

Test Plan for Circuit Emulation Services Over Ethernet



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1 Introduction

1.1 Abstract

This document defines detailed procedures for testing circuit emulation of Plesiochronous Digital Hierarchy (PDH) Services across Carrier Ethernet Networks. The test procedures for the emulation of DS1, E1, DS3, E3 and Nx64 kbit/s circuits are based on MEF 18 *Abstract Test Suite for Circuit Emulation Services over Ethernet*.

1.2 Structure of Document

This document is structured as follows:

- Section 1: Describes the abstract, structure of the document and scope. It also provides definitions, abbreviations, compliance levels and references.
- Section 2: Describes the CESoETH Service Frames.
- Section 3: Provides information on the different kinds of emulation, encapsulation and signaling methods.
- Section 4: Defines the minimum requirements for input Jitter and Wander.
- Section 5: Provides an overview of all CESoETH Test cases.
- Section 6: Describes the requirements and test procedures for CES over Ethernet - DS1.
- Section 7: Describes the requirements and test procedures for CES over Ethernet - E1.
- Section 8: Describes the requirements and test procedures for CES over Ethernet - DS3.
- Section 9: Describes the requirements and test procedures for CES over Ethernet - E3.

1.3 Scope

The test procedures defined in this document are based on MEF 18 *Abstract Test Suite for Circuit Emulation Services over Ethernet* and the requirements are derived from MEF 8 *Implementation Agreement for the Emulation of PDH Circuits* sections 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 and 9.1, 9.2.

Section 6.2 of MEF 8 defines the CESoETH encapsulation including the Ethernet services layer and the adaptation function headers such as the Emulated Circuit Identifier (ECID), the CESoETH control word and the RTP header. Section 6.3 defines the payload formats for structure-agnostic emulation, structure-aware emulation using structure-locked encapsulation and structure-aware emulation using structure-indicated encapsulation. Section 6.4 defines synchronization requirements, section 6.5 defines the TDM application signaling requirements, section 6.6 defines the CESoETH defects, section 6.7 defines performance monitoring and sections 9.1 and 9.2 define alarms and statistics counters requirements.

Together with the Test Plan for Ethernet Services at the UNI based on MEF 9 and the Test Plan for Traffic Management Phase 1 based on MEF 14, the Test Plan for Circuit Emulation Services over Ethernet provides a comprehensive set of test cases to determine the readiness of a Carrier Ethernet Network to deliver various Services, such as Ethernet Line (E-Line), TDM Line (T-Line) and Ethernet LAN (E-LAN) Services.

Vendors can refer to such requirements and test procedures in the development and commercial cycles of their products and service providers can refer to them to ensure that the Services they deploy on their Carrier Ethernet Network meet certain well-defined functionality, conformance and performance criteria.

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.

1.4 Definitions and Abbreviations

AAL1	ATM Adaptation Layer 1
AIS	Alarm Indication Signal
CAS	Channel Associated Signaling
CE	Customer Edge
CESoETH	Circuit Emulation Services over Ethernet
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
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 Service Frame that is either tagged or priority tagged
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 Tag	The IEEE 802.1Q Tag in a tagged Service Frame
CE-VLAN CoS	Customer Edge VLAN CoS
ECID	Emulated Circuit Identifier
Egress Service Frame	A Service Frame sent from the Service Provider network to the CE
ESF	Extended Super Frame
EVC	Ethernet Virtual Connection
Ethernet Virtual Connection	An association of two or more UNIs that limits the exchange of Service Frames to UNIs in the Ethernet Virtual Connection
FCS	Frame Check Sequence
FDL	Facility Data Link
IWF	Inter-Working Function
LOS	Loss of Signal
LOFS	Loss of Frames State
MAC	Medium Access Control
MRTIE	Maximum Relative Time Interval Error
MTIE	Maximum Time Interval Error
PDH	Plesiochronous Digital Hierarchy

