METROthernet Forum

MEF 9

Abstract Test Suite for Ethernet Services at the UNI

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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.
СЕ	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.

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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.

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3. Scope

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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, 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.

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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.

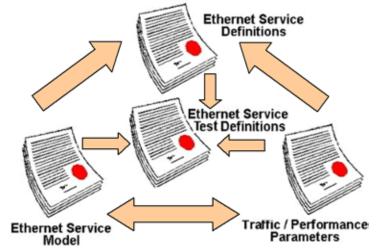


Figure 1: Relationship between different MEF Services Group documents and the Ethernet Services Test Definition document

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.

<u>Functional criteria</u>: 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 BPDUs (Bridge Protocol Data Units) when configured to do so.

<u>Conformance criteria</u>: 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

<u>Interoperability criteria</u>: 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.

<u>Performance criteria</u>: 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.

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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.

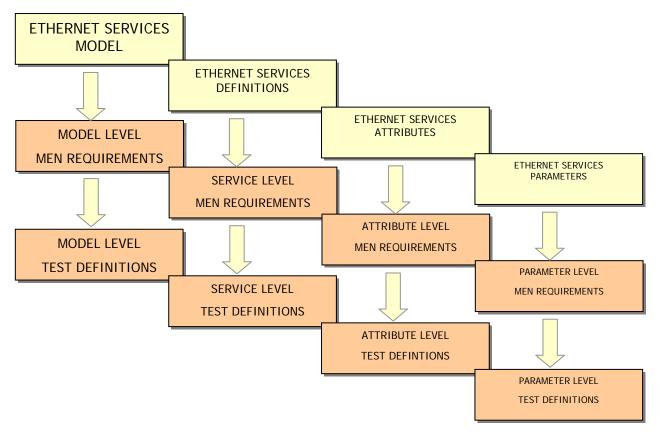


Figure 2: Relationship between Ethernet Services Documents and Abstract Test Cases for Ethernet Services at the UNI

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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.

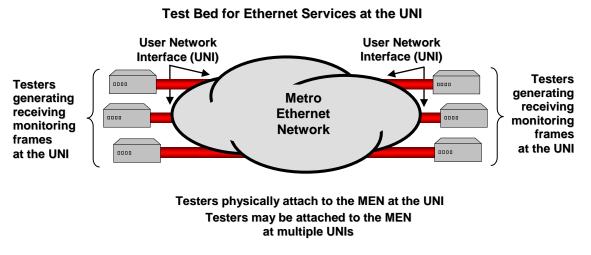


Figure 3: Test Bed for Ethernet Services at the UNI

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 UN	I 'B'		
CE-VLAN ID	EVC		CE-VLAN ID	EVC		
10	EVC_1		10 EVC			
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

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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:

	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	A sample VLAN ID/EVC Map is suggested. Variables augment the Map.INGRESS UNI 'A'EGRESS UNI 'B'CE-VLAN IDEVC10 EVC_1 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.					
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					

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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 5: Service Frame Conditional Delivery Test Case 6: 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.

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ABS	TRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI				
Test Name	Non-looping Frame Delivery				
Test Definition ID	M.6-2				
Reference	MEF 1 Ethernet Services Model, Phase 1				
Document Source					
Test Type	Conformance				
Test Status	Mandatory				
Requirement	A MEN MUST NOT deliver frames to the UNI on which they originated				
Description					
Test Object	Determine if a MEN forwards frames to the UNI on which they originated				
Test Bed	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN				
Configuration	ID is mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.				
VLAN-ID/EVC Map	INGRESS UNI 'A'EGRESS UNI 'B'CE-VLAN IDEVCCE-VLAN IDEVC10 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 1: Non-looping Frame Delivery

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Test Case 2: EVC Leakage

Δ	BSTRACT	TEST CASES FO	R FTHERNET	S	FRVICES AT THE		
Test Name	ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI EVC Leakage						
Test Definition ID	M.6-2						
Reference		ernet Services Mod	el Phase 1				
Document Source			en, i muse i				
Test Type	Conforman	ce					
Test Status	Mandatory						
Requirement		UST NOT deliver f	rames to a UNI	wh	ich is not in the EV	С	
Description						-	
Test Object	Determine	if a MEN forwards	frames to a UNI	[w	hich is not in the EV	′C	
Test Bed	Multiple E	VCs are configured	across the same	Μ	EN. Testers are attac	ched at all UNIs	in the
Configuration	configured						
		UNI	A ']	UNI '	B '	
		CE-VLAN ID	EVC		CE-VLAN ID	EVC	
		21	EVC _{P2P1}		21	EVC _{P2P1}	
					22	EVC _{P2P2}	
		31	EVC _{MP2MP10}	1	31	EVC _{MP2MP10}	
				1	32	EVC _{MP2MP11}	
		UNI	⁶ C'	1	UNI 'D'		
		CE-VLAN ID	EVC	1	CE-VLAN ID	EVC	
		22	EVC EVC _{P2P2}	1			
		23	EVC _{P2P2}	-	23	EVC _{P2P3}	
VLAN-ID/EVC Map		31	EVC _{MP2MP10}		25	L + C p2p3	
		32	EVC _{MP2MP10} EVC _{MP2MP11}	1	32	EVC _{MP2MP11}	
				not	mitted provided that		
					conforms to MEF 1,		
					unknown destinatior		
					Point EVC ₂ MUST		
		delivered by the M					
		3. Unicast, broadd	cast, multicast ar	nd	unknown destinatior	n MAC	
		address frames of	fered into Multij	poi	nt-to-Multipoint EV	C ₁₀ MUST	
		NOT be delivered	l by the MEN at	U	NI 'D'.		
	Tester offer	s unicast, broadcas	t. multicast and	լլոլ	known destination M	IAC address fra	mes to at
					s. All EVCs are more		
Test Procedure					ation MAC address		
		the EVC or EVCs					
Units		valid frames					
			rame lengths. N	um	ber of UNIs. Numb	er of EVCs per	UNI. Type
Variables				oint). Number of CE			
		gged and priority fr	-	_			
Results	Pass or fail	Pass or fail					
Remarks							

