



Technical Specification
MEF 34

Abstract Test Suite
For
Ethernet Access Services

February 2012

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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.

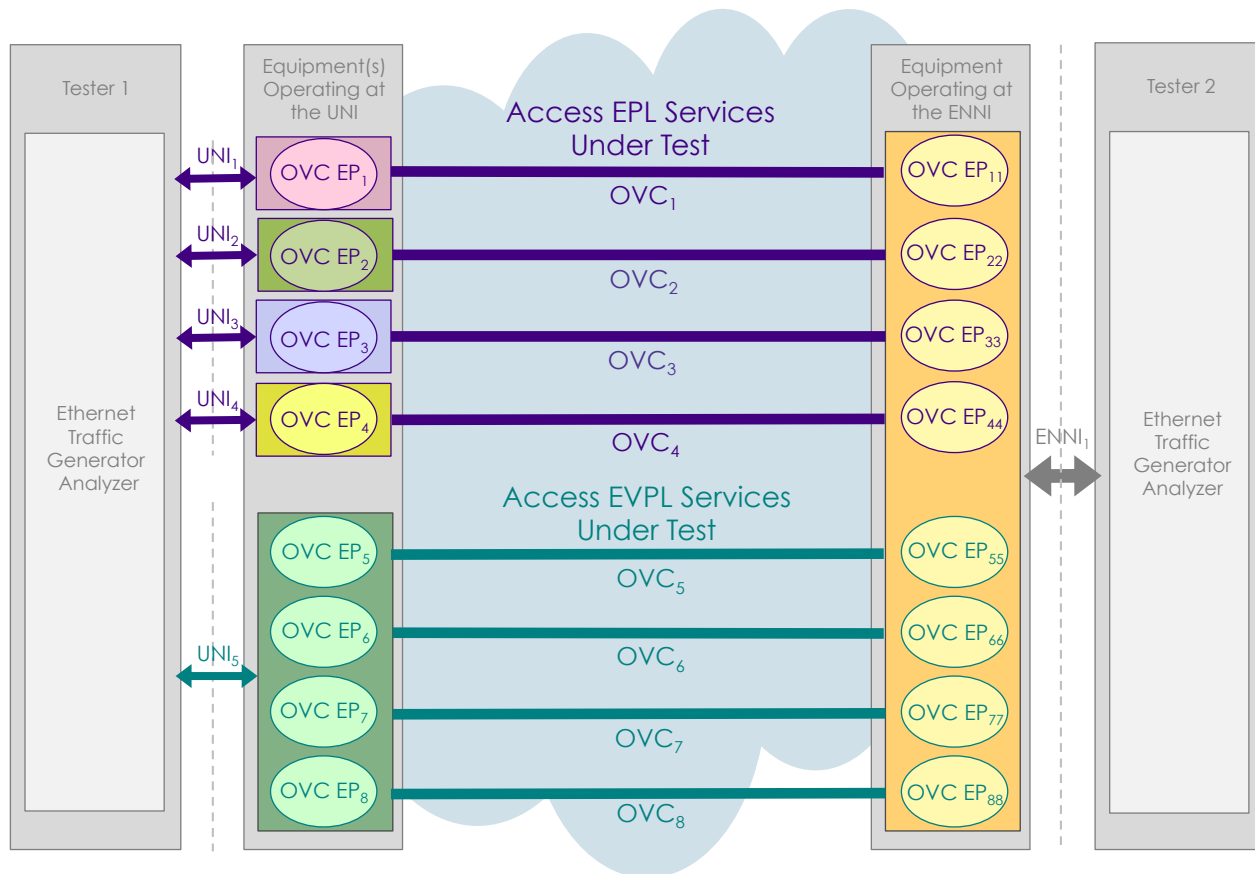


Figure 1: Ethernet Access Services overall test configuration

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 $1/10 \times \text{UNI speed}$ 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	<p>A unique punctuated alphanumeric string assigned to each test case. Example: AEPL1_R3_R12</p> <ul style="list-style-type: none"> • 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

Abstract Test Suite for Ethernet Access Services			
Test Name	CE-VLAN ID For Untagged and Priority Tagged Frames		
Test Definition ID	AEPL1_R1_R3_R13		
Test Type	Conformance		
Test Status	Mandatory		
Requirement Description	[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"		
Test Object	Verify that for an Access EPL service, the CE-VLAN ID for untagged and priority tagged Frames is a value from 1 – 4094		
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		Map at ENNI ₁
	CE-VLAN ID	OVC End Point	S-VLAN ID
	1,2*...4095	OVC EP ₁	111
			222
End Point Maps	Map at UNI ₂		
	CE-VLAN ID	OVC End Point	
	1,2*...4095	OVC EP ₂	
	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		Ingress Bandwidth Profile per OVC EP at ENNI ₁
	OVC End Point	Parameters	OVC End Point
	OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁	OVC EP ₁₁
	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	OVC EP ₂₂
Bandwidth Profile	Note 1: CIR ₁ = 3 Mbps, CIR ₂ = 30 Mbps Note 2: CBS ₁ ≥ 12176 Bytes, CBS ₂ ≥ 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		Note 1: CIR ₁₁ = 3 Mbps, CIR ₂₂ = 30 Mbps Note 2: CBS ₁₁ ≥ 12176 Bytes, and CBS ₂₂ ≥ 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	<ul style="list-style-type: none"> 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 		
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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
Map at UNI ₁																					
CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₁																				
Map at ENNI ₁																					
S-VLAN ID	OVC End Point																				
111	OVC EP ₁₁																				
222	OVC EP ₂₂																				
Map at UNI ₂																					
CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₂																				
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps, CIR₂ = 30 Mbps Note 2: CBS₁ ≥ 12176 Bytes, CBS₂ ≥ 12176 Bytes Note 3: EIR₁, EIR₂, EBS₁, EBS₂, CF₁ and CF₂ equal to 0 Note 4: CM₁ and CM₂ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps, CIR₂₂ = 30 Mbps Note 2: CBS₁₁ ≥ 12176 Bytes, and CBS₂₂ ≥ 12176 Bytes Note 3: EIR₁₁, EIR₂₂, EBS₁₁, EBS₂₂, CF₁₁ and CF₂₂ equal to 0 Note 4: CM₁₁ and CM₂₂ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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				
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OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂																				
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OVC End Point	Parameters																				
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																				
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers untagged, priority tagged and C-tagged Service Frames with CE-VLAN ID equal to 11 and frame size equal to the OVC₁ MTU size at UNI₁ configured in OVC₁ and with CE-VLAN ID equal to 11 and frame size equal to the OVC₂ MTU size at UNI₂ configured in OVC₂ Tester 2 verifies that all the untagged Service Frames offered at UNI₁ are delivered single-tagged with S-VLAN ID equal to 111 and that all the priority tagged and C-tagged Service Frames offered at UNI₁ are delivered double-tagged with S-VLAN ID equal to 111 at ENNI₁ configured in OVC₁. Tester 2 also verifies that all the untagged Service Frames offered at UNI₂ are delivered single-tagged with S-VLAN ID equal to 222 at ENNI₁ configured in OVC₂ and that all the priority tagged and C-tagged Service Frames offered at UNI₂ are delivered double-tagged with 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, 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 OVC₁ MTU size at ENNI₁ configured in OVC₁. 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 OVC₂ MTU size at ENNI₁ configured in OVC₂ Tester 1 verifies that all the ENNI Frames with S-VLAN ID 111 offered at ENNI₁ configured in OVC₁ are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI₁. Tester 1 also verifies that all the ENNI Frames with S-VLAN ID 222 offered at ENNI₁ configured in OVC₂ are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI₂ 																				
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 \leq to the MTU size of each External Interface where an OVC EP exists that is associated by the OVC
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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 $\{1, 2 \dots 4095\}$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>111</td><td>OVC EP₁₁</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
Map at UNI ₁																					
CE-VLAN ID	OVC End Point																				
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CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₂																				
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps, CIR₂ = 30 Mbps Note 2: CBS₁ \geq 12176 Bytes, CBS₂ \geq 12176 Bytes Note 3: EIR₁, EIR₂, EBS₁, EBS₂, CF₁ and CF₂ equal to 0 Note 4: CM₁ and CM₂ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps, CIR₂₂ = 30 Mbps Note 2: CBS₁₁ \geq 12176 Bytes, and CBS₂₂ \geq 12176 Bytes Note 3: EIR₁₁, EIR₂₂, EBS₁₁, EBS₂₂, CF₁₁ and CF₂₂ equal to 0 Note 4: CM₁₁ and CM₂₂ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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				
Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂																					
OVC End Point	Parameters																				
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																				
Ingress Bandwidth Profile per OVC EP at ENNI ₁																					
OVC End Point	Parameters																				
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																				
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers C-tagged Service Frames with CE-VLAN IDs equal to 1,2...4095 at UNI₁ configured in OVC₁ and at UNI₂ configured in OVC₂ Tester 2 verifies that the C-tagged Service Frames offered at UNI₁ are delivered double-tagged with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 111 at ENNI₁ configured in OVC₁. Tester 2 also verifies that the C-tagged Service Frames offered at UNI₂ are delivered double-tagged with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 222 at ENNI₁ configured in OVC₂ Tester 2 offers double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 111 at ENNI₁ configured in OVC₁ and double-tagged ENNI Frames with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 222 at the ENNI₁ configured in OVC₂ Tester 1 verifies that the ENNI Frames offered at ENNI₁ double-tagged with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 111 are received C-tagged at UNI₁ configured in OVC₁ with CE-VLAN IDs equal to 1,2...4095 and that the ENNI Frames offered at ENNI₁ double-tagged with CE-VLAN IDs equal to 1,2...4095 and S-VLAN ID equal to 222 are received C-tagged at UNI₂ configured in OVC₂ 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	<table><tr><th colspan="2">Map at UNI₁</th></tr><tr><th>CE-VLAN ID</th><th>OVC End Point</th></tr><tr><td>1,2*...4095</td><td>OVC EP₁</td></tr></table>		Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	<table><tr><th colspan="2">Map at ENNI₁</th></tr><tr><th>S-VLAN ID</th><th>OVC End Point</th></tr><tr><td>111</td><td>OVC EP₁₁</td></tr><tr><td>222</td><td>OVC EP₂₂</td></tr></table>		Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂		
	Map at UNI ₁																			
	CE-VLAN ID	OVC End Point																		
	1,2*...4095	OVC EP ₁																		
Map at ENNI ₁																				
S-VLAN ID	OVC End Point																			
111	OVC EP ₁₁																			
222	OVC EP ₂₂																			
	<table><tr><th colspan="2">Map at UNI₂</th></tr><tr><th>CE-VLAN ID</th><th>OVC End Point</th></tr><tr><td>1,2*...4095</td><td>OVC EP₂</td></tr></table>		Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂												
Map at UNI ₂																				
CE-VLAN ID	OVC End Point																			
1,2*...4095	OVC EP ₂																			
	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	<table><tr><th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr><tr><th>OVC End Point</th><th>Parameters</th></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>		Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	<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 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>		Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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
	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂																			
	OVC End Point	Parameters																		
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OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂																			
Ingress Bandwidth Profile per OVC EP at ENNI ₁																				
OVC End Point	Parameters																			
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	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	<ul style="list-style-type: none">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 UNI₁ configured in OVC₁ and at UNI₂ configured in OVC₂Tester 2 verifies that the C-tagged Service Frames offered at UNI₁ 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 ENNI₁ configured in OVC₁. Tester 2 also verifies that the C-tagged Service Frames offered at UNI₂ 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 ENNI₁ configured in OVC₂Tester 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 ENNI₁ configured in OVC₁. 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 ENNI₁ configured in OVC₂.Tester 1 verifies that the ENNI Frames offered at ENNI₁ 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 UNI₁ configured in OVC₁ 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 ENNI₁ 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 UNI₂ configured in OVC₂ 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
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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	<p>The diagram illustrates the test configuration. On the left, Tester 1 (Ethernet Traffic Generator/Analyzer) is connected to two UNIs, UNI₁ and UNI₂. These UNIs connect to two OVCs, OVC₁ and OVC₂, which are part of the 'Access EPL Services Under Test'. OVC₁ connects to ENNI₁ and OVC₂ connects to ENNI₂. Both ENNIs are connected to Tester 2 (Ethernet Traffic Generator/Analyzer).</p>																				
End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
Map at UNI ₁																					
CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₁																				
Map at ENNI ₁																					
S-VLAN ID	OVC End Point																				
111	OVC EP ₁₁																				
222	OVC EP ₂₂																				
Map at UNI ₂																					
CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₂																				
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps, CIR₂ = 30 Mbps Note 2: CBS₁ ≥ 12176 Bytes, CBS₂ ≥ 12176 Bytes Note 3: EIR₁, EIR₂, EBS₁, EBS₂, CF₁ and CF₂ equal to 0 Note 4: CM₁ and CM₂ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps, CIR₂₂ = 30 Mbps Note 2: CBS₁₁ ≥ 12176 Bytes, and CBS₂₂ ≥ 12176 Bytes Note 3: EIR₁₁, EIR₂₂, EBS₁₁, EBS₂₂, CF₁₁ and CF₂₂ equal to 0 Note 4: CM₁₁ and CM₂₂ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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				
Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂																					
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OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂																				
Ingress Bandwidth Profile per OVC EP at ENNI ₁																					
OVC End Point	Parameters																				
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																				
Test Procedure	<ul style="list-style-type: none"> 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 UNI₁ configured in OVC₁ and at UNI₂ configured in OVC₂ Tester 2 verifies that all the unicast, multicast and broadcast untagged Service Frames offered at UNI₁ 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 UNI₁ are delivered double-tagged with S-VLAN ID equal to 111 at ENNI₁ configured in OVC₁. Tester 2 also verifies that all the unicast, multicast and broadcast untagged Service Frames offered at UNI₁ are delivered single-tagged with S-VLAN ID equal to 222 at ENNI₁ configured in OVC₂ and that all the unicast, multicast and broadcast priority tagged and C-tagged Service Frames offered at UNI₂ are delivered double-tagged with S-VLAN ID equal to 222 at ENNI₁ configured in OVC₂ 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 ENNI₁ configured in OVC₁. 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 ENNI₁ configured in OVC₂ Tester 1 verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 111 offered at ENNI₁ configured in OVC₁ are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI₁. Tester 1 also verifies that all the unicast, multicast and broadcast ENNI Frames with S-VLAN ID 222 offered at ENNI₁ configured in OVC₂ are received untagged, priority tagged and C-tagged with CE-VLAN ID equal to 11 at UNI₂ 																				
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