PDU	Protocol Data Unit
Point-to-Point EVC	An EVC with exactly 2 UNIs
PRC	Primary Reference Clock
RTP	Real-time Transport Protocol
SF	Super Frame
Structure-agnostic	Structure-agnostic emulation is the transport of unstructured TDM, or of structured TDM when the structure is completely disregarded by the transport mechanism
Structure-aware	Structure-aware emulation is the transport of structured TDM taking at least some level of the structure into account
Structure-locked	Encapsulation utilized for Structure-Aware TDM transport where TDM structure boundaries are indicated by packet payload boundaries
Structure-indicated	Encapsulation utilized for Structure-Aware TDM transport where TDM structure boundaries are indicated by pointers
Service Frame	An Ethernet frame transmitted across the UNI toward the Service Provider or an Ethernet frame transmitted across the UNI toward the Subscriber
Service Provider	The organization providing Ethernet Services
Subscriber	The organization purchasing and/or using Ethernet Services
TDEV	Time Deviation
TDM	Time Division Multiplexing
T-Line	TDM Line Service
TDM Line Service	The TDM Line Service provides TDM interfaces to customers (Nx64 kbit/s, DS1, E1, DS3, E3, etc.), but transfers the data across a MEN instead of a traditional circuit switched TDM network
UI	Unit Interval
UNI	User Network Interface
User Network Interface	The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber
VLAN	Virtual Local Area Network

1.5 Compliance Levels

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

1.6 MEF References

- MEF 18 *Abstract Test Suite for Circuit Emulation Services over Ethernet*
- MEF 8 *Implementation Agreement for the Emulation of PDH Circuits*
- MEF 3 *Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks*

2 CESoETH Service Frames Description

2.1 MAC Header, Ethertype & VLAN Tag

The CESoETH Service Frame comprises a standard layer 2 IEEE 802.3 compliant Ethernet MAC header. Since the CESoETH adaptation function operates directly on top of the Ethernet layer without any intervening protocols, a separate Ethertype of 0x88D8 is allocated to CESoETH Service Frames in order to identify the protocol to a receiving device. If required, an optional VLAN tag and associated Tag ID and User Priority information can be added to the CESoETH Service Frame.

2.2 Emulated Circuit Identifier (ECID)

The ECID identifies the emulated circuit being carried. This separates the identification of the emulated circuit from the Ethernet layer, allowing the MEN operator to multiplex several emulated circuits across a single EVC where required.

