Introducing the Specifications of the Metro Ethernet Forum

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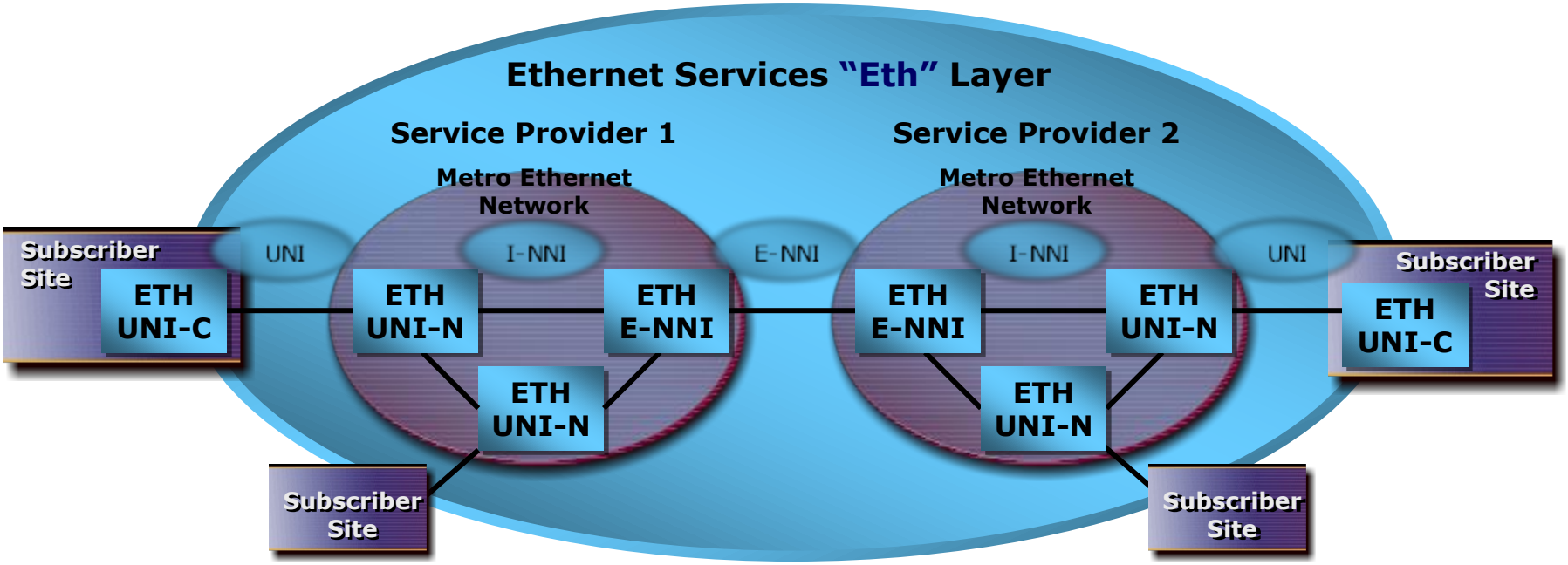
MEF 2	Requirements and Framework for Ethernet Service Protection
MEF 3	Circuit Emulation Service Definitions, Framework and Requirements in Metro Ethernet Networks
MEF 4	Metro Ethernet Network Architecture Framework Part 1: Generic Framework
MEF 6	Metro Ethernet Services Definitions Phase I
MEF 7	EMS-NMS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

