MEF 7.2: Carrier Ethernet
Management Information Model

July 2013
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://metroethernetforum.org/InformationCenter

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*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 See MEF web site for official current list, minor updates and superseded work (such as MEF 1 and MEF 5)*
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*Current at time of publication. See MEF web site for official current list, minor updates (such as MEF 31.0.1 amendment to this document) and superseded work (such as MEF 1 and MEF 5)*
## Purpose

This Specification defines a common set of managed object definitions that are consistent and readily integrated into a Carrier Ethernet Provider’s operations environment. This common management model helps ensure that vendors provide management functionality and information in their OSSs, NMSs, EMSs, and NEs in a logically consistent fashion, and allows service providers to readily integrate such capabilities into their management environment.

## Audience

- Equipment Manufacturers building devices that will carry Carrier Ethernet Services
- Useful for Service Providers architecting their systems and providing services.
- Tool vendors for developing back office applications
About MEF 7.2

• **Purpose:**
  – This presentation is an introduction to MEF 7.2 – Carrier Ethernet Management Information Model

• **Audience**
  – Equipment Manufacturers building devices that will carry Carrier Ethernet Services
  – Service Providers delivering Carrier Ethernet Services
  – EMS/NMS/OSS tool vendors developing back office applications for managing, provisioning and monitoring Carrier Ethernet Services

• **Other Documents**
  – Presentations of other MEF specifications and an overview of all specifications is available on the MEF web site
  – Other materials such as white papers and case studies are also available
EMS – NMS Information Model

• A Specification
  – Enable consistent definition of the management information required to manage Carrier Ethernet.

• A Model
  – Defines the specific EMS-NMS management interface and objects for each specific interface profile such as Common Object Request Broker Object (CORBA) IDL, Simple Network Management Protocol (SNMP), JAVA, XML, etc.

• Scope
  – Ethernet (ETH) layer UNI configuration provisioning
  – ETH layer configuration and provisioning
  – ETH layer network connection and fault management (including setup/modification, notification, testing)
  – Ethernet External Network Network Interface (ENNI) Service Attributes
  – UNI Tunnel Access (UTA) / Virtual User Network Interface (VUNI) Service Attributes
  – SOAM Service Attributes
  – Virtual Network Interface Device (vNID) Remote Management Interface
  – Ethernet Access Services
MEF Service OAM

• MEF 7.2 defines a means to provide OAM at the Ethernet Services layer
  – Does not define OAM at the transport link/network layers
  – Compliments/relies on the work done in the ITU, IEEE and IETF at the Transport data link and Network layers

• Provides a framework and concepts for managing and monitoring flows across a connectionless network
  – From end to end
  – From Operator to Operator

• Provides mechanism to perform:
  – Node Discovery, Establish connectivity, monitor CoS, and detect service impairments
Key Assumptions behind MEF OAM

• Assumes Ethernet is only common denominator
  – For example: 802.3 Ethernet, Ethernet over SONET/SDH, RPR, etc.
  – Must use Ethernet framing for OAM communications
• Ethernet segments interconnected with forwarding entities (bridges, etc.)
  – Connectionless (like IP)
  – Segment can be real or virtual
• Must measure “per service” and “fate share” with the data plane
  – Out-of-band OAM not reflective of the data plane
  – OAM mixes with user data within the core network
• Small initial focus on “SLA” metrics
  – Connectivity, latency, loss, jitter, availability
• Other functions may follow later
  – Traceroute, RDI/AIS, other
• Domain oriented
  – Domain may be intra-provider, inter-provider, customer-to-customer, etc.
Network Layering Concepts

- Flows, connections and resources can all be managed separately at each LND
- Each can remain independent
- Each in turn can pass information to upper management domains to isolate issues.
Carrier Ethernet Management

- Management Interface includes Configuration, Fault, Performance, and Common functions
• Provides the description of the various elements necessary for Configuration of Carrier Ethernet
• A couple of Configuration Function examples are given in the following slides
CM Example

• The next slide provides an example of the detail contained in MEF 7.2
• The figure shows the functions for Interface Management
• The slide after that shows the text describing ENNI Creation
• Each function is documented in manner displayed on the ENNI Creation Example slide
CM Example – Interface Management