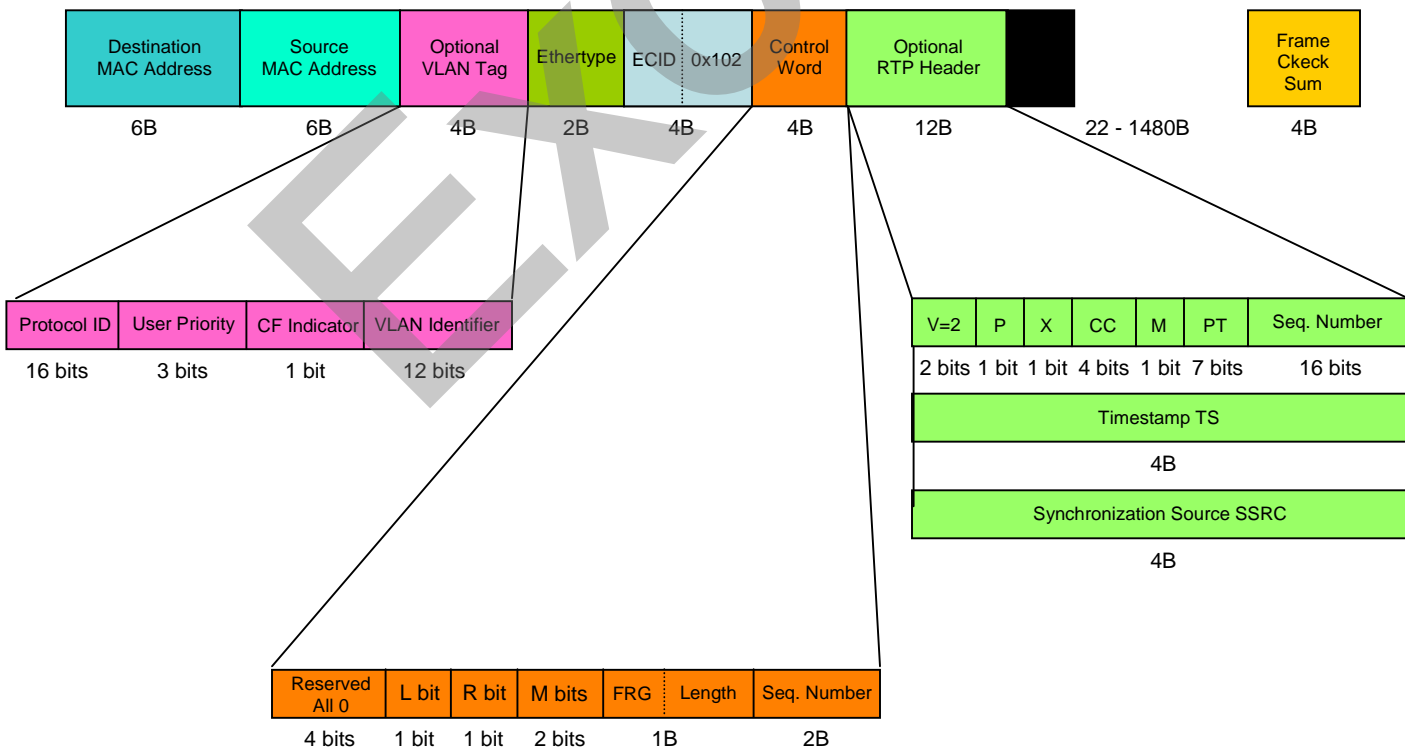
2.3 CESoETH control word

The control word provides sequencing and signaling of defects such as AIS of the TDM circuit, or packet loss detected in the MEN.

2.4 RTP header

Where appropriate, timing and sequencing may be provided by using the optional Real-time Transport Protocol header.

2.5 CESoETH Frame Format



TEST CASE 6.2a SYNCHRONIZATION																																											
TEST CASE NAME	6.2a Synchronization Test - Slow Variations in Network Load																																										
SERVICE TYPE	T-Line / Structure Agnostic DS1																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R47) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 6)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	The method of synchronization used MUST be such that the TDM-bound IWF meets the traffic interface requirements specified in ITU-T recommendation G.824 for DS1 circuits																																										
TEST OBJECT	Determine that the relevant clock quality standards are met when the device is operated over the following test network and submitted to slow variations in network load. (Network described in G.8261, Appendix VI.2.2, figure VI.4)																																										
TEST CONFIGURATION																																											
CE-VLAN ID/EVC MAP	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2">INGRESS UNI</th> <th colspan="2">EGRESS UNI</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> </tr> </tbody> </table>	INGRESS UNI		EGRESS UNI		CE-VLAN ID	EVC	CE-VLAN ID	EVC	11	EVC ₁	11	EVC ₁																														
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CE-VLAN ID	EVC	CE-VLAN ID	EVC																																								
11	EVC ₁	11	EVC ₁																																								
TEST PROCEDURE	Configure a structure-agnostic DS1 flow using raw encapsulation between DUT "A" and DUT "B". Use TDM Tester 1 to generate an unframed DS1 circuit with a (2 ²⁰ -1) PRBS for emulation by the DUTs. Allow a stabilization period of 900 seconds for the clock recovery process to stabilize. Use the Impairment Generator to create a delay variation profile that replaces the Ethernet Switches and the Traffic Generator transmitting the predefined load* and packet size profile** described in G.8261, Appendix VI.2.2, figure VI.4. and use the Jitter / Wander Analyzer to measure MTIE and to verify that the measurements are within the traffic interface masks described in G.824 for DS1 circuits																																										
