MEF

Introducing the Specifications of the Metro Ethernet Forum

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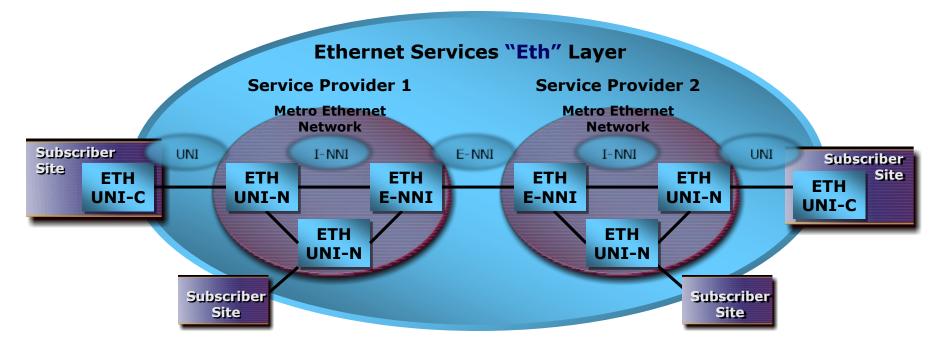
MEF 2	Requirements and Framework for Ethernet Service Protection
MEF 3	Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks
MEF 4	**Metro Ethernet Network Architecture Framework Part 1: Generic Framework**
MEF 6	Metro Ethernet Services Definitions Phase I
MEF 7	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

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This Presentation

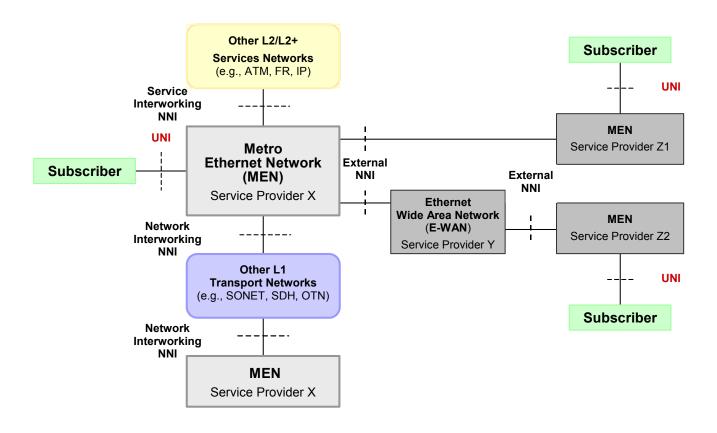| MEF 4	**Metro Ethernet Network Architecture Framework** **Part 1: Generic Framework**
Purpose	Introduces the framework and terminology for the services (Eth) layer and provides the fundamental understanding of the Carrier Ethernet architecture
Audience	Equipment Manufacturers, Service Providers & Enterprises

Ethernet Services "Eth" Layer

UNI: User Network Interface, UNI-C: UNI-customer side, UNI-N network side
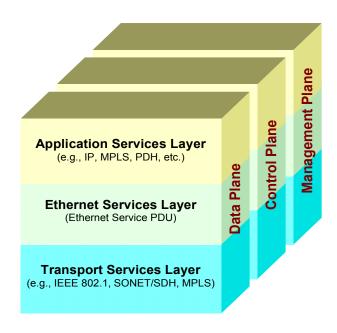NNI: Network to Network Interface, E-NNI: External NNI; I-NNI Internal NNI

- **The Industry first Carrier Ethernet generic architecture framework**
  - describes the high-level constructs used to model the various architectural components of a Carrier Ethernet services and transport.
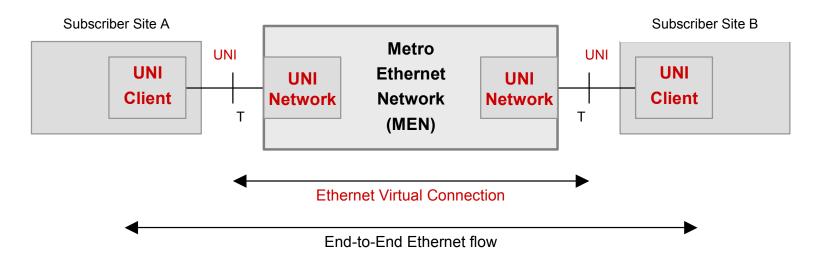
MEN Layer Network Model

