Introducing the Specifications of the Metro Ethernet Forum

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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	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

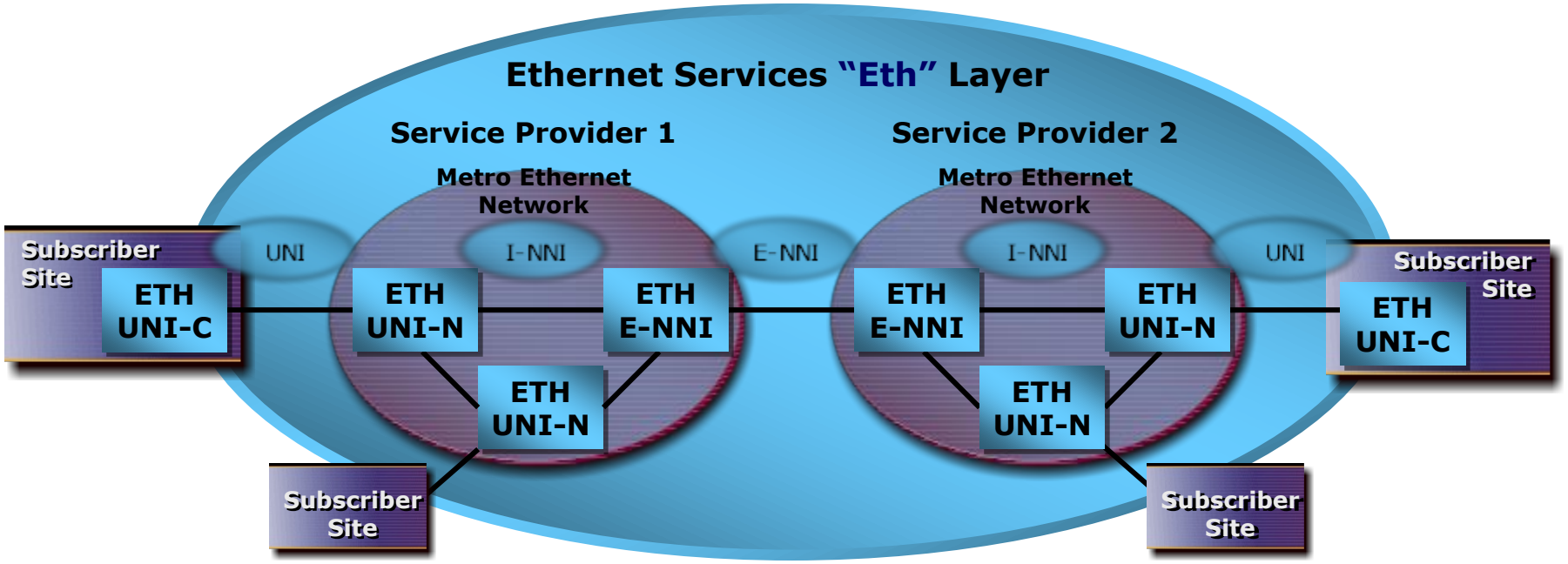
* MEF 10 * replaced MEF 1 and MEF 5

This Presentation

- **Purpose**
  - This presentation is intended as an introduction and companion to the MEF 12 Specification
- **Audience**
  - It is intended for Product Marketing, Engineering staff of member companies, for members of other standards bodies, Enterprise networking staff, and service providers who
    - Would like a quick overview of the specifications
    - Plan to read the specifications in detail
- **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 12	Metro Ethernet Network Architecture Framework Part 2: Ethernet Services Layer
Purpose	Defines the Ethernet Services (ETH) Layer as the specific layer network responsible for delivery of Ethernet Protocol Data Units across internal and external interfaces as introduced in the diagram below



Introduction to MEF 12

- **Rich functional model**
  - MEF 12 is a “topological functional model” that provides the rich set of capabilities required for sophisticated implementation of converged Enterprise and residential networks
- **Application to simple networks**
  - As a functional model this specification can also result in systems with minimal or null implementations of the functions for simple, rural or residential networks