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

Α	BSTRACT TEST	CASES FOR ETH	IERNET	SE	ERVICES AT THE	UNI	
Test Name	Single Copy Broa	Single Copy Broadcast, Multicast, Unknown DA Frame Delivery in MP-to-MP EVC					
Test Definition ID	M.6.1.2-1						
Reference	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
Test Type	Functional						
Test Status	Mandatory						
Requirement	Only one copy of	f broadcast, multicas	t and unkı	nov	vn destination MAC	address fr	ames should be
Description		gress UNIs on a MP					
Test Object		EN delivers a single vice frames to each					
Test Bed		C associating at least					E-VLAN ID is
Configuration	mapped to the EV	VC. Testers are attac	hed to all	UN	Is in the configured	EVCs.	
		INGRESS UN CE-VLAN ID	I 'A' EVC		EGRESS UNI CE-VLAN ID	·B' EVC	
		30	EVC ₁	{	30	EVC ₁	
		INGRESS UN	1	ł	50	LVC	
		CE-VLAN ID	EVC				
VLAN-ID/EVC Map							
		30	EVC ₁				
					permitted provided the IDs conforms to ME		
		Section 7.5.1.	CE-VLF	1 1N	IDS comornis to ME	2Г 1,	
		Section 7.5.1.					
		adcast, multicast and					
Test Procedure	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						
Variables		s. Number of UNIs. 1			E-VLAN IDs. Broad	dcast, mult	ticast, unknown
	destination MAC address frames. Frame lengths.						
Results	Pass or fail						
Remarks							

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	BSTRACT TEST	CASES FOR ET	HERNET	SE	ERVICES AT THE	UNI	
Test Name	Service Frame with	ith Invalid FCS Disc	card				
Test Definition ID	M.6.3.2-2	M.6.3.2-2					
Reference	MEF 1 Ethernet S	Services Model, Pha	ise 1				
Document Source							
Test Type	Functional						
Test Status	Mandatory						
Requirement	Service Frames w	vith an invalid FCS	MUST be a	dis	scarded by the MEN		
Description							
Test Object					re discarded by the N		
Test Bed	At least one EVC associating at least two UNIs is configured and at least one CE-VLAN ID is						
Configuration	mapped to the EVC. Testers are attached to all UNIs in the configured EVCs.						
VLAN-ID/EVC Map			EVC EVC ₁ LAN IDs is		EGRESS UNI CE-VLAN ID 40 Deermitted provided th IDs conforms to ME	EVC EVC ₁ nat	
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						
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 4: Service Frame with Invalid FCS Discard

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	st Case 5: Service Frame Discard Layer						
	BSTRACT TEST CASES FOR ETHERNET S						
Test Name	Service Frame Discard Layer 2 Control Protocol	S					
Test Definition ID	M.6.3.2-2						
Reference	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
Test Type	Functional						
Test Status	Mandatory						
Requirement	A MEN MUST discard Service Frames containing specific Layer 2 Control protocols when						
Description	configured to do so.						
Test Object	Verify that a MEN discards frames containing sp configured to do so.	pecific Layer 2 Control protocols when					
	At least one EVC associating at least two UNIs i	is configured and at least one CE VI AN ID for					
Test Bed	untagged and priority tagged Service Frames is i						
Configuration	UNIs in the configured EVCs.	happed to the EVC. Testers are attached to an					
	INGRESS UNI 'A'	EGRESS UNI 'B'					
	CE-VLAN ID EVC	CE-VLAN ID EVC					
	50° EVC ₁	50^{*} EVC ₁					
	Use of other CE-VLAN IDs is	1					
		CE-VLAN IDs conforms to					
	MEF 1, Section 7.5.1						
VLAN-ID/EVC Map							
	2. The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service						
		ed and priority tagged Service					
	Frames at that UNI.						
	* The CE-VLAN ID for untag						
	Service Frames is configured	to 50.					
	Tester offers frames containing Layer 2 Control	protocols to the EVCs at at least one UNI and					
Test Procedure	verifies that they are not delivered at any of the						
Units	Number of valid frames	01113.					
Units							
	MAC Addresses	Description					
	0x0180c2000000 through	Bridge Block of protocols					
	0x0180c200000f						
Variables	0x0180c2000020 through	GARP Block of protocols					
	0x0180c200002f	Critic Diote of protocols					
	0x0180c2000010	All Bridges Protocol					
	0.01002000010						
	Bridge Block of protocols, GARP Block of protocols, All Bridges Protocol are mandatory						
Results	Pass or fail	Jois, All Dhuges Flotocol are manuatory					
Remarks							

Test Case 5: Service Frame Discard Layer 2 Control Protocols

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	BSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI			
Test Name	Service Frame Conditional Delivery			
Test Definition ID	M.6.3.2-4			
Reference	MEF 1 Ethernet Services Model, Phase 1			
Document Source				
Test Type	Functional			
Test Status	Recommended			
Requirement	A MEN MUST deliver or discard Service Frames when conditions for their delivery are			
Description	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	UNI 'A'UNI 'B'CE-VLAN IDEVCCE-VLAN IDEVC60EVC1 60 EVC1 60 $EVC1$ Ge-VLAN IDEVC60EVC1 $1000000000000000000000000000000000000$			
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 6: Service Frame Conditional Delivery