- **APP Layer, supports applications carried on Ethernet services across the MEN.**

- **Ethernet Services Layer (ETH Layer) is responsible for the instantiation of Ethernet MAC oriented connectivity services and the delivery of Ethernet service frames.**

- **The Transport Layer (TRAN Layer), supports connectivity among ETH layer functional elements in a service independent manner. Various layer network technologies and interconnect approaches may be used to support the transport requirements for the Ethernet services layer.**

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The UNI and the MEN Reference Model

Subscriber Site A

UNI Client

UNI

T

UNI Network

Metro Ethernet Network (MEN)

UNI Network

UNI

T

Subscriber Site B

UNI Client

Ethernet Virtual Connection
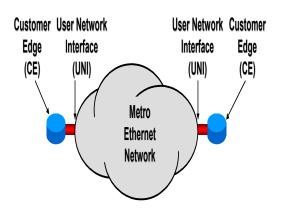
End-to-End Ethernet flow

- **Functionally the UNI is an asymmetric, compound functional element**
- **consists of a client side, referred to as the UNI-C, and a network side, referred to as the UNI-N**
- **The term UNI is used to refer to these two functional elements, and generically, to the data, management and control plane functions associated with them.**

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Ethernet Services – Basic MEF Model Concepts

- **Customer Equipment (CE) attaches to the Metro Ethernet Network (MEN) at the UNI**
  - May use any ISO layer O/1/2 transport technology
  - Only requirement: must pass Ethernet frames at network interface handoffs.
- **CE can be**
  - Router or bridge/switch -IEEE 802.1 bridge
- **UNI (User Network Interface)**
  - Demarcation point between the customer and provider network
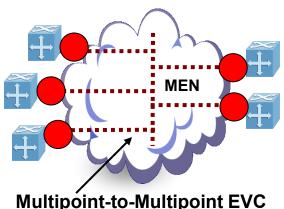 - Standard IEEE 802.3 Ethernet PHY/MAC

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Ethernet Virtual Connection (EVC)

- **An EVC is "an instance of an association of 2 or more UNIs"**
- **EVCs help visualize the Ethernet connections**
  - Like Frame Relay and ATM PVCs or SVCs
- **MEF has defined 2 EVC types**
  - Point-to-Point
  - Multipoint-to-Multipoint
    - Point to multi-point is a special case (e.g. Video broadcast)

Point-to-Point EVC

MEN

UNI   **UNI**

MEN

Multipoint-to-Multipoint EVC

EVCs help conceptualize the service connectivity

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Network to Network Interfaces

- External Network-to-Network Interface (E-NNI)
  - **an open interface used to interconnect two MEN service providers**

- Internal Network-to-Network Interface (I-NNI)
  - **an open interface used to interconnect network elements from a given MEN service provider**

- Network Interworking Network-to-Network Interface (NI-NNI)
  - **an open interface that supports the extension of transport facilities used to support Ethernet services, and associated EVCs, over an external transport network(s) not directly involved in the end-to-end Ethernet service**

- Service Interworking Network-to-Network Interface (SI-NNI)
  - **an interface that supports the interworking of an MEF service with services provided via other service enabling technologies (e.g., Frame Relay, ATM, IP, etc.).**

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MEN Topology Components

- Layer Network: **A complete set of logical or physical ports (see also access group) of the same type that may be associated for the purpose of transferring information. The transferred information is in terms of a well-defined traffic unit of the particular layer network and it is termed its Characteristic Information (CI).**