CESoETH CONFIGURATION PARAMETERS	<table border="1" style="width: 100%;"> <thead> <tr> <th>PARAMETER</th> <th colspan="2">CONFIGURATION</th> </tr> </thead> <tbody> <tr> <td>Number of P2P EVCs</td> <td>1 EVC <input checked="" type="checkbox"/></td> <td>2 EVCs <input type="checkbox"/></td> </tr> <tr> <td>EVC(s) Service Frame Type</td> <td>Tagged <input checked="" type="checkbox"/></td> <td>Untagged <input type="checkbox"/></td> </tr> <tr> <td>CE-VLAN ID Preservation</td> <td>EVC₁ Yes <input checked="" type="checkbox"/></td> <td>No <input type="checkbox"/></td> </tr> <tr> <td>CE-VLAN CoS Preservation</td> <td>EVC₁ Yes <input checked="" type="checkbox"/></td> <td>No <input type="checkbox"/></td> </tr> <tr> <td>Synchronization Type</td> <td>Adaptive Timing <input checked="" type="checkbox"/></td> <td>Differential Timing <input type="checkbox"/></td> </tr> <tr> <td>Jitter Buffer Size</td> <td>Maximum size <input type="checkbox"/></td> <td>Not Specified <input checked="" type="checkbox"/></td> </tr> <tr> <td>Number of CES Flows</td> <td>1 Flow <input checked="" type="checkbox"/></td> <td>2 Flows <input type="checkbox"/></td> </tr> <tr> <td>CES Flow #1 Payload Type & Size</td> <td colspan="2">PDH - 192 Bytes</td> </tr> <tr> <td>CES Flow #1 TDM Interface Type</td> <td colspan="2">DS1</td> </tr> <tr> <td>CES Flow #1 Rate</td> <td colspan="2">1.544 Mbit/s</td> </tr> <tr> <td>CES Flow #2 Payload Type & Size</td> <td colspan="2">N/A</td> </tr> <tr> <td>CES Flow #2 TDM Interface Type</td> <td colspan="2">N/A</td> </tr> <tr> <td>CES Flow #2 Rate</td> <td colspan="2">N/A</td> </tr> </tbody> </table>	PARAMETER	CONFIGURATION		Number of P2P EVCs	1 EVC <input checked="" type="checkbox"/>	2 EVCs <input type="checkbox"/>	EVC(s) Service Frame Type	Tagged <input checked="" type="checkbox"/>	Untagged <input type="checkbox"/>	CE-VLAN ID Preservation	EVC ₁ Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	CE-VLAN CoS Preservation	EVC ₁ Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Synchronization Type	Adaptive Timing <input checked="" type="checkbox"/>	Differential Timing <input type="checkbox"/>	Jitter Buffer Size	Maximum size <input type="checkbox"/>	Not Specified <input checked="" type="checkbox"/>	Number of CES Flows	1 Flow <input checked="" type="checkbox"/>	2 Flows <input type="checkbox"/>	CES Flow #1 Payload Type & Size	PDH - 192 Bytes		CES Flow #1 TDM Interface Type	DS1		CES Flow #1 Rate	1.544 Mbit/s		CES Flow #2 Payload Type & Size	N/A		CES Flow #2 TDM Interface Type	N/A		CES Flow #2 Rate	N/A	
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CES Flow #2 TDM Interface Type	N/A																																										
CES Flow #2 Rate	N/A																																										
UNITS	MTIE																																										
RESULTS	Pass or Fail																																										
REMARKS	*Load: Start with network disturbance load at 20% and increment the load using 1% increments (12 minutes per step) up to 80% then decrement the load using 1% decrements (12 minutes per step) down to 20% and repeat it for a 24-hour period. **Packet size profile is: 60% of 1518-byte, 30% of 64-byte and 10% of 576-byte frames																																										