Notes on the Scope of MEF 12

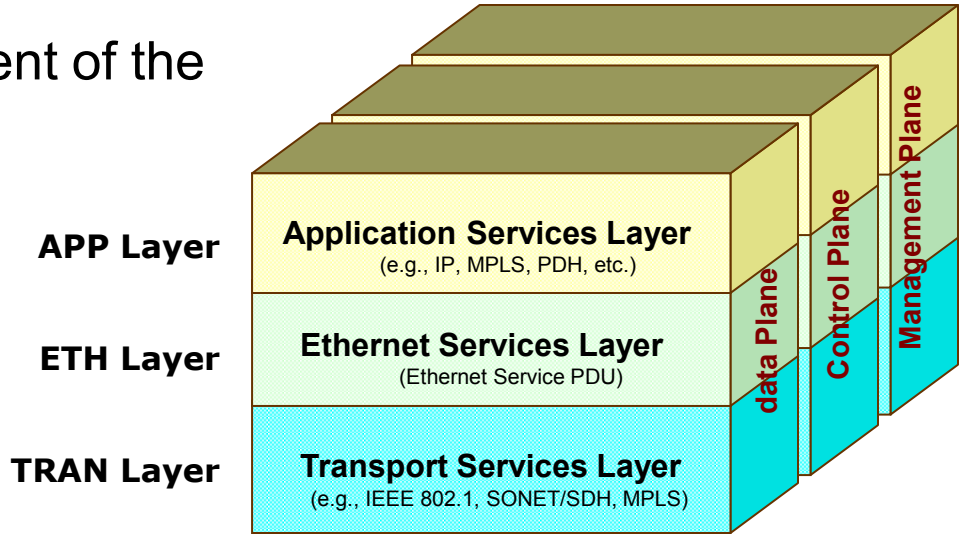
- **Scope** (MEF 12, page 6)
  - The Ethernet Services Layer architecture framework provides the generic model used by the MEF to describe architectural components and functional elements that enable and support Ethernet-centric[1] service-aware capabilities[2] of a MEN. The document is intended to describe the decomposition model[3] for a MEN in terms of the access and core service-enabling functions, their relationships to ETH Layer functional elements, and the interconnect rules among them.

Notes

1. MAC layer
2. All the functions that comprise an Ethernet Service
3. Models all the components of the ETH layer as modules

The Ethernet Services Layer

- "The Ethernet Services Layer, also referred to as the ETH Layer, is the layer within a MEN where Ethernet Services deliver Ethernet PDUs across well-defined internal and external interfaces.
- The ETH Layer is responsible for Ethernet MAC flows, including operations, administration, maintenance and provisioning capabilities required to support Ethernet Services.
- The ETH layer is a component of the MEN Layer Network Model described in MEF 4:



Interpreting the Terminology

- **Understanding**
  - The functional model requires creation of terminology which may require some careful understanding to those not familiar with that used by the ITU and other bodies
  - Those familiar with ITU-T recommendations will note that MEF 12 is based on the same functional model.
  - The terminology for functional elements is derived from ITU-T Recommendations G.809 and G.8010/Y.1306 [ITU G.809][ITU G.8010].
  - Some terminology in this functional view is derived from in ITU-T recommendations G.805, G.809, G.8010, which are covered in more detail in MEF 4 appendix I

