



Introducing the Specifications of the MEF

MEF 23.2: Class of Service Implementation Agreement – Phase 3

October 2016

MEF Reference Presentations

- **Intention**

- These MEF reference presentations are intended to give general overviews of the MEF work and have been approved by the MEF Marketing Committee
- Further details on the topic are to be found in related specifications, technical overviews, white papers in the MEF public site Information Center: <http://www.mef.net/carrier-ethernet/technical-specifications>

Outline

- **Approved MEF Specifications**
- **Implementation Guide Overview**
- **About MEF 23.2 / MEF23.2 Abstract / MEF23.2 Scope**
- **Key Definitions**
- **Class of Service and Bandwidth Profiles**
- **Delay-Related Performance Objectives**
- **Overview of Performance Objectives Tables**
- **List of Appendices**

Approved MEF Specifications*

Specification	Description
MEF 2	Requirements and Framework for Ethernet Service Protection
MEF 3	Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks
MEF 4	Metro Ethernet Network Architecture Framework Part 1: Generic Framework
MEF 6.2	EVC Ethernet Services Definitions Phase 3
MEF 7.2	Carrier Ethernet Information Model
MEF 8	Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet Networks
MEF 9	Abstract Test Suite for Ethernet Services at the UNI
MEF 10.3	Ethernet Services Attributes Phase 3
MEF 11	User Network Interface (UNI) Requirements and Framework
MEF 12.2	Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer
MEF 13	User Network Interface (UNI) Type 1 Implementation Agreement
MEF 14	Abstract Test Suite for Traffic Management Phase 1
MEF 15	Requirements for Management of Metro Ethernet Phase 1 Network Elements
MEF 16	Ethernet Local Management Interface
MEF 17	Service OAM Framework and Requirements

*Current at time of publication. See MEF web site for official current list, minor updates and superseded work (such as MEF 1 and MEF 5)

Approved MEF Specifications

Specification	Description
MEF 18	Abstract Test Suite for Circuit Emulation Services
MEF 19	Abstract Test Suite for UNI Type 1
MEF 20	User Network Interface (UNI) Type 2 Implementation Agreement
MEF 21	Abstract Test Suite for UNI Type 2 Part 1: Link OAM
MEF 22.2	Mobile Backhaul Phase 3 Implementation Agreement
MEF 23.2	Class of Service Implementation Agreement – Phase 3
MEF 24	Abstract Test Suite for UNI Type 2 Part 2: E-LMI
MEF 25	Abstract Test Suite for UNI Type 2 Part 3: Service OAM
MEF 26.2	External Network Network Interface (ENNI) and Operator Service Attributes
MEF 27	Abstract Test Suite For UNI Type 2 Part 5: Enhanced UNI Attributes & Part 6: L2CP Handling
MEF 28	External Network Network Interface (ENNI) Support for UNI Tunnel Access and Virtual UNI
MEF 29	Ethernet Services Constructs
MEF 30.1	Service OAM Fault Management Implementation Agreement Phase 2
MEF 30.1.1	Service OAM Fault Management Implementation Agreement Phase 2
MEF 31	Service OAM Fault Management Definition of Managed Objects

Approved MEF Specifications

Specification	Description
MEF 32	Requirements for Service Protection Across External Interfaces
MEF 33	Ethernet Access Services Definition
MEF 34	Abstract Test Suite for Ethernet Access Services
MEF 35.1	Service OAM Performance Monitoring Implementation Agreement
MEF 36	Service OAM SNMP MIB for Performance Monitoring
MEF 37	Abstract Test Suite for ENNI
MEF 38	Service OAM Fault Management YANG Modules Technical Specification
MEF 39	Service OAM Performance Monitoring YANG Modules Technical Specification
MEF 40	UNI and EVC Definition of Managed Objects Technical Specification
MEF 41	Generic Token Bucket Algorithm Technical Specification
MEF 42	ENNI and OVC Definition of Managed Objects Technical Specification
MEF 43	Virtual NID (vNID) Functionality for E-Access Services Technical Specification
MEF 44	Virtual NID (vNID) Definition of Managed Objects Technical Specification
MEF 45	Multi-CEN L2CP Technical Specification
MEF 46	Latching Loopback Protocol and Functionality Technical Specification

