



MEF 9

Abstract Test Suite for Ethernet Services at the UNI

October 2004

MEF 9

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Table of Contents

1.	Abstract.....	1
2.	Terminology	1
3.	Scope	3
4.	Compliance Levels	3
5.	Introduction.....	3
6.	Test Bed Schematics.....	6
7.	Template for Abstract Test Cases for Ethernet Services at the UNI.....	7
8.	Abstract Test Cases for Ethernet Services at the UNI for EVC Service Attributes	8
9.	Abstract Test Cases for Ethernet Services at the UNI for UNI Service Attributes	22
10.	Security	36
11.	References.....	36

List of Figures

Figure 1: Relationship between different MEF Services Group documents and the Ethernet Services Test Definition document.....	4
Figure 2: Relationship between Ethernet Services Documents and Abstract Test Cases for Ethernet Services at the UNI.....	5
Figure 3: Test Bed for Ethernet Services at the UNI.....	6

List of Tables

Table 1: Sample CE-VLAN ID/EVC Map.....	6
Table 2: Test Definition Template	7

List of Test Cases

Test Case 1: Non-looping Frame Delivery.....	9
Test Case 2: EVC Leakage.....	10
Test Case 3: Single Copy Broadcast, Multicast, Unknown DA Frame Delivery in MP-to-MP EVC.....	11
Test Case 4: Service Frame with Invalid FCS Discard	12
Test Case 5: Service Frame Discard Layer 2 Control Protocols	13
Test Case 6: Service Frame Conditional Delivery	14
Test Case 7: Service Frame Transparency Tag Exception 1	15
Test Case 8: Service Frame Transparency Tag Exception 2	16
Test Case 9: Service Frame Transparency Tag Exception 3	17
Test Case 10: CE-VLAN ID Preservation Untagged	18
Test Case 11: CE-VLAN ID Preservation Tagged.....	19
Test Case 12: CE-VLAN CoS Preservation.....	20
Test Case 13: EVC Layer 2 Control Protocol Processing	21
Test Case 14: UNI Physical Layer	23

Test Case 15: UNI MAC Layer.....	24
Test Case 16: UNI Service Multiplexing of Point-to-Point EVCs	25
Test Case 17: UNI Service Multiplexing of Multipoint-to-Multipoint EVCs	26
Test Case 18: UNI Service Multiplexing of Point-to-Point and Multipoint-to-Multipoint EVCs.....	27
Test Case 19: CE-VLAN ID for Untagged and Priority Tagged Service Frames	28
Test Case 20: CE-VLAN ID/EVC Map Service Frame Discard.....	29
Test Case 21: UNI EVC Support.....	30
Test Case 22: Maximum Number of EVCs.....	31
Test Case 23: UNI Bundling	32
Test Case 24: UNI All to One Bundling and CE-VLAN ID Preservation	33
Test Case 25: UNI Layer 2 Control Protocols Processing Discard	34
Test Case 26: UNI Layer 2 Control Protocols Processing Peer	35

1. Abstract

This document defines the requirements and corresponding test procedures that determine the readiness of a Metro Ethernet Network (MEN) to deliver various Ethernet Services, such as Ethernet Line (E-Line) and Ethernet LAN (E-LAN) services. Requirements are derived from Metro Ethernet Forum Technical Committee documents.

2. Terminology

All to One Bundling	A UNI attribute in which all CE-VLAN IDs are associated with a single EVC.
Bandwidth Profile	A characterization of ingress Service Frame arrival times and lengths at the UNI.
Broadcast Service Frame	A Service Frame that has the broadcast destination MAC address.
Bundling	A UNI attribute in which more than one CE-VLAN ID can be associated with an EVC.
CE	Customer Edge
CE-VLAN CoS	Customer Edge VLAN CoS
CE-VLAN ID	Customer Edge VLAN ID
CE-VLAN ID Preservation	An EVC attribute in which the CE-VLAN ID of an egress Service Frame is identical in value to the CE-VLAN ID of the corresponding ingress service Frame.
CE-VLAN ID/EVC Map	An association of CE-VLAN IDs with EVCs at a UNI.
CE-VLAN Tag	Customer Edge VLAN Tag
Class of Service	A set of Service Frames that have a commitment from the Service Provider to receive a particular level of performance.
Class of Service Identifier	Information derivable from a Service Frame that allows the identification of the Class of Service instance that applies to the Service Frame.
Customer Edge	Equipment on the Subscriber side of the UNI.
Customer Edge VLAN CoS	The user priority bits in the IEEE 802.1Q Tag in a tagged Service Frame.
Customer Edge VLAN ID	The identifier derivable from the content of a Service Frame that allows the Service Frame to be associated with an EVC at the UNI.
Customer Edge VLAN	The IEEE 802.1Q Tag in a tagged Service Frame.

Tag	
E-LAN Service	Ethernet LAN Service
E-Line Service	Ethernet Line Service
Egress Service Frame	A Service Frame sent from the Service Provider network to the CE.
Ethernet LAN Service	An Ethernet Service Type distinguished by its use of a Multipoint-to-Multipoint EVC.
Ethernet Line Service	An Ethernet Service Type distinguished by its use of a Point-to-Point EVC.
Ethernet Virtual Connection	An association of two or more UNIs that limits the exchange of Service Frames to UNIs in the Ethernet Virtual Connection.
EVC	Ethernet Virtual Connection
Frame	Short for Ethernet frame.
Ingress Service Frame	A Service Frame sent from the CE into the Service Provider network.
Layer 2 Control protocol Service Frame	A Service Frame that is used for Layer 2 control, e.g., Spanning Tree Protocol.
Layer 2 Control protocol Tunneling	The process by which a Layer 2 Control protocol Service Frame is passed through the Service Provider network without being processed and delivered unchanged to the proper UNI(s).
MEN	Metro Ethernet Network
Multicast Service Frame	A Service Frame that has a multicast destination MAC address.
Multipoint-to-Multipoint EVC	An EVC with two or more UNIs.
Point-to-Point EVC	An EVC with exactly 2 UNIs.
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 Multiplexing	A UNI service attribute in which the UNI can be in more than one EVC instance.
Service Provider	The organization providing Ethernet Service(s).
Subscriber	The organization purchasing and/or using Ethernet Services.
Tester	Special equipment used to generate and monitor traffic for verification purposes.
UNI	User Network Interface
Unicast Service Frame	A Service Frame that has a unicast destination MAC address.
User Network Interface	The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber.

3. Scope

This document defines the requirements and corresponding test procedures to qualify the ability of a Metro Ethernet Network to deliver Ethernet services, such as E-Line and E-LAN services as defined by the Metro Ethernet Forum. The tests are defined from the point of view of the Subscriber's equipment that is used to access the services. The goals of the test definitions are three-fold. The first goal is to provide test procedures to Subscribers to help them ensure the successful integration of Ethernet Services into their overall networking infrastructures. The second goal is to provide test definitions to host, switch, and router vendors allowing them to ensure that their products can be used in the MEN to allow Subscribers to successfully access Ethernet Services. The third is to provide Service Providers with a suite of tests that allow them to determine the ability of the MEN to offer Ethernet Services conformant to Metro Ethernet Forum specifications. The requirements defined in this document are based on Sections 6 and 7 of the Metro Ethernet Forum Technical Committee Ethernet Services Model document [Ethernet Services Model]. Requirements and test procedures to qualify the readiness of a MEN to support further services, attributes and parameters will be defined in subsequent revisions.

This document does not define methods for the measurement or monitoring of Service Level Specifications (SLSs) but it does define test procedures which determine the readiness of a MEN to deliver various SLSs defined in [Traffic and Performance Parameters for Ethernet Service Level Specifications]. This document does not re-define metrics or testing methods described in any of the standards documents already defined by such groups as the Benchmarking Methodology Working Group (BMWG) of the Internet Engineering Task Force (IETF), however metrics used in this document conform to BMWG definitions.

Implementation specifications are outside the scope of this document. This document may be updated in the future to reflect new work in the MEF Technical Committee.

4. 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.

5. Introduction

This document describes the requirements and corresponding test procedures to be used when testing the ability of a MEN to deliver Ethernet Services, such as the E-Line and E-LAN services defined in [Ethernet Services Definitions]. Vendors can refer to such requirements and test procedures in the development and commercial cycles of their products, carriers can use them to ensure that the devices or systems they select to deploy in the MEN will result in the successful delivery of Ethernet Services and subscribers can attach to the MEN knowing that the Ethernet services they access satisfy criteria based on accepted requirements and test procedures.

The definition of the requirements a MEN must satisfy to deliver Metro Ethernet services is tightly based on the MEF 1 [Ethernet Services Model], [Ethernet Services Definitions] and [Traffic and Performance Definitions] documents of the Technical Committee of the Metro Ethernet Forum. The Ethernet Service Definition Framework was created by the Metro Ethernet Forum (MEF) to provide the service attributes and parameters to create an Ethernet service. The relationship between this document and the three MEF services documents is illustrated in Figure 1.