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ABSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI Test Mame Service Frame Transparency Tag Exception 1 Test Definition ID M6.3.3-2 Reference MEF 1 Ethernet Services Model, Phase 1 Document Source Mandatory Requirement 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 Description 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 At least one EVC associating two or more UNIs is configured and a CE-VLAN ID for untagged former is somapped 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 INGRESS UNI 'A' EGRESS UNI 'B' Use of other CE-VLAN ID EVC; 100 EVC; 10* EVC; 100 EVC; VLAN-ID/EVC Map Tester offers untagged Service Frames at the ingress UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at the UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames at the UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames at the ingress UNI a		st case 7. Service France 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 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 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 INGRESS UNI 'A' CE-VLAN ID EVC 10* EGRESS UNI 'B' CE-VLAN ID EVC 10* VLAN-ID/EVC Map Tester offers untagged Service Frames at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * 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 VUNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multipoint). Number of service Frames at CE-VLAN IDs. Results Pass of fail					
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 INGRESS UNI 'A' CE-VLAN ID EVC 10* EGRESS UNI 'B' CE-VLAN ID EVC 100 Use of other CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 * The CE-VLAN ID to untagged and priority tagged Service Frames at that UNI. WLAN ID for untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI Number of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoin					
Document Source Image: Conformance Test Type Conformance 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 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 INGRESS UNI 'A' (CE-VLAN ID EVC) EGRESS UNI 'B' (CE-VLAN ID EVC) 10* EVC1 100 EVC1 10* The CE-VLAN ID at the ingress UNI is the					
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 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 INGRESS UNI 'A' CE-VLAN ID EVC 10* EGRESS UNI 'B' CE-VLAN ID EVC 100 VLAN-ID/EVC Map INGRESS UNI 'A' CE-VLAN ID EVC 10* EGRESS UNI 'B' CE-VLAN ID si 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 UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 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 Number of Valid frames Number of Valid frames Number of Valid frames Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multi		MEF 1 Ethernet Services Model, Phase 1			
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 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 INGRESS UNI 'A' CE-VLAN ID EVC 10* EGRESS UNI 'B' CE-VLAN ID EVC 100 VLAN-ID/EVC Map INGRESS UNI 'A' CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames at the ingress UNI is the CE- VLAN ID for untagged and priority tagged 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.	Document Source				
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 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 INGRESS UNI 'A' CE-VLAN ID Use of other CE-VLAN ID as is permitted provided that: 1. Configuration of the CE-VLAN ID sconforms to MEF 1, Section 7.5.1 2. The CE-VLAN ID as is permitted provided that: 1. Configuration of the CE-VLAN ID sconforms to MEF 1, Section 7.5.1 2. The CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI Units Number of VIIS. 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		Conformance			
Descriptionan IEEE 802.1Q Tag on egress but not on ingressTest ObjectVerify 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 ingressTest Bed ConfigurationAt 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 MapINGRESS UNI 'A' CE-VLAN ID 10*EGRESS UNI 'B' CE-VLAN ID EVC_1 100VLAN-ID/EVC MapInstruction of the CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI.* The CE-VLAN ID for untagged and priority tagged Service Frames at that UNI.Tester offers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI.VariablesNumber of UNIS. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multipoint). Number and values of CE-VLAN IDs.ResultsPass or fail	Test Status	Mandatory			
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 INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC CE-VLAN ID Use of other CE-VLAN ID is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF I, Section 7.5.1 VLAN-ID/EVC Map Tester offers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI * The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 * Tester offers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI Number of valid frames Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs. Pass or fail Pass or fail	Requirement	A MEN MUST recalculate the FCS of an egress Service Frame when that Service Frame has			
Service Frame has an IEEE 802.1Q Tag on egress but not on ingress 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 INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 100 EVC_1 Use of other CE-VLAN ID is permitted provided that: 1. Configuration of the CE-VLAN ID sconforms to MEF 1, Section 7.5.1 EGRESS UNI is the CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10 Test roffers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number of CE-VLAN IDs.	Description				
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 INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 100 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 EVC_1 2. The CE-VLAN ID for untagged and priority tagged Service Frames at that UNI. * The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames is configured to 10 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. Type of EVC (Point-to-Funt and Multipoint-to- Multipoint). Number of EVCs per UNI. Type of EVC (Point-to-Funt and Multipoint-to- Multipoint). Number of CE-VLAN IDs. Results Pass or fail	Test Object				
VLAN-ID/EVC MapCE-VLAN IDEVCCE-VLAN IDEVC10*EVC1100EVC1Use of other CE-VLAN IDs is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1Use of other CE-VLAN IDs conforms to MEF 1, Section 7.5.12. The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI.* The CE-VLAN ID for untagged and priority tagged Service Service Frames is configured to 10Test ProcedureTester offers untagged Service Frames at the ingress UNI and verifies that they are tagged and have a valid FCS at the egress UNISUII and verifies that they are tagged and have a valid FCS at the egress UNIVariablesNumber of UNIS. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint). Number and values of CE-VLAN IDs.ResultsPass or fail		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			
Test Procedure have a valid FCS at the egress UNI have a valid FCS at the egress UNI 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	VLAN-ID/EVC Map	CE-VLAN IDEVC10*EVC1100EVC1Use of other CE-VLAN IDs is permitted provided that:1.Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.12.The CE-VLAN ID at the ingress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI.* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 10			
VariablesNumber of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multipoint). Number and values of CE-VLAN IDs.ResultsPass or fail		have a valid FCS at the egress UNI			
Variables Multipoint). Number and values of CE-VLAN IDs. Results Pass or fail	Units				
	Variables				
Remarks	Results	Pass or fail			
	Remarks				

Test Case 7: Service Frame Transparency Tag Exception 1

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	Test Case 6. Service Frame Transparency Tag Exception 2				
	BSTRACT 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	MEF 1 Ethernet Services Model, Phase 1				
Document Source					
Test Type	Conformance				
Test Status	Mandatory				
Requirement	A MEN MUST recalculate the FCS of an egress Service Frame when that Service Frame has an				
Description	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	INGRESS UNI 'A'CE-VLAN IDEVC200EVC1CE-VLAN IDEVC120*EVC120*EVC1Use of other CE-VLAN IDs is permitted provided that: 1. Configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1EVC12.The CE-VLAN ID at the egress UNI is the CE- VLAN ID for untagged and priority tagged Service Frames at that UNI.* The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 20				
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 8: Service Frame Transparency Tag Exception 2

