Amendment to MEF10.3 – UNI Resiliency Enhancement
(All-Active UNI Operation)

This Amendment (MEF10.3.2) Summary

It extends UNI Resiliency Service Attribute to cover UNI All-Active operation. This feature enables that, when more than one link are used at a UNI, all links at the UNI can carry Service Frames and protect among each other. In addition, the document also specifies an operation at a UNI where more than two links are configured.

Prior to this enhancement, when two links are used at a UNI, only one link can carry Service Frames and another link is in standby mode. MEF10.3 did not specify an operation of a UNI with more than two links.

This document adopts "Per-service frame distribution" algorithm specified in IEEE802.1AX-2014 as the Service Frame distribution method for All-Active UNI, i.e., C-Tag VLAN ID based Service Frame distribution. As a result, it introduces a new Service Attribute: UNI Port Conversion ID to Aggregation Link Map.

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UNI Resiliency Service Attribute

- The attribute applies to a UNI, agnostic to the link termination device(s) at CEN and CE.

- The valid attribute values: *None, 2-link Active/Standby, All-Active, or Other* depending on the value of Number of Link Service Attribute.
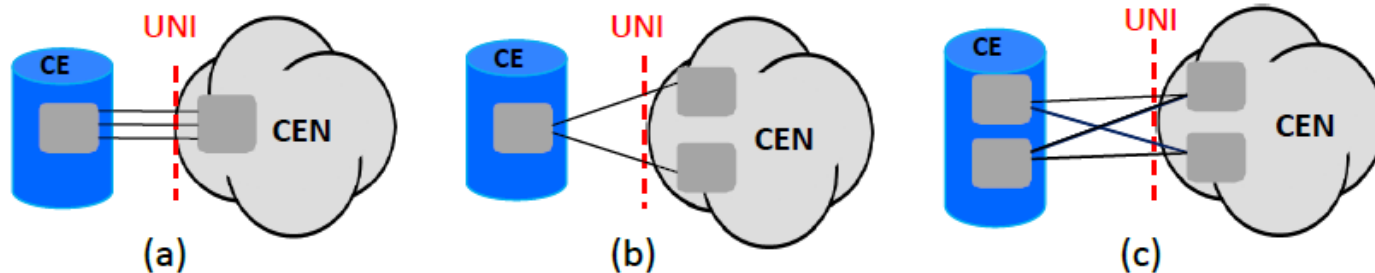

Figure A1 - 1– Examples of Multiple Physical Links at a UNI

A New UNI Service Attribute

- The new UNI Service Attribute name is:
  Port Conversation ID and Aggregation Link MAP

- This attribute is used when UNI Resiliency Service Attribute is set to 'All-Active'.

- The value of the new attribute MUST be mutually agreed by Service Provider and Subscriber,

  – The map applies the service frames in both directions.

- The attribute value has two columns: Port Conversation ID and Link Selection Priority List,

  – Port Conversation ID is the C-Tag VLAN ID at a given UNI,

  – The list contains the link IDs and expresses the link selection priority (in decreasing order) for the corresponding Port Conversion ID values in the same row,

  – Each row represents a mapping between some Port Conversation ID values and one link selection priority list.

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Port Conversation ID to Aggregation Link Map

The map example:
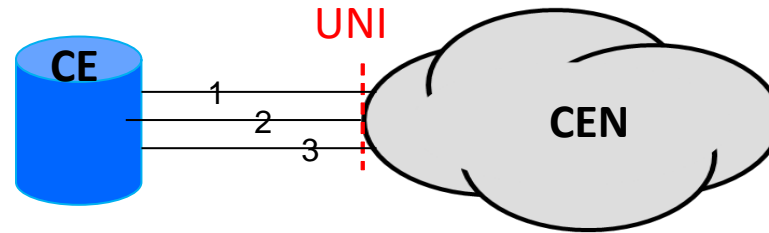
Port Conversation ID	Link Selection Priority List (decreasing order)
0, 1, 4	1, 3, 2
5	2, 3, 1
10	2, 1, 3
1000	2, 1
All other values	

Case: a UNI has three links and the link IDs are 1, 2, 3.

The first row in the map indicates that the Service Frames with C-tag values 0,1,4 has the link list: 1,3,2, which means these Service Frames will use link 1 if link 1 is operational; if link 1 fails, use link 3 if link 3 is operational; if both link 1 and 3 fails, use link 2.