Terminology Notes

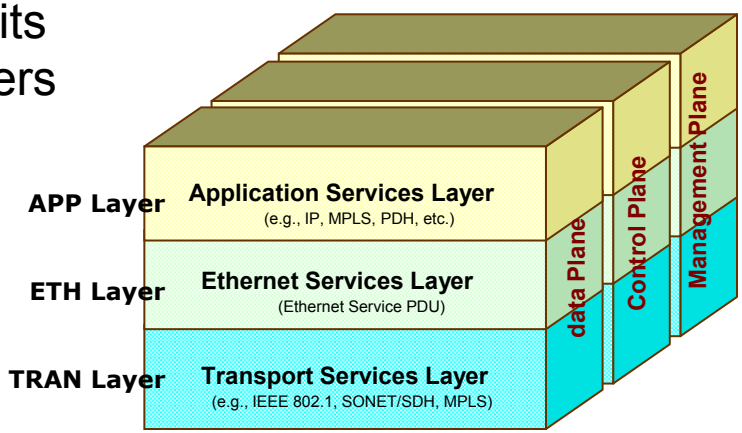
MEF 12 defines adaptation, termination and conditioning functions in the following topological table

Topological Components	Transport Entities	Reference Points
ETH Layer Network	ETH Network Flow	ETH Access Point
ETH Flow Domain	ETH Flow Domain Flow	ETH Termination Flow Point
ETH Link	ETH Link Flow	ETH Flow Point
ETH Access Group	ETH Connectionless Trail	ETH Flow Point Pool
		ETH Termination Flow Point Pool

Adaptation functions adapt protocol data units as they transition boundaries between the layers of the MEN network model

Termination functions create and terminate flows through the MEN

Conditioning functions shape the traffic at transition points throughout the network



Elements covered in this Document

The elements specifically defined in MEF 12 are:

- **ETH Services Layer**
- **ETH Reference Model**
- **ETH Links**

The overview in the following slides covers only those elements …

The Ethernet Services Layer (1)

- **ETH Layer Characteristic Information**
  - ETH Layer Characteristic Information (ETH-CI) is simply the basic Ethernet Packet that is transmitted unaltered across the MEN
  - The specification details the familiar PDU
  - (The Service Frame presented by the ETH Layer external interfaces is an Ethernet unicast, multicast or broadcast frame conforming to the IEEE 802.3-2002 frame format)

***Flow Point**: A reference point that represents a point of transfer for connectionless traffic units between topological components*

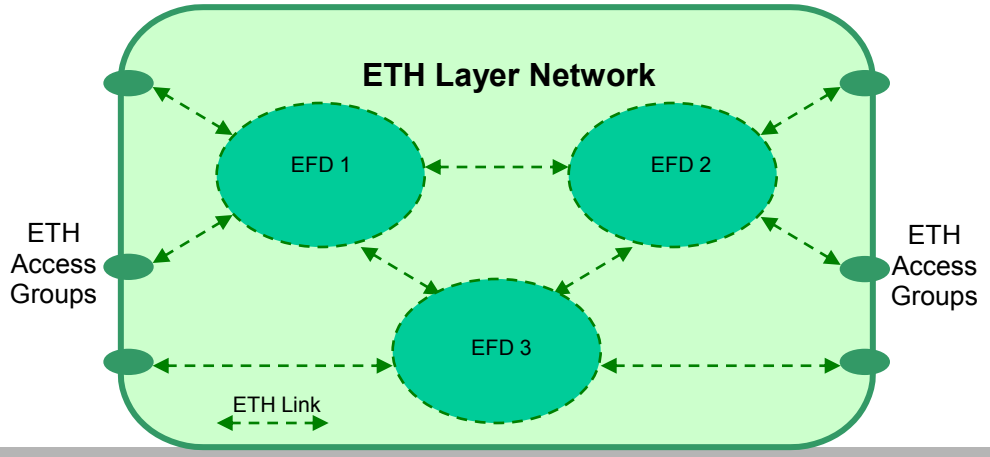
The Ethernet Services Layer (2)

- **ETH Layer Topological Components**
  - **ETH Flow Domain (EFD)**
    - *An EFD is a topological component defined by a set of all terminating ETH flow points that transfer information within a given administrative portion of the ETH Layer network.*
    - *The scope of an EFD is the selective broadcast domain of these flow points*
    - *EFDs may be partitioned into sets of non-overlapping EFDs interconnected by ETH links. An IEEE 802.1D bridge represents the smallest instance of an EFD.*