Abstract Test Suite for Ethernet Access Services																					
Test Name	Service OAM Connectivity Check Messages (CCM) Handling																				
Test Definition ID	AEPL7_R3_R13_R14																				
Test Type	Conformance																				
Test Status	Mandatory																				
Requirement Description	<p>[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.</p> <p>[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</p> <p>[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																				
Test Object	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																				
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
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OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂																				
Test Procedure	<ul style="list-style-type: none"> 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 																				
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																					

Test Case 8.1: 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	AEPL8_R3_R13_R14																				
Test Type	Conformance																				
Test Status	Mandatory																				
Requirement Description	<p>[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.</p> <p>[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</p> <p>[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																				
Test Object	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																				
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																				
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End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps, CIR₂ = 30 Mbps Note 2: CBS₁ ≥ 12176 Bytes, CBS₂ ≥ 12176 Bytes Note 3: EIR₁, EIR₂, EBS₁, EBS₂, CF₁ and CF₂ equal to 0 Note 4: CM₁ and CM₂ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps, CIR₂₂ = 30 Mbps Note 2: CBS₁₁ ≥ 12176 Bytes, and CBS₂₂ ≥ 12176 Bytes Note 3: EIR₁₁, EIR₂₂, EBS₁₁, EBS₂₂, CF₁₁ and CF₂₂ equal to 0 Note 4: CM₁₁ and CM₂₂ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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				
Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂																					
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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																				
Ingress Bandwidth Profile per OVC EP at ENNI ₁																					
OVC End Point	Parameters																				
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																				
Test Procedure	<ul style="list-style-type: none"> 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 																				
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																					

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

Abstract Test Suite for Ethernet Access Services																					
Test Name	Service OAM Loopback Messages (LBM/LBR) Handling																				
Test Definition ID	AEPL9_R3_R13_R14																				
Test Type	Conformance																				
Test Status	Mandatory																				
Requirement Description	<p>[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.</p> <p>[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</p> <p>[R13] Each S-VLAN ID value associated with an instance of Access EPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																				
Test Object	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																				
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁	222	OVC EP ₂₂	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂
Map at UNI ₁																					
CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₁																				
Map at ENNI ₁																					
S-VLAN ID	OVC End Point																				
111	OVC EP ₁₁																				
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CE-VLAN ID	OVC End Point																				
1,2*...4095	OVC EP ₂																				
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁ and UNI₂</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps, CIR₂ = 30 Mbps Note 2: CBS₁ ≥ 12176 Bytes, CBS₂ ≥ 12176 Bytes Note 3: EIR₁, EIR₂, EBS₁, EBS₂, CF₁ and CF₂ equal to 0 Note 4: CM₁ and CM₂ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps, CIR₂₂ = 30 Mbps Note 2: CBS₁₁ ≥ 12176 Bytes, and CBS₂₂ ≥ 12176 Bytes Note 3: EIR₁₁, EIR₂₂, EBS₁₁, EBS₂₂, CF₁₁ and CF₂₂ equal to 0 Note 4: CM₁₁ and CM₂₂ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNIs & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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				
Ingress Bandwidth Profile per OVC EP at UNI ₁ and UNI ₂																					
OVC End Point	Parameters																				
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																				
Ingress Bandwidth Profile per OVC EP at ENNI ₁																					
OVC End Point	Parameters																				
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																				
Test Procedure	<ul style="list-style-type: none"> 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 																				
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																					

