Introducing the Specifications of the Metro Ethernet Forum
| MEF 2 | Requirements and Framework for Ethernet Service Protection |
| MEF 3 | Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks |
| MEF 6 | Metro Ethernet Services Definitions Phase I |
| MEF 7 | EMS-NMS 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 | Ethernet Services Attributes Phase I |
| MEF 11 | User Network Interface (UNI) Requirements and Framework |
| MEF 12 | Metro 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 Ethernet Services at the UNI |
| MEF 15 | Requirements for Management of Metro Ethernet Phase 1 Network Elements |
| MEF 16 | Ethernet Local Management Interface |

* MEF 10 * replaced MEF 1 and MEF 5
This Presentation

• **Purpose**
  – This presentation is intended as an introduction and companion to the MEF 16 Specification

• **Audience**
  – It is intended for Product Marketing, Engineering staff of equipment manufacturers involved with products and services that deliver Carrier Ethernet
  – It is intended for Service Provider Engineering staff involved in the management of products and services that comply to the MEF specifications

• **Other Documents**
  – Presentations of the other 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
### Introduction

#### MEF 16: Ethernet Local Management Interface (E-LMI)

<table>
<thead>
<tr>
<th><strong>Purpose</strong></th>
<th>Enables customer equipment to receive information regarding the status and attributes of Ethernet Services thus allowing automatic configuration and improved Subscriber network performance.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audience</strong></td>
<td>Equipment manufacturers of Customer Edge devices and of Service Provider equipment. Useful for Service Providers architecting their systems.</td>
</tr>
</tbody>
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### Ethernet Services “Eth” Layer

**Service Provider 1**

- **Metro Ethernet Network**
  - ETH UNI-C
  - ETH UNI-N

**Service Provider 2**

- **Metro Ethernet Network**
  - ETH UNI-N
  - ETH UNI-N

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**UNI**: User Network Interface, **UNI-C**: UNI-customer side, **UNI-N** network side

**NNI**: Network to Network Interface, **E-NNI**: External NNI; **I-NNI** Internal NNI

**EVC**: Ethernet Virtual Circuit
Content of the MEF 16 Specification

• E-LMI Messages, Protocol and Procedures
• E-LMI Scope
• E-LMI Framing Mechanism
• EVC Status
• E-LMI Service Attributes and Parameters
• E-LMI Messages
  – Approx 18 message types and sub-categories
• E-LMI Procedures
  – Approx 27 procedures and sub-categories

(These last two representing the bulk of the content of the specification which totals 35 pages)
Background to the Specification

• The E-LMI protocol is based on
  – ITU-T Q.933, X.36 and other relevant recommendations
  – Frame Relay Local Management Interface (FR-LMI) Implementation Agreement document
    as defined by the Frame Relay Forum & related ITU-T recommendations
• Scope
  – The E-LMI protocol has a local significance at the UNI between the MEN and the CE.
  – The E-LMI protocols & procedures allows auto configuration of the CE.
  – The protocol also provides the status of an (EVC) notifying the Customer when an EVC is added, deleted and its status etc.
Framing Mechanism, Status, Attributes

• E-LMI Framing Mechanism
  – Describes the framing mechanism for transferring E-LMI messages between the UNI-C and UNI-N, based on the IEEE 802.3 untagged MAC-frame format.

• Status
  – Point-to-Point EVCs may be “new”, “active”, or “inactive”
  – In addition, multipoint-to-multipoint with some active EVCs are termed “partially active”

• E-LMI Service Attributes and Parameters
  – The set of service attributes required to be provided by the MEN to enable auto-configuration
Two messages are defined for the E-LMI protocol:
- STATUS and
- STATUS ENQUIRY

This section (5.5) of the specification describes the E-LMI message format, information elements, and sub-information elements (shown on the right), which are included in these E-LMI messages.

- **General Message Format and Information Element Coding**
- **E-LMI STATUS and STATUS ENQUIRY Messages**
  - STATUS Message
  - STATUS Enquiry
- **E-LMI Message Elements**
  - Protocol Version
  - Message Type
  - Report Type Information Element
  - Sequence Numbers Information Element
  - CE-VLAN ID/EVC Map Information Element
  - UNI Status Information Element
  - EVC Status Information Element
  - Data Instance (DI) Information Element
  - Bandwidth Profile Sub-information Element
  - EVC Map Entry Sub-information Element
  - UNI Identifier Sub-information Element
  - EVC Identifier Sub-information Element
  - EVC Parameters Sub-information Element
E-LMI Procedures

The behavior of the E-LMI protocol is defined by procedures to be carried re:
- The events at the CE and the MEN
- The E-LMI messages received by the UNI-C and the UNI-N

These procedures (summarized on the right) are characterized by messages that will be exchanged at the UNI.

The procedures are modeled on Frame Relay Local Management Interface procedures

- System parameters
- Periodic Polling
- Sequence Numbers
- Full Status
- Full Status Continued
- Asynchronous Status
- Data Instance Triggered Update
  - UNI-C Procedures
  - UNI-N Procedures
- Reporting a New EVC
- Error Procedures
  - UNI-N Operation
  - UNI-C Operation
  - Examples of Error Procedures
- Handling of Error Conditions
  - Protocol Version Error
  - Message too short
  - Message type errors
  - General information element errors (6 types)
  - E-LMI Operational Status Determination
- UNI-C Procedures
- UNI-N Procedures
Summary and Next Actions

• After reading this document you should now be familiar with
  – The scope and depth of MEF 16 and know that it details the messages and procedures that traverse the UN-C and UNI-N link

• Next Actions
  – Read the full MEF 16 specification
  – Read the related Frame Relay documents called out in the MEF 16
  – For Network Equipment manufactures: use this information to implement the management functions
For Full Details …

... visit [www.metroethernetforum.org](http://www.metroethernetforum.org) to access the MEF 16 specification.