Introducing the Specifications of the MEF

An Overview of MEF 6.1, 6.1.1, 10.2, 10.2.1
Carrier Ethernet Definitions and Attributes

2012 March
Agenda

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* MEF 6.1 replaced MEF 6., MEF 7.1 replaced MEF 7, MEF 10.2.1 & MEF 10.2 replaced MEF 10.1.1, MEF 10.1, MEF 10 which replaced MEF 1 and MEF 5.
## Approved MEF Specifications

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This Presentation

• **Purpose:**
  – Introduction to MEF 6.1, MEF 6.1.1, MEF 10.2 and MEF 10.2.1
  – Highlights of MEF 6.1 Services and Service Attributes.
  – This presentation does not cover examples of all Services and Service Attributes

• **Audience**
  – Most importantly, Subscribers of Ethernet Services
  – Equipment Manufacturers supporting MEF 6.1 Services using Service Attributes defined in MEF 10.2 & MEF 10.2.1.
  – Service Providers supporting MEF 6.1 Services

• **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
Provides foundational definitions and concepts for Metro Ethernet Services, service attributes and parameter requirements and as well as traffic classification, traffic profiles and related recommendations to deliver Carrier Ethernet Services.
Overview of MEF 6.1, MEF 6.1.1, 10.2, 10.2.1
## MEF Specification Overview

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<th>MEF 6.1</th>
<th>Metro Ethernet Services Definitions Phase 2</th>
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<td><strong>Purpose</strong></td>
<td>Defined Service types (E-Line, E-Lan, E-Tree) and standardizes few services based on the Service Types (EPL, EVPL, EP-LAN, EVP-LAN, EP-TREE, EVP-TREE)</td>
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<th>MEF 6.1.1</th>
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<td><strong>Purpose</strong></td>
<td>Aligns Layer 2 Control Protocol treatment at MEF compliant UNI to be consistent with IEEE specifications.</td>
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<th>MEF 10.2</th>
<th>Ethernet Services Attributes Phase 2</th>
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<td><strong>Purpose</strong></td>
<td>Defines the service attributes and parameters required to offer the services defined in MEF 6.1. Updated from Original MEF 10 and 10.1</td>
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<th>MEF 10.2.1</th>
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<td><strong>Purpose</strong></td>
<td>Redefine the service performance parameters concerning availability, resiliency, and handle related issues. Modifies specific sections in 10.2.</td>
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<td><strong>Audience</strong></td>
<td>All, since they provide the fundamentals required to build devices and services that deliver Carrier Ethernet. For Enterprise users it gives the background to Service Level Specifications for Carrier Ethernet Services being offered by their Service Providers and helps to plan Ethernet Services as part of their overall network.</td>
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Terminology & Concepts

- Services model and taxonomy
- Services type definitions
- Service attributes and parameters
  - Per UNI
  - EVC per UNI
  - Per EVC

* Refer to the MEF specification documents for details on all attributes.
• Customer’s (Subscriber) Service extends from UNI to UNI
• Connectivity between UNIs is an Ethernet Virtual Connection (EVC)
Ethernet Service – Basic MEF Model Concepts

- Customer Equipment (CE) attaches to the Carrier Ethernet Network at the UNI
- CE can be
  - Router, bridge/switch or Host (end system)
- UNI (User Network Interface)
  - Demarcation point between the customer (subscriber) and provider network
  - Standard IEEE 802.3 Ethernet PHY/MAC
- Carrier Ethernet Network is also referred to as a Metro Ethernet Network (MEN)
• **Ethernet Virtual Connection (EVC)**
  – Connects two or more UNI’s
  – Between UNIs that are associated with the same EVC
  – Three types of EVCs
    • Point-to-Point
    • Multipoint-to-Multipoint
    • Rooted Multipoint
  – One or more VLANs can be mapped (bundled) to a single EVC
  – A UNI can support up to 4K EVCs
  – Defined in MEF 10.2 (Ethernet Services Attributes)
<table>
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<th>UNI Service Attribute</th>
<th>EVC per UNI Service Attribute</th>
<th>EVC Service Attribute</th>
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<td>UNI EVC ID</td>
<td>EVC Type</td>
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<td>CE-VLAN ID / EVC Map</td>
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<td>Speed</td>
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<td>Mode</td>
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<td>MAC Layer</td>
<td>Egress Bandwidth Profile Per EVC</td>
<td>EVC MTU size</td>
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<td>Egress Bandwidth Profile Per CoS Identifier</td>
<td>CE-VLAN ID Preservation</td>
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<td>Unicord Service Frame Delivery</td>
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<td>All to One Bundling</td>
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<td>Multicast Service Frame Delivery</td>
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<td>CE-VLAN ID for untagged and priority tagged Service Frames</td>
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<td>Broadcast Service Frame Delivery</td>
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<td>Maximum number of EVCs</td>
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<td>Layer 2 Control Protocol Processing (only applies for L2CPs passed to the EVC)</td>
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<td>Ingress Bandwidth Profile Per UNI</td>
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<td>EVC Performance</td>
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<td>Egress Bandwidth Profile Per UNI</td>
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<td>Layer 2 Control Protocols Processing</td>
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Three Types of EVC’s