Introduction

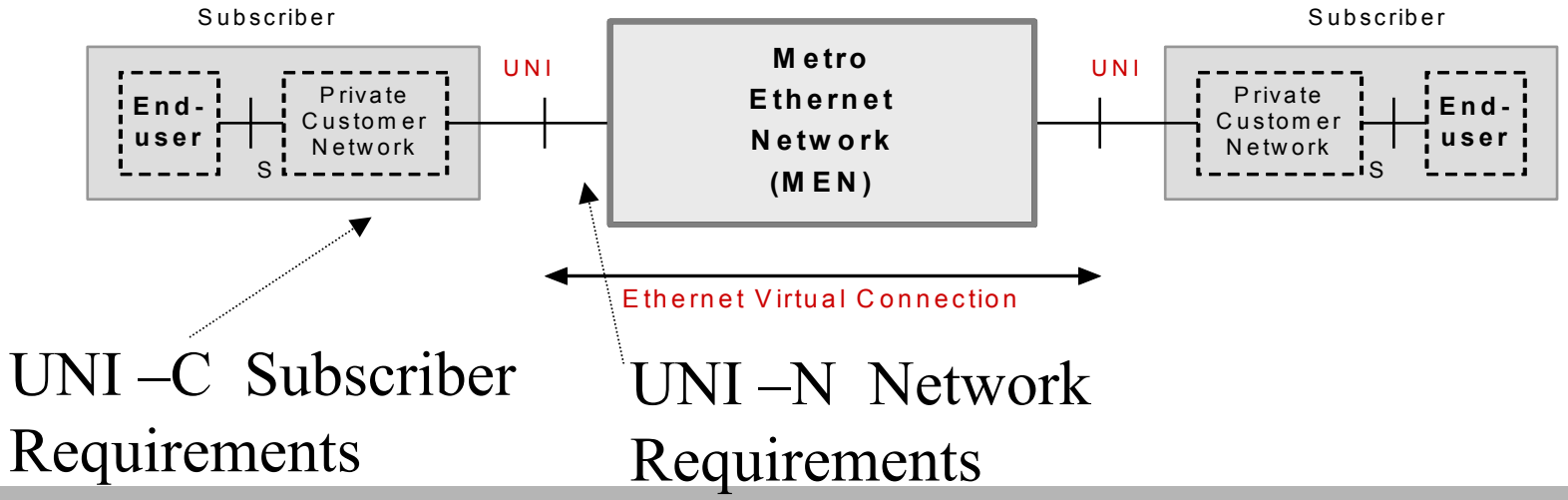
MEF 11	User Network Interface (UNI) Requirements and Framework
Purpose	Defines a split demarcation function between the customer (Subscriber), and the Service Provider
Audience	Equipment Manufacturers building devices that will carry Carrier Ethernet Services. Useful for Service Providers architecting their systems.



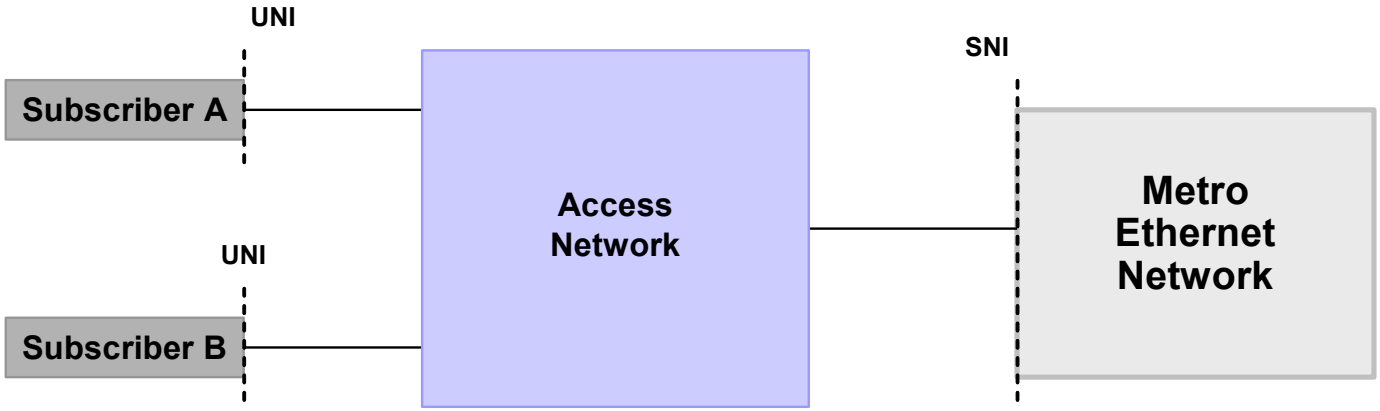
UNI: User Network Interface, UNI-C: UNI-customer side, UNI-N network side
NNI: Network to Network Interface, E-NNI: External NNI; I-NNI Internal NNI

MEF 11: UNI Specification

- **A Specification**
  - Defines a split demarcation function between the customer (Subscriber), and the service provider (Network)
    - Each maintains its own side independently of the other.
- **UNI Types**
  - Type 1: Manual configuration of the CE side only- completely compatible with all existing Ethernet customer equipment
  - Type 2: Allows the UNI-N to provision, configure, and distribute EVC information and the associated service attributes to the CE
  - Type 3: Allows the CE to request, signal and negotiate EVCs and its associated Service Attributes to the UNI-N.