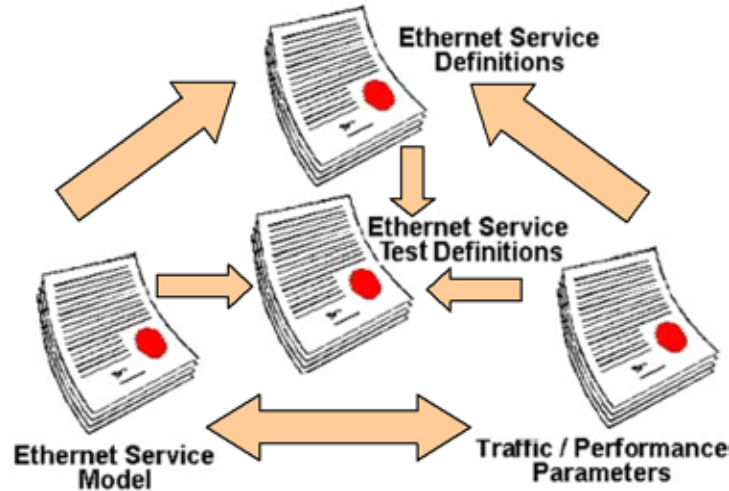


Figure 1: Relationship between different MEF Services Group documents and the Ethernet Services Test Definition document

Various types of criteria can be used to establish the requirements a MEN must satisfy to deliver Ethernet services. This document refers to four such criteria: functional, conformance, interoperability and performance.

Functional criteria: A MEN will have to satisfy certain well-defined functional criteria some of which can be safely taken for granted and others which it will be useful to test. An example of the latter would be that a MEN correctly filters BPDU's (Bridge Protocol Data Units) when configured to do so.

Conformance criteria: A MEN must also satisfy certain well-defined conformance criteria. An example of this is that a MEN **MUST NOT** deliver frames to the UNI on which they originated

Interoperability criteria: A further criteria is interoperability. An example of this would be the ability of a device to participate in the same arbitrary MEN as the device of another vendor or, more generally, of other vendors.

Performance criteria: A MEN must also meet certain performance criteria. An example of this would be the ability to successfully forward a certain percentile of frames without loss.

Functional, conformance and interoperability test results are typically reported as 'pass' or 'fail', whereas performance test results are generally reported in terms of frame counts, such as numbers of lost frames; times, such as mean time to recover in milliseconds; and rates, such as frames per second forwarding rates.

The fundamental service constructs defined in [Ethernet Services Model] are Ethernet Service Types. These have two types of Service Attributes associated with them, those associated with the UNI, and those associated with the EVC. The [Ethernet Services Model] also defines the type of parameter values associated with each of the Service Attributes.

In order to successfully deliver Ethernet Services, a MEN must first satisfy certain general requirements that the delivery of any Ethernet Service Type, Ethernet Service Attributes and Ethernet Service Attribute Parameters associated with an Ethernet Service implies. These general requirements are derived from the MEF [Ethernet Services Model]. A MEN delivering specific Ethernet Services must satisfy additional requirements based on [Ethernet Services Definitions] and [Traffic and Performance Definitions].

A conceptual schematic of the relationship between the MEF Technical Committee Ethernet Services documents and the derived MEN requirements and correspondingly defined test definitions is represented in Figure 2.

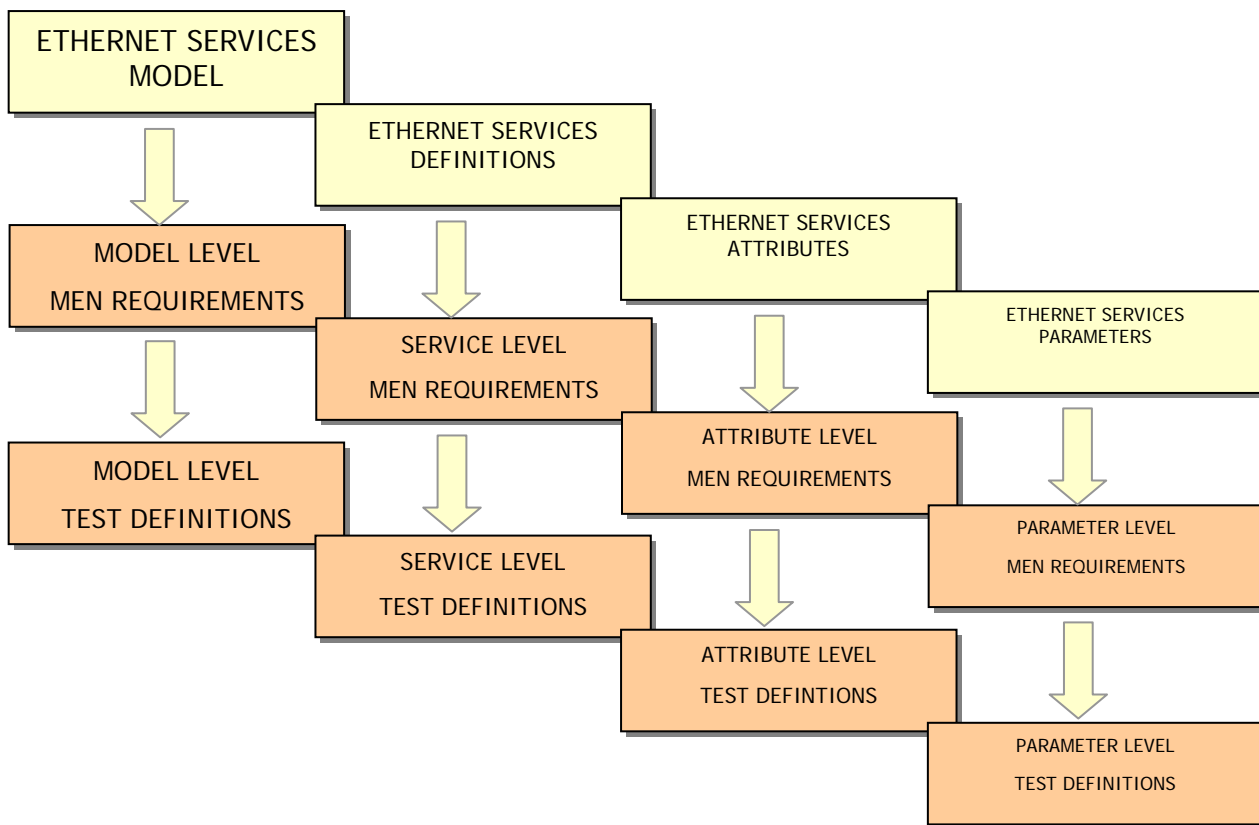


Figure 2: Relationship between Ethernet Services Documents and Abstract Test Cases for Ethernet Services at the UNI

6. Test Bed Schematics

Although some tests may require very specific test bed configurations, most tests defined in this document are to be executed by attaching the Ethernet interface or interfaces of a Tester to the Ethernet interface or interfaces at the UNI. Since the UNI is the physical demarcation point which delimits the responsibilities of the Subscriber and the Service Provider, the Tester attached in this way sees a MEN from the point of view of the Subscriber's equipment and can test a MEN's ability to offer Ethernet Services to the Subscriber. We schematically represent the attachment of the Tester to the MEN in Figure 3.

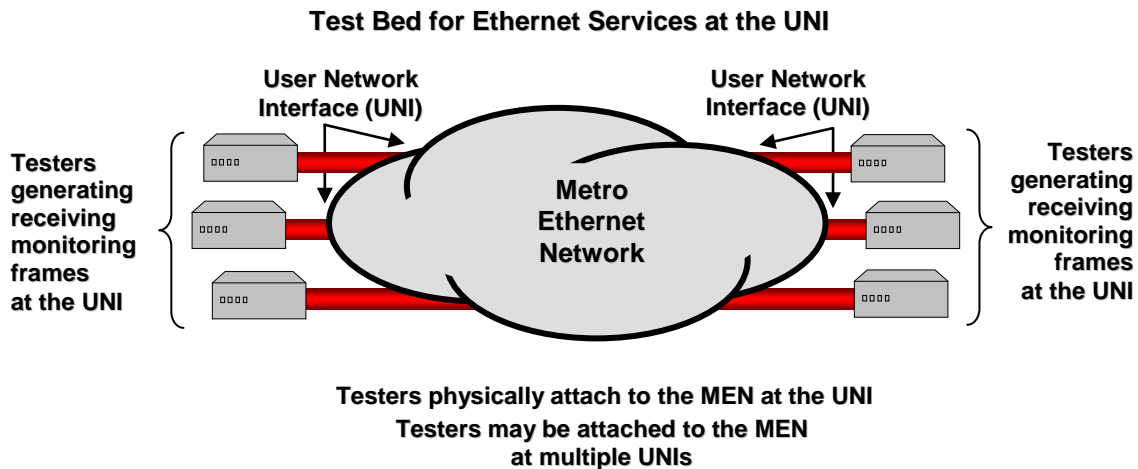


Figure 3: Test Bed for Ethernet Services at the UNI

The Test Bed Configuration for each Test Case describes the number of EVCs associating the number of UNIs in the Test Case and the number of CE-VLAN IDs mapped to the EVCs. Testers are attached to all UNIs in the configured EVCs in all Test Cases. CE-VLAN ID/EVC Maps are given for each Test Case. In this document CE-VLAN ID/EVC Map for the ingress and egress UNIs are suggested for each Test Case:

INGRESS UNI 'A'		EGRESS UNI 'B'	
CE-VLAN ID	EVC	CE-VLAN ID	EVC
10	EVC ₁	10	EVC ₁
Use of other CE-VLAN IDs may be permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.			