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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 MEF 1 Ethernet Services Model, Phase 1 Document Source Mandatory Test Type Conformance Test Status Mandatory Requirement 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. 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. 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 Frame soffered by the tester on the configured EVCs. The MEN is 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 identifies the CE-VLAN ID EVC 30 EVC1 30 EVC1 30 EVC1 EGRESS UNI *B' EGRESS UNI *B' VLAN-ID/EVC Map Test offers tagged Service Frames at the ingress UNI and verifies that the Service Frames are tagged with different contents to the ingress to the configuration of the CE-VLAN ID EVC1 300 EVC1 <tr< th=""><th></th><th></th><th></th><th>-</th><th></th><th></th><th></th><th></th></tr<>				-				
Test Definition ID M.6.3.3-4 Reference MEF 1 Ethernet Services Model, Phase 1 Document Source Test Type Test Type Conformance Test Status Mandatory 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. 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. 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. The MEN is 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 identifies the CE-VLAN and/or the portion of the CE-VLAN Tag that contains the user priority bits. VLAN-ID/EVC Map INGRESS UNI 'A' EGRESS UNI 'B' 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 Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to-Multipoint). Number and values of CE-VLAN IDs						ERVICES AT THE	UNI	
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. 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. 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 identifies the CE-VLAN ID EVC 300 EVC1 Use of other CE-VLAN IDs is permitted provided that configuration of the 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 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			ransparency TAG E	xception 3				
Document Source Image: Conformance Test Type Conformance 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 ID EVC 30 EVC, 100 EVC								
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. 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. 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 identifies the CE-VLAN and/or the portion of the CE-VLAN Tag that identifies the CE-VLAN into EVC 300 VLAN-ID/EVC Map INGRESS UNI 'A' EGRESS UNI 'B' 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 Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multipoint). Number and values of CE-VLAN IDs		MEF 1 Ethernet	MEF 1 Ethernet Services Model, Phase 1					
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Test Bed Configurationare 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 MapINGRESS UNI 'A' CE-VLAN ID 30EGRESS UNI 'B' CE-VLAN ID Section 7.5.1.Test Procedure unitsTester 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. Number of Valid framesVariablesNumber of Valid framesResultsPass or fail								
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VLAN-ID/EVC MapCE-VLAN ID 30EVC EVC1CE-VLAN ID EVC 300EVC EVC1Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.Evc Section 7.5.1Test ProcedureTester 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.UnitsNumber of valid framesVariablesNumber of UNIs. Number of EVCs per UNI. Type of EVC (Point-to-Point and Multipoint-to- Multipoint). Number and values of CE-VLAN IDsResultsPass or fail			INGRESS UN	I 'A'	1	EGRESS UN	[' B'	
30 EVC1 300 EVC1 Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1. 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					ł			
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Test Procedure 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	VLAN-ID/EVC Map	Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1,						
Test Procedure 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								
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Variables Multipoint). Number and values of CE-VLAN IDs Results Pass or fail	Units							
	Variables	Multipoint). Nun					Point and 1	Multipoint-to-
Remarks	Results	Pass or fail						
	Remarks							

Test Case 9: Service Frame Transparency Tag Exception 3

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	BSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI						
Test Name	CE-VLAN ID Preservation Untagged						
Test Definition ID	M.6.4.1-1						
Reference	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
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	INGRESS UNI 'A'EGRESS UNI 'B'CE-VLAN IDEVCCE-VLAN IDEVC 10^* EVC1 10^* EVC1Use 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 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 10: CE-VLAN ID Preservation Untagged

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	Test Case									
			HERNET S	ERVICES AT THE	UNI					
Test Name	CE-VLAN ID Preservation Tagged									
Test Definition ID		M.6.4.1-1								
Reference	MEF 1 Ethernet	Services Model, Pha	ase 1							
Document Source										
Test Type		Conformance								
Test Status		Mandatory								
Requirement		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								
Description	ingress and egres		II ILLE 002.	IQ Tags with VLAN	1DS that a	re equal at the				
				h contain IEEE 802.						
Test Object			ss UNIs whe	n an EVC with CE-V	/LAN ID I	Preservation				
	associates two or									
				is configured and at l						
- (- 1				NIs in the configured						
Test Bed				ain IEEE 802.1Q Tag						
Configuration				the MEN is configur						
			n IEEE 802.1	IQ Tags with null VI	LAN IDS O	n an EVC				
	associating two o	or more Unis.								
		INGRESS UN	T (A)	EGRESS UN	I (D)					
		CE-VLAN ID	EVC	CE-VLAN ID	EVC					
		10*	EVC EVC ₁	10*	EVC ₁					
		40	<u> </u>	40	-					
			EVC ₂		EVC ₂					
				permitted provided t						
			I the CE-VL	AN IDs conforms to	MEF 1,					
VLAN-ID/EVC Map			ID mannad t	Section 7.5.1.						
	2. The CE-VLAN ID mapped to EVC ₁ at the ingress and egress UNIs is the CE-VLAN ID for untagged and priority									
	tagged Service Frames at those UNIs.									
			CE-VLAN	ID for untagged and						
		tagged Service Fra	CE-VLAN I mes at those	ID for untagged and UNIs.	priority					
		tagged Service Fra * The CE-VLAN	CE-VLAN I times at those ID for untage	ID for untagged and UNIs. ged and priority tagg	priority ed					
		tagged Service Fra * The CE-VLAN Service Frames is	CE-VLAN I times at those ID for untage	ID for untagged and UNIs.	priority ed					
		tagged Service Fra * The CE-VLAN	CE-VLAN I times at those ID for untage	ID for untagged and UNIs. ged and priority tagg	priority ed					
		tagged Service Fra * The CE-VLAN Service Frames is	CE-VLAN I times at those ID for untage	ID for untagged and UNIs. ged and priority tagg	priority ed					
	Tester offers tags	tagged Service Fra * The CE-VLAN Service Frames is egress UNIs.	CE-VLAN umes at those ID for untagg configured to	ID for untagged and UNIs. ged and priority tagg	priority ed ind	AN ID is				
Test Procedure		tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames	CE-VLAN I imes at those ID for untagg configured to to the ingres	ID for untagged and b UNIs. ged and priority tagg to 10 at both ingress a	priority ed ind at the VL4					
Test Procedure	preserved at the of the null CE-VLA	tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames egress UNI. Priority N ID.	CE-VLAN I imes at those ID for untagg configured to to the ingres	ID for untagged and UNIs. ged and priority tagg to 10 at both ingress a s UNI and verifies th	priority ed ind at the VL4					
Test Procedure Units	preserved at the e the null CE-VLA Number of valid	tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames egress UNI. Priority N ID. frames	CE-VLAN I umes at those ID for untage configured to to the ingres y tagged Serv	ID for untagged and UNIs. ged and priority tagg to 10 at both ingress a s UNI and verifies the vice Frames MUST b	priority ed and at the VLA	d tagged with				
Units	preserved at the ethe null CE-VLA Number of valid Number of UNIs	tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames egress UNI. Priority N ID. frames . Number of EVCs J	CE-VLAN I umes at those ID for untagg configured to to the ingres y tagged Serv per UNI. Typ	ID for untagged and b UNIs. ged and priority tagg o 10 at both ingress a s UNI and verifies th vice Frames MUST b pe of EVC (Point-to-	priority ed and at the VLA	d tagged with				
Units Variables	preserved at the of the null CE-VLA Number of valid Number of UNIs Multipoint). Nun	tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames egress UNI. Priority N ID. frames	CE-VLAN I umes at those ID for untagg configured to to the ingres y tagged Serv per UNI. Typ	ID for untagged and b UNIs. ged and priority tagg o 10 at both ingress a s UNI and verifies th vice Frames MUST b pe of EVC (Point-to-	priority ed and at the VLA	d tagged with				
Units	preserved at the ethe null CE-VLA Number of valid Number of UNIs	tagged Service Fra * The CE-VLAN I Service Frames is egress UNIs. ged Service Frames egress UNI. Priority N ID. frames . Number of EVCs J	CE-VLAN I umes at those ID for untagg configured to to the ingres y tagged Serv per UNI. Typ	ID for untagged and b UNIs. ged and priority tagg o 10 at both ingress a s UNI and verifies th vice Frames MUST b pe of EVC (Point-to-	priority ed and at the VLA	d tagged with				