1. **Point to Point EVC:** each EVC associates exactly 2 UNIs – in this diagram one site is connected to two other sites with two EVCs

2. **Multipoint to Multipoint EVC:** each EVC associates ≥ 2 UNIs – in this diagram, three sites jointly share a multipoint EVC and can forward Ethernet frames to each other

3. **Rooted Multipoint EVC:** each EVC associates ≥ 2 UNIs with 1 or more UNIs as Roots – The roots can forward to the leaves, each leaf can only forward to the roots
### MEF 6.1 Ethernet Services Definitions Phase 2

<table>
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<th>Port-Based (All-to-One Bundling)</th>
<th>VLAN-Based (Service Multiplexed)</th>
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<td>E-Line (Point-to-Point EVC)</td>
<td>Ethernet Private Line (EPL)</td>
<td>Ethernet Virtual Private Line (EVPL)</td>
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<td>E-Tree (rooted multipoint EVC)</td>
<td>Ethernet Private Tree (EP-Tree)</td>
<td>Ethernet Virtual Private Tree (EVP-Tree)</td>
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### MEF 6.1 Enhancements
- Defines a service type (E-Tree) in addition to those defined in MEF 6
- Adds four services – two each to E-LAN and E-Tree
- EPL with > 1 CoS
- Updates Service Attributes
- Updates L2CP Processing
Services Using E-Line Service Type

Ethernet Private Line (EPL)
- One use case is for replacing a TDM Private line
- Port-based service with single service (EVC) across dedicated UNIs providing site-to-site connectivity
- Most popular Ethernet service due to its simplicity
Services Using E-Line Service Type

Ethernet Virtual Private Line (EVPL)

- Replaces Frame Relay or ATM L2 VPN services
  - To deliver higher bandwidth, end-to-end services
- Enables multiple services (EVCs) to be delivered over a single physical connection (UNI) to customer premises
Services Using E-LAN Service Type

- **EP-LAN**: Each UNI dedicated to the EP-LAN service. Example use is Transparent LAN.
- **EVP-LAN**: Service Multiplexing allowed at each UNI. Example use is Internet access and corporate VPN via one UNI.
**EP-Tree and EVP-Tree:** Both allow root - root and root - leaf communication but not leaf - leaf communication.

- **EP-Tree** requires dedication of the UNIs to the single EP-Tree service.
- **EVP-Tree** allows each UNI to support multiple services.

**Ethernet Private Tree example**

**Ethernet Virtual Private Tree example**

E-Tree is referenced in MEF 10.2 as Rooted-Multipoint EVC.
Carrier Ethernet Architecture

Data moves from UNI to UNI across "the network" with a layered architecture.

When traffic moves between ETH domains is does so at the TRAN layer. This allows Carrier Ethernet traffic to be agnostic to the networks that it traverses.
Delivery of Service Frames

- **Broadcast**
  - Deliver to all UNIs in the EVC but the ingress UNI

- **Multicast**
  - Delivered to all UNIs in the EVC but the ingress UNI

- **Unicast (unknown and known destination address)**
  - Delivered to all UNIs in the EVC but the ingress UNI if unknown destination address
  - Delivered to the UNI with known destination MAC address

- **Layer 2 Control (e.g., BPDU)**
  - Discard, peer, or tunnel
Options for Layer 2 Control Protocols

