Technical Specification

MEF 13

User Network Interface (UNI) Type 1

Implementation Agreement

November, 2005

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1. Abstract

This document specifies an implementation agreement for MEF User to Network Interface (UNI) Type 1. The main objective of this version is to specify the MEF UNI characteristics and operation in manual configuration mode. This allows existing Ethernet devices (switch, router, workstation, etc) acting as CEs to be instantly compliant to this IA with no additional software or hardware upgrades. The main functionality of this version is to allow data-plane Ethernet connectivity between the UNI-C and UNI-N. This document references MEF UNI Requirements and Framework [4] for all concepts, constructs and terminology. The UNI Type 1 mode provides bare minimum data-plane connectivity services with no control-plane or management-plane capabilities..

2. Terminology

Term	Definition
CE-VLAN CoS	The user-priority bits of the IEEE 802.1Q Tag in a tagged Service Frame over UNI.
CE-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.
CBS	Committed Burst Size
CIR	committed Information Rate
EVC	Ethernet Virtual Connection. An association of two or more UNIs that limits the exchange of frames to UNIs in the Ethernet Virtual Connection
Frame	Short for Ethernet frame.
Ingress	The direction 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.
Multicast Service Frame	A Service Frame that has a multicast destination MAC address.
Multipoint EVC	An EVC with two or more UNIs.
EBS	Excess Burst Size
EIR	Excess Information Rate
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 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.
UNI	User Network Interface. The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber
Unicast Service Frame	A Service Frame that has a unicast destination MAC address.

3. Scope

3.1 Purpose

The purpose of this document is an Implementation Agreement for a manually configured Ethernet UNI. This document is based on the MEF UNI Framework [4].

3.2 UNI Modes

3.2.1 Type 1 – Manual Configuration

The manual configuration mode provides data-plane connectivity services with no control-plane and management plane capability. The scope of this Implementation Agreement is UNI Type 1.

3.2.2 Type 2 – Static Service Discovery

This mode is out of the scope of this implementation agreement

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. Common Characteristics

5.1 Physical Medium

1. A Type 1 UNI-C **MUST** support at least one of the following IEEE 802.3 Ethernet PHYs:
   - 10BASE-T in Full-duplex mode [1].
   - 100BASE-T including 100BASE-TX and 100BASE-FX in Full-duplex mode [1].
   - 1000BASE-X including 1000BASE-SX, 1000BASE-LX, and 1000BASE-T in Full-duplex mode [1].
   - 10GBASE-SR, 10GBASE-LX4, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, and 10GBASE-EW in Full-duplex mode [1].

2. A Type 1 UNI-N **MUST** support at least one of the following IEEE 802.3 Ethernet PHYs:
   - 10BASE-T in Full-duplex mode [1].
   - 100BASE-T including 100BASE-TX and 100BASE-FX in Full-duplex mode [1].
   - 1000BASE-X including 1000BASE-SX, 1000BASE-LX, and 1000BASE-T in Full-duplex mode [1].
   - 10GBASE-SR, 10GBASE-LX4, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, and 10GBASE-EW in Full-duplex mode [1].

5.2 Ethernet Frame Format

3. A Type 1 UNI-C **MUST** support transmission and reception of Untagged Ethernet frames according to IEEE 802.3-2002 [1]. In addition it **MAY** support transmission and reception of Priority-tagged and/or VLAN Tagged service frames in compliance to 802.3-2002.
4. A Type 1 UNI-N **MUST** support transmission and reception of Untagged, VLAN-tagged and Priority-tagged Ethernet frames according to IEEE 802.3-2002 [1].
5. A Type 1 UNI-C **MUST** support transmission and reception of Ethernet frames that have a minimum and maximum size as specified in IEEE 802.3-2002 [1].
6. A Type 1 UNI-N **MUST** support transmission and reception of Ethernet frames that have a minimum and maximum size as specified in IEEE 802.3-2002 [1].

6. Service Specific Characteristics

6.1 UNI Type 1.1

UNI Type 1.1 is a subset of UNI Type 1 that is meant to support non-service multiplexed UNIs, such as those required to support the EPL *service* [5].

6.1.1 CE-VLAN ID

7. A Type 1.1 UNI-N **MUST** be able to accept any CE-VLAN ID received from UNI-C, meaning that it shouldn't discard any CE-VLAN ID.