Test Case 11: CE-VLAN ID Preservation Tagged

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Δ	BSTRACT TEST	CASES FOR FT	HERNET	SE	RVICES AT THE	UNI		
Test Name	CE-VLAN CoS							
Test Definition ID	M.6.4.2-1							
Reference		Services Model, Ph	ase 1					
Document Source		,						
Test Type	Conformance							
Test Status	Mandatory							
Requirement Description	deliver Service F	When an EVC with CE-VLAN CoS Preservation associates two or more UNIs, the MEN MUST leliver 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	equal at the ingre two or more UN	ess and egress UNIs Is.	when an E	VC	contain IEEE 802. C with CE-VLAN C	oS Preserv	vation associates	
Test Bed Configuration	mapped to the EV configured to del	VC. Testers are atta liver Service Frame	ched to all s which co	UN ntai	s configured and at l Ils in the configured in IEEE 802.1Q Tag ues for CoS are 0 to	l EVCs. The second s	he MEN is	
VLAN-ID/EVC Map		configuration of th Section 7.5.1.	EVC EVC ₁ /LAN IDs ne CE-VLA	N	EGRESS UN CE-VLAN ID 60 permitted provided t IDs conforms to M	EVC EVC ₁ hat EF 1,		
Test Procedure	Tester offers tagg preserved at the e		at the ingr	ess	UNI and verifies th	at the CE-	VLAN CoS is	
Units	Number of valid							
Variables	Multipoint). Nun				e of EVC (Point-to- s. Number and value			
Results	Pass or fail							
Remarks								

Test Case 12: CE-VLAN CoS Preservation

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	Test Case 15: EVC Layer 2 Control Protocol Processing						
	BSTRACT TEST CASES FOR ETHERNET SERVICES AT THE UNI						
Test Name	EVC L2 Control Protocol Processing						
Test Definition ID	M.6.5-1						
Reference	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
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							
VLAN-ID/EVC Map Test Procedure	INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC1 10* EVC1 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. 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.						
VLAN-ID/EVC Map	INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC1 10* EVC1 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. 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. Number of valid frames Image: Service Frames						
VLAN-ID/EVC Map Test Procedure	INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC1 10* EVC1 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. 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.						
VLAN-ID/EVC Map Test Procedure	INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC1 10* EVC1 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. 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. Number of valid frames Image: Service Frames						
VLAN-ID/EVC Map Test Procedure Units	Outrol protocols. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC 10* EVC 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. 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. Number of valid frames Description						
VLAN-ID/EVC Map Test Procedure	Outrol protocols. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC 10* EVC 10* EVC 10* EVC 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. 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. Number of valid frames MAC Addresses Description 0x0180c2000000 through 0x0180c200000f Bridge Block of protocols						
VLAN-ID/EVC Map Test Procedure Units	Control protocols. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC1 10* EVC1 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. 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. Number of valid frames MAC Addresses Description 0x0180c2000000 through 0x0180c2000002f GARP Block of protocols 0x0180c2000010 All Bridges Protocol						
VLAN-ID/EVC Map Test Procedure Units Variables	Control protocols. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC1 10* EVC1 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. * 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. Number of valid frames MAC Addresses Description 0x0180c2000000 through 0x0180c200002f GARP Block of protocols 0x0180c2000010 All Bridges Protocol						
VLAN-ID/EVC Map Test Procedure Units	Control protocols. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC 10* EVC1 10* EVC1 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. 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. Number of valid frames MAC Addresses Description 0x0180c2000000 through 0x0180c2000002f GARP Block of protocols 0x0180c2000010 All Bridges Protocol						

Test Case 13: EVC Layer 2 Control Protocol Processing

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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

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Test Case 14: UNI Physical Layer

AF	BSTR	ACT TEST	CASES FOR ET	HERNET	SE	RVICES AT THE	UNI		
Test Name	UNI	UNI Physical Layer							
Test Definition ID	M.7	.2							
Reference	ME	F 1 Ethernet S	ervices Model, Ph	ase 1					
Document Source									
Test Type		formance							
Test Status		landatory							
Requirement Description	Phys 1 Gł	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	Test	Verify that a UNI is equipped with at least one of the combinations listed as Variables in this Test Case.							
Test Bed Configuration			ting two UNIs is co attached to the UN			at least one CE-VL. gured EVC.	AN ID is 1	mapped to th	e
VLAN-ID/EVC Map			configuration of the Section 7.5.1.	ne CE-VLA	AN	UNI 'B' CE-VLAN ID 10 Dermitted provided the IDs conforms to MH	EF 1,		
Test Procedure			ice Frames bidirec Illy delivered by th			h UNI configured in other UNI	the EVC	and verifies	that
Units		ber of valid f			anc.				
0	1,011								
		Speed	Mode	P	hv	sical Medium			1
		10 Mbps	Full duplex						
Variables		100 Mbps	Full duplex						
		10/100 Mbp				Ethernet physical me		atible with	
		1 Gbps	Full duplex	S	- Speed and Mode listed in [5].				
		I GUDS	I'un uupica						
		10 Gbps	Full duplex						
Results	Pass	-	1						