- **Discard**
  - The MEN will discard ingress L2CP frames

- **Peer**
  - The MEN will actively participate with the protocol

- **Tunnel**
  - Service Frames containing the protocol will be transported across the MEN to the destination UNI(s) without change

Above: The Logic Flow Chart for L2CP Service Frames
CE-VLAN ID Preservation (1)

Ethernet Virtual Private Lines to a Hub Location

- In this example, CE-VLAN Preservation = No for all EVCs (See EVC service attribute table 16 of MEF 6.1)
- Service Provider has three EVCs, each from a branch location to a hub location.
- UNI 1 is the hub location and the other UNIs are the branch locations.
- The CE-VLAN ID/EVC Maps as agreed to by the Subscriber and the Service Provider for each UNI are included in the figure.

The example shows the EVCs as perceived by the Subscriber.
Ethernet Private LAN

- In this example, CE-VLAN Preservation = Yes (See EVC service attribute table 20 of MEF 6.1.1)
- the Service Provider provides a single Ethernet Private LAN associating four UNIs.
All to One Bundling (Map)

- Only one EVC at the UNI (no service multiplexing)
- All CE-VLAN IDs map to this EVC – no need for coordination of CE-VLAN ID/EVC Map between Subscriber and Service Provider
- EVC must have CE-VLAN ID Preservation
Using All to One Bundling

Simplified Branch LAN extension Set-up

- CE-VLAN map to 1 EVC
- CE-VLAN preservation

Customer VLAN 6,7,9
One to One Map

- Subscriber and Service Provider must coordinate CE-VLAN ID/EVC Map
- No more than one CE-VLAN ID is mapped to each EVC at the UNI
- If CE-VLAN ID not mapped to EVC, ingress Service Frames with that CE-VLAN ID are discarded
- Service Multiplexing possible
- CE-VLAN ID Preservation is optional
CE-VLAN ID Translation

CE-VLAN ID/EVC Map can be different at different UNIs in an EVC

- Fine for CE routers
- Problematic for CE bridges (depends on configuration)
### Identifying an EVC at a UNI

#### Service Frame Format

<table>
<thead>
<tr>
<th>Service Frame Format</th>
<th>CE-VLAN ID</th>
<th>EVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untagged*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priority Tagged*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tagged, VID = 1</td>
<td>1</td>
<td>Red</td>
</tr>
<tr>
<td>Tagged, VID = 2</td>
<td>2</td>
<td>Green</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Tagged, VID = 4094</td>
<td>4094</td>
<td>Blue</td>
</tr>
<tr>
<td>Tagged, VID = 4095</td>
<td>4095</td>
<td></td>
</tr>
</tbody>
</table>

*Untagged and Priority Tagged Service Frames can have the same CE-VLAN ID. (depends on use case) Configurable at each UNI. This is the behavior expected by an IEEE 802.1Q CE.*
Using One to One Map w/ Translation – 1

- CE Router
- Frame Relay PVC Replacement

ISP Customer 1
- 178 ↔ Blue
- 179 ↔ Yellow
- 180 ↔ Green

ISP Customer 2
- 2000 ↔ Yellow

ISP Customer 3
- 2000 ↔ Green

Internet Service Provider

CE-VLAN ID Preservation would constrain ISP

Pt to Pt EVCs
Using One to One Map – 2

- ASP/SaaS
- ASP/SaaS
- ASP/SaaS
- ASP/SaaS

ASP/SaaS Customer 1
ASP/SaaS Customer 2
ASP/SaaS Customer 3
ASP/SaaS Customer 3

CE Router

Multipoint-to-Multipoint EVCs

(application servers)

(application servers)
Industry Service Requirements

• For services are to be adopted in the market:
  – They require strong service attributes
  – With meaningful and measurable parameters on which to base the SLA Specification
The Best Of All Worlds

• Offer a mix of SLA “ensured” and non SLA traffic
  – Over the same “shared” MEN access/backbone links.
  – Allow certain traffic be delivered with strict SLAs (Service Level Agreements),
  – Allow other traffic to be delivered best efforts.