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1												
Test Definition ID	AEPL10_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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												
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>111</td><td>OVC EP₁₁</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁
Map at UNI ₁													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₁												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
111	OVC EP ₁₁												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₁</td><td>CIR₁ CBS₁ EIR₁ EBS₁ CF₁ CM₁</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₁₁</td><td>CIR₁₁ CBS₁₁ EIR₁₁ EBS₁₁ CF₁₁ CM₁₁</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁		OVC End Point	Parameters	OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁
Ingress Bandwidth Profile per OVC EP at UNI ₁													
OVC End Point	Parameters												
OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₁ 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_{CIR}) 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₁ , CBS ₁₁												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1												
Test Definition ID	AEPL11_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>111</td><td>OVC EP₁₁</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁
Map at UNI ₁													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₁												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
111	OVC EP ₁₁												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁</td><td>CIR₁ CBS₁ EIR₁ EBS₁ CF₁ CM₁</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁₁</td><td>CIR₁₁ CBS₁₁ EIR₁₁ EBS₁₁ CF₁₁ CM₁₁</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁		OVC End Point	Parameters	OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁
Ingress Bandwidth Profile per OVC EP at UNI ₁													
OVC End Point	Parameters												
OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁												
Test Procedure	<ul style="list-style-type: none"> 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 												
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 ₁ , CBS ₁₁												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2												
Test Definition ID	AEPL12_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 10 Mbps												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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 $\pm (F_{CIR})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂ 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 $\pm (F_{CIR})$ 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2												
Test Definition ID	AEPL13_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 10 Mbps												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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 $\pm (F_{CBS})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CBS})$ 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 												
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 ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3												
Test Definition ID	AEPL14_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 100 Mbps												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 $\pm (F_{CIR})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₃</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₃</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>333</td><td>OVC EP₃₃</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₃		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₃	Map at ENNI ₁		S-VLAN ID	OVC End Point	333	OVC EP ₃₃
Map at UNI ₃													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₃												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
333	OVC EP ₃₃												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₃</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₃</td><td>CIR₃ CBS₃ EIR₃ EBS₃ CF₃ CM₃</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₃₃</td><td>CIR₃₃ CBS₃₃ EIR₃₃ EBS₃₃ CF₃₃ CM₃₃</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₃		OVC End Point	Parameters	OVC EP ₃	CIR ₃ CBS ₃ EIR ₃ EBS ₃ CF ₃ CM ₃	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃
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OVC End Point	Parameters												
OVC EP ₃	CIR ₃ CBS ₃ EIR ₃ EBS ₃ CF ₃ CM ₃												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₃ , CBS ₃₃												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS \geq 12176 Bytes</p> <p>[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</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS \geq 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 \pm (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												
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End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₃</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₃</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>333</td><td>OVC EP₃₃</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₃		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₃	Map at ENNI ₁		S-VLAN ID	OVC End Point	333	OVC EP ₃₃
Map at UNI ₃													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₃												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
333	OVC EP ₃₃												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₃</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₃</td><td>CIR₃ CBS₃ EIR₃ EBS₃ CF₃ CM₃</td></tr> </tbody> </table> <p>Note 1: CIR₃ = 300 Mbps Note 2: CBS₃ \geq 12176 Bytes Note 3: EIR₃, EBS₃, and CF₃ equal to 0 Note 4: CM₃ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₃₃</td><td>CIR₃₃ CBS₃₃ EIR₃₃ EBS₃₃ CF₃₃ CM₃₃</td></tr> </tbody> </table> <p>Note 1: CIR₃₃ = 300 Mbps Note 2: CBS₃₃ \geq 12176 Bytes Note 3: EIR₃₃, EBS₃₃, and CF₃₃ equal to 0 Note 4: CM₃₃ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₃		OVC End Point	Parameters	OVC EP ₃	CIR ₃ CBS ₃ EIR ₃ EBS ₃ CF ₃ CM ₃	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃
Ingress Bandwidth Profile per OVC EP at UNI ₃													
OVC End Point	Parameters												
OVC EP ₃	CIR ₃ CBS ₃ EIR ₃ EBS ₃ CF ₃ CM ₃												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃												
Test Procedure	<ul style="list-style-type: none"> 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 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 \pm (F_{CBS}) 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 												
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	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4												
Test Definition ID	AEPL16_R4_R5_R9												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 1 Gbps												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 $\pm (F_{CIR})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₄</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₄</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>444</td><td>OVC EP₄₄</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₄		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₄	Map at ENNI ₁		S-VLAN ID	OVC End Point	444	OVC EP ₄₄
Map at UNI ₄													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₄												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
444	OVC EP ₄₄												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₄</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄</td><td>CIR₄ CBS₄ EIR₄ EBS₄ CF₄ CM₄</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄₄</td><td>CIR₄₄ CBS₄₄ EIR₄₄ EBS₄₄ CF₄₄ CM₄₄</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₄		OVC End Point	Parameters	OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄
Ingress Bandwidth Profile per OVC EP at UNI ₄													
OVC End Point	Parameters												
OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₄ , CBS ₄₄												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[R5] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 $\pm (F_{CBS})$ 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	<p>The diagram illustrates the test setup. On the left, 'Tester 1' contains an 'Ethernet Traffic Generator Analyzer'. A dashed line labeled 'UNI₄' connects it to a box labeled 'Equipment Operating at the UNI'. Inside this box is a yellow circle labeled 'OVC EP₄'. A solid purple arrow labeled 'OVC₄' points from 'OVC EP₄' to another yellow circle labeled 'OVC EP₄₄' inside a box labeled 'Equipment Operating at the ENNI'. A dashed line labeled 'ENNI₁' connects 'OVC EP₄₄' to 'Tester 2', which contains an 'Ethernet Traffic Generator Analyzer'. A large cloud labeled 'Access EPL Service Under Test' encompasses the OVC EPs and the connecting arrow.</p>												
End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₄</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₄</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>444</td><td>OVC EP₄₄</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₄		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₄	Map at ENNI ₁		S-VLAN ID	OVC End Point	444	OVC EP ₄₄
Map at UNI ₄													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₄												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₄</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄</td><td>CIR₄ CBS₄ EIR₄ EBS₄ CF₄ CM₄</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄₄</td><td>CIR₄₄ CBS₄₄ EIR₄₄ EBS₄₄ CF₄₄ CM₄₄</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₄		OVC End Point	Parameters	OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄
Ingress Bandwidth Profile per OVC EP at UNI ₄													
OVC End Point	Parameters												
OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄												
Test Procedure	<ul style="list-style-type: none"> 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 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 $\pm (F_{CBS})$ 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 												
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	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1												
Test Definition ID	AEPL18_R11_R12												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS \geq 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 $\pm (F_{CIR})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>111</td><td>OVC EP₁₁</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁
Map at UNI ₁													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₁												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
111	OVC EP ₁₁												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁</td><td>CIR₁, CBS₁, EIR₁, EBS₁, CF₁, CM₁</td></tr> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps Note 2: CBS₁ \geq 12176 Bytes Note 3: EIR₁, EBS₁, and CF₁ equal to 0 Note 4: CM₁ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁₁</td><td>CIR₁₁, CBS₁₁, EIR₁₁, EBS₁₁, CF₁₁, CM₁₁</td></tr> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps Note 2: CBS₁₁ \geq 12176 Bytes Note 3: EIR₁₁, EBS₁₁, and CF₁₁ equal to 0 Note 4: CM₁₁ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁		OVC End Point	Parameters	OVC EP ₁	CIR ₁ , CBS ₁ , EIR ₁ , EBS ₁ , CF ₁ , CM ₁	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₁₁	CIR ₁₁ , CBS ₁₁ , EIR ₁₁ , EBS ₁₁ , CF ₁₁ , CM ₁₁
Ingress Bandwidth Profile per OVC EP at UNI ₁													
OVC End Point	Parameters												
OVC EP ₁	CIR ₁ , CBS ₁ , EIR ₁ , EBS ₁ , CF ₁ , CM ₁												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₁₁	CIR ₁₁ , CBS ₁₁ , EIR ₁₁ , EBS ₁₁ , CF ₁₁ , CM ₁₁												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₁₁ to the ingress OVC End Point (OVC EP₁₁ at ENNI₁) 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 EP₁ at UNI₁). The amount of traffic delivered at the egress OVC EP₁ at UNI₁ must be within $\pm (F_{CIR})$ of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP₁ at UNI₁ 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 CIR₁₁ to the ingress OVC End Point (OVC EP₁₁ at ENNI₁) 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 EP₁ at UNI₁). The amount of traffic delivered at the egress OVC EP₁ at UNI₁ 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 ₁ , CBS ₁₁												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS \geq 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 \pm (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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₁</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₁</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>111</td><td>OVC EP₁₁</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₁		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₁	Map at ENNI ₁		S-VLAN ID	OVC End Point	111	OVC EP ₁₁
Map at UNI ₁													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₁												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
111	OVC EP ₁₁												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁</td><td>CIR₁ CBS₁ EIR₁ EBS₁ CF₁ CM₁</td></tr> </tbody> </table> <p>Note 1: CIR₁ = 3 Mbps Note 2: CBS₁ \geq 12176 Bytes Note 3: EIR₁, EBS₁, and CF₁ equal to 0 Note 4: CM₁ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₁₁</td><td>CIR₁₁ CBS₁₁ EIR₁₁ EBS₁₁ CF₁₁ CM₁₁</td></tr> </tbody> </table> <p>Note 1: CIR₁₁ = 3 Mbps Note 2: CBS₁₁ \geq 12176 Bytes Note 3: EIR₁₁, EBS₁₁, and CF₁₁ equal to 0 Note 4: CM₁₁ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₁		OVC End Point	Parameters	OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁
Ingress Bandwidth Profile per OVC EP at UNI ₁													
OVC End Point	Parameters												
OVC EP ₁	CIR ₁ CBS ₁ EIR ₁ EBS ₁ CF ₁ CM ₁												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₁₁	CIR ₁₁ CBS ₁₁ EIR ₁₁ EBS ₁₁ CF ₁₁ CM ₁₁												
Test Procedure	<ul style="list-style-type: none"> 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 EP₁₁ at ENNI₁) 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 EP₁ at UNI₁). The amount of traffic delivered at the egress OVC EP₁ at UNI₁ must be within \pm (F_{CBS}) of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP₁ at UNI₁ 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 EP₁₁ at ENNI₁) 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 EP₁ at UNI₁). The amount of traffic delivered at the egress OVC EP₁ at UNI₁ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2												
Test Definition ID	AEPL20_R11_R12												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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_{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												
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Map at UNI ₂													
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OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂₂ to the ingress OVC End Point (OVC EP₂₂ at ENNI₁) 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 EP₂ at UNI₂). The amount of traffic delivered at the egress OVC EP₂ at UNI₂ 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 EP₂ at UNI₂ 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 CIR₂₂ to the ingress OVC End Point (OVC EP₂₂ at ENNI₁) 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 EP₂ at UNI₂). The amount of traffic delivered at the egress OVC EP₂ at UNI₂ 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 ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS \geq 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 $\pm (F_{CBS})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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OVC End Point	Parameters												
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Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 EP₂₂ at ENNI₁) during a time interval T Tester 1 measures the number of single-tagged Service Frames with CE-VLAN ID 12 and OVC-VLAN CoS equal to 2 delivered at the egress OVC End Point (OVC EP₂ at UNI₂). The amount of traffic delivered at the egress OVC EP₂ at UNI₂ must be within $\pm (F_{CBS})$ of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP₂ at UNI₂ 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 EP₂₂ at ENNI₁) 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 EP₂ at UNI₂). The amount of traffic delivered at the egress OVC EP₂ at UNI₂ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3												
Test Definition ID	AEPL22_R11_R12												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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_{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												
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Map at UNI ₃													
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S-VLAN ID	OVC End Point												
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OVC End Point	Parameters												
OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₃₃ to the ingress OVC End Point (OVC EP₃₃ at ENNI₁) 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 EP₃ at UNI₃). The amount of traffic delivered at the egress OVC EP₃ at UNI₃ 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 EP₃ at UNI₃ 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 CIR₃₃ to the ingress OVC End Point (OVC EP₃₃ at ENNI₁) 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 EP₃ at UNI₃). The amount of traffic delivered at the egress OVC EP₃ at UNI₃ 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 ₃ , CBS ₃₃												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS \geq 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 $\pm (F_{CBS})$ 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												
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End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₃</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₃</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>333</td><td>OVC EP₃₃</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₃		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₃	Map at ENNI ₁		S-VLAN ID	OVC End Point	333	OVC EP ₃₃
Map at UNI ₃													
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OVC End Point	Parameters												
OVC EP ₃	CIR ₃ CBS ₃ EIR ₃ EBS ₃ CF ₃ CM ₃												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₃₃	CIR ₃₃ CBS ₃₃ EIR ₃₃ EBS ₃₃ CF ₃₃ CM ₃₃												
Test Procedure	<ul style="list-style-type: none"> 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 EP₃₃ at ENNI₁) 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 EP₃ at UNI₃). The amount of traffic delivered at the egress OVC EP₃ at UNI₃ must be within $\pm (F_{CBS})$ of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP₃ at UNI₃ 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 EP₃₃ at ENNI₁) 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 EP₃ at UNI₃). The amount of traffic delivered at the egress OVC EP₃ at UNI₃ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