The map also specifies a link list for C-tag values 5,10,1000; the row with all other values has a non-list, which means the Service Frame w/ C-tag values not listed in above rows will be dropped at the UNI.

Benefit from All-Active UNI

- All links at a UNI can carry frames and protect among each other.
- MEF now provides a solution for more than two links at a UNI.
- The map provides the flexibility for Service Provider and Subscriber to specify desired service frame distribution pattern.
- The map supports a link in 'standby' when all links are operational.
- The map allows that some service frames have more resiliency than other service frames.

Port Conversation ID	Link Selection Priority List (decreasing order)
0, 1, 4	1, 3, 2
5	2, 3, 1
10	2, 1, 3
1000	2, 1
All other values	

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All-Active UNI Use Case I

- An EPL Service for an enterprise customer:
  - Has two UNIs, UNI A and UNI B, each UNI has two 10G links
  - All-to-one bundle is enabled at both UNIs
  - UNI Resiliency is set to 'All-Active' at UNI A and UNI B
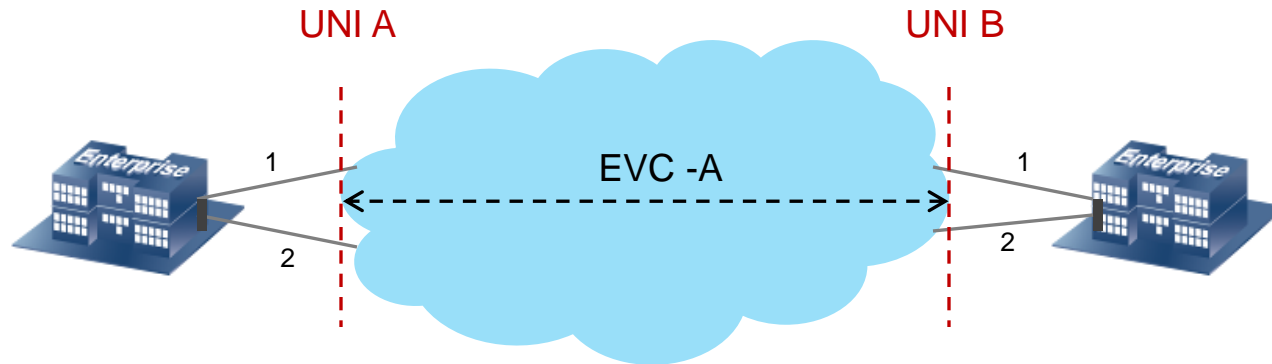
UNI Port Conversation ID to Aggregation Link Map

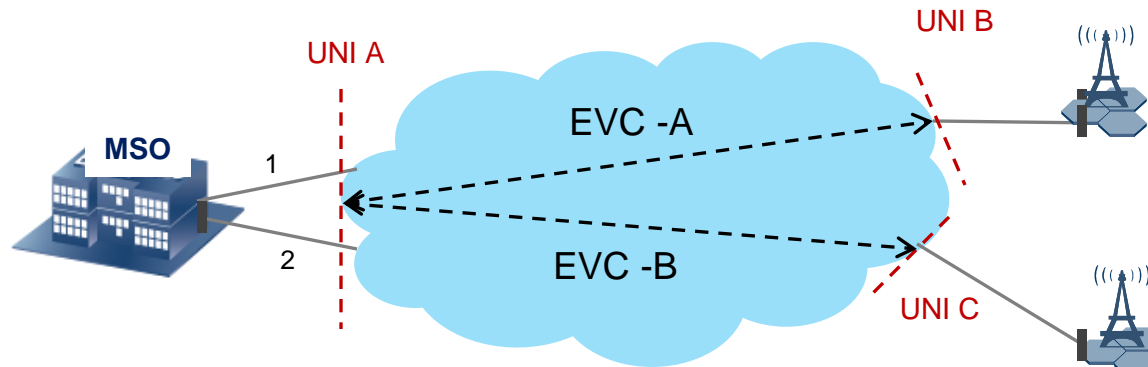| Port Conversation ID	Link Selection Priority List
0-2000	1, 2
All other values	2.1