UNI - Network Location



- **An access network may exist between the subscriber and the MEN**
  - In that case the UNI is still co-located at the subscriber edge
  - UNI-C is always IEE802.3 PHY connected
- **The reference point between the access network and the Provider Edge (PE) equipment is called Service Node Interface (SNI)**
  - The SNI definition is not in the cope of MEF 11
  - UNI-N functional components which implement the Service Provider side of the UNI functions may be distributed over an access network

Scope of UNI Framework

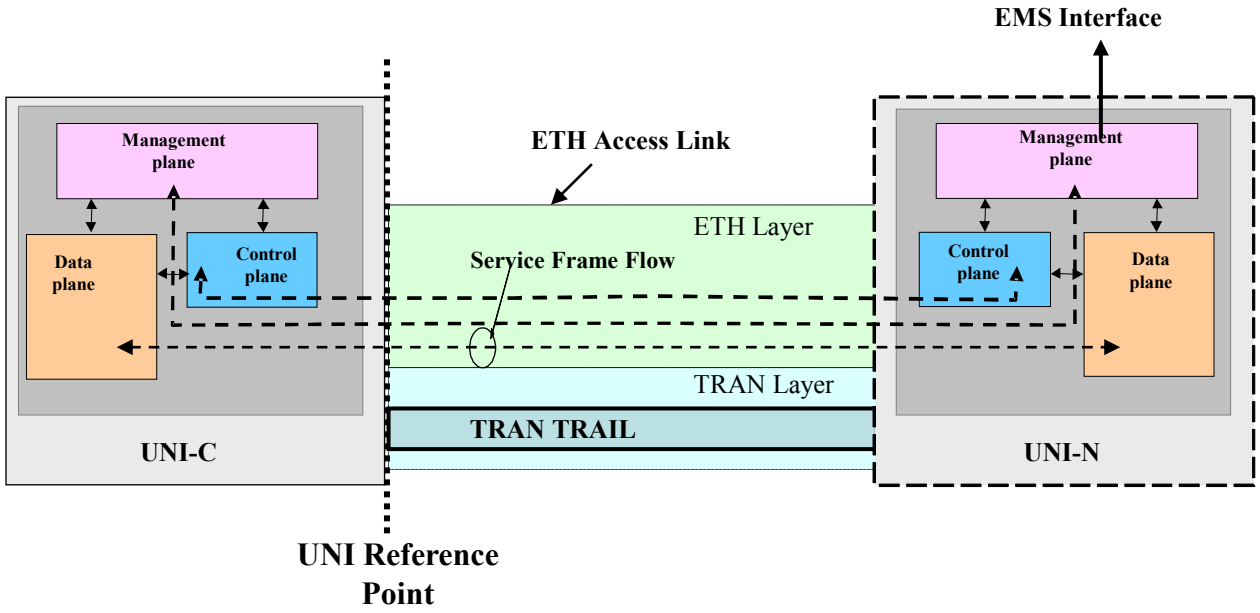
UNI Reference model

- **MEF 11 Defines the functions of each**
- **Defines the supporting requirements**

Plane Functions & Requirements

- **Data Plane**
  - Requires and 802.3PHY, supports 802.1Q/p tagged frames
    - Allows VLAN ID and COS information to be sent from subscriber to the MEN
- **Control Plane**
  - Provides communication link between the subscriber and network side
    - Designed to Allow for Dynamic service contract set-up and negotiation as well as service provisioning
- **Management Plane**
  - Allows for Device Configuration, Service OAM, and Service load-balancing/restoration
    - Allows for greater degree of managed service offering by the carriers
    - Allows for greater customer insight into the service level being delivered by the MEN

Potential for more value added services



- **Demonstrates the three UNI functions distributed on either side of the UNI**
- **Allows for transport multiplexing (TMF) of separate UNI-C ETH Access links on a single underlying transport (TRAN) terminated at a single UNI-N**

UNI Types

MEF has defined various UNI functionality

- **Type 1**
  - Manual configuration of the CE side only- completely compatible with all existing Ethernet customer equipment
- **Type 2**
  - Allows the UNI-N to provision, configure, and distribute EVC information and the associated service attributes to the CE
- **Type 3**
  - Allows the CE to request, signal and negotiate EVCs and its associated Service Attributes to the UNI-N.

UNI Defined Service Attributes

- UNI Identifier,
- Physical Layer (speed, mode, and physical medium),
- MAC Layer,
- Service Multiplexing,
- UNI EVC ID,
- CE-VLAN ID/EVC Map,
- Maximum number of EVCs,
- Bundling,
- All to One Bundling,
- Bandwidth Profiles, and
- UNI Layer 2 Control Protocol Processing.