Test Case 24.1: 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	AEPL24_R11_R12												
Test Type	Conformance												
Test Status	Mandatory if the ENNI Speed is greater than 1Gbps												
Requirement Description	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS \geq 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 $\pm (F_{CIR})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₄</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₄</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>444</td><td>OVC EP₄₄</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₄		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₄	Map at ENNI ₁		S-VLAN ID	OVC End Point	444	OVC EP ₄₄
Map at UNI ₄													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₄												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
444	OVC EP ₄₄												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₄</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄</td><td>CIR₄ CBS₄ EIR₄ EBS₄ CF₄ CM₄</td></tr> </tbody> </table> <p>Note 1: CIR₄ = 3 Gbps Note 2: CBS₄ \geq 12176 Bytes Note 3: EIR₄, EBS₄, and CF₄ equal to 0 Note 4: CM₄ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄₄</td><td>CIR₄₄ CBS₄₄ EIR₄₄ EBS₄₄ CF₄₄ CM₄₄</td></tr> </tbody> </table> <p>Note 1: CIR₄₄ = 3 Gbps Note 2: CBS₄₄ \geq 12176 Bytes Note 3: EIR₄₄, EBS₄₄, and CF₄₄ equal to 0 Note 4: CM₄₄ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₄		OVC End Point	Parameters	OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄
Ingress Bandwidth Profile per OVC EP at UNI ₄													
OVC End Point	Parameters												
OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
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 ₄ , CBS ₄₄												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R12] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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 $\pm (F_{CBS})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₄</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₄</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>444</td><td>OVC EP₄₄</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₄		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₄	Map at ENNI ₁		S-VLAN ID	OVC End Point	444	OVC EP ₄₄
Map at UNI ₄													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₄												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
444	OVC EP ₄₄												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₄</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄</td><td>CIR₄ CBS₄ EIR₄ EBS₄ CF₄ CM₄</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₄₄</td><td>CIR₄₄ CBS₄₄ EIR₄₄ EBS₄₄ CF₄₄ CM₄₄</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₄		OVC End Point	Parameters	OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄
Ingress Bandwidth Profile per OVC EP at UNI ₄													
OVC End Point	Parameters												
OVC EP ₄	CIR ₄ CBS ₄ EIR ₄ EBS ₄ CF ₄ CM ₄												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₄₄	CIR ₄₄ CBS ₄₄ EIR ₄₄ EBS ₄₄ CF ₄₄ CM ₄₄												
Test Procedure	<ul style="list-style-type: none"> 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 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 $\pm (F_{CBS})$ 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 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 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 												
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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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	<p>[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</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>15*</td><td>OVC EP₅</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>555</td><td>OVC EP₅₅</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15*	OVC EP ₅	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅	666	OVC EP ₆₆
Map at UNI ₅																	
CE-VLAN ID	OVC End Point																
15*	OVC EP ₅																
16	OVC EP ₆																
Map at ENNI ₁																	
S-VLAN ID	OVC End Point																
555	OVC EP ₅₅																
666	OVC EP ₆₆																
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅ = 3 Mbps and CIR₆ = 30 Mbps Note 2: CBS₅ \geq 12176 Bytes and CBS₆ \geq 12176 Bytes Note 3: EIR₅, EIR₆, EBS₅, EBS₆, CF₅ and CF₆ equal to 0 Note 4: CM₅ and CM₆ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅₅ = 3 Mbps and CIR₆₆ = 30 Mbps Note 2: CBS₅₅ \geq 12176 Bytes and CBS₆₆ \geq 12176 Bytes Note 3: EIR₅₅, EIR₆₆, EBS₅₅, EBS₆₆, CF₅₅ and CF₆₆ equal to 0 Note 4: CM₅₅ and CM₆₆ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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
Ingress Bandwidth Profile per OVC EP at UNI ₅																	
OVC End Point	Parameters																
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																
Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers untagged and priority tagged Service Frames at UNI₅ configured in OVC₅ Tester 2 verifies that the untagged Service Frames offered at UNI₅ are delivered single-tagged with S-VLAN ID equal to 555 and that the priority tagged Service Frames offered at UNI₅ are delivered double-tagged with CE-VLAN ID equal to 0 and S-VLAN ID equal to 555 at ENNI₁ configured in OVC₅ 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 ENNI₁ configured in OVC₅ Tester 1 verifies that the single-tagged ENNI Frames with S-VLAN ID equal to 555 are delivered untagged at UNI₅ configured in OVC₅ 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 UNI₅ configured in OVC₅ 																
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

Abstract Test Suite for Ethernet Access Services																	
Test Name	Maximum Number of CE-VLAN IDs per OVC																
Test Definition ID	AEVPL2_R22_R24_R25_R35																
Test Type	Conformance																
Test Status	Mandatory if the maximum number of OVCs per UNI is greater than 1																
Requirement Description	<p>[R24] Maximum number of CE-VLAN IDs per OVC for an Access EVPL Service: The end point Map SHOULD support a value > 1</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	Verify that for an Access EVPL service, the Maximum number of CE-VLAN IDs mapped to the OVC EP is > 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																	
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OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> 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 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 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 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 X₆...Y₆ at UNI₅ 																
Units	Number of valid frames received at the external interfaces																
Variables	Maximum number of CE-VLAN IDs per OVC, UNI and ENNI interface speeds and bandwidth profile parameters CBS ₅ , CBS ₆ , CBS ₅₅ , CBS ₆₆																
Results	Pass or fail																
Remarks	The maximum number of CE-VLAN IDs per OVC is to be provided by the Operator																

Test Case 3.2: OVC Maximum Transmission Unit Size

Abstract Test Suite for Ethernet Access Services																	
Test Name	OVC Maximum Transmission Unit Size																
Test Definition ID	AEVPL3_R22_R23_R25_R28_R35																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	<p>[R28] For an Access EVPL service, the OVC Maximum Transmission Unit Size MUST be integer number of bytes ≥ 1526</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	Verify that for an Access EVPL 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 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																
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End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>15</td><td>OVC EP₅</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>555</td><td>OVC EP₅₅</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15	OVC EP ₅	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅	666	OVC EP ₆₆
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OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆																
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 and frame size equal to the OVC₅ MTU size at UNI₅ configured in OVC₅ and C-tagged Service Frames with CE-VLAN ID equal to 16 and frame size equal to the OVC₆ MTU size at UNI₅ configured in OVC₆ Tester 2 verifies that all the 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 C-tagged Service Frames with CE-VLAN ID equal to 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 double-tagged ENNI frames with CE-VLAN ID equal to 15, S-VLAN ID equal to 555 and frame size equal to the OVC₅ MTU size at ENNI₁ configured in OVC₅. 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 OVC₆ MTU size 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 15 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 16 at UNI₅ 																
Units	Number of valid frames received at the external interfaces																
Variables	OVC MTU size, UNI and ENNI interface speeds and bandwidth profile parameters CBS ₅ , CBS ₆ , CBS ₅₅ , CBS ₆₆																
Results	Pass or fail																
Remarks	<p>Note 1: OVC MTU size of the services under test are to be provided by the Operator</p> <p>Note 2: The OVC MTU size MUST be \leq to the MTU size of each External Interface where an OVC EP exists that is associated by the OVC</p>																