Table 1: Sample CE-VLAN ID/EVC Map

7. Template for Abstract Test Cases for Ethernet Services at the UNI

We adopt the following template for the definition of Abstract Test Cases for Ethernet Services at the UNI:

Table 2: Test Definition Template

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Name derived from reference document												
Test Definition ID	A punctuated alphanumeric string assigned to each defined requirement and test procedure couple using the following convention: ‘one to three letter abbreviated source document name’. ‘section number’ - ‘paragraph number in the section from which requirement is derived’. This number always figures as the last number of an ID. Ethernet Services Model=M; Ethernet Services Definitions=S; Traffic and Performance Parameters for SLSs=T. Example: M.6.1-4												
Reference Document Source	Reference document and section (and paragraph when useful for clarity)												
Test Type	Functional, Conformance, Interoperability or Performance												
Test Status	Mandatory, optional												
Requirement Description	Brief description of the service requirement that the MEN MUST or SHOULD satisfy												
Test Object	Succinct description of test purpose												
Test Bed Configuration	Succinct description of test bed configuration												
VLAN ID/EVC Map	<p>A sample VLAN ID/EVC Map is suggested. Variables augment the Map.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI ‘A’</th> <th colspan="2">EGRESS UNI ‘B’</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>EVC₁</td> <td>10</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs may be permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	INGRESS UNI ‘A’		EGRESS UNI ‘B’		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10	EVC ₁	10	EVC ₁
INGRESS UNI ‘A’		EGRESS UNI ‘B’											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
10	EVC ₁	10	EVC ₁										
Test Procedure	Succinct description of the test procedure. CE-VLAN ID/EVC Maps are provided for all tests.												
Units	Units can be time units, rates and counts in integers such as milliseconds, frames per second and numbers of valid frames. For the most part units used are defined in RFCs 2285, 2544, 2889.												
Variables	Variables such as number of UNIs, EVCs and CE-VLAN IDs and frame formats and lengths MUST be described.												
Results	Description of the textual, numerical and/or graphical format in which to display test results. Results can be Pass or Fail.												
Remarks	Description of any particular observations that might effect the test result												

8. Abstract Test Cases for Ethernet Services at the UNI for EVC Service Attributes

In this section we assume familiarity with the MEF 1 [Ethernet Services Model] and, in particular, its section 6 which defines EVC Service Attributes. Abstract Test Cases based on the EVC Service Attributes described in the Model are defined. There are thirteen Test Cases defined in this section.

Test Case 1: Non-looping Frame Delivery

Test Case 2: EVC Leakage

Test Case 3: Single Copy Broadcast, Multicast, Unknown DA Frame Delivery in MP-to-MP EVC

Test Case 4: Service Frame with Invalid FCS Discard

Test Case 5: Service Frame Discard Layer 2 Control Protocols

Test Case 6: Service Frame Conditional Delivery

Test Case 7: Service Frame Transparency Tag Exception 1

Test Case 8: Service Frame Transparency Tag Exception 2

Test Case 9: Service Frame transparency Tag Exception 3

Test Case 10: CE-VLAN ID Preservation Untagged

Test Case 11: CE-VLAN ID Preservation Tagged

Test Case 12: CE-VLAN CoS Preservation

Test Case 13: EVC Layer 2 Control Protocol Processing

The detailed Test Case definitions follow.

Test Case 1: Non-looping Frame Delivery

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	Non-looping Frame Delivery																
Test Definition ID	M.6-2																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	A MEN MUST NOT deliver frames to the UNI on which they originated																
Test Object	Determine if a MEN forwards frames to the UNI on which they originated																
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>EVC₁</td> <td>10</td> <td>EVC₁</td> </tr> <tr> <td colspan="4">Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</td> </tr> </tbody> </table>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10	EVC ₁	10	EVC ₁	Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.			
INGRESS UNI 'A'		EGRESS UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
10	EVC ₁	10	EVC ₁														
Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.																	
Test Procedure	Tester offers unicast, broadcast, multicast and unknown destination MAC address frames at the UNI and monitors the same UNI to detect if any of the offered frames are delivered to the UNI on which they originated. Unicast frames are configured with identical source and destination MAC addresses.																
Units	Number of valid frames																
Variables	Unicast, multicast, broadcast, unknown destination MAC address frames. Unicast frames configured with identical source and destination MAC addresses. Frame lengths. Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of CE-VLAN IDs.																
Results	Pass or fail																
Remarks																	

Test Case 2: EVC Leakage

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																																																	
Test Name	EVC Leakage																																																
Test Definition ID	M.6-2																																																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																																																
Test Type	Conformance																																																
Test Status	Mandatory																																																
Requirement Description	A MEN MUST NOT deliver frames to a UNI which is not in the EVC																																																
Test Object	Determine if a MEN forwards frames to a UNI which is not in the EVC																																																
Test Bed Configuration	Multiple EVCs are configured across the same MEN. Testers are attached at all UNIs in the configured EVCs.																																																
VLAN-ID/EVC Map	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>21</td> <td>EVC_{P2P1}</td> <td>21</td> <td>EVC_{P2P1}</td> </tr> <tr> <td></td> <td></td> <td>22</td> <td>EVC_{P2P2}</td> </tr> <tr> <td>31</td> <td>EVC_{MP2MP10}</td> <td>31</td> <td>EVC_{MP2MP10}</td> </tr> <tr> <td></td> <td></td> <td>32</td> <td>EVC_{MP2MP11}</td> </tr> <tr> <th colspan="2">UNI 'C'</th> <th colspan="2">UNI 'D'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> <tr> <td>22</td> <td>EVC_{P2P2}</td> <td></td> <td></td> </tr> <tr> <td>23</td> <td>EVC_{P2P3}</td> <td>23</td> <td>EVC_{P2P3}</td> </tr> <tr> <td>31</td> <td>EVC_{MP2MP10}</td> <td></td> <td></td> </tr> <tr> <td>32</td> <td>EVC_{MP2MP11}</td> <td>32</td> <td>EVC_{MP2MP11}</td> </tr> </tbody> </table> <p>1. Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. Unicast, broadcast, multicast and unknown destination MAC address frames offered into Point-to-Point EVC₂ MUST NOT be delivered by the MEN at UNIs 'A' or 'D'. 3. Unicast, broadcast, multicast and unknown destination MAC address frames offered into Multipoint-to-Multipoint EVC₁₀ MUST NOT be delivered by the MEN at UNI 'D'.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	21	EVC _{P2P1}	21	EVC _{P2P1}			22	EVC _{P2P2}	31	EVC _{MP2MP10}	31	EVC _{MP2MP10}			32	EVC _{MP2MP11}	UNI 'C'		UNI 'D'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	22	EVC _{P2P2}			23	EVC _{P2P3}	23	EVC _{P2P3}	31	EVC _{MP2MP10}			32	EVC _{MP2MP11}	32	EVC _{MP2MP11}
	UNI 'A'		UNI 'B'																																														
	CE-VLAN ID	EVC	CE-VLAN ID	EVC																																													
	21	EVC _{P2P1}	21	EVC _{P2P1}																																													
			22	EVC _{P2P2}																																													
	31	EVC _{MP2MP10}	31	EVC _{MP2MP10}																																													
			32	EVC _{MP2MP11}																																													
	UNI 'C'		UNI 'D'																																														
	CE-VLAN ID	EVC	CE-VLAN ID	EVC																																													
	22	EVC _{P2P2}																																															
23	EVC _{P2P3}	23	EVC _{P2P3}																																														
31	EVC _{MP2MP10}																																																
32	EVC _{MP2MP11}	32	EVC _{MP2MP11}																																														
Test Procedure	Tester offers unicast, broadcast, multicast and unknown destination MAC address frames to at least one less than the number of configured EVCs. All EVCs are monitored to verify that unicast, broadcast, multicast and unknown destination MAC address frames are only received at the UNIs in the EVC or EVCs on which the tester offers frames.																																																
Units	Number of valid frames																																																
Variables	Unicast, multicast, broadcast, frame lengths. Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of CE-VLAN IDs. CE-VLAN ID for untagged and priority frames.																																																
Results	Pass or fail																																																
Remarks																																																	