- Subnetwork**:   A partition of a layer network used to affect the steering of specific user data within a portion of a layer network. In the ITU-T terminology the term subnetwork is reserved for connection oriented networks. The term** *Flow Domain* **is used in the context of a connectionless layer network, such as Ethernet.**

- Link: **A (fixed) connectivity relationship between a "subnetwork" or "access group" and another "subnetwork" or "access group". The term** *Flow Point Pool Link* **are used in the context of a connectionless layer network, such as Ethernet.**

- Access Group: **A group of co-located logical or physical ports, with associated processing functions that are connected to the same "subnetwork" or "link". Basically, an access group represents the logical access ports into a given sub-network or flow domain.**

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MEN Transport Components

- Connection**:** **A transport entity that represents an aggregation of one or more connection oriented traffic units with an element of common routing.   Referred to as** *Flow* **in the context of a connectionless layer network.**

- Connection Point**: A reference point that represents a location of transfer of connection-oriented traffic units between topological components. Referred to as a** *Flow Point/Flow Point Pool* **in the context of a connectionless layer network.**

- Trail**:   A transport entity that represents the transfer of monitored and adapted characteristic information of client layer network between two access points. Typically used to represent the association between source and destination(s) on a per traffic unit basis. Referred to as a** *Connectionless Trail* **in the context of a connectionless layer network.**

- Trail Termination Point**: A reference point that represents a location of insertion/extraction of monitored and adapted information characteristic to a given layer network (as opposed to the information presented by the client of the layer network). Referred to as a** *Flow Termination Point* **in the context of a connectionless layer network.**

- Access Point: **A reference point where the output (input) of a "trail termination" is bound to the input (output) of an "adaptation" or the output of an "adaptation" function.**
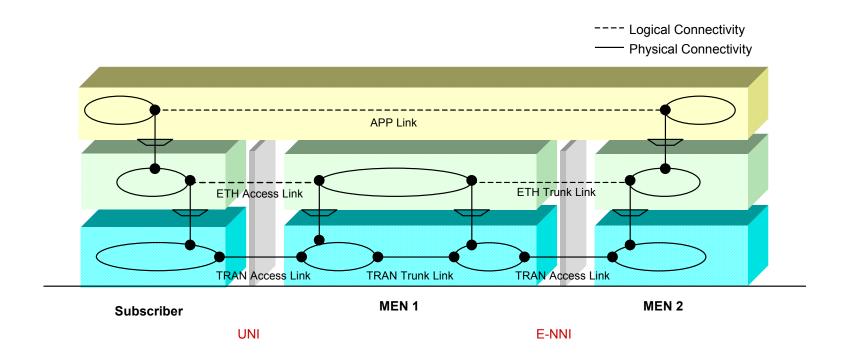
Generic MEN Functional Elements

As specified by ITU G.805 and G.809

- Adaptation Function**: A transport processing function that converts the server layer network trail information into the characteristic information of the client layer network (and vice versa).**

- Termination Function**: A transport processing function which accepts adapted characteristic information from a client layer network at its input, adds information to allow the associated trail to be monitored (if supported) and presents the characteristic information of the layer network at its output(s).**

- **In addition, ITU Recommendation G.806 defines a generic functional element to steer flows within a network:**
  Connection Function**: A transport processing function that transfers information (potentially transparently) from a given input to one or more outputs. Note that a Connection Function is the smallest subnetwork / flow domain (also referred to as Flow Domain Function).**

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MEN Reference Link Model Example

- **This example illustrates the high-level relationship between link types and the MEN UNI and E-NNI reference points.**

- **Separate specifications will provide detailed relationships between processing functions and reference points for any MEF specified interface.**

Summary and Next Actions

- **After reading this document you should now be familiar with**

  - The main MEF architecture functional components for the Ethernet layer

- **Next Actions**

  - This specification should be viewed in conjunction with the MEF 6, 10 and 12 specifications

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to access the full specification