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	<p>[R29] For an Access EVPL service, CE-VLAN ID Preservation MUST be Yes</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
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																
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Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers C-tagged Service Frames with CE-VLAN ID equal to 15 at UNI₅ configured in OVC₅ and C-tagged Service Frames with CE-VLAN ID equal to 16 at UNI₅ configured in OVC₆ Tester 2 verifies that the C-tagged Service Frames offered with CE-VLAN ID equal to 15 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 the C-tagged Service Frames offered with CE-VLAN ID equal to 16 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 double-tagged ENNI Frames with CE-VLAN ID equal to 15 and S-VLAN ID equal to 555 at ENNI₁ configured in OVC₅ and double-tagged ENNI Frames with CE-VLAN IDs equal to 16 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 S-VLAN ID equal to 555 are received C-tagged at UNI₅ configured in OVC₅ with CE-VLAN ID equal to 15 and that the ENNI Frames offered at ENNI₁ double-tagged with CE-VLAN ID equal to 16 and S-VLAN ID equal to 666 are received C-tagged at UNI₅ configured in OVC₆ 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

Abstract Test Suite for Ethernet Access Services																	
Test Name	CE-VLAN CoS ID Value Preservation																
Test Definition ID	AEVPL5_R22_R23_R25_R30_R35																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	<p>[R30] For an Access EVPL service, CE-VLAN CoS ID Value Preservation MUST be Yes</p> <p>[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</p> <p>[R22] The Maximum number of OVCS per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	Verify that for an Access EVPL 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. 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																
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OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> 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 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 																
Units	CE-VLAN ID, CE-VLAN CoS 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-VLAN ID formats are specified in IEEE 802.1ad sections 9.5, 9.6 and 9.7																

Test Case 6.2: 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	AEVPL6_R22_R23_R25_R32_R35																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	<p>[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.</p> <p>[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</p> <p>[R22] The Maximum number of OVCS per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	Verify that for an Access EVPL service, the unicast, multicast and broadcast frames are delivered unconditionally																
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>15</td><td>OVC EP₅</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>555</td><td>OVC EP₅₅</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15	OVC EP ₅	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅	666	OVC EP ₆₆
Map at UNI ₅																	
CE-VLAN ID	OVC End Point																
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Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> 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 equal to 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 																
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	The multicast frames MUST NOT be Layer 2 Control Protocol frames																

11.2 Test Cases for Access EVPL – Service OAM Frames Handling

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

Abstract Test Suite for Ethernet Access Services																	
Test Name	Service OAM Connectivity Check Messages (CCM) Handling																
Test Definition ID	AEVPL7_R22_R23_R25_R35_R36																
Test Type	Conformance																
Test Status	Mandatory if untagged and priority tagged frames are supported																
Requirement Description	<p>[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</p> <p>[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</p> <p>[R22] The Maximum number of OVCS per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	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																
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																	
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OVC End Point	Parameters																
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OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆																
Test Procedure	<ul style="list-style-type: none"> 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 																
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 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	<p>[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</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC: The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>15*</td><td>OVC EP₅</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>555</td><td>OVC EP₅₅</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15*	OVC EP ₅	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅	666	OVC EP ₆₆
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅ = 3 Mbps and CIR₆ = 30 Mbps Note 2: CBS₅ \geq 12176 Bytes and CBS₆ \geq 12176 Bytes Note 3: EIR₅, EIR₆, EBS₅, EBS₆, CF₅ and CF₆ equal to 0 Note 4: CM₅ and CM₆ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅₅ = 3 Mbps and CIR₆₆ = 30 Mbps Note 2: CBS₅₅ \geq 12176 Bytes and CBS₆₆ \geq 12176 Bytes Note 3: EIR₅₅, EIR₆₆, EBS₅₅, EBS₆₆, CF₅₅ and CF₆₆ equal to 0 Note 4: CM₅₅ and CM₆₆ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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
Ingress Bandwidth Profile per OVC EP at UNI ₅																	
OVC End Point	Parameters																
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																
Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers untagged LTM and LTR messages at MEG level 5 and 6 at UNI₅ configured in OVC₅ Tester 2 verifies that all the untagged LTM and LTR 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 LTM and LTR 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 LTM and LTR 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 																
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

Abstract Test Suite for Ethernet Access Services																	
Test Name	Service OAM Loopback Messages (LBM/LBR) Handling																
Test Definition ID	AEVPL9_R22_R23_R25_R35_R36																
Test Type	Conformance																
Test Status	Mandatory if untagged and priority tagged frames are supported																
Requirement Description	<p>[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</p> <p>[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</p> <p>[R22] The Maximum number of OVCs per UNI MUST be ≥ 1</p> <p>[R23] Maximum number of CE-VLAN IDs per OVC; The end point Map MUST support a value = 1</p> <p>[R35] Each S-VLAN ID value associated with an instance of Access EVPL Service MUST map to a distinct End Point, of Type = "OVC"</p>																
Test Object	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																
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>15*</td><td>OVC EP₅</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>555</td><td>OVC EP₅₅</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15*	OVC EP ₅	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅	666	OVC EP ₆₆
Map at UNI ₅																	
CE-VLAN ID	OVC End Point																
15*	OVC EP ₅																
16	OVC EP ₆																
Map at ENNI ₁																	
S-VLAN ID	OVC End Point																
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅ = 3 Mbps and CIR₆ = 30 Mbps Note 2: CBS₅ \geq 12176 Bytes and CBS₆ \geq 12176 Bytes Note 3: EIR₅, EIR₆, EBS₅, EBS₆, CF₅ and CF₆ equal to 0 Note 4: CM₅ and CM₆ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <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> </tbody> </table> <p>Note 1: CIR₅₅ = 3 Mbps and CIR₆₆ = 30 Mbps Note 2: CBS₅₅ \geq 12176 Bytes and CBS₆₆ \geq 12176 Bytes Note 3: EIR₅₅, EIR₆₆, EBS₅₅, EBS₆₆, CF₅₅ and CF₆₆ equal to 0 Note 4: CM₅₅ and CM₆₆ in color-aware mode</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	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	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	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
Ingress Bandwidth Profile per OVC EP at UNI ₅																	
OVC End Point	Parameters																
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																
Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
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																
Test Procedure	<ul style="list-style-type: none"> Tester 1 offers untagged LBM and LBR messages at MEG level 5 and 6 at UNI₅ configured in OVC₅ Tester 2 verifies that all the untagged LBM and LBR 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 LBM and LBR 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 LBM and LBR 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 																
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																	

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 1												
Test Definition ID	AEVPL10_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS \geq 12176 Bytes</p> <p>[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</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS \geq 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 $\pm (F_{CIR})$ 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. 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												
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Map at UNI ₅													
CE-VLAN ID	OVC End Point												
15	OVC EP ₅												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
555	OVC EP ₅₅												
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Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₅	CIR ₅ CBS ₅ EIR ₅ EBS ₅ CF ₅ CM ₅												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₅₅	CIR ₅₅ CBS ₅₅ EIR ₅₅ EBS ₅₅ CF ₅₅ CM ₅₅												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₅ , CBS ₅₅												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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

Abstract Test Suite for Ethernet Access Services																	
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 1																
Test Definition ID	AEVPL11_R26_R27_R31																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS \geq 12176 Bytes</p> <p>[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</p>																
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS \geq 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 $\pm (F_{CBS})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>15</td><td>OVC EP₅</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>555</td><td>OVC EP₅₅</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	15	OVC EP ₅	Map at ENNI ₁		S-VLAN ID	OVC End Point	555	OVC EP ₅₅				
Map at UNI ₅																	
CE-VLAN ID	OVC End Point																
15	OVC EP ₅																
Map at ENNI ₁																	
S-VLAN ID	OVC End Point																
555	OVC EP ₅₅																
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> </thead> <tbody> <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 \geq 12176 Bytes Note 3: EIR₅, EBS₅, and CF₅ equal to 0 Note 4: CM₅ in color-blind mode </td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <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 \geq 12176 Bytes Note 3: EIR₅₅, EBS₅₅, and CF₅₅ equal to 0 Note 4: CM₅₅ in color-aware mode </td></tr> </tbody> </table>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₅	CIR ₅ CBS ₅ EIR ₅ EBS ₅ CF ₅ CM ₅	Note 1: CIR ₅ = 3 Mbps Note 2: CBS ₅ \geq 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	Parameters	OVC EP ₅₅	CIR ₅₅ CBS ₅₅ EIR ₅₅ EBS ₅₅ CF ₅₅ CM ₅₅	Note 1: CIR ₅₅ = 3 Mbps Note 2: CBS ₅₅ \geq 12176 Bytes Note 3: EIR ₅₅ , EBS ₅₅ , and CF ₅₅ equal to 0 Note 4: CM ₅₅ in color-aware mode	
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OVC End Point	Parameters																
OVC EP ₅	CIR ₅ CBS ₅ EIR ₅ EBS ₅ CF ₅ CM ₅																
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Ingress Bandwidth Profile per OVC EP at ENNI ₁																	
OVC End Point	Parameters																
OVC EP ₅₅	CIR ₅₅ CBS ₅₅ EIR ₅₅ EBS ₅₅ CF ₅₅ CM ₅₅																
Note 1: CIR ₅₅ = 3 Mbps Note 2: CBS ₅₅ \geq 12176 Bytes Note 3: EIR ₅₅ , EBS ₅₅ , and CF ₅₅ equal to 0 Note 4: CM ₅₅ in color-aware mode																	
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CBS})$ 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 																
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 ₅ , CBS ₅₅																
Results	Pass or fail																
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>																