Test Case 3: Single Copy Broadcast, Multicast, Unknown DA Frame Delivery in MP-to-MP EVC

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																					
Test Name	Single Copy Broadcast, Multicast, Unknown DA Frame Delivery in MP-to-MP EVC																				
Test Definition ID	M.6.1.2-1																				
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																				
Test Type	Functional																				
Test Status	Mandatory																				
Requirement Description	Only one copy of broadcast, multicast and unknown destination MAC address frames should be delivered to the egress UNIs on a MP-to-MP EVC																				
Test Object	Verify that the MEN delivers a single copy of broadcast, multicast and unknown destination MAC address service frames to each of the egress UNIs in a Multipoint-to-Multipoint EVC																				
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.																				
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>30</td> <td>EVC₁</td> <td>30</td> <td>EVC₁</td> </tr> <tr> <th colspan="2">INGRESS UNI 'C'</th> <td colspan="2" rowspan="3"></td> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> </tr> <tr> <td>30</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	30	EVC ₁	30	EVC ₁	INGRESS UNI 'C'				CE-VLAN ID	EVC	30	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'																			
CE-VLAN ID	EVC	CE-VLAN ID	EVC																		
30	EVC ₁	30	EVC ₁																		
INGRESS UNI 'C'																					
CE-VLAN ID	EVC																				
30	EVC ₁																				
Test Procedure	Tester offers broadcast, multicast and unknown destination MAC address frames to an ingress UNI in the MP-to-MP EVC and verifies that only one copy of each offered frame is delivered at the egress UNIs in the MP-to-MP EVC.																				
Units	Number of valid frames																				
Variables	MP-to-MP EVCs. Number of UNIs. Number of CE-VLAN IDs. Broadcast, multicast, unknown destination MAC address frames. Frame lengths.																				
Results	Pass or fail																				
Remarks																					

Test Case 4: Service Frame with Invalid FCS Discard

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Service Frame with Invalid FCS Discard												
Test Definition ID	M.6.3.2-2												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Functional												
Test Status	Mandatory												
Requirement Description	Service Frames with an invalid FCS MUST be discarded by the MEN												
Test Object	Verify that Service Frames with an invalid FCS are discarded by the MEN												
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>40</td> <td>EVC₁</td> <td>40</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	40	EVC ₁	40	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
40	EVC ₁	40	EVC ₁										
Test Procedure	Tester offers frames with invalid FCS to one or more EVCs at one or more UNIs and verifies that they are not delivered to any egress UNI.												
Units	Number of valid frames												
Variables	Frames with invalid FCS. Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of CE-VLAN IDs.												
Results	Pass or fail												
Remarks													

Test Case 5: Service Frame Discard Layer 2 Control Protocols

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Service Frame Discard Layer 2 Control Protocols												
Test Definition ID	M.6.3.2-2												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Functional												
Test Status	Mandatory												
Requirement Description	A MEN MUST discard Service Frames containing specific Layer 2 Control protocols when configured to do so.												
Test Object	Verify that a MEN discards frames containing specific Layer 2 Control protocols when configured to do so.												
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID for untagged and priority tagged Service Frames is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>50*</td> <td>EVC₁</td> <td>50*</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1 2. The CE-VLAN ID at the ingress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 50.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	50*	EVC ₁	50*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
50*	EVC ₁	50*	EVC ₁										
Test Procedure	Tester offers frames containing Layer 2 Control protocols to the EVCs at at least one UNI and verifies that they are not delivered at any of the UNIs.												
Units	Number of valid frames												
Variables	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>MAC Addresses</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x0180c2000000 through 0x0180c200000f</td> <td>Bridge Block of protocols</td> </tr> <tr> <td>0x0180c2000020 through 0x0180c200002f</td> <td>GARP Block of protocols</td> </tr> <tr> <td>0x0180c2000010</td> <td>All Bridges Protocol</td> </tr> </tbody> </table> <p>Bridge Block of protocols, GARP Block of protocols, All Bridges Protocol are mandatory</p>	MAC Addresses	Description	0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols	0x0180c2000020 through 0x0180c200002f	GARP Block of protocols	0x0180c2000010	All Bridges Protocol				
MAC Addresses	Description												
0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols												
0x0180c2000020 through 0x0180c200002f	GARP Block of protocols												
0x0180c2000010	All Bridges Protocol												
Results	Pass or fail												
Remarks													

Test Case 6: Service Frame Conditional Delivery

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																									
Test Name	Service Frame Conditional Delivery																								
Test Definition ID	M.6.3.2-4																								
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																								
Test Type	Functional																								
Test Status	Recommended																								
Requirement Description	A MEN MUST deliver or discard Service Frames when conditions for their delivery are specified.																								
Test Object	Verify that a MEN delivers Service Frames when conditions for their delivery are specified.																								
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver or discard Service Frames under the conditions specified for their delivery. See Variables for conditions.																								
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>EVC₁</td> <td>60</td> <td>EVC₁</td> </tr> <tr> <th colspan="2">UNI 'C'</th> <td colspan="2"></td> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <td colspan="2"></td> </tr> <tr> <td>60</td> <td>EVC₁</td> <td colspan="2"></td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	60	EVC ₁	60	EVC ₁	UNI 'C'				CE-VLAN ID	EVC			60	EVC ₁		
UNI 'A'		UNI 'B'																							
CE-VLAN ID	EVC	CE-VLAN ID	EVC																						
60	EVC ₁	60	EVC ₁																						
UNI 'C'																									
CE-VLAN ID	EVC																								
60	EVC ₁																								
Test Procedure	Tester offers Service Frames at at least one ingress UNI to at least one Multipoint-to-Multipoint EVC and verifies that they are delivered at the destination MAC address known by the MEN to be "at" the destination UNI.																								
Units	Number of valid frames																								
Variables	Number of UNIs. Number of EVCs per UNI. Number of CE-VLAN IDs.																								
Results	Pass or fail																								
Remarks																									

Test Case 7: Service Frame Transparency Tag Exception 1

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Service Frame Transparency Tag Exception 1												
Test Definition ID	M.6.3.3-2												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	A MEN MUST recalculate the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag on egress but not on ingress												
Test Object	Verify that a MEN correctly recalculates the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag on egress but not on ingress												
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and a CE-VLAN ID for untagged and priority tagged frames is mapped to the ingress EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver the Service Frames offered by the tester on the configured EVCs at the egress UNI with an IEEE 802.1Q Tag.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10*</td> <td>EVC₁</td> <td>100</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1 2. The CE-VLAN ID at the ingress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10*	EVC ₁	100	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
10*	EVC ₁	100	EVC ₁										
Test Procedure	Tester offers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI												
Units	Number of valid frames												
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.												
Results	Pass or fail												
Remarks													

Test Case 8: Service Frame Transparency Tag Exception 2

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Service Frame Transparency Tag Exception 2												
Test Definition ID	M.6.3.3-3												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	A MEN MUST recalculate the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag on ingress but not on egress												
Test Object	Verify that a MEN correctly recalculates the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag on ingress but not on egress												
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and a CE-VLAN ID for untagged and priority tagged frames is mapped to the egress EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver the Service Frames offered by the tester on the configured EVCs at the egress UNI without an IEEE 802.1Q Tag.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>200</td> <td>EVC₁</td> <td>20*</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1 2. The CE-VLAN ID at the egress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 20</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	200	EVC ₁	20*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
200	EVC ₁	20*	EVC ₁										
Test Procedure	Tester offers tagged Service Frames at the ingress UNI and verifies that they are untagged and have a valid FCS at the egress UNI												
Units	Number of valid frames												
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs												
Results	Pass or fail												
Remarks													

