Technical Specification
MEF 45.0.1

Amendment to MEF 45:
OVC Services Requirements for L2CP

August, 2017

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1   List of Contributing Members

The following Member companies of the MEF participated in the development of this document and have requested to be included in this list.

Member Company
Bell Canada
Ciena Corporation
Cisco Systems
Colt Technology Services
HFR, Inc.
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2   Abstract

This amendment makes the following changes to MEF 45:

- Adds a new subsection to section 10 to identify L2CP attributes necessary to support E-Access and E-Transit Services as defined in MEF 51.

- Replaces the UNI Tunnel Access (UTA) Service requirements in section 10.3.3 with Feeder OVC requirements. This makes MEF 45 consistent with MEF 26.2 which supersedes MEF 28 and replaces the UNI Tunnel Access Service with the Feeder OVC.

- Corrects the error in Table 6.

- Corrects broken cross references in sections 9 and 10.

- Adds MEF 51 OVC Services to the References in section 11, removes unnecessary references, and corrects other references.

3   Changes to Section 8 of MEF 45

Replace Table 6 of MEF 45 with the following:

Protocol to be Peered (not part of L2CP Peering Service Attribute)	L2CP Peering Service Attribute	
	Protocol Identifier	L2CP Destination Address
Link Aggregation (LACP)	Ethertype: 0x8809 Subtypes: 01,02	01-80-C2-00-00-02
Link OAM	Ethertype: 0x8809 Subtype: 03	01-80-C2-00-00-02
E-LMI	Ethertype: 0x88EE	01-80-C2-00-00-07
Spanning Tree (RSTP/MSTP)	LLC Address: 0x42	01-80-C2-00-00-00

Table 6 – Example L2CP Peering Service Attribute

4   Changes to Section 9 of MEF 45

The subsections below describe minor corrections (e.g. to cross-references) within section 9 of MEF 45. Text to be added is shown in red with underscore; text to be removed is shown in red with strikethrough. Unchanged text is shown in black.

4.1 Change to the first paragraph of section 9.1 in MEF 45

The flow chart in Figure 6 specifies the action taken on a L2CP Frame at a UNI or VUNI L2CP Decision Point when the L2CP Address Set service attribute has a value of CTA or CTB. When the L2CP Address Set service attribute has a value of CTB-2 the actions taken at a UNI L2CP Decision Point are specified in 8.1.29.1.1.

4.2 Changes to Table 8 of MEF 45

Protocol Type	Protocol Identifier	L2CP Destination Address	L2CP Action
STP[3]/[4]RSTP[3][4]/MSTP[4][5]	LLC Address: 0x42	01-80-C2-00-00-00	**MUST** Pass
E-LMI[9][20]	Ethertype: 0x88EE	01-80-C2-00-00-07	**MUST** Pass[10]
LLDP[8][1]	Ethertype: 0x88CC	01-80-C2-00-00-0E	**MUST** Pass
PTP Peer Delay[13][5]	Ethertype: 0x88F7	01-80-C2-00-00-0E	**MUST** Pass
GARP[4]/MRP[17][5] Block	any	01-80-C2-00-00-20 through 01-80-C2-00-00-2F	**MUST** Pass

Table 8 – EPL Option 2 L2CP Processing Requirements

4.3 Changes to Table 9 of MEF 45

Protocol Type	Protocol Identifier	L2CP Destination Address	L2CP Action
PAUSE[5][12]	Ethertype: 0x8808 Subtype: 0x0001	01-80-C2-00-00-01	**SHOULD** Discard
LACP/LAMP[5][2]	Ethertype: 0x8809 Subtypes: 0x01, 0x02	01-80-C2-00-00-02	**SHOULD** Pass
Link OAM[5][12]	Ethertype: 0x8809 Subtype: 0x03	01-80-C2-00-00-02	**SHOULD** Pass
Port Authentication[7][11]	Ethertype: 0x888E	01-80-C2-00-00-03	**SHOULD** Pass
ESMC[14][8]	Ethertype: 0x8809 Subtype: 0x0A	01-80-C2-00-00-02	**SHOULD** Pass[11]

Table 9 – EPL Option 2 L2CP Processing Recommendations

4.4 Change to the fifth paragraph of section 9.2 in MEF 45

The fourth decision block (D) determines whether the L2CP processing implementation at the ENNI supports 802.1 compliant processing of tagged L2CP Frames (see section [R18]8.3). If not then the frame is Passed.