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Test Case 15: UNI MAC Layer

A	BSTRACT TEST	CASES FOR ET	HERNET	S	ERVICES AT THE	UNI	
Test Name	UNI MAC Layer	•					
Test Definition ID	M.7.3						
Reference	MEF 1 Ethernet	Services Model, Pha	ase 1				
Document Source							
Test Type	Conformance	Conformance					
Test Status	Mandatory	Aandatory					
Requirement	A UNI MUST su	apport the IEEE 802	.3-2002 fr	am	e formats.		
Description							
Test Object		I supports the IEEE					
Test Bed					s configured and at l		E-VLAN ID is
Configuration	mapped to the E	VC. Testers are attac	ched to all	Uľ	NIs in the configured	l EVCs.	
				-			
		UNI 'A'		4	UNI 'B'	1	
		CE-VLAN ID	EVC		CE-VLAN ID	EVC	
		400	EVC ₁		400	EVC ₁	
		10*	EVC ₂		10*	EVC ₂	
					permitted provided t		
VLAN-ID/EVC Map		U	e CE-VL	AN	IDs conforms to MI	EF 1,	
		Section 7.5.1.	-				
	* The CE-VLAN ID for untagged and priority tagged						
	Service Frames is configured to 10 at both ingress and						
		egress UNIs.					
	Tester offers Ser	vice Frames with IF	EE 802 3	.20	02 frame formats at	each UNL	configured in the
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						
restriededuie	UNIs.		unies are s	ucc	costany derivered b	y the willi	at the other
Units	Number of valid	frames					
			02.3-2002	2 Se	ervice Frames with a	range of f	rame lengths as
Variables					ority tagged frames.		
					nd Multipoint-to-Mu		
	values of CE-VL				1	1	
Results	Pass or fail						
Remarks							

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	st case 10. Otti Sei vice iviutipiexing of 1 onit-to-1 onit E v Cs					
	BSTRACT 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	MEF 1 Ethernet Services Model, Phase 1					
Document Source						
Test Type	Conformance					
Test Status	Mandatory					
Requirement	A UNI with the Service Multiplexing attribute MUST be configurable to support multiple					
Description	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	UNI 'A'CE-VLAN IDEVC400 EVC_1 410 EVC_2 UNI 'C'CE-VLAN IDEVC410 EVC_2 UNI 'C' EVC_2 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 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 16: UNI Service Multiplexing of Point-to-Point EVCs

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

Δ		CASES FOR ET		6						
Test Name						UNI				
Test Definition ID	M.7.4	UNI Service Multiplexing of Multipoint-to-Multipoint EVCs								
Reference										
Document Source	MEF I Ethernet	MEF 1 Ethernet Services Model, Phase 1								
Test Type	Conformance	7								
Test Status	Mandatory	Conformance								
Requirement		Service Multiplexing	- attributa	м	IST he configurable	to anno a	multinla			
Description	Multipoint-to-M		g attribute	IVI	USI de configurada	e to support	. multiple			
Description		I with the Service M	Intintaria	~ ~	ttribute can be confi	aured to au	nn out multinlo			
Test Object	Multipoint-to-M	ultipoint EVCs.	-	-		-				
Test Bed	At least two Mul	ltipoint-to-Multipoin	t EVCs ar	e c	onfigured associatin	g at least a	single UNI to			
Configuration		r UNIs and at least o			NID is mapped to ea	ach of the E	VCs. Testers			
	are attached to a	ll UNIs in the config	ured EVC	s.						
				1						
		UNI 'A'		ļ	UNI 'B'					
		CE-VLAN ID	EVC	ļ	CE-VLAN ID	EVC				
		400	EVC ₁		400	EVC ₁				
		410	EVC ₂	1	410	EVC ₂				
		UNI 'C'	-			÷				
VLAN-ID/EVC Map		CE-VLAN ID	EVC							
		400	EVC ₁							
		410	EVC ₂	1						
		Use of other CE-V	LAN IDs	is p	permitted provided t	hat				
		configuration of th	e CE-VLA	٩N	IDs conforms to MI	EF 1,				
	Section 7.5.1.									
	Tester offers Service Frames into the EVCs configured at the ingress UNIs and verifies that they									
Test Procedure	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									
Variables	Number of Multi IDs.	ipoint-to-Multipoint	EVCs. Nu	ımt	per of UNIs. Numbe	r and value	s of CE-VLAN			
Results	Pass or fail									
Remarks										
	•									

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

	Bei vice main	8			*		
					ERVICES AT THE		
Test Name	UNI Service Multiplexing of Point-to-Point and Multipoint-to-Multipoint EVCs						
Test Definition ID	M.7.4						
Reference	MEF 1 Ethernet	Services Model, Pha	ise 1				
Document Source							
Test Type	Conformance						
Test Status	Mandatory						
Requirement	A UNI with the S	Service Multiplexing	g attribute	M	UST be configurable	to suppor	t multiple Point-
Description		ltipoint-to-Multipoin			-		-
Test Object	Verify that a UN	I with the Service M	lultiplexin	ng a	ttribute can be confi	gured to su	upport multiple
Test Object		nd Multipoint-to-Mu					
					figured associating a		
Test Bed					ating two UNIs at lea		
Configuration					E-VLAN ID is mapp	ed to each	of the EVCs.
	Testers are attach	ned to all UNIs in the	e configu	ed	EVCs.		
				_			
		UNI 'A']	UNI 'B'		
		CE-VLAN ID	EVC		CE-VLAN ID	EVC	
		400	EVC ₁	J	400	EVC ₁	
		410	EVC ₂	1	410	EVC ₂	
		UNI 'C'	-			•	
VLAN-ID/EVC Map		CE-VLAN ID	EVC	1			
		410	EVC ₂	1			
		110	-	is r	permitted provided the	nat	
	configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.						
	Sector 7.5.1.						
	Tester offers Ser	vice Frames into the	EVCs co	nfig	gured at the ingress U	JNIs and v	verifies that they
Test Procedure					per EVC at the egres		
		ce Frames should be					
Units	Number of valid						
Variables	Number of Point	-to-Point and Multip	oint-to-M	lulti	ipoint EVCs. Numbe	er of UNIs	. Number and
Variables	values of CE-VL				-		
Results	Pass or fail						
Remarks							
	•						

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

ΔΕ	BSTRACT 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	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
Test Type	Conformance						
Test Status	Mandatory						
	When the CE-VLAN ID Preservation Service Attribute is not in force for an EVC, egress						
Requirement	Service Frames with the CE-VLAN ID value for untagged and priority tagged Service Frames						
Description	MUST be untagged.						
	Verify that when the CE-VLAN ID Preservation Service Attribute is not in force for an EVC,						
Test Object	egress Service Frames with the CE-VLAN ID value for untagged and priority tagged Service						
	Frames are untagged at the egress UNI.						
	At least one EVC associating at least two UNIs is configured for which the CE-VLAN ID						
Test Bed	Preservation Service Attribute is not in force and two CE-VLAN IDs are mapped to the EVC,						
Configuration	one for untagged and priority tagged frames. Testers are attached to all UNIs in the configured	l					
	EVCs.						
	INGRESS UNI 'A' EGRESS UNI 'B'						
	CE-VLAN IDEVCCE-VLAN IDEVC						
	$50 \qquad EVC_1 \qquad 10^* \qquad EVC_1$						
	Use of other CE-VLAN IDs is permitted provided that:						
	1. Configuration of the CE-VLAN IDs conforms to MEF 1,						
VLAN-ID/EVC Map	Section 7.5.1.						
VLAN-ID/EVC Map	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.						
	Tester offers tagged, untagged and priority tagged Service Frames to the ingress UNI and						
Test Procedure	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 II)s.					
Results	Pass or fail						
Remarks							