• Critical SLA Service Attributes
  – Bandwidth Profile
  – Service Performance

• Allows bandwidth to exceed commitments
  – But does not apply SLA conformance measures to that traffic
How to Classify the Traffic

• **Apply Bandwidth Profiles (MEF 10.2)**
  The Bandwidth Profile is the set of traffic parameters that define the maximum limits of the customer’s traffic
  – An Ingress Bandwidth Profile limits traffic transmitted into the network,
    • Each Service Frame is checked for compliance against the profile
    • Separately definable for each UNI (MEF 10.2)
    • Service frames that meet the profile are forwarded
    • Service frames that do not meet the profile are dropped at the interface
  – An Egress Bandwidth Profile
    • Could be applied anywhere in the network to control the focused overload problem of multiple UNIs sending to an egress UNI simultaneously
Coloring Classified Traffic

- **MEF 10.2** specifies three levels of Bandwidth Profile compliance for each individual Service Frame:
  - **Green**: Service Frame subject to SLA performance guarantees
  - **Yellow**: Service Frame not subject to SLA performance guarantees, but will be forwarded on a “best effort” basis. They have lower priority and are discard-eligible in the event of network congestion.
  - **Red**: Service Frame discarded at the UNI by the traffic policer
Bandwidth Profile Parameters

- Customers are allowed a combination of rate and burst
- Green frames conform to the Committed Information Rate (CIR) and Committed Burst Size (CBS) limits
- Yellow frames conform to the Excess Information Rate (EIR) and Excess Burst Size (EBS) limits
- In Color Mode (CM) unaware service, the service provider will mark the frames green or yellow solely according to each frame’s arrival time
- Customers may have the option of marking their frames green or yellow themselves (Color Mode aware) to better allow them to utilize their CIR/CBS/EIR/EBS bandwidth profile
- In Color Mode aware service there may be an optional Coupling Flag (CF) that can be enabled to allow customers to better utilize unused tokens from the committed token bucket (unused CIR/CBS capacity)
- The total set of Bandwidth Profile Parameters is CIR/CBS/EIR/EBS/CM/CF
Bandwidth Profile Defined by Token Bucket Algorithm (2 rates, 3 colors)

Color Blind Algorithm:
If (Service Frame length is less than C-Bucket tokens)
   {declare green; remove tokens from C-Bucket}
else if (Service Frame length is less than E-Bucket tokens)
   {declare yellow; remove tokens from E-Bucket}
else declare red
CBS vs. EBS

- Burst size in Bytes per second allowed
  - CBS marked Green, EBS is Yellow,
  - Bursts beyond EBS limit is discarded
CIR vs. EIR Service Example

- **Conceptual Example**
  - 3 EVCs share fixed UNI bandwidth
  - 3 CIRs can always be met
  - 3 EIRs can not always be assured (simultaneously)

**Traffic Passed at CIR rates are subject to SLS conformance - if other parameters also met**

**EIR traffic is marked yellow – not subject to SLS**
Application of Bandwidth Profiles

• **Bandwidth profiles may be applied with 3 layers of granularity:**
  – Ingress Bandwidth Profile Per Ingress UNI
  – Ingress Bandwidth Profile Per EVC
  – Ingress Bandwidth Profile Per CoS ID

  Note: Only one profile may be applied to a given service name
Port, EVC, and VLAN based BWPs

Three Types of Bandwidth Profiles Defined in MEF 10.1

Port-based

Ingress Bandwidth Profile Per Ingress UNI

Port/VLAN-based

Ingress Bandwidth Profile Per EVC

Port/VLAN/CoS-based

Ingress Bandwidth Profile Per CoS
Two Ways to Identify CoS Instance

• **EVC**
  – All Service Frames mapped to the same EVC receive the same CoS

• **EVC, priority marking**
  – All Service Frames mapped to an EVC with one of a set of user priority values receive the same Class of Service
  – The user may be able to mark the priority with 802.1Q Priority bits in the VLAN Tag Priority Code Point (C-TAG)
  – The user may be able to mark the priority with IP DSCP bits
  – L2CP can have their own CoS ID
• **Five performance attributes are considered in MEF 10.2.1**
  - Frame Delay Performance
    - a) Frame Delay
    - b) Frame Delay Range
    - c) Mean Frame Delay
Frame Delay and Delay Variation

- **Frame Delay**
  - This is measured as the time taken for service frames to cross the network.
  - Frame Delay is measured from the arrival of the first bit at the ingress UNI to the output of the last bit of the egress UNI. I.e. an end-to-end measurement as the customer views it.