The Ethernet Services Layer (3)

- **ETH Layer Topological Components (Cont)**
  - **ETH Link**
    - *The interconnecting link between Access Groups and EFDs*
  - **ETH Access Group**
    - *An ETH access group is a group of co-located ETH flow termination functions* that are connected to the same EFD or EFD link. The ETH access group demarcates the point of access into the ETH Layer network.*

    * Located at the network side of the UNI ETH Link
  - **ETH Layer Network**
    - *Consists of all the Access Groups, Ethernet Flow Domains and Eth Links*
    - *The scope is the broadcast domain of all of the Access Groups*



ETH Layer Network Reference Model (1)

- **Ethernet Virtual Connection (EVC)**
  - *The construct used to associate UNIs, enabling an end-to-end subscriber services across one or more MEN Service Providers*
  - *An EVC is represents a single instance of an ETH Layer service*
- **ETH Layer Functional Elements**
  - APP to ETH Adaptation Function
    - *A class of processes responsible for the adaptation of the APP layer PDUs to the ETH Layer. These are application specific as there are multiple application client types*
  - ETH Flow Termination Functions
    - *Processes responsible for the creation and termination of ETH network flows*

ETH Layer Network Reference Model (2)

- **ETH Conditioning functions**
  - *Processes responsible for classifying, filtering, metering, marking, policing, shaping flows in & out of the ETH Layer links between administrative network boundaries. These fall into three categories*
    - ETH Flow Conditioning Function
    - ETH Subscriber Conditioning Function
    - ETH Provider Conditioning Function
- **ETH EVC Adaptation Function**
  - Adaptation of service frames into and out of EVCs
  - Adaptation of the Subscriber CoS ID into Service Provider CoS indication as per contracted CoS instance
  - Multiplexing/demultiplexing service frames to and from EVCs if called out by SLAs

ETH Layer Network Reference Model (3)

- **ETH EVC Termination Function**
  - The process a specialized instance of a “Flow Termination Function” that creates and terminates Eth Trails between Access Points across the MEN
- **ETH Connection function**
  - The process that switches EVC PDUs within the MEN for point-to-point or multipoint connections
  - Connections models may be associated with an ECF include IEEE 802.1D Relay or Bridge, IEEE 802.1Q Bridge, IEEE P802.1ad Bridge, IETF VPLS function
- **ETH to TRAN Adaptation function**
  - The process that adapts ETH Layer PDUs to its serving TRAN layer.
  - These functions are technology/infrastructure specific since ETH Layer links way be provided by Ethernet, SONET/SDH, Wireless, WDM, ATM, FR, etc.

ETH Links

- **ETH Access Link**
  - This can be the link between the port in the Subscriber's CE implementing the UNI-C processing functions to the port in Service Provider's Edge Device, implementing the UNI-N processing functions. Or …
  - The link between the ports of the Provider's Edge Devices in two different Service Providers implementing the E-NNI processing function
- **ETH Trunk Link**
  - Interconnect ports between Service Provider network elements implementing the I-NNI processing functions

Next actions

- This introduction to the specification should be read along with the other related introductions and specifications and become familiar with the UNI/NNI elements
- ITU=T recommendation G.8010 is also recommended reading for implementation of Carrier Ethernet Services over native Ethernet
- For equipment manufacturers the next step is to read the specification and use the reference model as the basis for implementation.
- The implementation of actual infrastructure within Access

Summary and Next Actions

- **After reading this document you should now be familiar with**
  - The main MEF architecture functional components for the Ethernet layer
  - Relationships between functional model components
  - Relationships between subscriber and provider function
- **Next Actions**
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For Full Details …

… visit www.metroethernetforum.org

to access the MEF 12 specification