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

Α	BSTRACT TEST	CASES FOR ETH	HERNET	SE	ERVICES AT THE	UNI	
Test Name	CE-VLAN ID/EVC Map Service Frame Discard						
Test Definition ID	M.7.6.1-3	*					
Reference	MEF 1 Ethernet S	Services Model, Pha	se 1				
Document Source							
Test Type	Conformance						
Test Status	Mandatory						
Requirement Description	VLAN ID, any in VLAN ID MUST	gress Service Frame be discarded by the	e at the UN e MEN.	۱Ì י	does not contain an with this instance of	the map w	with this CE-
Test Object	given CE-VLAN this CE-VLAN II	ID, any ingress Ser D is discarded by the	vice Frame e MEN.	e a	/EVC Map does not t the UNI with this in	nstance of	the map with
Test Bed					configured and at le		E-VLAN ID is
Configuration	mapped to the EV	C. Testers are attac	hed to all	UN	Is in the configured	EVCs.	
VLAN-ID/EVC Map	mapped to the EVC. Testers are attached to all UNIs in the configured EVCs. INGRESS UNI 'A' EGRESS UNI 'B' CE-VLAN ID EVC CE-VLAN ID EVC 400 EVC1 400 EVC1 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						
Variables		Number of EVCs plues of C			e of EVC (Point-to-I s.	Point and 1	Multipoint-to-
Results	Pass or fail						
Remarks							

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Test Case 21: UNI EVC Support

A	BSTRACT TEST	CASES FOR ET	HERNET	SE	ERVICES AT THE	UNI	
Test Name	UNI EVC Suppo	UNI EVC Support					
Test Definition ID	M.7.7						
Reference	MEF 1 Ethernet	Services Model, Pha	ase 1				
Document Source							
Test Type	Conformance						
Test Status	Mandatory						
Requirement	A UNI supports a	at least one EVC.					
Description							
Test Object		I can support at leas					
Test Bed					ed and at least one C	CE-VLAN	ID is mapped to
Configuration	the EVC. Testers	are attached to all	UNIs in the	e co	onfigured EVCs.		
VLAN-ID/EVC Map	UNI 'A'UNI 'B'CE-VLAN IDEVCCE-VLAN IDEVC 500 EVC1 500 EVC1Use of other CE-VLAN IDs is permitted provided that configuration of the CE-VLAN IDs conforms to MEF 1, Section 7.5.1.Section 7.5.1.						
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					e of EVC (Point-to-	Point and I	Multipoint-to-
		nber and values of C	CE-VLAN I	[D	S.		
Results	Number of EVCs	s equal to 0 or 1.					
Remarks							

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A	BSTRACT TEST CASES FOR ETHERNET	SERVICES AT THE UNI				
Test Name	Maximum Number of EVCs					
Test Definition ID	M.7.7					
Reference	MEF 1 Ethernet Services Model, Phase 1					
Document Source						
Test Type	Conformance					
Test Status	Optional					
Requirement	A UNI supports a maximum number of EVCs	greater than one.				
Description						
Test Object	Determine the maximum number of EVCs that					
Test Bed	Multiple EVCs associating at least two UNIs a					
Configuration	mapped to the EVCs. Testers are attached to al	l UNIs in the configured EVCs.				
VLAN-ID/EVC Map	UNI 'A' CE-VLAN ID EVC 2 to 4095 EVCs ₂₋₄₀₉₅	UNI 'B' CE-VLAN ID EVC 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. T	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 22: Maximum Number of EVCs

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Remarks

A	BSTRAC	T TEST CASES	FOR ETHERNET	SE	RVICES AT THE	UNI			
Test Name	UNI Bundling and CE-VLAN ID Preservation								
Test Definition ID	M.7.8-1								
Reference	MEF 1 E	thernet Services M	lodel, Phase 1						
Document Source									
Test Type	Conformation	ance							
Test Status	Mandator	ry							
Requirement	A UNI w	hich supports bund	iling MUST be con	nfig	urable so that more	than one CE-VLA	N ID		
Description		to an EVC at the U							
Test Object			pports bundling is c	onf	igurable so that mo	re than one CE-V	LAN ID		
		to an EVC at the U							
Test Bed			t two UNIs is config						
Configuration			ore CE-VLAN ID is			al EVC association	ng the		
g	same UN	Is. Testers are atta	ched to all UNIs in	the	configured EVCs.				
	UNI 'A'		4	UNI 'B'					
		CE-VLAN ID	EVC	4	CE-VLAN ID	EVC			
		600	EVC ₁		600	EVC ₁			
VLAN-ID/EVC Map		610	EVC ₁		610	EVC ₁			
		700	EVC ₂		700	EVC ₂			
		Use of other CE-	VLAN IDs is perm	itte	d provided that con	figuration of the			
	CE-VLAN IDs conforms to MEF 1, Section 7.5.1.								
			s bidirectionally wi						
Test Procedure	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.						
Unite	Number of valid frames								
Units									
Variables	Number of	of UNIs. Number of	of EVCs per UNI. T			Point and Multipo	int-to-		
Variables	Number o Multipoir	of UNIs. Number of the of UNIs. Number and values of the other and values of the other and values of the other other of the other o	of EVCs per UNI. T alues of CE-VLAN			Point and Multipo	int-to-		
	Number of	of UNIs. Number of the of UNIs. Number and values of the other and values of the other and values of the other other of the other o				Point and Multipo	int-to-		