- **Inter Frame Delay Variation**
  - Frame Delay Variation is therefore the variation in this delay for a number of frames. This delay is an important factor in the transmission of unbuffered video and where variation occurs in the millisecond range can affect voice quality. For data can cause a number of undesirable effects such as perceived frame loss, etc.
• **One-way Frame Delay Performance for an EVC**
  
  - Defines three performance attributes: the One-way Frame Delay Performance corresponding to a percentile of the distribution, the One-way Mean Frame delay, and the One-way Frame Delay Range.
  
  - The One-way Frame Delay for an egress Service Frame at a given UNI in the EVC is defined as the time elapsed from the reception at the ingress UNI of the first bit of the corresponding ingress Service Frame until the Transmission of the last bit of the Service Frame at the given UNI. This delay definition is illustrated above.
Frame Delay Performance

- **Inter-Frame Delay Variation Performance for Point-to-Point EVC**
  - **Inter-Frame Delay Variation (IFDV):** The difference between the one-way delays of a pair of selected Service Frames. (same as in RFC3393 [6] where IP packet delay variation is defined.)
  - **The Inter-Frame Delay Variation Performance:** The “P-percentile” of the absolute values of the difference between the Frame delays of all Qualified Service Frame pairs if the difference in the arrival times of the first bit of each Service Frame at the ingress UNI was exactly \( \Delta t \).

  - This definition agrees with IP packet delay variation definition where delay variation is defined as the difference between the one-way delay of two packets selected according to some selection function and are within a given interval \([ T_1, T_2] \).

  - Inter-Frame Delay Variation Performance depends on the choice of the value for \( \Delta t \). Values for both \( \Delta t \) and \( T \) typically should be chosen to achieve a reasonable level of statistical accuracy.
The difference in delays encountered by frame $i$ and $j$ is given by $d_i - d_j$

For a particular Class of Service instance, Inter-Frame Delay Variation Performance metrics may be specified over any given subset of two or more UNIs on an EVC.
Frame Loss Ratio (FLR)

- **Frame loss** is a measure of the number of lost service frames inside the MEN
  - Frame loss ratio is \( \% = \frac{\text{# frames lost}}{\text{# frames sent}} \)

```
5 frames lost/or received as errored
0.1% Frame Loss Ratio (5/5000)
```
Frame Loss Ratio Performance

- **One-way Frame Loss Ratio Performance for an EVC**
  - There may be multiple One-way Frame Loss Ratio Performance metrics defined for a particular Class of Service instance on an EVC.
  - Each such metric is based on a subset of the ordered pairs of UNIs in the EVC for a time interval “T”.
  - One-way Frame Loss Ratio Performance metric is defined as follows:

\[
FLR_{T,S} = \begin{cases} 
\max \{FLR_T^{(i,j)} | \langle i, j \rangle \in S \text{ and where } I_T^{(i,j)} \geq 1 \} \\
\text{Undefined when all } I_T^{(i,j)} = 0 | \langle i, j \rangle \in S
\end{cases}
\]

- a One-way Frame Loss Ratio Performance metric entry must specify a set of parameters and an objective. The parameters and objective of a One-way Frame Loss Ratio Performance metric are referenced in Table 6 of MEF 10.2.

- Given \( T, S, \) and a One-way Frame Loss Ratio Performance objective, the One-way Frame Loss Performance SHALL be defined as met over the time interval \( T \) for the subset \( S \) if and only if \( FLR_{T,S} \leq \hat{L} \).
Availability & Resilience Performance

One-way Availability Performance for an EVC

- Availability Performance is based on Service Frame loss during a sequence of consecutive small time intervals and the availability state during the previous small time interval; it is the percentage of time within a specified time interval during which the frame loss is small.
  - If frame loss is high for each small time interval in the current sequence, then the small time interval at the beginning of the current sequence is defined as unavailable; otherwise it is defined as available.