EVC Defined Service Attributes

- **EVC Type (Point-to-Point or Multipoint-to-Multipoint),**
- **UNI List,**
- **Service Frame Delivery,**
- **CE-VLAN ID Preservation,**
- **CE-VLAN CoS Preservation**
- **Layer 2 Control Protocol Processing, and**
- **EVC related Performance**

UNI General Requirements

- **UNI Type 1** MUST **allow UNI-C of Subscriber equipments to connect to a UNI-N of MEN using an IEEE 802.3 2002 conforming interface.**
- **UNI Type I** MUST **allow UNI-C of Subscriber equipments, conforming to IEEE 802.1Q [5] and IEEE 802.1D [6], to connect to a UNI-N of MEN.**
- **UNI Type I** MUST **allow UNI-C of Subscriber equipments, implementing IEEE 802.3 end stations e.g. routers, to connect to a UNI-N of MEN.**
- **UNI Type 1 UNI-Ns** MUST **support the full range of CE-VLAN Ids, in accordance with IEEE 802.1Q tag.**

UNI Physical Requirements

UNI Type 1 MUST support at least one of the following IEEE 802.3 Ethernet PHYs:

- **10BASE-T in Full-duplex mode**
- **100BASE-T including 100BASE-TX and 100BASE-FX in Full-duplex mode**
- **1000BASE-X including 1000BASE-SX, 1000BASE-LX, and 1000BASE-T in Full-duplex mode**
- **10GBASE-SR, 10GBASE-LX4, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, and 10GBASE-EW in Full-duplex mode**

UNI Type 1 Data Plane Requirements

- **UNI Type 1** MUST **allow sending Subscriber's IEEE 802.3-2002 compliant service frames across the UNI.**
- **When multiple EVCs are supported by UNI-N, UNI Type 1** MUST **allow mapping of Service Frames to corresponding EVCs.**
- **UNI Type 1** MUST **allow the mapping of Service Frames to the following types of EVCs:**
  - Point-to-Point EVC
  - Multipoint-to-Multipoint EVC
- **UNI Type 1** MUST **support an option for ingress bandwidth profile across the UNI.**
- **UNI Type 1** MUST **be transparent to higher layer protocols.**

UNI Type 1 Data Plane Requirements

- **UNI Type 1** MUST **allow manual configuration to set-up or tear-down EVCs across the UNI**
- **UNI Type 1** MUST **allow manual configuration to modify the service attributes associated with the EVCs across the UNI**
- **UNI Type 1** MUST **allow manual configuration to modify the ingress bandwidth profile across the UNI, where the modification may result in increment or decrement of bandwidth**
- **If Bandwidth Profile Parameter CIR is supported, UNI Type 1** MUST **allow manual configuration to modify CIR in the following granularities:**
  - 1Mbps steps up to 10Mpbs
  - 5 Mbps steps beyond 10Mbps and up to 100Mbps
  - 50 Mbps steps beyond 100Mpbs and up to 1Gbps
  - 500 Mbps steps beyond 1Gbps

UNI Type 1 Control Requirements

- **UNI Type 1** MUST **support manual configuration of following service parameters at UNI-C and UNI-N.**
- **CE-VLAN ID/EVC Map allowing mapping each Subscriber service frame into an EVC.**
- **Parameters of Ingress bandwidth profile per UNI**
- **Parameters of Ingress bandwidth profile per EVC**
- **Parameters of Ingress bandwidth profile per CoS**
- **CoS Identifiers**
- **Handling of UNI Layer 2 control protocols, where the handling may include:**
  - Tunneled through EVC
  - Discarded, or
  - Processed
- **UNI Type 1** MUST **support failure detection based on failure detection mechanisms of IEEE 802.3ah.**

UNI Type 2 Requirements

- **UNI Type 2 UNI-C and UNI-N** MUST **be backward compatible with UNI Type 1.**
- **UNI Type 2 UNI-C and UNI-N** MUST **support sending Ethernet OAM frames, as required by UNI Type 2 management plane, across the UNI.**
- **UNI Type 2 UNI-C and UNI-N** MUST **support the service parameters to be communicated from UNI-N to UNI-C**
- **UNI Type 2 UNI-C and UNI-N** MUST **support the following Ethernet OAM mechanisms between UNI-C and UNI-N such that UNI can be managed:**
  - Connectivity verification which helps in establishing connectivity status between UNI-C and UNI-N.
  - Communicate the EVC availability status to the UNI-C.

UNI Type 3 Requirements

- **UNI Type 3 UNI-C and UNI-N** MUST **be backward compatible with UNI Type 2 and UNI Type 1.**

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**
  - 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

For Full Details …

… visit www.metroethernetforum.org

to access the full specification