6.6 Test Cases for DS1 Extended Super Frame

TEST CASE 12.1a DS1 EXTENDED SUPER FRAME																																											
TEST CASE NAME	12.1a Verification of CESoETH implementation rule - Facility Data Link																																										
SERVICE TYPE	T-Line / Structure Agnostic DS1																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R83) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 12)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	CESoETH implementations supporting DS1 circuit using ESF framing MUST NOT change messages carried in the FDL (Facility Data Link), or insert new messages																																										
TEST OBJECT	Verify that CESoETH implementation does not change the messages carried in the facility data link																																										
TEST CONFIGURATION																																											
CE-VLAN ID/EVC MAP	<table border="1" style="display: inline-table; margin-right: 20px;"> <thead> <tr> <th colspan="2">INGRESS UNI</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>EVC₁</td> </tr> </tbody> </table> <table border="1" style="display: inline-table;"> <thead> <tr> <th colspan="2">EGRESS UNI</th> </tr> <tr> <th>CE-VLAN ID</th> <th>EVC</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>EVC₁</td> </tr> </tbody> </table>	INGRESS UNI		CE-VLAN ID	EVC	11	EVC ₁	EGRESS UNI		CE-VLAN ID	EVC	11	EVC ₁																														
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TEST PROCEDURE	Configure one structure-agnostic DS1 flow using raw encapsulation between DUT "A" and DUT "B". Use TDM Tester 1 to generate a Super Frame DS1 circuit with a specific message in the FDL for emulation by the DUTs and use it to verify that the message in the FDL is received with no errors or data loss, and that no extra messages have been inserted																																										
CESoETH CONFIGURATION PARAMETERS	<table border="1" style="width: 100%;"> <thead> <tr> <th>PARAMETER</th> <th colspan="2">CONFIGURATION</th> </tr> </thead> <tbody> <tr> <td>Number of P2P EVCs</td> <td>1 EVC <input checked="" type="checkbox"/></td> <td>2 EVCs <input type="checkbox"/></td> </tr> <tr> <td>EVC(s) Service Frame Type</td> <td>Tagged <input checked="" type="checkbox"/></td> <td>Untagged <input type="checkbox"/></td> </tr> <tr> <td>CE-VLAN ID Preservation</td> <td>EVC₁ Yes <input checked="" type="checkbox"/></td> <td>No <input type="checkbox"/></td> </tr> <tr> <td>CE-VLAN CoS Preservation</td> <td>EVC₁ Yes <input checked="" type="checkbox"/></td> <td>No <input type="checkbox"/></td> </tr> <tr> <td>Synchronization Type</td> <td>Adaptive Timing <input checked="" type="checkbox"/></td> <td>Differential Timing <input type="checkbox"/></td> </tr> <tr> <td>Jitter Buffer Size</td> <td>Maximum size <input type="checkbox"/></td> <td>Not Specified <input checked="" type="checkbox"/></td> </tr> <tr> <td>Number of CES Flows</td> <td>1 Flow <input checked="" type="checkbox"/></td> <td>2 Flows <input type="checkbox"/></td> </tr> <tr> <td>CES Flow #1 Payload Type & Size</td> <td colspan="2">PDH - 192 Bytes</td> </tr> <tr> <td>CES Flow #1 TDM Interface Type</td> <td colspan="2">DS1</td> </tr> <tr> <td>CES Flow #1 Rate</td> <td colspan="2">1.544 Mbit/s</td> </tr> <tr> <td>CES Flow #2 Payload Type & Size</td> <td colspan="2">N/A</td> </tr> <tr> <td>CES Flow #2 TDM Interface Type</td> <td colspan="2">N/A</td> </tr> <tr> <td>CES Flow #2 Rate</td> <td colspan="2">N/A</td> </tr> </tbody> </table>	PARAMETER	CONFIGURATION		Number of P2P EVCs	1 EVC <input checked="" type="checkbox"/>	2 EVCs <input type="checkbox"/>	EVC(s) Service Frame Type	Tagged <input checked="" type="checkbox"/>	Untagged <input type="checkbox"/>	CE-VLAN ID Preservation	EVC ₁ Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	CE-VLAN CoS Preservation	EVC ₁ Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Synchronization Type	Adaptive Timing <input checked="" type="checkbox"/>	Differential Timing <input type="checkbox"/>	Jitter Buffer Size	Maximum size <input type="checkbox"/>	Not Specified <input checked="" type="checkbox"/>	Number of CES Flows	1 Flow <input checked="" type="checkbox"/>	2 Flows <input type="checkbox"/>	CES Flow #1 Payload Type & Size	PDH - 192 Bytes		CES Flow #1 TDM Interface Type	DS1		CES Flow #1 Rate	1.544 Mbit/s		CES Flow #2 Payload Type & Size	N/A		CES Flow #2 TDM Interface Type	N/A		CES Flow #2 Rate	N/A	
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CES Flow #2 Rate	N/A																																										
UNITS	Number of valid frames																																										
RESULTS	Pass or Fail																																										
REMARKS																																											

TEST CASE 1.4b ENCAPSULATION LAYERS																																											
TEST CASE NAME	1.4b Emulated Circuit Identifier and Sequencing - MAC Address, Ethertype and ECID - Untagged Service Frames - Multiple CES Flows																																										
SERVICE TYPE	T-Line / Structure Agnostic E1																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R1) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 1)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	Each TDM-bound IWF at a given MAC address MUST have a unique ECID value																																										
TEST OBJECT	Determine that the attached device operates with a valid ECID attribute																																										
TEST CONFIGURATION	<pre> graph LR TDM[TDM Tester 1] --> DUT[CESoETH DUT "A"] DUT --> ET[Ethernet Tester 1] </pre>																																										
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TEST PROCEDURE	Configure two structure-agnostic E1 flows using raw encapsulation from DUT "A". Use TDM Tester 1 to generate two unframed E1 circuits with (2 ²⁰ -1) PRBS for emulation by the DUT "A". Use Ethernet Tester 1 to verify that the Service Frames associated with each CES flow have a unique and valid ECID attribute																																										
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CES Flow #2 TDM Interface Type	E1																																										
CES Flow #2 Rate	2.048 Mbit/s																																										
UNITS	Flow #1 and Flow #2 ECID values																																										
RESULTS	Pass or Fail																																										
REMARKS																																											