4.5 Change to the first paragraph of section 9.2.1 in MEF 45

For a first example, consider the LLDP frame from the example in 7.1.19.1.2.

5 Changes to Section 10 of MEF 45

The subsections below describe minor corrections (e.g. to cross-references) within section 10 of MEF 45, as well as more substantive changes to section 10.3.3. Text to be added is shown in red with underscore; text to be removed is shown in red with strikethrough. Unchanged text is shown in black.

5.1 Changes to Table 11 of MEF 45

UNI Service Attributes	EPL, EP-LAN, EP-Tree Service type Requirement
L2CP Address Set	**[R24]** EPL Option 1 without EPL Option 2 L2CP Processing, EP-LAN, and EP-Tree: **MUST** be CTB **[R25]** EPL with EPL Option 2 L2CP Processing: **MUST** be CTB-2
L2CP Peering	EPL Option 1 without EPL Option 2 L2CP Processing, EP-LAN, and EP-Tree: No additional constraints from section 7.2 **[D5]** EPL with EPL Option 2 L2CP Processing: The UNI L2CP Peering attribute **SHOULD NOT** have any protocols listed to be Peered.

Table 11 – UNI L2CP Service Attributes for Ethernet Private Services

5.2 Changes to Table 14 of MEF 45

ENNI Service Attributes	Access EVPL Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section [R18]8.3

Table 14 – ENNI L2CP Service Attributes for Access EVPL

5.3 Changes to Table 17 of MEF 45

ENNI Service Attributes	Access EPL Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section [R18]8.3

Table 17 – ENNI L2CP Service Attributes for Access EPL

5.4 Changes to Section 10.3 and 10.3.3 of MEF 45

10.3 Access EVPL, Access EPL and ~~UTA Service~~ Feeder OVC Requirements

10.3.3 ~~UNI Tunnel Access (UTA)~~ ~~Service~~ Feeder OVC Requirements

The Service Attribute and Parameter requirements pertaining to L2CP for ~~UTA services~~ Feeder OVC [24] are shown in Table 18, Table 19, and Table 20. When a Point-to-Point OVC is intended to be used as a Feeder OVC, it is the responsibility of the Service Provider or Super Operator [24] to order an OVC meeting the Feeder OVC requirements.

UNI Service Attributes	~~UTA~~ Feeder OVC ~~Service type~~ Requirement
L2CP Address Set	**[R31] MUST** be ~~CTB~~CTA when not all CE-VLAN IDs map to the same OVC End Point This is a consequence of [R5]. [R1A] **MUST** be CTB when all CE-VLAN IDs map to the same OVC End Point Note that [R9] requires the UNI L2CP Address Set Attribute to be the same value as the OVC L2CP Address Set Attribute in Table 19.
L2CP Peering	No additional constraints from section 8.2

Table 18 – UNI L2CP Service Attributes for ~~UTA~~a Feeder OVC

OVC Service Attributes	~~UTA Service type~~Feeder OVC Requirement
L2CP Address Set	**[R32] MUST** be CTB or CTA when there is an OVC End Point at a UNI. Note that [R9] requires OVC L2CP Address Set Attribute to be the same value as the UNI L2CP Address Set Attribute in Table 18 when there is an OVC End Point at the UNI. [R2A] **MUST** be CTB when all OVC End Points are at an ENNI.

Table 19 – OVC L2CP Service Attributes for ~~UTA~~a Feeder OVC

ENNI Service Attributes	~~UTA Service type~~**Feeder OVC** Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section ~~[R18]~~8.3

Table 20 – ENNI L2CP Service Attributes for ~~UTA~~a Feeder OVC

5.5 Changes to Table 21 of MEF 45

VUNI Service Attributes	VUNI Service type Requirement
L2CP Address Set	**[R33] MUST** be CTB when the VUNI supports an EPL, EP-LAN, or EP-TREE. **[R34] MUST** be CTA when the VUNI is supporting EVPL, EVP-LAN, or EVP-TREE service(s). Note that [R9] requires ~~this~~ the VUNI L2CP Address Set Attribute to be the same value as the OVC L2CP Address Set Attribute in Table 22~~Table 19~~.
L2CP Peering	No additional constraints from section 8.2

Table 21 – VUNI L2CP Service Attributes for VUNI Service

5.6 Changes to Table 25 of MEF 45

ENNI Service Attributes	vNID Case A Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section ~~[R18]~~8.3