Approved MEF Specifications

Specification	Description
MEF 47	Carrier Ethernet Services for Cloud Implementation Agreement
MEF 48	Service Activation Testing Technical Specification
MEF 49	Service Activation Testing Control Protocol and PDU Formats Technical Specification
MEF 49.0.1	Amendment to Service Activation Testing Control Protocol and PDU Formats
MEF 50	Carrier Ethernet Service Lifecycle Process Model Guidelines
MEF 51	OVC Services Definitions Technical Specification
MEF 52	Carrier Ethernet Performance Reporting Framework
MEF 53	Carrier Ethernet Services Qualification Questionnaire
MEF 54	Ethernet Interconnection Point (EIP): An ENNI Implementation Agreement
MEF 55	Lifecycle Service Orchestration (LSO): Reference Architecture and Framework



Overview of MEF 23.2

Class of Service Implementation Agreement – phase 3

About MEF 23.2

- **Purpose**

- This presentation is an introduction to MEF 23.2 – Class of Service Implementation Agreement – Phase 3.

- **Audience**

- Service Providers – architecting their services and networks
- Equipment Manufacturers – building devices that will carry Carrier Ethernet Services

- **Other Documents**

- MEF10.3: Ethernet Service Attributes – Phase 3
- MEF6.2: EVC Ethernet Service Definitions – Phase 3
- MEF 26.2: External Network Network Interface (ENNI) and Operator Service Attributes
- MEF 33: Ethernet Access Services Definition
- MEF 51: OVC Services Definitions

MEF 23.2 - Abstract

In order to provide differentiated levels of service, it is necessary to classify incoming frames to a service level either based on context (e.g., which EVC or OVC) or content (i.e, the value in a specific field within the frame).

MEF10.3 and MEF26.2 provide attributes for associating each ingress frame with a Class of Service Name (CoS Name) for this purpose. Those specifications also provide attributes for associating each ingress frame with a color.

MEF23.2 formalizes the Class of Service Name (CoS Name) and defines three specific CoS Names called Class of Service Labels (CoS Labels). For frames associated with a CoS Label, it provides:

- values for fields containing the CoS identifier
- values for fields containing the frame color
- definition of Performance Tiers. Performance Tiers provide a way to define sets of performance objectives based on inherent characteristics of the service (primarily geographic span).
- specific performance objectives. Required values for performance objectives are specified in this document for service with a Class of Service identified by one of the MEF CoS Labels.
- requirements associated with bandwidth profile applicability to frames associated with the CoS Labels.

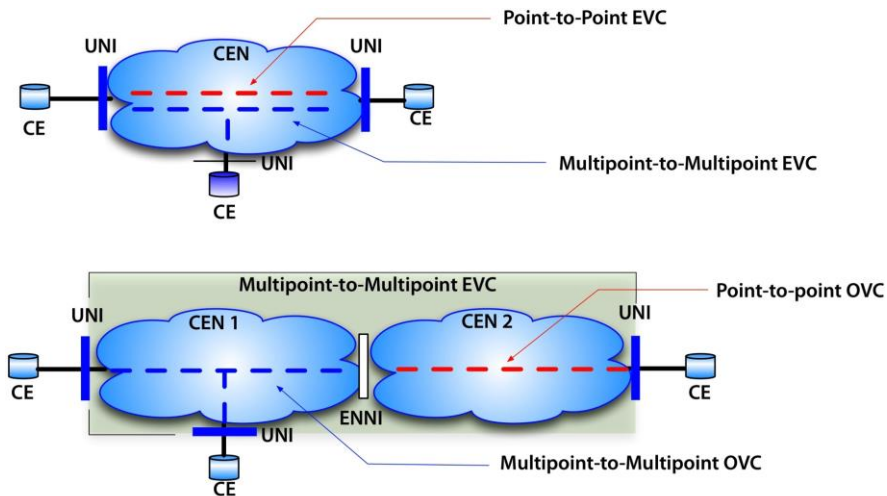
MEF23.2 also provides guidelines for CoS Names, in general, in terms of how the performance objectives for OVCs are composed into performance objectives for EVCs.