6.1.2 CE-VLAN ID/EVC Map

8. A Type 1.1 UNI-N **MUST** be able to support a single EVC.
9. A Type 1.1 UNI-N **MUST** be configurable to either map all CE-VLAN IDs to an EVC or don't map any CE-VLAN ID to any EVC.

Note: This requirement is needed for temporary disconnection of customer service, without tearing down the EVC.

6.1.3 Traffic Management

10. A Type 1.1 UNI-N **MUST** be able to support per-UNI Ingress BW profiling based on [6].
11. A Type 1.1 UNI-C **SHOULD** be able to shape its traffic to the contracted BWP in order to receive the contracted QoS commitments.
12. A Type 1.1 UNI-N **MUST** be able to support color-blind BW profiling in which EIR=EBS=0 and CIR and CBS are non-zero.
13. A Type 1.1 UNI-N **MUST** allow configuration to modify CIR in the following granularities:
    - 1Mbps steps up to 10Mpbs
    - 5 Mbps steps beyond 10Mbps and up to 100Mbps
    - 50 Mbps steps beyond 100Mpbs and up to 1Gbps
    - 500 Mbps steps beyond 1Gbps
14. A Type 1.1 UNI-N **SHOULD** allow configuration to modify CIR in the following granularities:
    - 64 Kbps (DS0 rate) steps up to 1.422 Mbps (VC11 rate) or 1.932 Mbps (VC12 rate)
    - 1.422 Mbps (VC11 rate) or 1.932 Mbps (VC12 rate) steps up to 50 Mbps
    - 43.008 Mbps (VC3 rate) steps beyond 50 Mbps and up to 150 Mbps
    - 133.12 Mbps (VC4 rate) steps beyond 150 Mbps
15. A Type 1.1 UNI-N **MUST** be able to at least support CBS values that are equal to or greater than the 8xMTU = 8x1522 bytes =12176 bytes

6.1.4 L2 Control Processing

16. A Type 1.1 UNI-N **MUST** be able to pass the following L2 Control Protocols to the EVC:
    - Spanning Tree Protocol (STP),
    - Rapid Spanning Tree Protocol (RSTP),
    - Multiple Spanning Tree Protocol (MSTP)
    - All LANs Bridge Management Group Block of Protocol
    - Generic Attribute Registration Protocol (GARP)

17. A Type 1.1 UNI-N **SHOULD** be able to pass the following L2 Control Protocols to the EVC:
    - Link Aggregation Control Protocol (LACP)
    - Marker Protocol
    - Authentication (802.1x)
18. A Type 1.1 UNI-N **SHOULD** be able to discard 802.3x PAUSE frames

6.1.5 EVC Type

19. A Type 1.1 UNI-N **MUST** be able to support point-to-point EVCs.

6.1.6 CE-VLAN ID Processing

20. A Type 1.1 UNI-N **MUST** be able to support CE-VLAN ID preservation.

6.1.7 CE-VLAN CoS Preservation

21. A Type 1.1 UNI-N **MUST** be able to support CE-VLAN CoS preservation.

6.1.8 Service Frame Delivery

22. A Type 1.1 UNI-N **MUST** be able to Tunnel Unicast, Multicast and Broadcast service frames, except 802.3x PAUSE frames unconditionally.

6.2 UNI Type 1.2

UNI Type 1.2 is a subset of UNI Type 1 that is meant to support service multiplexed UNIs, such as those required to support the EVPL service [5].

6.2.1 Service Multiplexing

23. A Type 1.2 UNI-N **MUST** be able to support Service Multiplexing as defined in [MEF10].
24. A Type 1.2 UNI-N **SHOULD** at least be able to support a minimum number of EVCs as per following table.

Link Speed	***10/100 M bits/s***	***1 G bit/s***	***10 G bit/s***
Minimum number of EVCs	8	64	512

6.2.2 CE-VLAN ID

25. A Type 1.2 UNI-N **SHOULD** be able to support at least a minimum number of CE-VLAN IDs as per following table, which **SHOULD** be configurable in the range of 1-4095 [MEF10].

Link Speed	***10/100 M bits/s***	***1 G bit/s***	***10 G bit/s***
Minimum number of CE-VLANs	8	64	512

6.2.3 CE-VLAN ID/EVC Map

26. A Type 1.2 UNI-N **MUST** have a configurable CE-VLAN/EVC mapping table.
27. A Type 1.2 UNI-N **MUST** be able to drop the frames if a match in the CE-VLAN/EVC map table cannot be found.