Table 25 – ENNI L2CP Service Attributes for vNID Case A

5.7 Changes to Table 26 of MEF 45

UNI Service Attributes	vNID Case B Service type Requirement
L2CP Address Set	**[R40] MUST** be CTB or CTB-2 Note that [R9] requires this to be the same value as the OVC L2CP Address Set Attribute in Table 27~~Table 13~~.
L2CP Peering	No additional constraints from section 8.2

Table 26 – UNI L2CP Service Attributes for vNID Case B

5.8 Changes to Table 28 of MEF 45

ENNI Service Attributes	vNID Case B Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section ~~[R18]~~8.3

Table 28 – ENNI L2CP Service Attributes for vNID Case B

6   New sub-section in section 10

The following is a new section 10.6 to be added to MEF 45:

10.6 E-Access and E-Transit Service Requirements

The L2CP requirements in 10.6.1 and 10.6.2 apply to the E-Access and E-Transit Services defined in MEF 51 OVC Services Definitions [X1].

Note that it is the responsibility of the Service Provider or Super Operator [24] to order an OVC appropriate for the requirements of the EVC. MEF 26.2 [24] Appendix H Tables 52, 54, and 55 describe the relationship of the L2CP Service Attributes when a Service Provider provides an EVC to a Subscriber, and implements the EVC using a number of OVCs purchased from underlying Operators.

10.6.1 Access E-Line and Access E-LAN Service Requirements

The Service Attribute and Parameter requirements pertaining to L2CP for Access E-Line and Access E-LAN services are shown in Table A-1, Table A-2, and Table A-3.

UNI Service Attributes	Access E-Line, Access E-LAN Service type Requirement
L2CP Address Set	**[R3A] MUST** be CTA when not all CE-VLAN IDs map to the same OVC End Point This is a consequence of [R5]. **[R4A] MUST** be CTB or CTB-2 when all CE-VLAN IDs map to the same OVC End Point Note that [R9] requires the UNI L2CP Address Set Attribute to be the same value as the OVC L2CP Address Set Attribute in Table A-2.
L2CP Peering	No additional constraints from section 8.2

Table A-1 – UNI L2CP Service Attribute for Access E-Line, Access E-LAN

OVC Service Attributes	Access E-Line, Access E-LAN Service type Requirement
L2CP Address Set	**[R5A] MUST** be CTB-2 when the UNI-to-UNI service is EPL with EPL Option 2 L2CP Processing. Note that [R9] requires the OVC L2CP Address Set Attribute to be the same value as the UNI L2CP Address Set Attribute in Table A-1.

Table A-2 – OVC L2CP Service Attributes for Access E-Line, Access E-LAN

ENNI Service Attributes	Access E-Line, Access E-LAN Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section 8.3

Table A-3 – ENNI L2CP Service Attributes for Access E-Line, Access E-LAN

Note that [R4A] and [R5A] allow the UNI and OVC L2CP Address Set for an Access EPL service to be CTB-2 even when the end-to-end service is not EPL with EPL Option 2 L2CP processing, however this can compromise proper operation of many protocols, including LACP, LLDP, Link-OAM, E-LMI, PTP Peer Delay and ESMC.

10.6.2 Transit E-Line and Transit E-LAN Service Requirements

The Service Attribute and Parameter requirements pertaining to L2CP for Transit E-Line and Transit E-LAN services are shown in Table A-4 and Table A-5.

OVC Service Attributes	Transit E-Line, Transit E-LAN Service type Requirement
L2CP Address Set	No additional constraints from section 8.2

Table A-4 – OVC L2CP Service Attributes for Transit E-Line, Transit E-LAN

ENNI Service Attributes	Transit E-Line, Transit E-LAN Service type Requirement
L2CP Peering	No additional constraints from section 8.2
ENNI Tagged L2CP Frame Processing	No additional constraints from section 8.3

Table A-5 – ENNI L2CP Service Attributes for Transit E-Line, Transit E-LAN

7   Changes to Section 11 (References) in MEF 45

In this section, text to be added is shown in red with underscore; text to be removed is shown in red with strikethrough. Unchanged text is shown in black.

Delete the following references:

[21]   Metro Ethernet Forum MEF 20, User Network Interface (UNI) Type 2 Implementation Agreement, July 2008.

[22]   Metro Ethernet Forum MEF 22.1, *Mobile Backhaul Phase 2*, January 2012.