Test Case 23: UNI Bundling

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

٨	BSTRACT TEST CASES FOR ETHERNET S						
Test Name							
Test Definition ID	M.7.9-1	JNI All to One Bundling and CE-VLAN ID Preservation					
Reference							
	MEF 1 Ethernet Services Model, Phase 1						
Document Source							
Test Type	Conformance						
Test Status	Mandatory						
Requirement	When a UNI has the All to One Bundling attribu						
Description	EVC at the UNI and the list of CE-VLAN IDs m UNI in the EVC.	apped to the EVC MUST be the same at each					
	Verify that when a UNI has the All to One Bund	ling attribute, all CE-VLAN IDs are mapped to					
Test Object	a single EVC at the UNI and the list of CE-VLA						
	UNI in the EVC.						
Test Bed	An EVC associating at least two UNIs is configu	ared and two or more CE-VLAN IDs are					
Configuration	mapped to the EVC. All CE-VLAN IDs MUST	be mapped to the same EVC. Testers are					
Configuration	attached to all UNIs in the configured EVCs.						
	UNI 'A'	UNI 'B'					
	CE-VLAN ID EVC	CE-VLAN ID EVC					
	$600 ext{ EVC}_1$	$600 ext{ EVC}_1$					
VLAN-ID/EVC Map	610 EVC_1	610 EVC ₁					
	Use of other CE-VLAN IDs is permit	ted provided that configuration of the					
	CE-VLAN IDs conforms to MEF 1, Section 7.5.1.						
	Testers offer Service Frames with all possible CE-VLAN ID values into the EVC at each UNI						
Test Procedure	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	l.					
Units	Number of valid frames						
Variables	Number of UNIs. Number of EVCs per UNI. Ty	pe of EVC (Point-to-Point and Multipoint-to-					
	Multipoint). Number.						
Results	Pass or fail						
Remarks							

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Test Case 25: UNI Layer 2 Control Protocols Processing Discard

Α	BSTRACT TEST	CASES FOR ET	HERNET	SE	ERVICES AT THE	UNI		
Test Name		ntrol Protocols Proce				••••		
Test Definition ID	M.7.12.1							
Reference		Services Model, Pha	ise 1					
Document Source		,						
Test Type	Functional							
Test Status	Mandatory							
Requirement Description	MUST NOT gen protocols when c	erate any egress Ser onfigured to do so	vice Frame	es c	g specific Layer 2 Co containing the specif	ic Layer 2	2 Control	
Test Object	generate any egre configured to do	ess Service Frames c so	containing	the	pecific Layer 2 Cont e specific Layer 2 Co	ontrol prot	ocols when	
Test Bed					configured and at le		E-VLAN ID is	
Configuration	mapped to the E	VC. Testers are attac	hed to all	UN	Is in the configured	EVCs.		
		INGRESS UNI 'A CE-VLAN ID	EVC		EGRESS UNI 'B' CE-VLAN ID	EVC		
VLAN-ID/EVC Map	50*EVC150*EVC1Use 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.ID The CE-VLAN ID for untagged and priority tagged Service Frames is configured to 50 since only untagged frames carry Layer 2 Control protocols.EVC1							
Test Procedure	they are not delive	vered at any of the eg			rotocols at the ingres	s UNIs ar	d verify that	
Units	Number of valid	frames						
		MAC Addresses 0x0180c2000000 t	hrough		Description Bridge Block of prot	tocols		
Variables		0x0180c200000f 0x0180c2000020 t 0x0180c200002f	hrough		GARP Block of prot			
		0x0180c2000010			All Bridges Protocol			
		protocols, GARP Bl	ock of pro	toc	cols, All Bridges Pro	tocol are r	nandatory.	
Results	Pass or fail							
Remarks								

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Test Case 26: UNI Layer 2 Control Protocols Processing	Peer
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		U U			ERVICES AT THE			
Test Name	1							
Test Definition ID	M.7.12.2	UNI Layer 2 Control Protocols Processing Peer						
Reference		Services Model, Pha	ise 1					
Document Source	WILL I Luiemet	bervices widder, i na	130 1					
Test Type	Functional							
Test Status	Mandatory							
Requirement		act as a peer of the C	E in the or	nei	ation of specific Lay	ver 2 Control pr	otocols	
Description	when configured			6 -		· · · · · I		
Test Object			f the CE in	th	e operation of specif	ic Layer 2 Cont	trol	
-		configured to do so						
Test Bed					configured and at le		AN ID is	
Configuration	mapped to the E	VC. Testers are attac	ched to all	UN	NIs in the configured	EVCs.		
		NODECC INT (ECDECC INIT (7)			
		INGRESS UNI 'A			EGRESS UNI 'B'			
		CE-VLAN ID	EVC		CE-VLAN ID	EVC		
		50*	EVC ₁		50*	EVC ₁		
	Use of other CE-VLAN IDs is permitted provided that:							
	Configuration of the CE-VLAN IDs conforms to MEF 1,							
VLAN-ID/EVC Map	Section 7.5.1							
VLAN-ID/EVC Map	The CE-VLAN ID at the ingress UNI is the CE-VLAN ID							
	for untagged and priority tagged Service Frames at that							
	UNI. * The CE-VLAN ID for untagged and priority tagged							
	Service Frames is configured to 50 since only untagged frames carry Layer 2 Control protocols.							
	frames carry Layer 2 Control protocols.							
	Testers offer fram	nes containing Laye	r 2 Control	l p	rotocols to the ingres	s UNIs and mo	nitor the	
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						
				_				
		MAC Addresses			Description			
		0x0180c2000000	hrough		Bridge Block of prot	ocols		
Variables		0x0180c200000f						
valiables		0x0180c2000020	hrough		GARP Block of prot	ocols		
		0x0180c200002f						
		0x0180c2000010			All Bridges Protocol			
	Bridge Block of	protocols, GARP Bl	ock of pro	too	cols, All Bridges Pro	tocol are manda	tory.	
Results	Pass or fail	-	•					
Remarks								
	•							

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10. Security

Security issues are not addressed in this document.

11. References

Reference	Reference Details	
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[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, <u>http://www.ietf.org/rfc/rfc2119.txt</u> (Normative)	
[7] RFC 2285	RFC 2285, "Benchmarking Terminology for LAN Switching Devices", R. Mandeville, <u>http://www.ietf.org/rfc/rfc2285.txt</u>	
[8] RFC 2544	RFC 2544, "Benchmarking Methodology for Network Interconnect Devices", S. Bradner, J. McQuaid, <u>http://www.ietf.org/rfc/rfc2544.txt</u>	
[9] RFC 2889	RFC 2889, "Benchmarking Methodology for LAN Switching Devices", R. Mandeville, J. Perser, <u>http://www.ietf.org/rfc/rfc2889.txt</u>	

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