MEF23.2 Scope and Applicability

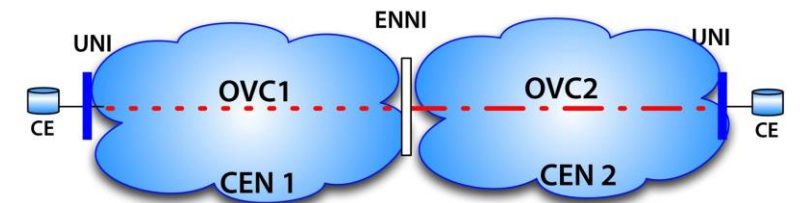
The CoS Name and Color requirements in this IA are applicable at UNIs and ENNIs (collectively External Interfaces or EIs), and the indicated CoS Performance Objectives are applicable to Qualified Frames that arrive at those EIs for transport across an EVC or OVC.

The three CoS Labels provide support for key applications. MEF23.2 also sets requirements for the mapping of Class of Service IDs defined in [1] and [10] to CoS Labels. Operators can offer other proprietary CoS Names and map values of the CoS ID to these CoS Names. An Operator or Service Provider can offer zero to all three of the CoS Labels in any combination simultaneously with zero or more proprietary CoS Names.

The diagram below depicts the scope and applicability of MEF23.2.



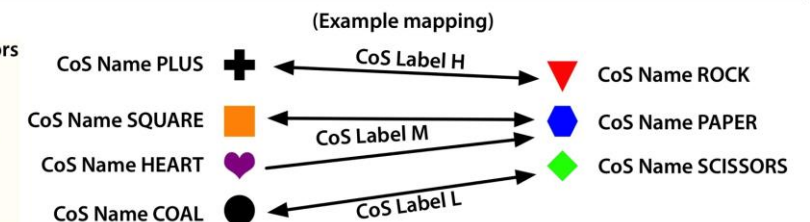
Common CoS lexicon between ENNI-connected Operators facilitates CoS alignment.



No MEF CoS IA: Mapping at ENNI requires different bilateral agreements at the ENNI. Subscribers may not get consistent Class of Service.



With MEF CoS IA: Operators remark frames on egress to the ENNI to align with MEF CoS Labels which are associated with specific Performance Objectives, PCP values, BWP, etc.



Key Definitions – CoS Name and CoS Label

Service Providers and Operators are free to select any Class of Service Names, **CoS Names**, for the various classes of service that they sell to their customers, e.g., *Platinum, Gold, Silver, Bronze*.

MEF23 defines three¹ specific CoS Names, *H, M, and L*, which are referred to as **CoS Labels**. Class of Service offerings associated with these CoS Labels have additional requirements in MEF23 (several of these requirements are noted in this document and identified with “✧”).

One of the major drivers for the Class of Service IA was to provide quantitative performance objectives for service performance. MEF23.2 includes these CoS Performance Objectives (CPOs) in section 9.

¹ MEF22.x, the Mobile Backhaul IA, includes a fourth CoS Label

CoS Labels - continued

CoS Labels *H*, *M*, and *L* informally refer to *High*, *Medium*, and *Low*, and are differentiated in their performance requirements.

- H – intended for applications that are very sensitive to loss, delay, and delay variation such as VoIP and mobile backhaul control.
- M – intended for applications that are sensitive to loss but more tolerant of delay and delay variation such as near-real-time or critical data applications.
- L – intended for applications that are more tolerant of loss as well as delay and delay variation such as non-critical data applications.

Key Definitions – Performance Tier

- **Performance Tier** – Class of Service Performance Objectives (CPOs) apply to qualified service frames on ordered pairs of endpoints. The Ordered Endpoint Pairs (OEPPs) in a service (EVC or OVC) are organized into sets that have common performance characteristics (see CoS Frame Set). Geographic distance is the primary (although not only) determinant of performance. MEF23.2 defines five sets of CPOs called Performance Tiers (City, Metro, Regional, Continental, Global). For each Performance Tier a set of CPOs is specified for each of the three CoS Labels.