[23]   Metro Ethernet Forum MEF 23.1, *Carrier Ethernet Class of Service Phase 2*, January 2012.

[25]   Metro Ethernet Forum MEF 28, External Network Network Interface (ENNI) Support for UNI Tunnel Access and Virtual UNI, October 2010.

[26]   Metro Ethernet Forum MEF 30, Service OAM Fault Management Implementation Agreement, January 2011.

[28]   Metro Ethernet Forum MEF 35, Service OAM Performance Monitoring Implementation Agreement, April 2012.

Modify the following references as shown:

[5]   IEEE Std 802.1Q – 2011, IEEE Standards for Local and metropolitan area networks—Media Access Control (MAC) Bridges and Virtual Bridge Local Area Networks, ~~7 May 2003~~31 August, 2011.

[12]   IEEE Std 802.3 ~~2012~~2015, *IEEE Standard for Ethernet*, ~~28 December 2012~~3 September 2015. (Normative)

[14]   International Telecommunication Union, Recommendation G.8264– ~~2008~~2014, *Distribution of Timing Information Through Packet Networks*, ~~27 March 2008~~May 2014, Annex F

[16]   ~~Metro Ethernet~~MEF Forum, MEF 4, Metro Ethernet Network Architecture Framework: Part 1 – Generic Framework, May 2004.

[17]   ~~Metro Ethernet~~MEF Forum, MEF 6.~~1~~2, *Ethernet Services Definitions - Phase ~~2~~3*, ~~April 2008~~August 2014.

[18]   ~~Metro Ethernet~~MEF Forum, MEF 6.1.1, Layer 2 Control Protocol Handling Amendment to MEF 6.1, January 2012.

[19]   ~~Metro Ethernet~~MEF Forum, MEF 10.3, *Ethernet Services Attributes Phase 3*, October 2013.

[20]   ~~Metro Ethernet~~MEF Forum, MEF 16, *Ethernet Lcal Management Interface (E-LMI)*, January 2006.

[24]   ~~Metro Ethernet~~ MEF Forum, MEF 26.~~1~~2, External Network Network Interface (ENNI) –Phase ~~2~~3, ~~January 2012~~August 2016.

[27]   ~~Metro Ethernet~~MEF Forum, MEF 33, *Ethernet Access Services Definition*, January 2012.

Add the following reference to the end of the list:

[X1]   MEF Forum, MEF 51, OVC Services Definition, August 2015.

7.1 Changes resulting from updating the Section 11 References

In keeping with above changes to the Section 11 References:

Change the first sentence of the second paragraph in MEF 45 Section 3 as shown:
"Terms defined in MEF 4 [16], MEF 6.2 [17], MEF 10.3 [19], and MEF ~~26.1~~26.2 [24] are included in this document by reference and, hence, not repeated in table below."

Change the second sentence of the second paragraph in MEF 45 Section 5 as shown:
"The model includes the attributes and basic requirements for passing, peering, or discarding L2CP Frames at a UNI [19], VUNI ~~[25]~~[24], and ENNI [24], as well as detailed peering requirements for selected protocols and/or services."

Change the last sentence of the first bullet in MEF 45 Section 7 as shown:

"In some cases it might be the responsibility of the operator with the ingress UNI, but in a scenario with a UNI Tunnel Access (UTA) service, for example, it might make more sense for it to be the responsibility of the operator with the VUNI ~~[25]~~[24]."

Change the first sentence after [R13] in MEF 45 Section 8.2.1 as shown:

"~~MEF 26.1 requires Peering LACP when~~When there are two or more physical links at the ENNI using Link Aggregation as the protection mechanism, Peering LACP is required."

Change the first sentence of MEF 45 Section B.1.2 as shown:

"When there are two or more physical links at the ENNI using Link Aggregation as the protection mechanism, Peering LACP is required~~MEF 26.1 requires peering of LACP on physical links for an ENNI with two links~~. In this case LACP is listed as being Peered in the ENNI L2CP Peering Service Attribute."

Change the first sentence of MEF 45 Section B.1.5 as shown:

"When there are two physical links at a UNI or ENNI using Link Aggregation ~~MEF 10.3 and MEF 26.1 require that LACP at a UNI or ENNI operates~~ in active/standby mode~~.~~, IEEE Std 802.1AX will designate links in an aggregation as active or standby when device limitations prevent all links from being active simultaneously~~, however~~. However there is no standard management object that allows an operator to explicitly configure active/standby operation."