Test Case 9: Service Frame Transparency Tag Exception 3

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	Service Frame Transparency TAG Exception 3																
Test Definition ID	M.6.3.3-4																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	A MEN MUST recalculate the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag with content different from that at ingress.																
Test Object	Verify that a MEN correctly recalculates the FCS of an egress Service Frame when that Service Frame has an IEEE 802.1Q Tag on egress with contents that are different from the Tag on ingress.																
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and two different CE-VLAN IDs are mapped to the EVC at the ingress and egress UNIs. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver the Service Frames offered by the tester on the configured EVCs at the egress UNI with an IEEE 802.1Q Tag with different contents to the ingress Tag. The MEN can be configured to change the portion of the CE-VLAN Tag that identifies the CE-VLAN and/or the portion of the CE-VLAN Tag that contains the user priority bits.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="background-color: #f4a460;">INGRESS UNI 'A'</th> <th colspan="2" style="background-color: #f4a460;">EGRESS UNI 'B'</th> </tr> <tr> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">30</td> <td style="background-color: #f4a460;">EVC₁</td> <td style="background-color: #f4a460;">300</td> <td style="background-color: #f4a460;">EVC₁</td> </tr> <tr> <td colspan="4" style="background-color: #f4a460;">Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</td> </tr> </tbody> </table>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	30	EVC ₁	300	EVC ₁	Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.			
INGRESS UNI 'A'		EGRESS UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
30	EVC ₁	300	EVC ₁														
Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.																	
Test Procedure	Tester offers tagged Service Frames at the ingress UNI and verifies that the Service Frames are tagged with different contents and have a valid FCS at the egress UNI.																
Units	Number of valid frames																
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs																
Results	Pass or fail																
Remarks																	

Test Case 10: CE-VLAN ID Preservation Untagged

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	CE-VLAN ID Preservation Untagged												
Test Definition ID	M.6.4.1-1												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	When an EVC with CE-VLAN ID Preservation associates two or more UNIs, the MEN MUST deliver Service Frames which do not contain IEEE 802.1Q Tags at the ingress UNI untagged at the egress UNIs.												
Test Object	Verify that a MEN delivers Service Frames which do not contain IEEE 802.1Q Tags at the ingress UNI untagged at the egress UNIs.												
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and the CE-VLAN ID for untagged Service Frames is mapped to the EVC at both ingress and egress UNIs. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver Service Frames untagged at the egress UNIs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10*</td> <td>EVC₁</td> <td>10*</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10*	EVC ₁	10*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
10*	EVC ₁	10*	EVC ₁										
Test Procedure	Tester offers untagged Service Frames to the ingress UNI and verifies that the MEN delivers the Service Frames untagged at the egress UNI.												
Units	Number of valid frames												
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.												
Results	Pass or fail												
Remarks													

Test Case 11: CE-VLAN ID Preservation Tagged

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	CE-VLAN ID Preservation Tagged																
Test Definition ID	M.6.4.1-1																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	When an EVC with CE-VLAN ID Preservation associates two or more UNIs, the MEN MUST deliver Service Frames which contain IEEE 802.1Q Tags with VLAN IDs that are equal at the ingress and egress UNIs.																
Test Object	Verify that a MEN delivers Service Frames which contain IEEE 802.1Q Tags with VLAN IDs that are equal at the ingress and egress UNIs when an EVC with CE-VLAN ID Preservation associates two or more UNIs.																
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver Service Frames which contain IEEE 802.1Q Tags with VLAN IDs that are equal at the ingress and egress UNIs. In addition the MEN is configured to deliver priority tagged Service Frames which contain IEEE 802.1Q Tags with null VLAN IDs on an EVC associating two or more UNIs.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10*</td> <td>EVC₁</td> <td>10*</td> <td>EVC₁</td> </tr> <tr> <td>40</td> <td>EVC₂</td> <td>40</td> <td>EVC₂</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID mapped to EVC₁ at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10*	EVC ₁	10*	EVC ₁	40	EVC ₂	40	EVC ₂
INGRESS UNI 'A'		EGRESS UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
10*	EVC ₁	10*	EVC ₁														
40	EVC ₂	40	EVC ₂														
Test Procedure	Tester offers tagged Service Frames to the ingress UNI and verifies that the VLAN ID is preserved at the egress UNI. Priority tagged Service Frames MUST be delivered tagged with the null CE-VLAN ID.																
Units	Number of valid frames																
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.																
Results	Pass or fail																
Remarks																	

Test Case 12: CE-VLAN CoS Preservation

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	CE-VLAN CoS Preservation																
Test Definition ID	M.6.4.2-1																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	When an EVC with CE-VLAN CoS Preservation associates two or more UNIs, the MEN MUST deliver Service Frames, which contain IEEE 802.1Q Tags, at the egress UNIs with CE-VLAN CoSs that are identical to the ingress CE-VLAN CoSs.																
Test Object	Verify that a MEN delivers Service Frames which contain IEEE 802.1Q Tags with CoSs that are equal at the ingress and egress UNIs when an EVC with CE-VLAN CoS Preservation associates two or more UNIs.																
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to deliver Service Frames which contain IEEE 802.1Q Tags with CoS values that are identical at the ingress and egress UNIs. Valid values for CoS are 0 to 7.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>EVC₁</td> <td>60</td> <td>EVC₁</td> </tr> <tr> <td colspan="4">Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</td> </tr> </tbody> </table>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	50	EVC ₁	60	EVC ₁	Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.			
INGRESS UNI 'A'		EGRESS UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
50	EVC ₁	60	EVC ₁														
Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.																	
Test Procedure	Tester offers tagged Service Frames at the ingress UNI and verifies that the CE-VLAN CoS is preserved at the egress UNI.																
Units	Number of valid frames																
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs. Number and values of CE-VLAN CoS.																
Results	Pass or fail																
Remarks																	

Test Case 13: EVC Layer 2 Control Protocol Processing

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																													
Test Name	EVC L2 Control Protocol Processing																												
Test Definition ID	M.6.5-1																												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																												
Test Type	Conformance																												
Test Status	Mandatory																												
Requirement Description	When an EVC configured with the EVC Layer 2 Control Processing Attribute associates two or more UNIs and when specific Layer 2 Control Protocols are configured for tunneling, the MEN MUST tunnel the specific Layer 2 Control Protocols on the EVC that is mapped to the untagged CE-VLAN ID in the CE-VLAN ID/EVC Map and deliver the Service Frames carrying the specific Layer 2 protocols at all egress UNIs in the EVC identical to the corresponding ingress Service Frames.																												
Test Object	Verify an EVC configured with the EVC Layer 2 Control Processing Attribute associates two or more UNIs and when specific Layer 2 Control Protocols are configured for tunneling, the MEN tunnels the specific Layer 2 Control Protocols on the EVC that is mapped to the untagged CE-VLAN ID in the CE-VLAN ID/EVC Map and deliver the Service Frames carrying the specific Layer 2 protocols at all egress UNIs in the EVC identical to the corresponding ingress Service Frames.																												
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and at least one CE-VLAN ID for untagged and priority tagged frames is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs. The MEN is configured to tunnel the Service Frames carrying Layer 2 Control protocols.																												
VLAN-ID/EVC Map	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10*</td> <td>EVC₁</td> <td>10*</td> <td>EVC₁</td> </tr> <tr> <td colspan="4">Use of other CE-VLAN IDs is permitted provided that:</td> </tr> <tr> <td colspan="4">1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</td> </tr> <tr> <td colspan="4">2. The CE-VLAN ID at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs.</td> </tr> <tr> <td colspan="4">* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.</td> </tr> </tbody> </table>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10*	EVC ₁	10*	EVC ₁	Use of other CE-VLAN IDs is permitted provided that:				1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.				2. The CE-VLAN ID at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs.				* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.			
INGRESS UNI 'A'		EGRESS UNI 'B'																											
CE-VLAN ID	EVC	CE-VLAN ID	EVC																										
10*	EVC ₁	10*	EVC ₁																										
Use of other CE-VLAN IDs is permitted provided that:																													
1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.																													
2. The CE-VLAN ID at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs.																													
* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.																													
Test Procedure	Tester offers Service Frames carrying Layer 2 Control protocols at the ingress UNI and verifies that the Service Frames delivered at the egress UNI are identical to the corresponding ingress Service Frames.																												
Units	Number of valid frames																												
Variables	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>MAC Addresses</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x0180c2000000 through 0x0180c200000f</td> <td>Bridge Block of protocols</td> </tr> <tr> <td>0x0180c2000020 through 0x0180c200002f</td> <td>GARP Block of protocols</td> </tr> <tr> <td>0x0180c2000010</td> <td>All Bridges Protocol</td> </tr> </tbody> </table> <p>Bridge Block of protocols, GARP Block of protocols, All Bridges Protocol are mandatory.</p>	MAC Addresses	Description	0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols	0x0180c2000020 through 0x0180c200002f	GARP Block of protocols	0x0180c2000010	All Bridges Protocol																				
MAC Addresses	Description																												
0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols																												
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0x0180c2000010	All Bridges Protocol																												
Results	Pass or fail																												
Remarks																													

9. Abstract Test Cases for Ethernet Services at the UNI for UNI Service Attributes

In this section we again assume familiarity with the MEF 1 [Ethernet Services Model] and, in particular, its section 7 which defines UNI Service Attributes. Abstract Test Cases based on the UNI Service Attributes described in the Model are defined. There are thirteen Test Cases defined in this section.