6.2.4 Bundling

28. A Type 1.2 UNI-N **MUST** be able to support All-to-one bundling.

6.2.5 Traffic Management

29. A Type 1.2 UNI-N **MUST** be able to support per-UNI Ingress BW profiling [6].
30. A Type 1.2 UNI-N **MUST** be able support Per-EVC BW profiling [6].

31. A Type 1.2 UNI-N **SHOULD** be able to support Per-CoS BW profiling [6].

Note1: Multiple models of BW profile may exist at a UNI Type 1.2. However, a UNI Type 1.2 is not required to apply more than one BW profile to each service frame.
Note 2: Best Effort service is also considered to need CIR and CBS, in which CIR=CBS=0.

32. A Type 1.2 UNI-C **SHOULD** be able to shape its traffic to the contracted BWP in order to received the contracted QoS commitments
33. A Type 1.2 UNI-N **MUST** be able to support color-blind BW profiling to enforce CIR, CBS, EIR and EBS.
34. A Type 1.2 UNI-N **MUST** allow configuration to modify CIR and EIR in the following granularities:
    - 1Mbps steps up to 10Mpbs
    - 5 Mbps steps beyond 10Mbps and up to 100Mbps
    - 50 Mbps steps beyond 100Mpbs and up to 1Gbps
    - 500 Mbps steps beyond 1Gbps
35. A Type 1.2 UNI-N **SHOULD** allow configuration to modify CIR and EIR in the following granularities:
    - 64 Kbps (DS0 rate) steps up to 1.422 Mbps (VC11 rate) or 1.932 Mbps (VC12 rate)
    - 1.422 Mbps (VC11 rate) or 1.932 Mbps (VC12 rate) steps up to 50 Mbps
    - 43.008 Mbps (VC3 rate) steps beyond 50 Mbps and up to 150 Mbps
    - 133.12 Mbps (VC4 rate) steps beyond 150 Mbps
36. A Type 1.2 UNI-N **MUST** be able to at least support CBS and EBS values that are equal or greater than 8xMTU = 8x1522 bytes = 12176 bytes.

6.2.6 L2 Control Processing

37. A Type 1.2 UNI-N **SHOULD** be able to discard the following L2 Control Protocols:
    - Spanning Tree Protocol (STP),
    - Rapid Spanning Tree Protocol (RSTP),
    - Multiple Spanning Tree Protocol (MSTP)
    - All LANs Bridge Management Group Block of Protocol
    - Generic Attribute Registration Protocol (GARP)
    - Link Aggregation Control Protocol (LACP)
    - Marker Protocol
    - Authentication (802.1x)
    - 802.3x (PAUSE) frames
38. A type 1.2 UNI-N **SHOULD** not generate 802.3x (PAUSE) frames.
39. A Type 1.2 UNI-N **SHOULD** be configurable to peer the following L2 Control Protocols
    - Link Aggregation Control Protocol (LACP)
    - Marker Protocol
    - Authentication (802.1x)

6.2.7 EVC Type

40. A Type 1.2 UNI-N **MUST** be able to support Point-to-point and Multipoint EVCs concurrently.

6.2.8 CE-VLAN ID Processing

41. A Type 1.2 UNI-N **MUST** be able to support CE-VLAN ID preservation.

6.2.9 CE-VLAN CoS Preservation

42. A Type 1.2 UNI-N **MUST** be able to support CE-VLAN CoS preservation.

6.2.10 Service Frame Delivery

43. A Type 1.2 UNI-N **MUST** be able to Tunnel Multicast and Broadcast service frames that are not listed in section 6.2.6 unconditionally.
44. A Type 1.2 UNI-N **MUST** be able to Tunnel all other Unicast service frames unconditionally

7. References

Reference	Reference Details
[1] IEEE 802.3	IEEE P 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)
[2] IEEE 802.3ae	IEEE 802.3ae-2002Information Technology - Local & Metropolitan Area Networks - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Media Access Control Parameters, Physical Layers and Management Parameters for 10 Gb/s Operation
[3]IEEE 802.1Q	IEEE 802.1Q, 2003 Edition, IEEE Standards for Local and metropolitan area networks—Virtual Bridged Local Area Networks
[4]UNI-REQ-FRMK	Metro Ethernet Forum, MEF 11, User Network Interface (UNI) Requirements and Framework, November 2004
[5] MEF 6	Metro Ethernet Forum MEF 6, Ethernet Service Definition, June 2004.
[6] MEF 10	Metro Ethernet Forum MEF 10, Ethernet Services Attributes Phase 1, November 2004.