Key Definitions – CoS Frame Set

- **CoS Frame Set** – A CoS Frame Set (CoS FS) is an association of a CoS Name and a set of Ordered Endpoint Pairs (OEPPs). It represents all of the frames flowing between a particular set of EVC/OVC endpoints with a particular Class of Service. If the CoS Name is a CoS Label then two requirements apply:
 - All of the CoS Frame Sets within an EVC or OVC must be pairwise disjoint (i.e. there cannot be an OEPP that is in one CoS FS for one performance metric and a different CoS FS for another metric).
 - Each CoS Frame Set within an EVC or OVC must be associated with one of the five Performance Tiers.

Class and Service and Bandwidth Profiles

- MEF23.2 requires that an Ingress Bandwidth Profile for an EVC or OVC that has Performance Objectives in the SLS must utilize the “per CoS Name” model (rather than, e.g., per UNI, per EVC, per OVC-endpoint, etc.).
- MEF23.2 includes requirements for Bandwidth Profile Flows associated with CoS Labels. Specifically:
 - ✧ BWP Flows associated with CoS Labels H and M must have $CBS \geq MFS$ and the envelope parameters must ensure that there is a mechanism to refresh the tokens in the committed token bucket.
 - ✧ BWP Flows associated with CoS Label L must have $CBS \geq MFS$ or $EBS \geq MFS$ or both and the envelope parameters must ensure that there is a mechanism to refresh the tokens into whichever of the two buckets exist (or both if they both exist).

Mapping CoS ID and Color ID

- ✧ MEF23.2 provides a standard set of ingress mappings for CoS Identifier Values (PCP values and DSCP values) to MEF CoS Labels at External Interfaces.
- Unspecified values can be mapped to any CoS Name.
- MEF23.2 provides specific mappings from DEI and PCP values to color for frames that map to CoS Labels.
- MEF23.2 indicates that L2CP frames should be mapped to CoS Label M or to a CoS Name that as one-way Frame Loss Ratio Performance Objectives that meet the constraints of CoS Label M.

Performance Objectives

✧ Use of a MEF CoS Label requires that the Performance Objectives specified in MEF23.2 must apply to the CoS Frame Set. This is captured in the following requirement:

[R15] In an EVC or OVC that uses a MEF CoS Label, an SLS entry for a given performance metric and a given CoS Frame Set associated with that CoS Label MUST be specified per:

- (1) The parameter values for that performance metric defined in Table 5, Table 6 and Table 7, as appropriate for the EVC/OVC type, and;
- (2) The objective for that performance metric for the associated CoS Label and EVC/OVC Type in Table 8, Table 9, Table 10, Table 11, or Table 12, where table selection is dependent on the Performance Tier chosen for that CoS Frame Set.

Delay-Related Performance Objectives

- ✧ The SLS for each CoS FS associated with a CoS Label must have a Performance Objective for either One-Way Frame Delay, One-Way Mean Frame Delay, or both.
- ✧ The SLS for each CoS FS associated with a CoS Label must have a Performance Objective for either One-Way Frame Delay Range, One-Way Interframe Delay Variation, or both.
- If the SLS for a CoS FS does not have a Performance Objective for One-Way Frame Delay, it should have a Performance Objective for One-Way Frame Delay Range.

Performance Objective Tables

- **MEF23.2 includes the following tables in section 9:**
 - SLS Common Parameters
 - Parameter values for CoS Labels H, M, L for point-to-point services
 - Parameter values for CoS Labels H, M, L for multipoint services
 - Performance Objective Tables for each of the 5 Performance Tiers that include objectives for point-to-point and multipoint services for each of the three CoS Labels, H, M, L.

MEF23.2 Appendices

- A: Performance Tier Model Derivation
- B: Ethernet Network Section Model – Composing UNI-UNI Values
- C: Key Applications to Device Performance Requirements
- D: Example PCP and DSCP Mapping at UNI for Multi-CoS EVCs
- E: Other Relevant Standards and Industry Models
- F: Guidelines for Multipoint Services
- G: Burst Size and Shaper Considerations
- H: Guidelines For Choosing Value for CBS



***Accelerating Worldwide Adoption of
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