Test Case 14: UNI Physical Layer

Test Case 15: UNI MAC Layer

Test Case 16: UNI Service Multiplexing of Point-to-Point EVCs

Test Case 17: UNI Service Multiplexing of Multipoint-to-Multipoint EVCs

Test Case 18: UNI Service Multiplexing of Point-to-Point and Multipoint-to-Multipoint EVCs

Test Case 19: CE-VLAN ID for untagged and priority tagged Service Frames

Test Case 20: CE-VLAN ID/EVC Map Service Frame Discard

Test Case 21: UNI EVC Support

Test Case 22: Maximum Number of EVCs

Test Case 23: UNI Bundling and CE-VLAN ID Preservation

Test Case 24: UNI All to One Bundling and CE-VLAN ID Preservation

Test Case 25: UNI Layer 2 Control Protocols Processing Discard

Test Case 26: UNI Layer 2 Control Protocols Processing Peer

Test Case 14: UNI Physical Layer

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	UNI Physical Layer																
Test Definition ID	M.7.2																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	A UNI MUST have one of the following combinations of Speed (in bits per second), Mode, and Physical medium: 10 Mbps Full duplex, 100 Mbps Full Duplex, 10/100 Mbps Auto negotiation, 1 Gbps Full duplex, 10 Gbps Full duplex																
Test Object	Verify that a UNI is equipped with at least one of the combinations listed as Variables in this Test Case.																
Test Bed Configuration	One EVC associating two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to the UNIs in the configured EVC.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>EVC₁</td> <td>10</td> <td>EVC₁</td> </tr> <tr> <td colspan="4">Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</td> </tr> </tbody> </table>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	10	EVC ₁	10	EVC ₁	Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.			
UNI 'A'		UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
10	EVC ₁	10	EVC ₁														
Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.																	
Test Procedure	Tester offers Service Frames bidirectionally at each UNI configured in the EVC and verifies that they are successfully delivered by the MEN at the other UNI.																
Units	Number of valid frames																
Variables	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Speed</th> <th>Mode</th> <th>Physical Medium</th> </tr> </thead> <tbody> <tr> <td>10 Mbps</td> <td>Full duplex</td> <td rowspan="5">All Ethernet physical media compatible with Speed and Mode listed in [5].</td> </tr> <tr> <td>100 Mbps</td> <td>Full duplex</td> </tr> <tr> <td>10/100 Mbps</td> <td>Auto negotiation</td> </tr> <tr> <td>1 Gbps</td> <td>Full duplex</td> </tr> <tr> <td>10 Gbps</td> <td>Full duplex</td> </tr> </tbody> </table>	Speed	Mode	Physical Medium	10 Mbps	Full duplex	All Ethernet physical media compatible with Speed and Mode listed in [5].	100 Mbps	Full duplex	10/100 Mbps	Auto negotiation	1 Gbps	Full duplex	10 Gbps	Full duplex		
Speed	Mode	Physical Medium															
10 Mbps	Full duplex	All Ethernet physical media compatible with Speed and Mode listed in [5].															
100 Mbps	Full duplex																
10/100 Mbps	Auto negotiation																
1 Gbps	Full duplex																
10 Gbps	Full duplex																
Results	Pass or fail																
Remarks																	

Test Case 15: UNI MAC Layer

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	UNI MAC Layer																
Test Definition ID	M.7.3																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	A UNI MUST support the IEEE 802.3-2002 frame formats.																
Test Object	Verify that a UNI supports the IEEE 802.3-2002 frame formats.																
Test Bed Configuration	At least one EVC associating two or more UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>EVC₁</td> <td>400</td> <td>EVC₁</td> </tr> <tr> <td>10*</td> <td>EVC₂</td> <td>10*</td> <td>EVC₂</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p> <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	400	EVC ₁	400	EVC ₁	10*	EVC ₂	10*	EVC ₂
UNI 'A'		UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
400	EVC ₁	400	EVC ₁														
10*	EVC ₂	10*	EVC ₂														
Test Procedure	Tester offers Service Frames with IEEE 802.3-2002 frame formats at each UNI configured in the EVC and verifies that the Service Frames are successfully delivered by the MEN at the other UNIs.																
Units	Number of valid frames																
Variables	Unicast, multicast, broadcast IEEE 802.3-2002 Service Frames with a range of frame lengths as specified in RFC 2544. Tagged, untagged and priority tagged frames. Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.																
Results	Pass or fail																
Remarks																	

Test Case 16: UNI Service Multiplexing of Point-to-Point EVCs

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																													
Test Name	UNI Service Multiplexing of Point-to-Point EVCs																												
Test Definition ID	M.7.4																												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																												
Test Type	Conformance																												
Test Status	Mandatory																												
Requirement Description	A UNI with the Service Multiplexing attribute MUST be configurable to support multiple EVCs.																												
Test Object	Verify that a UNI with the Service Multiplexing attribute can be configured to support multiple Point-to-Point EVCs.																												
Test Bed Configuration	At least two Point-to-Point EVCs are configured associating at most one ingress UNI and at least two egress UNIs and at least one CE-VLAN ID is mapped to the EVCs. Testers are attached to all UNIs in the configured EVCs.																												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>EVC₁</td> <td>400</td> <td>EVC₁</td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td></td> <td></td> </tr> <tr> <th colspan="2">UNI 'C'</th> <td></td> <td></td> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <td></td> <td></td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td></td> <td></td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	400	EVC ₁	400	EVC ₁	410	EVC ₂			UNI 'C'				CE-VLAN ID	EVC			410	EVC ₂		
UNI 'A'		UNI 'B'																											
CE-VLAN ID	EVC	CE-VLAN ID	EVC																										
400	EVC ₁	400	EVC ₁																										
410	EVC ₂																												
UNI 'C'																													
CE-VLAN ID	EVC																												
410	EVC ₂																												
Test Procedure	Tester offers Service Frames into the EVCs configured at the ingress UNIs and verifies that they are successfully delivered by the MEN on the proper EVC at the egress UNI. Since EVCs are bidirectional Service Frames should be offered at all UNIs in the EVC.																												
Units	Number of valid frames.																												
Variables	Number of EVCs multiplexed at the ingress UNI. Number of egress UNIs. Number and values of CE-VLAN IDs.																												
Results	Pass or fail																												
Remarks																													

Test Case 17: UNI Service Multiplexing of Multipoint-to-Multipoint EVCs

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																																	
Test Name	UNI Service Multiplexing of Multipoint-to-Multipoint EVCs																																
Test Definition ID	M.7.4																																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																																
Test Type	Conformance																																
Test Status	Mandatory																																
Requirement Description	A UNI with the Service Multiplexing attribute MUST be configurable to support multiple Multipoint-to-Multipoint EVCs.																																
Test Object	Verify that a UNI with the Service Multiplexing attribute can be configured to support multiple Multipoint-to-Multipoint EVCs.																																
Test Bed Configuration	At least two Multipoint-to-Multipoint EVCs are configured associating at least a single UNI to at least two other UNIs and at least one CE-VLAN ID is mapped to each of the EVCs. Testers are attached to all UNIs in the configured EVCs.																																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>EVC₁</td> <td>400</td> <td>EVC₁</td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td>410</td> <td>EVC₂</td> </tr> <tr> <th colspan="2">UNI 'C'</th> <td colspan="2"></td> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <td colspan="2"></td> </tr> <tr> <td>400</td> <td>EVC₁</td> <td colspan="2"></td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td colspan="2"></td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	400	EVC ₁	400	EVC ₁	410	EVC ₂	410	EVC ₂	UNI 'C'				CE-VLAN ID	EVC			400	EVC ₁			410	EVC ₂		
UNI 'A'		UNI 'B'																															
CE-VLAN ID	EVC	CE-VLAN ID	EVC																														
400	EVC ₁	400	EVC ₁																														
410	EVC ₂	410	EVC ₂																														
UNI 'C'																																	
CE-VLAN ID	EVC																																
400	EVC ₁																																
410	EVC ₂																																
Test Procedure	Tester offers Service Frames into the EVCs configured at the ingress UNIs and verifies that they are successfully delivered by the MEN on the proper EVC at the egress UNI. Since EVCs are bidirectional Service Frames should be offered at all UNIs in the EVC.																																
Units	Number of valid frames.																																
Variables	Number of Multipoint-to-Multipoint EVCs. Number of UNIs. Number and values of CE-VLAN IDs.																																
Results	Pass or fail																																
Remarks																																	

Test Case 18: UNI Service Multiplexing of Point-to-Point and Multipoint-to-Multipoint EVCs