TEST CASE 6.9b SYNCHRONIZATION																													
TEST CASE NAME	6.9b Synchronization Test - Maximum Tolerable Jitter (MTJ)																												
SERVICE TYPE	T-Line / Structure Agnostic E1																												
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R48) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 6)																												
TEST TYPE	Conformance																												
TEST STATUS	Mandatory																												
REQUIREMENT DESCRIPTION	The jitter and wander that can be tolerated at the MEN-bound IWF TDM input MUST meet the traffic interface requirements specified in ITU-T recommendation G.823 for E1 circuits																												
TEST OBJECT	Determine that the relevant clock quality standards are met when the device is operated over the following test network and submitted to a specific test pattern with sinusoidal jitter at defined frequencies. (Network described in G.8261, Appendix VI.2.2, figure VI.4)																												
TEST CONFIGURATION																													
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TEST PROCEDURE	Configure a structure-agnostic E1 flow using raw encapsulation between DUT "A" and DUT "B". Use the Jitter/Wander generator to transmit a specific E1 test pattern with sinusoidal jitter at a defined frequency*. Increase the jitter amplitude of the signal until errors occur at the output of the DUT "B". This amplitude is the Maximum Tolerable Jitter (MTJ) result for the defined frequency. Repeat the test for the different frequencies* and use the results to form a MTJ graph and compare it with the requirements specified in ITU-T recommendation G.823 for E1 circuits																												
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CES Flow #2 Payload Type & Size	N/A																												
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CES Flow #2 Rate	N/A																												
UNITS	MTJ																												
RESULTS	Pass or Fail																												
REMARKS	*Refer to Table 2 on page 13 of this document																												

8.4 Test Cases for DS3 Misconnection/Impairments

TEST CASE 7.1c MISCONNECTION/IMPAIRMENTS																																											
TEST CASE NAME	7.1c Effect of Stray Frames - Wrong Destination Address																																										
SERVICE TYPE	T-Line / Structure Agnostic DS3																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R57-R60) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 7)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	The CES IWF MUST only accept frames that contain the correct Ethernet destination address field and ECID value for that IWF and when a stray frame is detected by a Circuit Emulation Inter-working Function, it MUST be discarded																																										
TEST OBJECT	Verify that only genuine CESoETH frames are accepted by the CES IWF, and that all stray frames with the wrong destination address are discarded																																										
TEST CONFIGURATION																																											
CE-VLAN ID/EVC MAP	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="background-color: #FFD700;">INGRESS UNI</th> <th colspan="2" style="background-color: #FFD700;">EGRESS UNI</th> </tr> <tr> <th style="background-color: #FFD700;">CE-VLAN ID</th> <th style="background-color: #FFD700;">EVC</th> <th style="background-color: #FFD700;">CE-VLAN ID</th> <th style="background-color: #FFD700;">EVC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> </tr> </tbody> </table>	INGRESS UNI		EGRESS UNI		CE-VLAN ID	EVC	CE-VLAN ID	EVC	11	EVC ₁	11	EVC ₁																														
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TEST PROCEDURE	<p>Configure a structure-agnostic DS3 flow using raw encapsulation between DUT "A" and DUT "B".</p> <p>Use TDM Tester 1 to generate a DS3 circuit with a (2²⁰ -1) PRBS for emulation by the DUTs. Use the Impairment Generator to inject stray frames with wrong a destination address containing an all-zeros data pattern towards the receive CES Ethernet interface of the DUT "B". Use TDM Tester 1 to verify that no bit errors are detected.</p> <p>Note: Bit errors would be detected if the stray frames were not discarded by the DUT "B"</p>																																										
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CES Flow #2 Rate	N/A																																										
UNITS	Bit errors																																										
RESULTS	Pass or Fail																																										
REMARKS																																											