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 2												
Test Definition ID	AEVPL12_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 10 Mbps												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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												
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												
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OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆ 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_{CIR}) 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CBS Enforcement Range 2												
Test Definition ID	AEVPL13_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 10 Mbps												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 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 $\pm (F_{CBS})$ 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												
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Map at UNI ₅													
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S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
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OVC End Point	Parameters												
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OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CBS})$ 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 												
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 ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 3												
Test Definition ID	AEVPL14_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 100 Mbps												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS \geq 12176 Bytes</p> <p>[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</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS \geq 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 $\pm (F_{CIR})$ 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. 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												
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Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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OVC End Point	Parameters												
OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₇ , CBS ₇₇												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

Test Case 15.2: 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	AEVPL15_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 100 Mbps												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 $\pm (F_{CBS})$ 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												
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OVC End Point	Parameters												
OVC EP ₇	CIR ₇ CBS ₇ EIR ₇ EBS ₇ CF ₇ CM ₇												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CBS})$ 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 												
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 ₇ , CBS ₇₇												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the UNI – CIR Enforcement Range 4												
Test Definition ID	AEVPL16_R26_R27_R31												
Test Type	Conformance												
Test Status	Mandatory if the UNI Speed is greater than 1 Gbps												
Requirement Description	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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_{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. 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												
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Map at UNI ₅													
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OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈												
Test Procedure	<ul style="list-style-type: none"> 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 												
Units	Number of valid frames received at the ENNI												
Variables	UNI and ENNI interface speeds, Service Frame length λ , time interval T , tolerance F_{CIR} and bandwidth profile parameters CBS ₈ , CBS ₈₈												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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</p> <p>[R27] Ingress Bandwidth Profile per OVC EP at a UNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind” and it MUST have CBS ≥ 12176 Bytes</p> <p>[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</p>												
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 $\pm (F_{CBS})$ 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												
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Map at UNI ₅													
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OVC End Point	Parameters												
OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈												
Test Procedure	<ul style="list-style-type: none"> 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 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 $\pm (F_{CBS})$ 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 												
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	<p>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</p> <p>Note 2: Green Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 1												
Test Definition ID	AEVPL18_R33_R34												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Mbps, CBS \geq 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 $\pm (F_{CIR})$ 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	<p>The schematic shows a central cloud labeled 'Access EVPL Service Under Test' containing 'OVC₅'. To the left, 'Tester 1' (Ethernet Traffic Generator Analyzer) connects to 'Equipment Operating at the UNI' via 'UNI₅', which contains 'OVC EP₅'. To the right, 'Equipment Operating at the ENNI' contains 'OVC EP₅₅', which connects to 'Tester 2' (Ethernet Traffic Generator Analyzer) via 'ENNI₁'.</p>												
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Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
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OVC End Point	Parameters												
OVC EP ₅₅	CIR ₅₅ CBS ₅₅ EIR ₅₅ EBS ₅₅ CF ₅₅ CM ₅₅												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
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 ₅ , CBS ₅₅												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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												
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OVC End Point	Parameters												
OVC EP ₅₅	CIR ₅₅ CBS ₅₅ EIR ₅₅ EBS ₅₅ CF ₅₅ CM ₅₅												
Test Procedure	<ul style="list-style-type: none"> 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 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_{CBS}) 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 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 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 												
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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 2												
Test Definition ID	AEVPL20_R33_R34												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
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OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆ to the ingress OVC End Point (OVC EP₆₆ at ENNI₁) 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 EP₆ at UNI₅). The amount of traffic delivered at the egress OVC EP₆ 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 EP₆ at UNI₅ 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 CIR₆₆ to the ingress OVC End Point (OVC EP₆₆ at ENNI₁) 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 EP₆ at UNI₅). The amount of traffic delivered at the egress OVC EP₆ at UNI₅ 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 ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 30 Mbps, CBS \geq 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												
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Map at UNI ₅													
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OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
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OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 EP₆₆ at ENNI₁) 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 EP₆ at UNI₅). The amount of traffic delivered at the egress OVC EP₆ 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 EP₆ at UNI₅ 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 EP₆₆ at ENNI₁) 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 EP₆ at UNI₅). The amount of traffic delivered at the egress OVC EP₆ at UNI₅ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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

Abstract Test Suite for Ethernet Access Services													
Test Name	Ingress Bandwidth Profile per OVC EP at the ENNI – CIR Enforcement Range 3												
Test Definition ID	AEVPL22_R33_R34												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS \geq 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 $\pm (F_{CIR})$ 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												
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Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₇</td><td>CIR₇ CBS₇ EIR₇ EBS₇ CF₇ CM₇</td></tr> </tbody> </table> <p>Note 1: CIR₇ = 300 Mbps Note 2: CBS₇ \geq 12176 Bytes Note 3: EIR₇, EBS₇, and CF₇ equal to 0 Note 4: CM₇ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₇₇</td><td>CIR₇₇ CBS₇₇ EIR₇₇ EBS₇₇ CF₇₇ CM₇₇</td></tr> </tbody> </table> <p>Note 1: CIR₇₇ = 300 Mbps Note 2: CBS₇₇ \geq 12176 Bytes Note 3: EIR₇₇, EBS₇₇, and CF₇₇ equal to 0 Note 4: CM₇₇ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₇	CIR ₇ CBS ₇ EIR ₇ EBS ₇ CF ₇ CM ₇	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇
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OVC End Point	Parameters												
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Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CIR})$ 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 												
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 ₇ , CBS ₇₇												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

Test Case 23.2: 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	AEVPL23_R33_R34												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 300 Mbps, CBS \geq 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 $\pm (F_{CBS})$ 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												
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End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>17</td><td>OVC EP₇</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>777</td><td>OVC EP₇₇</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	17	OVC EP ₇	Map at ENNI ₁		S-VLAN ID	OVC End Point	777	OVC EP ₇₇
Map at UNI ₅													
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S-VLAN ID	OVC End Point												
777	OVC EP ₇₇												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₇</td><td>CIR₇ CBS₇ EIR₇ EBS₇ CF₇ CM₇</td></tr> </tbody> </table> <p>Note 1: CIR₇ = 300 Mbps Note 2: CBS₇ \geq 12176 Bytes Note 3: EIR₇, EBS₇, and CF₇ equal to 0 Note 4: CM₇ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₇₇</td><td>CIR₇₇ CBS₇₇ EIR₇₇ EBS₇₇ CF₇₇ CM₇₇</td></tr> </tbody> </table> <p>Note 1: CIR₇₇ = 300 Mbps Note 2: CBS₇₇ \geq 12176 Bytes Note 3: EIR₇₇, EBS₇₇, and CF₇₇ equal to 0 Note 4: CM₇₇ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₇	CIR ₇ CBS ₇ EIR ₇ EBS ₇ CF ₇ CM ₇	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₇	CIR ₇ CBS ₇ EIR ₇ EBS ₇ CF ₇ CM ₇												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₇₇	CIR ₇₇ CBS ₇₇ EIR ₇₇ EBS ₇₇ CF ₇₇ CM ₇₇												
Test Procedure	<ul style="list-style-type: none"> 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 $\pm (F_{CBS})$ 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 												
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 ₇ , CBS ₇₇												
Results	Pass or fail												
Remarks	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

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	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS ≥ 12176 Bytes</p>												
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>18</td><td>OVC EP₈</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>888</td><td>OVC EP₈₈</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	18	OVC EP ₈	Map at ENNI ₁		S-VLAN ID	OVC End Point	888	OVC EP ₈₈
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₈</td><td>CIR₈ CBS₈ EIR₈ EBS₈ CF₈ CM₈</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₈₈</td><td>CIR₈₈ CBS₈₈ EIR₈₈ EBS₈₈ CF₈₈ CM₈₈</td></tr> </tbody> </table> <p>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</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₈	CIR ₈ CBS ₈ EIR ₈ EBS ₈ CF ₈ CM ₈	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₈	CIR ₈ CBS ₈ EIR ₈ EBS ₈ CF ₈ CM ₈												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₈₈ to the ingress OVC End Point (OVC EP₈₈ at ENNI₁) 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 EP₈ at UNI₅). The amount of traffic delivered at the egress OVC EP₈ 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 EP₈ at UNI₅ 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 CIR₈₈ to the ingress OVC End Point (OVC EP₈₈ at ENNI₁) 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 EP₈ at UNI₅). The amount of traffic delivered at the egress OVC EP₈ at UNI₅ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p> <p>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</p>												