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																													
Test Name	UNI Service Multiplexing of Point-to-Point and Multipoint-to-Multipoint EVCs																												
Test Definition ID	M.7.4																												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																												
Test Type	Conformance																												
Test Status	Mandatory																												
Requirement Description	A UNI with the Service Multiplexing attribute MUST be configurable to support multiple Point-to-Point and Multipoint-to-Multipoint EVCs.																												
Test Object	Verify that a UNI with the Service Multiplexing attribute can be configured to support multiple Point-to-Point and Multipoint-to-Multipoint EVCs.																												
Test Bed Configuration	At least one Multipoint-to-Multipoint EVC is configured associating at least two UNIs and at least one Point-to-Point EVC is configured associating two UNIs at least one of which is in the Multipoint-to-Multipoint EVC and at least one CE-VLAN ID is mapped to each of the EVCs. Testers are attached to all UNIs in the configured EVCs.																												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>EVC₁</td> <td>400</td> <td>EVC₁</td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td>410</td> <td>EVC₂</td> </tr> <tr> <th colspan="2">UNI 'C'</th> <td colspan="2"></td> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <td colspan="2"></td> </tr> <tr> <td>410</td> <td>EVC₂</td> <td colspan="2"></td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	400	EVC ₁	400	EVC ₁	410	EVC ₂	410	EVC ₂	UNI 'C'				CE-VLAN ID	EVC			410	EVC ₂		
UNI 'A'		UNI 'B'																											
CE-VLAN ID	EVC	CE-VLAN ID	EVC																										
400	EVC ₁	400	EVC ₁																										
410	EVC ₂	410	EVC ₂																										
UNI 'C'																													
CE-VLAN ID	EVC																												
410	EVC ₂																												
Test Procedure	Tester offers Service Frames into the EVCs configured at the ingress UNIs and verifies that they are successfully delivered by the MEN on the proper EVC at the egress UNI. Since EVCs are bi-directional Service Frames should be offered at all UNIs in the EVC.																												
Units	Number of valid frames.																												
Variables	Number of Point-to-Point and Multipoint-to-Multipoint EVCs. Number of UNIs. Number and values of CE-VLAN IDs.																												
Results	Pass or fail																												
Remarks																													

Test Case 19: CE-VLAN ID for Untagged and Priority Tagged Service Frames

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	CE-VLAN ID for Untagged and Priority Tagged Service Frames												
Test Definition ID	M.7.5.1-1												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	When the CE-VLAN ID Preservation Service Attribute is not in force for an EVC, egress Service Frames with the CE-VLAN ID value for untagged and priority tagged Service Frames MUST be untagged.												
Test Object	Verify that when the CE-VLAN ID Preservation Service Attribute is not in force for an EVC, egress Service Frames with the CE-VLAN ID value for untagged and priority tagged Service Frames are untagged at the egress UNI.												
Test Bed Configuration	At least one EVC associating at least two UNIs is configured for which the CE-VLAN ID Preservation Service Attribute is not in force and two CE-VLAN IDs are mapped to the EVC, one for untagged and priority tagged frames. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="background-color: #f4a460;">INGRESS UNI 'A'</th> <th colspan="2" style="background-color: #f4a460;">EGRESS UNI 'B'</th> </tr> <tr> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">50</td> <td style="background-color: #f4a460;">EVC₁</td> <td style="background-color: #f4a460;">10*</td> <td style="background-color: #f4a460;">EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that:</p> <ol style="list-style-type: none"> 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority tagged Service Frames at those UNIs. <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 at both ingress and egress UNIs.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	50	EVC ₁	10*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
50	EVC ₁	10*	EVC ₁										
Test Procedure	Tester offers tagged, untagged and priority tagged Service Frames to the ingress UNI and verifies that egress Service Frames with the CE-VLAN ID value for untagged and priority tagged Service Frames are untagged at the egress UNI.												
Units	Number of valid frames												
Variables	Untagged and priority tagged Service Frames. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of UNIs. Number and values of CE-VLAN IDs.												
Results	Pass or fail												
Remarks													

Test Case 20: CE-VLAN ID/EVC Map Service Frame Discard

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	CE-VLAN ID/EVC Map Service Frame Discard																
Test Definition ID	M.7.6.1-3																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	When an instance of the CE-VLAN ID/EVC Map does not contain an entry for a given CE-VLAN ID, any ingress Service Frame at the UNI with this instance of the map with this CE-VLAN ID MUST be discarded by the MEN.																
Test Object	Verify that when an instance of the CE-VLAN ID/EVC Map does not contain an entry for a given CE-VLAN ID, any ingress Service Frame at the UNI with this instance of the map with this CE-VLAN ID is discarded by the MEN.																
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>EVC₁</td> <td>400</td> <td>EVC₁</td> </tr> <tr> <td colspan="4">Use of other CE-VLAN IDs is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID is not the same as the Service Frames offered by the Tester at the ingress UNI.</td> </tr> </tbody> </table>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	400	EVC ₁	400	EVC ₁	Use of other CE-VLAN IDs is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID is not the same as the Service Frames offered by the Tester at the ingress UNI.			
INGRESS UNI 'A'		EGRESS UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
400	EVC ₁	400	EVC ₁														
Use of other CE-VLAN IDs is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 2. The CE-VLAN ID is not the same as the Service Frames offered by the Tester at the ingress UNI.																	
Test Procedure	Tester offers Service Frames with a CE-VLAN ID which is not mapped to an EVC and verifies at the egress UNI that it is discarded in the MEN.																
Units	Number of valid frames																
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.																
Results	Pass or fail																
Remarks																	

Test Case 21: UNI EVC Support

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	UNI EVC Support												
Test Definition ID	M.7.7												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Mandatory												
Requirement Description	A UNI supports at least one EVC.												
Test Object	Verify that a UNI can support at least one EVC.												
Test Bed Configuration	An EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>500</td> <td>EVC₁</td> <td>500</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	500	EVC ₁	500	EVC ₁
UNI 'A'		UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
500	EVC ₁	500	EVC ₁										
Test Procedure	Testers offers Service Frames bidirectionally on the configured EVC at each UNI and verify that the MEN delivers the corresponding Service Frames at the egress UNI(s) on the same EVC.												
Units	Number of valid frames.												
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.												
Results	Number of EVCs equal to 0 or 1.												
Remarks													

Test Case 22: Maximum Number of EVCs

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	Maximum Number of EVCs												
Test Definition ID	M.7.7												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Conformance												
Test Status	Optional												
Requirement Description	A UNI supports a maximum number of EVCs greater than one.												
Test Object	Determine the maximum number of EVCs that are supported at the UNI.												
Test Bed Configuration	Multiple EVCs associating at least two UNIs are configured and at least one CE-VLAN ID is mapped to the EVCs. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>2 to 4095</td> <td>EVCs₂₋₄₀₉₅</td> <td>2 to 4095</td> <td>EVCs₂₋₄₀₉₅</td> </tr> </tbody> </table>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	2 to 4095	EVCs ₂₋₄₀₉₅	2 to 4095	EVCs ₂₋₄₀₉₅
UNI 'A'		UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
2 to 4095	EVCs ₂₋₄₀₉₅	2 to 4095	EVCs ₂₋₄₀₉₅										
Test Procedure	An iterative process may be used to determine the maximum number of EVCs supported at the UNI. Testers offer Service Frames bidirectionally on the configured EVCs at each UNI and verify that the MEN delivers the corresponding Service Frames at the egress UNI on the same EVCs. The maximum number of EVCs supported at the UNI is given by the largest number of EVCs over which Service Frames are successfully delivered to the egress UNI(s) by the MEN.												
Units	Number of valid frames.												
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.												
Results	Maximum number of EVCs												
Remarks													

Test Case 23: UNI Bundling

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																					
Test Name	UNI Bundling and CE-VLAN ID Preservation																				
Test Definition ID	M.7.8-1																				
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																				
Test Type	Conformance																				
Test Status	Mandatory																				
Requirement Description	A UNI which supports bundling MUST be configurable so that more than one CE-VLAN ID can map to an EVC at the UNI.																				
Test Object	Verify that a UNI which supports bundling is configurable so that more than one CE-VLAN ID can map to an EVC at the UNI.																				
Test Bed Configuration	An EVC associating at least two UNIs is configured and at least two CE-VLAN IDs are mapped to the EVC. At least one more CE-VLAN ID is mapped to an additional EVC associating the same UNIs. Testers are attached to all UNIs in the configured EVCs.																				
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">UNI 'A'</th> <th colspan="2">UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>600</td> <td>EVC₁</td> <td>600</td> <td>EVC₁</td> </tr> <tr> <td>610</td> <td>EVC₁</td> <td>610</td> <td>EVC₁</td> </tr> <tr> <td>700</td> <td>EVC₂</td> <td>700</td> <td>EVC₂</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	600	EVC ₁	600	EVC ₁	610	EVC ₁	610	EVC ₁	700	EVC ₂	700	EVC ₂
UNI 'A'		UNI 'B'																			
CE-VLAN ID	EVC	CE-VLAN ID	EVC																		
600	EVC ₁	600	EVC ₁																		
610	EVC ₁	610	EVC ₁																		
700	EVC ₂	700	EVC ₂																		
Test Procedure	Tester offers Service Frames bidirectionally with CE-VLAN IDs corresponding to the CE-VLAN IDs in the CE-VLAN ID/EVC Map into the EVC at each UNI and verifies that the corresponding Service Frames are delivered by the MEN at the egress UNI on the same EVC with CE-VLAN IDs preserved.																				
Units	Number of valid frames																				
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs.																				
Results	Pass or fail																				
Remarks																					