One-way Resiliency Performance for an EVC

The figure to the right illustrates how the two resiliency attributes defined here, counts of High Loss Intervals and counts of Consecutive High Loss Intervals, fit into the hierarchy of time and other attributes.
## Availability Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T</strong></td>
<td>The time interval</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Subset of the UNI pairs (used for Multipoint EVC)</td>
</tr>
<tr>
<td><strong>Δt</strong></td>
<td>A time interval much smaller than T</td>
</tr>
<tr>
<td><strong>C_u</strong></td>
<td>Unavailability frame loss ratio threshold</td>
</tr>
<tr>
<td><strong>C_a</strong></td>
<td>Availability frame loss ratio threshold with $C_a \leq C_u$</td>
</tr>
<tr>
<td><strong>n</strong></td>
<td>Number of consecutive small time intervals for assessing availability</td>
</tr>
<tr>
<td><strong>Â</strong></td>
<td>Availability Performance objective</td>
</tr>
</tbody>
</table>
UNI-oriented Availability Example

• In this case, an Availability Performance metric is defined for each UNI for each Class of Service. The metric is based on the ability to communicate between the UNI in question and the other UNIs identified by the important traffic flows. Define the following subsets of UNI pairs:

- \( S_{A,1} = \{\langle A, B \rangle, \langle A, C \rangle, \langle A, D \rangle, \langle A, E \rangle\} \)
- \( S_{B,1} = \{\langle B, A \rangle, \langle B, C \rangle, \langle B, D \rangle, \langle B, E \rangle\} \)
- \( S_{C,1} = \{\langle C, A \rangle, \langle C, B \rangle\} \)
- \( S_{D,1} = \{\langle D, A \rangle, \langle D, B \rangle\} \)
- \( S_{E,1} = \{\langle E, A \rangle, \langle E, B \rangle\} \)
- \( S_{A,2} = \{\langle A, C \rangle, \langle A, E \rangle\} \)
- \( S_{C,2} = \{\langle C, A \rangle, \langle C, E \rangle\} \)
- \( S_{D,2} = \{\langle D, A \rangle, \langle D, E \rangle\} \)
- \( S_{E,2} = \{\langle E, C \rangle, \langle E, A \rangle\} \)

• For this example, assume that \( T, , , , \) and \( n \), are used for all availability definitions. Then using the definition in Section 6.8.4, can be viewed as the availability of UNI A for Class of Service 1 and this reflects the availability of the important point to point paths that UNI A is a part of. Similarly, can be viewed as the availability of UNI C for Class of Service 2.
In this case, Availability Performance metric is defined for each Class of Service supported by the EVC.

- \( S_1 = \{\{A, B\}, \{A, C\}, \{A, D\}, \{A, E\}, \{B, C\}, \{B, D\}, \{B, E\}\} \)
- \( S_2 = \{\{A, C\}, \{A, E\}, \{C, E\}\} \)

For this example, assume that \( T, c, e, e, \), and \( n \), are used for both availability definitions. Then using the definition in Section 6.8.4, can be viewed as the availability of Class of Service 1 on the EVC and can be viewed as the availability of Class of Service 2 on the EVC.
High Loss Interval/Consecutive High Loss Interval

- High Loss Interval (HLI) is a small time interval contained in $T$ (having the same duration as the interval, with a high frame loss ratio).

- When sufficient HLIs are adjacent, the interval is designated as a Consecutive High Loss Interval (CHLI)

![Diagram showing HLI and CHLI counting processes.]

$n = 10, p = 3$

- $fr_{i,j}(\Delta t_m) > C$
- $fr_{i,j}(\Delta t_m) \leq C$

Figure 12 shows an example that depicts the HLI and CHLI counting processes.
Summary
Summary

- MEF 6.1.1 modifies MEF 6.1 with respect to Layer 2 Control Protocol processing requirements, and provides a closer alignment to IEEE 802.1 specifications.

- MEF 10.2 defines the attributes of Ethernet Services observable at a User Network Interface (UNI) and from User Network Interface to User Network Interface (UNI to UNI) and a framework for defining specific instances of Ethernet Services.

- The 10.2.1 modifies and enhances MEF 10.2 in the definition of Qualified Service Frames, Availability, new performance attributes for resiliency performance and adds new terms.
Final Word

• Service Attributes & Parameters
  – Ethernet Private Line, Ethernet Virtual Private Line, Ethernet LAN attributes and parameters are covered in detail in the specifications

• Next Actions
  – After reading this document you should now be familiar with the main concepts of Ethernet Services and be in a position to follow the details contained in both the MEF 6.1 and MEF 10.2 and 10.2.1 Specifications
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