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	<p>[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}</p> <p>[R34] Ingress Bandwidth Profile per OVC EP at a ENNI is required and MUST allow configuration to support CIR of:</p> <ul style="list-style-type: none"> 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) <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware” and it MUST have CBS \geq 12176 Bytes</p>												
Test Object	Verify that when an Ingress Bandwidth Profile per OVC EP with CIR = 3 Gbps, CBS \geq 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 $\pm (F_{CBS})$ 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>18</td><td>OVC EP₈</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>888</td><td>OVC EP₈₈</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	18	OVC EP ₈	Map at ENNI ₁		S-VLAN ID	OVC End Point	888	OVC EP ₈₈
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
18	OVC EP ₈												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
888	OVC EP ₈₈												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₈</td><td>CIR₈ CBS₈ EIR₈ EBS₈ CF₈ CM₈</td></tr> </tbody> </table> <p>Note 1: CIR₈ = 3 Gbps Note 2: CBS₈ \geq 12176 Bytes Note 3: EIR₈, EBS₈, and CF₈ equal to 0 Note 4: CM₈ in color-blind mode</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₈₈</td><td>CIR₈₈ CBS₈₈ EIR₈₈ EBS₈₈ CF₈₈ CM₈₈</td></tr> </tbody> </table> <p>Note 1: CIR₈₈ = 3 Gbps Note 2: CBS₈₈ \geq 12176 Bytes Note 3: EIR₈₈, EBS₈₈, and CF₈₈ equal to 0 Note 4: CM₈₈ in color-aware mode</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₈	CIR ₈ CBS ₈ EIR ₈ EBS ₈ CF ₈ CM ₈	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₈	CIR ₈ CBS ₈ EIR ₈ EBS ₈ CF ₈ CM ₈												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₈₈	CIR ₈₈ CBS ₈₈ EIR ₈₈ EBS ₈₈ CF ₈₈ CM ₈₈												
Test Procedure	<ul style="list-style-type: none"> 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 EP₈₈ at ENNI₁) 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 EP₈ at UNI₅). The amount of traffic delivered at the egress OVC EP₈ at UNI₅ must be within $\pm (F_{CBS})$ of the calculated amount of traffic accepted as Green over the time interval T that should be delivered to the egress OVC EP₈ at UNI₅ 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 EP₈₈ at ENNI₁) 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 EP₈ at UNI₅). The amount of traffic delivered at the egress OVC EP₈ at UNI₅ 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	<p>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</p> <p>Note 2: Green and Yellow Color Identifiers defined in MEF 23.1 Table 4</p>												

12 Test Cases for Access EPL – Performance Attributes

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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Frame Delay Performance From UNI To ENNI												
Test Definition ID	AEPL26_R4_R15_R16												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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												
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂, using a test traffic profile which exercises both configured CIR₂ and CBS₂ at the same time, to the ingress OVC End Point (OVC EP₂ at UNI₂) 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 EP₂₂ at ENNI₁) One-Way Frame Delay Performance from UNI₂ to ENNI₁ 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 (UNI₂ to ENNI₁) The One-Way Frame Delay Performance from UNI₂ to ENNI₁ 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, Service Frame length λ , time interval T and bandwidth profile parameters CBS ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks													

Test Case 27.1: 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	AEPL27_R11_R15_R16												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_T and Time Interval T parameters for FD 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 Frame Delay Performance from ENNI₁ to UNI₂ 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 (ENNI₁ to UNI₂) The One-Way Frame Delay Performance from ENNI₁ to UNI₂ 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 ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4												

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	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂, using a test traffic profile which exercises both configured CIR₂ and CBS₂ at the same time, to the ingress OVC End Point (OVC EP₂ at UNI₂) 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 EP₂₂ at ENNI₁) One-Way Mean Frame Delay Performance from UNI₂ to ENNI₁ is then calculated for a time interval T, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces (UNI₂ to ENNI₁) The One-Way Mean Frame Delay Performance from UNI₂ to ENNI₁ 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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Mean Frame Delay Performance From ENNI To UNI												
Test Definition ID	AEPL29_R11_R15_R17												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 												
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 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	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_n, 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂, using a test traffic profile which exercises both configured CIR₂ and CBS₂ at the same time, to the ingress OVC End Point (OVC EP₂ at UNI₂) 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 UNI₂ to ENNI₁ 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 EP₂ at UNI₂) was exactly Δt The One-Way Inter-Frame Delay Variation Performance from UNI₂ to ENNI₁ 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	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_x, 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 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 ENNI₁ to UNI₂ 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 EP₂₂ at ENNI₁) was exactly Δt The One-Way Inter-Frame Delay Variation Performance from ENNI₁ to UNI₂ 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	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂, using a test traffic profile which exercises both configured CIR₂ and CBS₂ at the same time, to the ingress OVC End Point (OVC EP₂ at UNI₂) 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 EP₂₂ at ENNI₁) One-Way Frame Delay Range Performance from UNI₂ to ENNI₁ 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 (UNI₂ to ENNI₁) The One-Way Frame Delay Range Performance from UNI₂ to ENNI₁ 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	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 Frame Delay Range Performance from ENNI₁ to UNI₂ 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 (ENNI₁ to UNI₂) The One-Way Frame Delay Range Performance from ENNI₁ to UNI₂ 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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Frame Loss Ratio Performance From UNI To ENNI												
Test Definition ID	AEPL34_R4_R15_R20												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[R4] The CoS Identifier for Service Frames MUST be the OVC End Point; that OVC MUST have a single CoS Name</p> <p>[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</p> <p>[R20] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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 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. 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	<p>The diagram illustrates the test setup. On the left, 'Tester 1' contains an 'Ethernet Traffic Generator Analyzer'. A dashed line labeled 'UNI₂' connects it to a box labeled 'Equipment Operating at the UNI', which contains 'OVC EP₂'. A solid line labeled 'OVC₂' connects 'OVC EP₂' to a box labeled 'Equipment Operating at the ENNI', which contains 'OVC EP₂₂'. A dashed line labeled 'ENNI₁' connects 'OVC EP₂₂' to 'Tester 2', which contains an 'Ethernet Traffic Generator Analyzer'. The central area between the equipment boxes is labeled 'Access EPL Service Under Test'.</p>												
End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₂, using a test traffic profile which exercises both configured CIR₂ and CBS₂ at the same time, to the ingress OVC End Point (OVC EP₂ at UNI₂) 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 EP₂₂ at ENNI₁) are counted One-Way Frame Loss Ratio Performance from UNI₂ to ENNI₁ 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 EP₂₂ at ENNI₁) divided by the total number of ingress Qualified Frames that should have been delivered The One-Way Frame Loss Ratio Performance from UNI₂ to ENNI₁ 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 ₂ , CBS ₂₂												
Results	Pass or fail												
Remarks													

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	<p>[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}</p> <p>[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</p> <p>[R20] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>1,2*...4095</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>222</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	1,2*...4095	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	222	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
1,2*...4095	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
222	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 the number of ingress Qualified Frames and the number of unique (not duplicated) corresponding frames successfully delivered at the egress OVC End Point (OVC EP₂ at UNI₂) are counted One-Way Frame Loss Ratio Performance from ENNI₁ to UNI₂ 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 EP₂ at UNI₂) divided by the total number of ingress Qualified Frames that should have been delivered The One-Way Frame Loss Ratio Performance from ENNI₁ to UNI₂ 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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Frame Delay Performance From UNI To ENNI												
Test Definition ID	AEVPL26_R26_R37_R38												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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												
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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
16	OVC EP ₆												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆, using a test traffic profile which exercises both configured CIR₆ and CBS₆ at the same time, to the ingress OVC End Point (OVC EP₆ at UNI₅) 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 EP₆₆ at ENNI₁) One-Way Frame Delay Performance from UNI₅ to ENNI₁ 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 (UNI₅ to ENNI₁) The One-Way Frame Delay Performance from UNI₅ to ENNI₁ 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, Service Frame length λ , time interval T and bandwidth profile parameters CBS ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks													

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	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_T 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> </thead> <tbody> <tr> <td>CE-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> </thead> <tbody> <tr> <td>S-VLAN ID</td><td>OVC End Point</td></tr> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
16	OVC EP ₆												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> </thead> <tbody> <tr> <td>OVC End Point</td><td>Parameters</td></tr> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆, using a test traffic profile which exercises both configured CIR₆₆ and CBS₆₆ at the same time, to the ingress OVC End Point (OVC EP₆₆ 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 EP₆ at UNI₅) One-Way Frame Delay Performance from ENNI₁ to UNI₅ 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 (ENNI₁ to UNI₅) The One-Way Frame Delay Performance from ENNI₁ to UNI₅ 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	<p>[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</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
16	OVC EP ₆												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆, using a test traffic profile which exercises both configured CIR₆ and CBS₆ at the same time, to the ingress OVC End Point (OVC EP₆ at UNI₅) 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 EP₆₆ at ENNI₁) One-Way Mean Frame Delay Performance from UNI₅ to ENNI₁ is then calculated for a time interval T, as the arithmetic mean of Frame Delays for all frames successfully delivered between the External Interfaces (UNI₅ to ENNI₁) The One-Way Mean Frame Delay Performance from UNI₅ to ENNI₁ 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	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
16	OVC EP ₆												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆, using a test traffic profile which exercises both configured CIR₆₆ and CBS₆₆ at the same time, to the ingress OVC End Point (OVC EP₆₆ 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 EP₆ at UNI₅) One-Way Mean Frame Delay Performance from ENNI₁ to UNI₅ 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 UNI₅) The One-Way Mean Frame Delay Performance from ENNI₁ to UNI₅ 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	<p>[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</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_{α}, 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆, using a test traffic profile which exercises both configured CIR₆ and CBS₆ at the same time, to the ingress OVC End Point (OVC EP₆ at UNI₅) 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 UNI₅ to ENNI₁ 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 EP₆ at UNI₅) was exactly Δt The One-Way Inter-Frame Delay Variation Performance from UNI₅ to ENNI₁ 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	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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_x, 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆, using a test traffic profile which exercises both configured CIR₆₆ and CBS₆₆ at the same time, to the ingress OVC End Point (OVC EP₆₆ at ENNI₁) 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 ENNI₁ to UNI₅ 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 EP₆₆ at ENNI₁) was exactly Δt The One-Way Inter-Frame Delay Variation Performance from ENNI₁ to UNI₅ 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	<p>[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</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
16	OVC EP ₆												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆, using a test traffic profile which exercises both configured CIR₆ and CBS₆ at the same time, to the ingress OVC End Point (OVC EP₆ at UNI₅) 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 EP₆₆ at ENNI₁) One-Way Frame Delay Range Performance from UNI₅ to ENNI₁ 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 (UNI₅ to ENNI₁) The One-Way Frame Delay Range Performance from UNI₅ to ENNI₁ 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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Frame Delay Range Performance From ENNI To UNI												
Test Definition ID	AEVPL33_R33_R37_R41												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[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</p> <p>[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:</p> <ul style="list-style-type: none"> 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 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 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	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₆₆												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆, using a test traffic profile which exercises both configured CIR₆₆ and CBS₆₆ at the same time, to the ingress OVC End Point (OVC EP₆₆ 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 EP₆ at UNI₅) One-Way Frame Delay Range Performance from ENNI₁ to UNI₅ 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 (ENNI₁ to UNI₅) The One-Way Frame Delay Range Performance from ENNI₁ to UNI₅ 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 ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4												