Test Case 24: UNI All to One Bundling and CE-VLAN ID Preservation

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI																	
Test Name	UNI All to One Bundling and CE-VLAN ID Preservation																
Test Definition ID	M.7.9-1																
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1																
Test Type	Conformance																
Test Status	Mandatory																
Requirement Description	When a UNI has the All to One Bundling attribute, all CE-VLAN IDs MUST map to a single EVC at the UNI and the list of CE-VLAN IDs mapped to the EVC MUST be the same at each UNI in the EVC.																
Test Object	Verify that when a UNI has the All to One Bundling attribute, all CE-VLAN IDs are mapped to a single EVC at the UNI and the list of CE-VLAN IDs mapped to the EVC are the same at each UNI in the EVC.																
Test Bed Configuration	An EVC associating at least two UNIs is configured and two or more CE-VLAN IDs are mapped to the EVC. All CE-VLAN IDs MUST be mapped to the same EVC. Testers are attached to all UNIs in the configured EVCs.																
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="background-color: #f4a460;">UNI 'A'</th> <th colspan="2" style="background-color: #f4a460;">UNI 'B'</th> </tr> <tr> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> </tr> </thead> <tbody> <tr> <td style="background-color: #f4a460;">600</td> <td style="background-color: #f4a460;">EVC₁</td> <td style="background-color: #f4a460;">600</td> <td style="background-color: #f4a460;">EVC₁</td> </tr> <tr> <td style="background-color: #f4a460;">610</td> <td style="background-color: #f4a460;">EVC₁</td> <td style="background-color: #f4a460;">610</td> <td style="background-color: #f4a460;">EVC₁</td> </tr> </tbody> </table> <p style="text-align: center;">Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.</p>	UNI 'A'		UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	600	EVC ₁	600	EVC ₁	610	EVC ₁	610	EVC ₁
UNI 'A'		UNI 'B'															
CE-VLAN ID	EVC	CE-VLAN ID	EVC														
600	EVC ₁	600	EVC ₁														
610	EVC ₁	610	EVC ₁														
Test Procedure	Testers offer Service Frames with all possible CE-VLAN ID values into the EVC at each UNI and verify that the corresponding Service Frames are delivered by the MEN at the other UNI(s) on the same EVC with CE-VLAN IDs preserved.																
Units	Number of valid frames																
Variables	Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number.																
Results	Pass or fail																
Remarks																	

Test Case 25: UNI Layer 2 Control Protocols Processing Discard

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	UNI Layer 2 Control Protocols Processing Discard												
Test Definition ID	M.7.12.1												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Functional												
Test Status	Mandatory												
Requirement Description	A MEN MUST discard Service Frames containing specific Layer 2 Control protocols and MUST NOT generate any egress Service Frames containing the specific Layer 2 Control protocols when configured to do so												
Test Object	Verify that the MEN discards frames containing specific Layer 2 Control protocols and does not generate any egress Service Frames containing the specific Layer 2 Control protocols when configured to do so												
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>50*</td> <td>EVC₁</td> <td>50*</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that: Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1 The CE-VLAN ID at the ingress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI.</p> <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 50 since only untagged frames carry Layer 2 Control protocols.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	50*	EVC ₁	50*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
50*	EVC ₁	50*	EVC ₁										
Test Procedure	Testers offer frames containing Layer 2 Control protocols at the ingress UNIs and verify that they are not delivered at any of the egress UNIs.												
Units	Number of valid frames												
Variables	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>MAC Addresses</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x0180c2000000 through 0x0180c200000f</td> <td>Bridge Block of protocols</td> </tr> <tr> <td>0x0180c2000020 through 0x0180c200002f</td> <td>GARP Block of protocols</td> </tr> <tr> <td>0x0180c2000010</td> <td>All Bridges Protocol</td> </tr> </tbody> </table> <p>Bridge Block of protocols, GARP Block of protocols, All Bridges Protocol are mandatory.</p>	MAC Addresses	Description	0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols	0x0180c2000020 through 0x0180c200002f	GARP Block of protocols	0x0180c2000010	All Bridges Protocol				
MAC Addresses	Description												
0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols												
0x0180c2000020 through 0x0180c200002f	GARP Block of protocols												
0x0180c2000010	All Bridges Protocol												
Results	Pass or fail												
Remarks													

Test Case 26: UNI Layer 2 Control Protocols Processing Peer

ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI													
Test Name	UNI Layer 2 Control Protocols Processing Peer												
Test Definition ID	M.7.12.2												
Reference Document Source	MEF 1 Ethernet Services Model, Phase 1												
Test Type	Functional												
Test Status	Mandatory												
Requirement Description	A MEN MUST act as a peer of the CE in the operation of specific Layer 2 Control protocols when configured to do so												
Test Object	Verify that the MEN acts as a peer of the CE in the operation of specific Layer 2 Control protocols when configured to do so												
Test Bed Configuration	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.												
VLAN-ID/EVC Map	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI 'A'</th> <th colspan="2">EGRESS UNI 'B'</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>50*</td> <td>EVC₁</td> <td>50*</td> <td>EVC₁</td> </tr> </tbody> </table> <p>Use of other CE-VLAN IDs is permitted provided that: Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1 The CE-VLAN ID at the ingress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI.</p> <p>* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 50 since only untagged frames carry Layer 2 Control protocols.</p>	INGRESS UNI 'A'		EGRESS UNI 'B'		CE-VLAN ID	EVC	CE-VLAN ID	EVC	50*	EVC ₁	50*	EVC ₁
INGRESS UNI 'A'		EGRESS UNI 'B'											
CE-VLAN ID	EVC	CE-VLAN ID	EVC										
50*	EVC ₁	50*	EVC ₁										
Test Procedure	Testers offer frames containing Layer 2 Control protocols to the ingress UNIs and monitor the protocol exchange between the CE and the MEN. Testers also verify that none of the frames are delivered to the egress UNIs.												
Units	Number of valid frames												
Variables	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>MAC Addresses</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0x0180c2000000 through 0x0180c200000f</td> <td>Bridge Block of protocols</td> </tr> <tr> <td>0x0180c2000020 through 0x0180c200002f</td> <td>GARP Block of protocols</td> </tr> <tr> <td>0x0180c2000010</td> <td>All Bridges Protocol</td> </tr> </tbody> </table> <p>Bridge Block of protocols, GARP Block of protocols, All Bridges Protocol are mandatory.</p>	MAC Addresses	Description	0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols	0x0180c2000020 through 0x0180c200002f	GARP Block of protocols	0x0180c2000010	All Bridges Protocol				
MAC Addresses	Description												
0x0180c2000000 through 0x0180c200000f	Bridge Block of protocols												
0x0180c2000020 through 0x0180c200002f	GARP Block of protocols												
0x0180c2000010	All Bridges Protocol												
Results	Pass or fail												
Remarks													

10. Security

Security issues are not addressed in this document.

11. References

Reference	Reference Details
[1] Ethernet Services Model	MEF 1 “Ethernet Services Model, Phase 1”
[2] Ethernet Traffic Management	MEF 5 “Traffic Management Specification: Phase 1”
[3] Services Definitions	MEF 6 “Ethernet Services Definitions”
[4] Metro Ethernet Services	MEF “Metro Ethernet Services – A Technical Overview” white paper, R. Santitoro (Informative)
[5] IEEE 802.3 – 2002	Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications, 8 March 2002. (Normative)
[6] RFC 2119	RFC 2119, “Key words for use in RFCs to Indicate Requirement Levels”, S. Bradner, http://www.ietf.org/rfc/rfc2119.txt (Normative)
[7] RFC 2285	RFC 2285, “Benchmarking Terminology for LAN Switching Devices”, R. Mandeville, http://www.ietf.org/rfc/rfc2285.txt
[8] RFC 2544	RFC 2544, “Benchmarking Methodology for Network Interconnect Devices”, S. Bradner, J. McQuaid, http://www.ietf.org/rfc/rfc2544.txt
[9] RFC 2889	RFC 2889, “Benchmarking Methodology for LAN Switching Devices”, R. Mandeville, J. Perser, http://www.ietf.org/rfc/rfc2889.txt