- Create, Delete, Modify, Query functions defined for
  - UNI
  - VUNI
  - ENNI
- Flow Point Pool (FPP) Management
**Name** | ETH Flow Point Pool (FPP) ENNI Creation  
---|---  
**Summary** | The Carrier Ethernet Manager creates and configures an ETH ENNI on a pre-selected port. ETH FPP ENNIs may be created automatically by Managed System when physical ports are created, and can be retrieved by Carrier Ethernet Manager.  
**Actor(s)** | Carrier Ethernet Manager  
**Assumptions** | The Carrier Ethernet Manager has the authority to create the ETH ENNI.  
**Pre-Conditions** | The Carrier Ethernet Manager has established communication with Managed System.  
**Begins When** | The Carrier Ethernet Manager has selected a port (e.g., Generic Transport TTP) and sends a request to provision an ETH_FPP_ENNI representing an Ethernet ENNI on the port.  
**Description** | The Carrier Ethernet Manager needs to create a new ETH ENNI associated with a specific port. The Carrier Ethernet Manager requests the creation of a new Ethernet FPP ENNI to be managed by the Managed System. As part of the creation request, the Carrier Ethernet Manager provides Ethernet ENNI configuration parameters. Based on the creation request, the Managed System creates an instance of ETH FPP ENNI and returns the name of the new ETH FPP ENNI instance. In addition, an Object Creation Notification for the new instance of ETH FPP ENNI is autonomously sent from the Managed System. For an ETH FPP ENNI, the following information may be provided by the Carrier Ethernet Manager as part of the creation request:  
- **FPP Type**: Indicates that the ETH FPP is an ENNI.  
- **FPP SubType (Optional)**: A string that indicates the detailed FPP sub-type.  
- **User Label**.  
- **IEEE 802.3Address (Optional)**: The [IEEE 802.3] address which is placed in the source-address field of any non-FDFr specific Ethernet frames that originate at this interface.  
- **Max Number of Virtual Connections (Optional)**.  
- **MTU Size**.  
**Description (cont.)** |  
- **ENNI Label**: Describes the ENNI within the scope of the Ethernet provider domain. The ENNI Label attribute is a value that is assigned to the ENNI by the Ethernet Provider.  
- **Protection Mechanism**: The method for protection, if any, against a failure.  
- **SVLAN-ID Mapping**: The map that associates each S-Tagged ENNI Frame with an End Point. The End Point Type within an End Point Map for ENNI frames mapped to an OVC MUST take the value of “OVC”. The End Point Type within an End Point Map for ENNI frames mapped to a VUNI MUST take the value of “VUNI”.  
- **Maximum Number of OVC End Points per OVC**: The Maximum Number of OVC End Points per OVC provides an upper bound on the number of OVC End Points that are associated by an OVC that the Operator can support at the ENNI. Note that if the Maximum Number of OVC End Points per OVC is one, then hairpin switching cannot be supported at the ENNI.  
- **Supported By (GET, SET BY CREATE)**: Relationship with supporting objects.  
- **Client/Server (GET, SET BY CREATE)**: Relationship with TRANS layer TTP (Encapsulation Port).  
- **Flow Domain Interfaces (GET, SET BY CREATE)**: Relationship with ETH Flow Domain that contains the FPP in a given layer.  
- **Ingress Bandwidth Profile (Optional)**: This attribute indicates the ingress bandwidth profile for all ETH services at the ETH FPP ENNI in the ingress direction.  
- **Egress Bandwidth Profile (Optional)**: This attribute indicates the egress bandwidth profile for all ETH services at the ETH FPP ENNI in the egress direction.  
**Ends When** | 1) Managed System returns the creation response to Carrier Ethernet Manager  
2) Exception happens  
**Exceptions** | 1) Unknown Managed Entity  
2) Managed System Processing Error  
3) Invalid Parameter  
**Post-Conditions** | A new instance of ETH Flow Point Pool ENNI is created.
Performance Management

• Functions to control SOAM PM (MEF 35)
• Loss, Delay, and Availability are covered
Fault Management functions as defined by MEF 30
- Loopback, Link Trace, Lock
- Alarm and Notifications
• MEF 7.2 provides MEF specific extensions to the ITU-T Q.827.1 information model
MEF Specific Information Model

- MEF 7.2 provides the class object diagrams for the MEF specific Carrier Ethernet Services
- For example, below is the diagram for the ENNI related bandwidth profile attributes:
Summary
Summary MEF 7.2

• MEF 7.2 provides the EMS-NMS Management Information Model
• Provides the Use Cases needed for the EMS-NMS Management Interface
• Provides detailed functional decomposition
• Shows the linkage between the MEF specific objects and the common models from the ITU-T and TMF
For Full Details ...

Please visit [www.metroethernetforum.org](http://www.metroethernetforum.org)
Select Information Center on Left Navigation to access the full specification and extracted MIB files

**EVC:** Ethernet Virtual Connection

**UNI:** User Network Interface. the physical demarcation point between the responsibility of the Service Provider and the responsibility of the End-User/Subscriber

**CE:** Customer Equipment
Accelerating Worldwide Adoption of Carrier-class Ethernet Networks and Services

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