UNI A

Port Conversation ID	Link Selection Priority List
All VLAN ID values	1, 2

UNI B

All-Active UNI Use Case II

- EVPL Services for Mobile Backhaul:
  - UNI A is configured at customer MSO with two links
  - UNI B and UNI C are configured at customer cell sites
  - EVC-A carries CE-VLAN ID 13, 14; EVC-B carries 23, 24.
  - UNI Resiliency Service Attribute is set to 'All-Active' at UNI A
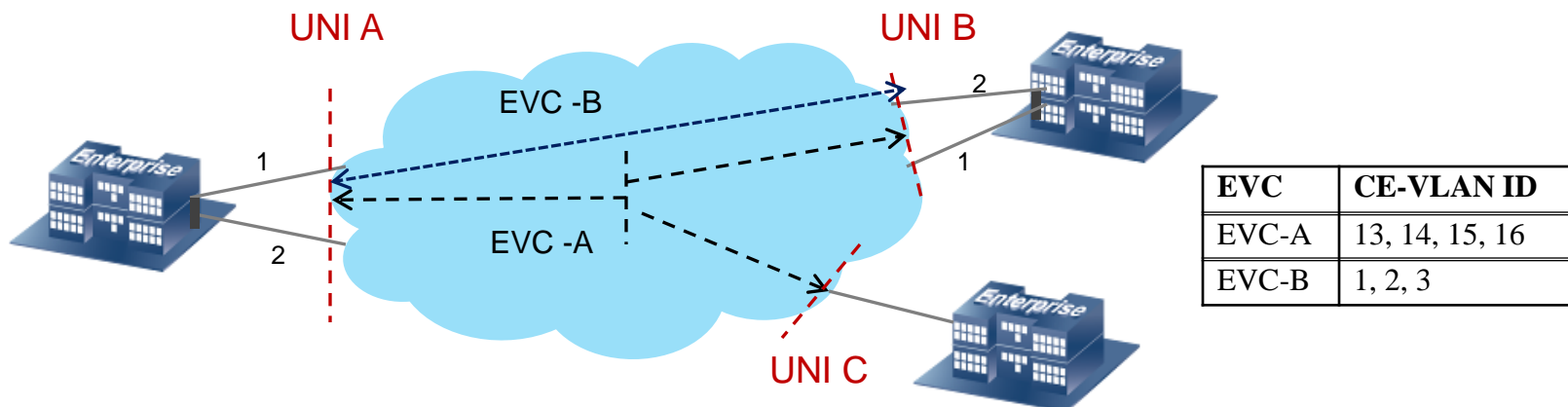

UNI A: EVC per UNI Service Attribute

EVC	CE-VLAN ID
EVC-A	13, 14
EVC-B	23, 24

UNI A: UNI Port Conversation ID to Aggregation Link Map

Port Conversation ID	Link Selection Priority List
13, 14	1, 2
23, 24	2,1
All other values	

All-Active UNI Use Case III

- ## An EVLAN Service For Data Center Interconnection:
  - EVC-A has three UNIs, UNI A, UNI B, and UNI C
  - UNI A and UNI B have two links and UNI-C has one link
  - EVC-B is P2P, configured between UNI A and UNI B
  - EVC-A and EVC-B each carry several CE-VLAN IDs

EVC	CE-VLAN ID
EVC-A	13, 14, 15, 16
EVC-B	1, 2, 3

UNI A and UNI B: UNI Port Conversation ID to Aggregation Link Map

Port Conversation ID	Link Selection Priority List
13, 14, 15, 16	1, 2
1, 2, 3	2, 1
All other values	

or

Port Conversation ID	Link Selection Priority List
1, 13, 14	1, 2
2, 3, 15,16	2, 1
All other values	

All-Active UNI Constraints

- Distribute the service frames of an EVC to different links at a UNI,
    - Such distribution could require a Service Provider to make tradeoffs between the Service Frame distribution and the application of MEF SOAM and Bandwidth Profiles. E.g., physical links terminate at different devices.

- This document only require:
    - [R] When Ingress Bandwidth Profiles and/or Egress Bandwidth Profiles are used at a given UNI, the Service Provider **MUST** support a value of the Port Conversation ID to Aggregation Link Map Service Attribute such that all Service Frames that map to a given Envelope are carried on the same link.

- However SP may support advanced service frame distribution at a UNI that complaints with MEF services.

Summary

- All-Active UNI enables all links at a UNI carrying traffic and protecting among each other.

- All-Active UNI adopts IEEE VLAN ID based Service Frame Distribution Algorithm (IEEE802.1AX-2014).

- All-Active UNI fully works with other MEF applications such SOAM and Bandwidth profiles.

- All-Active UNI will empower MEF services by use of multiple physical links at a UNI to carry traffic and provide traffic protection flexibility.