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	<p>[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</p> <p>[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</p> <p>[R42] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>The diagram illustrates the test setup. On the left, 'Tester 1' contains an 'Ethernet Traffic Generator Analyzer'. A dashed line labeled 'UNI₅' connects it to a box labeled 'Equipment Operating at the UNI', which contains a green circle labeled 'OVC EP₆'. A solid blue arrow labeled 'OVC₆' connects 'OVC EP₆' to a yellow circle labeled 'OVC EP₆₆' inside a box labeled 'Equipment Operating at the ENNI'. This equipment is connected to 'Tester 2', which contains an 'Ethernet Traffic Generator Analyzer'. A dashed line labeled 'ENNI₁' connects the ENNI equipment to Tester 2. The central area between the two equipment boxes is labeled 'Access EVPL Service Under Test'.</p>												
End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₅</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₆</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₆₆</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₅		CE-VLAN ID	OVC End Point	16	OVC EP ₆	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₆₆
Map at UNI ₅													
CE-VLAN ID	OVC End Point												
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Map at ENNI ₁													
S-VLAN ID	OVC End Point												
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Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₅</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆</td><td>CIR₆ CBS₆ EIR₆ EBS₆ CF₆ CM₆</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₆₆</td><td>CIR₆₆ CBS₆₆ EIR₆₆ EBS₆₆ CF₆₆ CM₆₆</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₅		OVC End Point	Parameters	OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆
Ingress Bandwidth Profile per OVC EP at UNI ₅													
OVC End Point	Parameters												
OVC EP ₆	CIR ₆ CBS ₆ EIR ₆ EBS ₆ CF ₆ CM ₆												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₆₆	CIR ₆₆ CBS ₆₆ EIR ₆₆ EBS ₆₆ CF ₆₆ CM ₆₆												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆, using a test traffic profile which exercises both configured CIR₆ and CBS₆ at the same time, to the ingress OVC End Point (OVC EP₆ at UNI₅) 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 EP₆₆ at ENNI₁) are counted One-Way Frame Loss Ratio Performance from UNI₅ to ENNI₁ 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 EP₆₆ at ENNI₁) divided by the total number of ingress Qualified Frames that should have been delivered The One-Way Frame Loss Ratio Performance from UNI₅ to ENNI₁ 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

Abstract Test Suite for Ethernet Access Services													
Test Name	One-Way Frame Loss Ratio Performance From ENNI To UNI												
Test Definition ID	AEVPL35_R33_R37_R42												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	<p>[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}</p> <p>[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</p> <p>[R42] In an SLS that includes FLR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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 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	<p>The diagram illustrates the test setup. On the right, Tester 2 (Ethernet Traffic Generator Analyzer) sends traffic through ENNI₁ to OVC EP₆₆ at the ENNI. This traffic then travels through the Access EVPL Service Under Test, which is represented by a cloud containing OVC₆. The traffic exits the cloud at OVC EP₆ at the UNI and is received by Tester 1 (Ethernet Traffic Generator Analyzer). Equipment operating at the UNI and ENNI is also indicated.</p>												
End Point Maps	<table border="1"> <thead> <tr> <th colspan="2">Map at UNI₂</th></tr> <tr> <th>CE-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>16</td><td>OVC EP₂</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Map at ENNI₁</th></tr> <tr> <th>S-VLAN ID</th><th>OVC End Point</th></tr> </thead> <tbody> <tr> <td>666</td><td>OVC EP₂₂</td></tr> </tbody> </table> <p>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</p>	Map at UNI ₂		CE-VLAN ID	OVC End Point	16	OVC EP ₂	Map at ENNI ₁		S-VLAN ID	OVC End Point	666	OVC EP ₂₂
Map at UNI ₂													
CE-VLAN ID	OVC End Point												
16	OVC EP ₂												
Map at ENNI ₁													
S-VLAN ID	OVC End Point												
666	OVC EP ₂₂												
Bandwidth Profile	<table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at UNI₂</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂</td><td>CIR₂ CBS₂ EIR₂ EBS₂ CF₂ CM₂</td></tr> </tbody> </table> <p>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</p> <table border="1"> <thead> <tr> <th colspan="2">Ingress Bandwidth Profile per OVC EP at ENNI₁</th></tr> <tr> <th>OVC End Point</th><th>Parameters</th></tr> </thead> <tbody> <tr> <td>OVC EP₂₂</td><td>CIR₂₂ CBS₂₂ EIR₂₂ EBS₂₂ CF₂₂ CM₂₂</td></tr> </tbody> </table> <p>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</p> <p>Note: Use of other bandwidth profile parameter values at the UNI & ENNI is permitted provided that the configuration conforms to MEF 26.1</p>	Ingress Bandwidth Profile per OVC EP at UNI ₂		OVC End Point	Parameters	OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂	Ingress Bandwidth Profile per OVC EP at ENNI ₁		OVC End Point	Parameters	OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂
Ingress Bandwidth Profile per OVC EP at UNI ₂													
OVC End Point	Parameters												
OVC EP ₂	CIR ₂ CBS ₂ EIR ₂ EBS ₂ CF ₂ CM ₂												
Ingress Bandwidth Profile per OVC EP at ENNI ₁													
OVC End Point	Parameters												
OVC EP ₂₂	CIR ₂₂ CBS ₂₂ EIR ₂₂ EBS ₂₂ CF ₂₂ CM ₂₂												
Test Procedure	<ul style="list-style-type: none"> 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 CIR₆₆, using a test traffic profile which exercises both configured CIR₆₆ and CBS₆₆ at the same time, to the ingress OVC End Point (OVC EP₆₆ at ENNI₁) 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 EP₆₆ at ENNI₁) are counted One-Way Frame Loss Ratio Performance from ENNI₁ to UNI₅ 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 EP₆ at UNI₅) divided by the total number of ingress Qualified Frames that should have been delivered The One-Way Frame Loss Ratio Performance from ENNI₁ to UNI₅ 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 ₆ , CBS ₆₆												
Results	Pass or fail												
Remarks	Green Color Identifiers defined in MEF 23.1 Table 4												

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	<p>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:</p> <ul style="list-style-type: none"> • 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 <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind”</p> <p>It MUST have CBS ≥ 12176 Bytes</p> <p>It MUST NOT be combined with any other type of ingress bandwidth profile</p> <p>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].</p> <p><small>* 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.</small></p>	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	<p>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:</p> <ul style="list-style-type: none"> 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 <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware”</p> <p>It MUST have CBS ≥ 12176 bytes</p> <p>It MUST NOT be combined with any other type of ingress bandwidth profile</p> <ul style="list-style-type: none"> 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. <p>**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%.</p>	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	<p>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.</p> <p>And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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 defined in MEF 23.1 Table 5 	Carrier Ethernet Class of Service Phase 2 [R21], [R23]
20	<p>In an SLS that is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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:</p> <ul style="list-style-type: none"> • 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 <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color blind”</p> <p>It MUST have CBS ≥ 12176 Bytes</p> <p>It MUST NOT be combined with any other type of ingress bandwidth profile</p> <p>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].</p> <p>* 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.</p>	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	<p>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:</p> <ul style="list-style-type: none"> • 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 <p>It MUST allow configuration of EIR = 0, EBS = 0, CF = 0, Color Mode = “color aware”</p> <p>It MUST have CBS ≥ 12176 Bytes</p> <p>It MUST NOT be combined with any other type of ingress bandwidth profile</p> <ul style="list-style-type: none"> • 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. <p>** 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%.</p>	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	<p>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.</p> <p>And, in an SLS that includes FD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes MFD Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes IFDV Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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	<p>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.</p> <p>And, in an SLS that includes FDR Performance and is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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 defined in MEF 23.1 Table 5 	Carrier Ethernet Class of Service Phase 2 [R21], [R23]
42	<p>In an SLS that is based on a MEF CoS Label, the SLS MUST be specified per:</p> <ul style="list-style-type: none"> 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]