TEST CASE 11.2c JITTER BUFFER																																											
TEST CASE NAME	11.2c Detection of Jitter Buffer Overruns - CESoETH frame rate tripled																																										
SERVICE TYPE	T-Line / Structure Agnostic DS3																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R78-R79) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 11)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	A CESoETH IWF MUST detect the Jitter Buffer Overrun conditions and if a CESoETH frame cannot be stored in the jitter buffer due to a jitter buffer overrun condition, the TDM-bound IWF MUST discard the frame																																										
TEST OBJECT	Verify that a CESoETH IWF detects jitter buffer overruns, and discards the CESoETH frames accordingly when the CESoETH frame rate is doubled																																										
TEST CONFIGURATION																																											
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TEST PROCEDURE	<p>Configure one structure-agnostic DS3 flow using raw encapsulation from DUT "A".</p> <p>Use Ethernet Tester 1 to generate a valid DS3 flow with a 1024 bytes payload size that contains an incrementing pattern towards the DUT "A" at a rate of 1000 frames/sec and use it to verify data integrity.</p> <p>Increase the rate at which the CESoETH frames are sent by the Ethernet Tester 1 by a factor of 3 and use it to verify that once the jitter buffer has filled up entirely the DUT "A" discards / replaces the payload of at least ((3-1) / 3) or (2/3) of the received CESoETH frames</p>																																										
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CES Flow #2 Rate	N/A																																										
UNITS	Number of valid frames																																										
RESULTS	Pass or Fail																																										
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9.2 Test Cases for E3 Payload Format

TEST CASE 5.1d PAYLOAD FORMAT																																											
TEST CASE NAME	5.1d Structure Agnostic Emulation - E3																																										
SERVICE TYPE	T-Line / Structure Agnostic E3																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R30-R31) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 5)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	A CES IWF MUST support structure-agnostic emulation, as defined in section 6.3.1 of MEF8 and E3 CESoETH implementations MUST at least support 1024 octets of TDM payload in both directions, and the lifespan of the connection																																										
TEST OBJECT	Determine that the attached device operates with structure agnostic emulation using the E3 default payload size																																										
TEST CONFIGURATION																																											
CE-VLAN ID/EVC MAP	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="background-color: #f4a460;">INGRESS UNI</th> <th colspan="2" style="background-color: #f4a460;">EGRESS UNI</th> </tr> <tr> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> <th style="background-color: #f4a460;">CE-VLAN ID</th> <th style="background-color: #f4a460;">EVC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> <td style="text-align: center;">11</td> <td style="text-align: center;">EVC₁</td> </tr> </tbody> </table>	INGRESS UNI		EGRESS UNI		CE-VLAN ID	EVC	CE-VLAN ID	EVC	11	EVC ₁	11	EVC ₁																														
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TEST PROCEDURE	Configure a structure-agnostic E3 flow using raw encapsulation between DUT "A" and DUT "B". Use TDM Tester 1 to generate an E3 circuit with a (2 ²⁰ - 1) PRBS for emulation by the DUTs. Use the Ethernet Tester 1 to verify that the CESoETH frames payload flowing in both directions contain the correct number of octets and that it does not change during the whole test sequence (10 minutes). TDM tester 1 is used to verify data integrity																																										
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CES Flow #2 Rate	N/A																																										
UNITS	Number of Payload Octets																																										
RESULTS	Pass or Fail																																										
REMARKS																																											

TEST CASE 9.3d MISCONNECTION/IMPAIRMENTS																																											
TEST CASE NAME	9.3d Discarding of Three Out-of-Sequence CESoETH Frames																																										
SERVICE TYPE	T-Line / Structure Agnostic E3																																										
REFERENCES	MEF 8 Ethernet Services Attributes - Phase 1 (R66) MEF 18 Abstract Test Suite for Circuit Emulation Services over Ethernet (Test Case 9)																																										
TEST TYPE	Conformance																																										
TEST STATUS	Mandatory																																										
REQUIREMENT DESCRIPTION	Out-of-sequence CESoETH frames that cannot be re-ordered MUST be discarded, and considered as lost																																										
TEST OBJECT	Verify that CES IWF discards out-of-sequence frames and considers them as lost frames																																										
TEST CONFIGURATION																																											
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TEST PROCEDURE	<p>Configure a structure-agnostic E3 flow using raw encapsulation between DUT "A" and DUT "B".</p> <p>Use TDM Tester 1 to generate an E3 circuit with a $(2^{20} - 1)$ PRBS for emulation by the DUTs. Use the Impairment Generator to delay three frames towards the receive CES Ethernet interface of the DUT "B", by 1ms greater than the jitter buffer size, forcing them to be re-ordered/discarded by the IWF. Use TDM Tester 1 to verify that a burst of bit errors is detected</p>																																										
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9 Revision History

Revision	Date	Comments
Release 1.0	10-17-2007	1) First Release

EXCERPT