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Ethernet Service Characteristics

Revision history:

| **Rev** | **Document number** | **Date** | **Description** |
| --- | --- | --- | --- |
| 0.1 | Wd25 | Sept 1, 2014 | Proposal from MEF (TD192/WP3) plus:   * editorial additions * new appendix summarizing changes |
| 0.2 | Wd25r1 | Sept 3, 2014 | Q10 drafting updates   * including unagreed proposal for MEF IA references |
| 0.3 | TD 294/P | October 2014 | Draft for consent |
| 0.4 | Wd04 | November 2014 | SG15 Q10 updates   * revised scope & summary * addition of G.8013 & clarification of manageability * alignment of OAM description and grouping |
| 0.5 | Wd04r1 Wd04r2 Wd04r3 | November 2014 | SG15 Q10 drafting updates   * move section 6 to appendix * alignment of references |
| 0.6 | TD 294r1/P | December 2014 | Draft for consent (D0.5 without change marks) |

Draft revised Recommendation ITU-T G.8011/Y.1307

Ethernet over Transport – Ethernet service characteristics

Summary

Recommendation ITU-T G.8011/Y.1307 describes a framework for defining network-oriented characteristics of Ethernet services based on MEF specifications. The framework is supported by the modelling of Ethernet layer networks described in ITU-T and MEF. The service definition, service attributes and OAM introduced in this framework are used to create numerous specific Ethernet services.

This Recommendation supersedes Recommendations ITU-T G.8011.1/Y.1307.1 (2013), ITU-T G.8011.2/Y.1307.2 (2013), ITU-T G.8011.3/Y.1307.3 (2013), ITU-T G.8011.4/Y.1307.4 (2013), and ITU-T G.8011.5/Y.1307.5 (2013).

|  |
| --- |
| Keywords  Ethernet, Ethernet connection, Ethernet service, framework, network-to-network interface, user‑to‑network interface. |

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Draft revised Recommendation ITU-T G.8011/Y.1307

Ethernet over Transport – Ethernet service characteristics

# Scope

This Recommendation defines a framework to describe Ethernet services based on MEF specifications. The framework consists of a set of service definitions, service attributes and OAM for each Ethernet virtual connection (EVC), Operator virtual connection (OVC), Ethernet connection (EC), Ethernet user-to-network interface (UNI) and Ethernet external network-to-network interface (ENNI). The resulting services that can be defined do not refer to a particular network technology implementation and are supported by ITU-T and MEF Ethernet layer architecture models.

# References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T G.8001] Recommendation ITU-T G.8001/Y.1354 (2013), *Terms and definitions for Ethernet frames over Transport*.

|  |  |
| --- | --- |
| [ITU-T G.8010] | Recommendation ITU-T G.8010/Y.1306 (2004), *Architecture of Ethernet layer networks,* plus Amendment 1 (2006), Amendment 2 (2010), Errata 1 (2007), Errata 2 (2007). |
| [ITU-T G.8013]  [IEEE 802.1Q]  [IEEE 802.1AX]  [IEEE 802.3]  [MEF 6.2] | Recommendation ITU-T G.8013/Y.1731 (2013), *OAM functions and mechanisms for Ethernet based networks,* plus Amendment 1 (2015)*.*  IEEE 802.1Q (2014), *IEEE standard for Local and Metropolitan Area Networks – Bridges and Bridged Networks*.  IEEE 802.1AX (2014), *IEEE Standard for Local and Metropolitan Area Networks* – *Link Aggregation*.  IEEE 802.3 (2012), *IEEE Standard for Ethernet*  MEF 6.2 (2014), *EVC Ethernet Services Definitions Phase 3* |
| [MEF 10.3] | MEF 10.3 (2013), *Ethernet Services Attributes Phase 3* |
| [MEF 12.2] | MEF 12.2 (2014), *Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer* |
| [MEF 13] | MEF 13 (2005), *User Network Interface (UNI) Type 1 Implementation Agreement* |
| [MEF 20] | MEF 20 (2008), *User Network Interface (UNI) Type 2 Implementation Agreement* |
| [MEF 22.1] | MEF 22.1 (2012), *Mobile Backhaul Phase 2,* plus amendment MEF 22.1.1 (2014), *Mobile Backhaul Phase 2 Amendment* |
| [MEF 23.1] | MEF 23.1 (2012), *Carrier Ethernet Class of Service – Phase 2* |
| [MEF 26.1] | MEF 26.1 (2012), *External Network Network Interface (ENNI) – Phase 2* |
| [MEF 28] | MEF 28 (2010), *External Network Network Interface (ENNI) Support for UNI Tunnel Access and Virtual UNI* |
| [MEF 30.1] | MEF 30.1 (2013), *Service OAM Fault Management Implementation Agreement: Phase 2,* plus amendment MEF 30.1.1 (2014), *Corrected Requirement Number For MEF 30.1* |
| [MEF 33] | MEF 33(2012), *Ethernet Access Services Definition* |
| [MEF 35] | MEF 35 (2012), *Service OAM Performance Monitoring Implementation Agreement,* plus amendments MEF 35.0.1 (2013), *SOAM PM Implementation Agreement Amendment 1,* MEF 35.0.2 (2014), *SOAM PM Implementation Agreement Amendment 2* |
| [MEF 45] | MEF 45 (2014), *Multi-CEN L2CP* |

NOTE – The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

# Definitions

## Terms defined in other ITU-T Recommendations

This Recommendation uses the following terms defined in [ITU-T G.8001]:

**3.1 .1 Customer**

**3.1.2 Ethernet service**

**3.1.3 NNI**

**3.1.4 UNI**

## Terms defined elsewhere

This Recommendation uses the following terms defined in [MEF 10.3]:

**3.2.1 Ethernet virtual connection (EVC)**

**3.2.2 Service frame**

This Recommendation uses the following terms defined in [MEF 26.1]:

**3.2.3 External NNI (ENNI)**

**3.2.4 Operator virtual connection (OVC)**

# Abbreviations

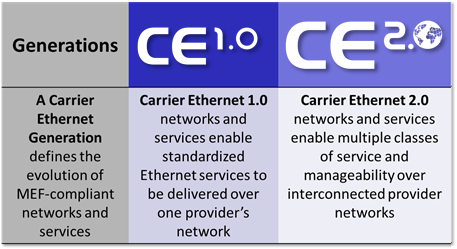
This Recommendation uses the following abbreviations and acronyms:

|  |  |
| --- | --- |
| APP | Application |
| CEN | Carrier Ethernet Networks |
| CoS | Class of Service |
| E-LAN | Ethernet LAN |
| E-Line | Ethernet Line |
| E-LMI | Ethernet Link Management Interface |
| ENNI | External Network-Network Interface |
| EVC | Ethernet Virtual Connection |
| FM | Fault Management |
| IA | Implementation Agreement |
| LAN | Local Area Network |
| L2CP | Layer 2 Control Protocol |
| MEF | Metro Ethernet Forum |
| MEG | Maintenance Entity Group |
| MEN | Metro Ethernet Network |
| OAM | Operation, Administration and Maintenance |
| OVC | Operator Virtual Connection |
| PM | Performance Monitoring |
| SOAM | Service OAM |
| TRAN | Transport Layer |
| UNI | User Network Interfaces |
| UNI-C | UNI-Customer |
| UNI-N | UNI -Network |
| UTA | UNI Tunnel Access |
| VLAN | Virtual LAN |
| VUNI | Virtual UNI |

# Summary of Carrier Ethernet

Carrier Ethernet (CE) services are enabling service provider evolution of legacy services as well as supporting enterprise business communications, cloud computing and mobility services. CE 2.0, which was launched February 2012, adds five new services to CE 1.0 bringing the total number of services to eight.  These eight services encompass both the port-based and VLAN-based E-LINE, E-LAN, E-Tree and E-Access services.

CE 2.0 is founded on three specific tenets: multiple classes of service (Multi-CoS), interconnectedness and manageability.



*Figure 1 – MEF Generations Framework*

Figure 1 provides a summary of the MEF’s Generations Framework for Carrier Ethernet. CE 1.0 focused on standardized Ethernet services within a single provider’s network.

CE 2.0 enhances the work of CE 1.0 by extending the specifications to address multiple classes of service, standards for delivering CE services across multiple, interconnected networks and overall service management of CE services, in particular over multi-provider networks. The multi-CoS, management and interconnected features apply to each of the eight services.

**Multi-CoS**

Multi-CoS defines standardized performance objectives across geographically defined performance tiers such that long haul services have different target objectives when compared to metro-based services given the derived propagation delay inherent in the distances covered by each performance tier. In addition, MEF specifications have compiled data from a number of public resources to provide specific application performance requirements and this per application type (for example VoIP, interactive video, point-of-sale, etc.)

**Interconnectedness**

Just as the success of the telephone voice system was based on standards enabling the interconnectivity of public switched telephone networks, so too is the success of Carrier Ethernet based on standards enabling Interconnectivity of Carrier Ethernet networks so that one service can be delivered across multiple operator’s networks without compromising its features such as Multi-CoS and manageability.

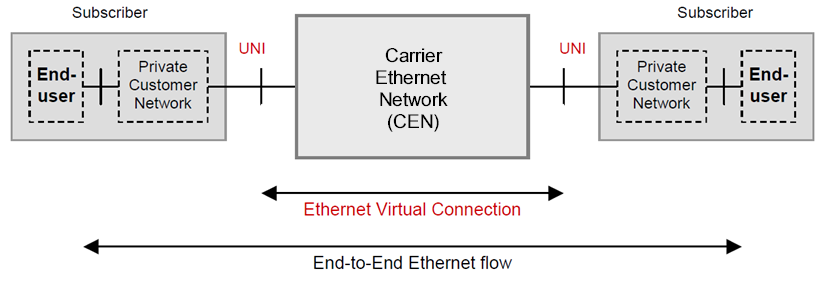
**Manageability[[1]](#footnote-2)**

Finally, manageability ensures standards for both fault management and performance monitoring of any CE 2.0 service whether they are provided by a single operator or traverse multiple operator’s networks. Manageability is critical in delivering an assured service that meets its objectives for availability and performance. Furthermore, these features support service providers in differentiating their services to their end customers, providing the necessary service level agreement (SLA) reporting, maintaining their own service level objectives and minimizing operations costs involved in the troubleshooting and maintenance of CE 2.0 services (e.g. truck rolls).

## MEF Carrier Ethernet Service Definition

The MEF has defined a Carrier Ethernet service definition in [MEF 6.2]. As depicted in Figure 2, the MEF network reference model defines Ethernet services that transport subscriber Ethernet frames across a service provider’s Carrier Ethernet network (CEN). The service provider is responsible for the performance and availability of the service between the user-to-network interface (UNI) demarcation points.

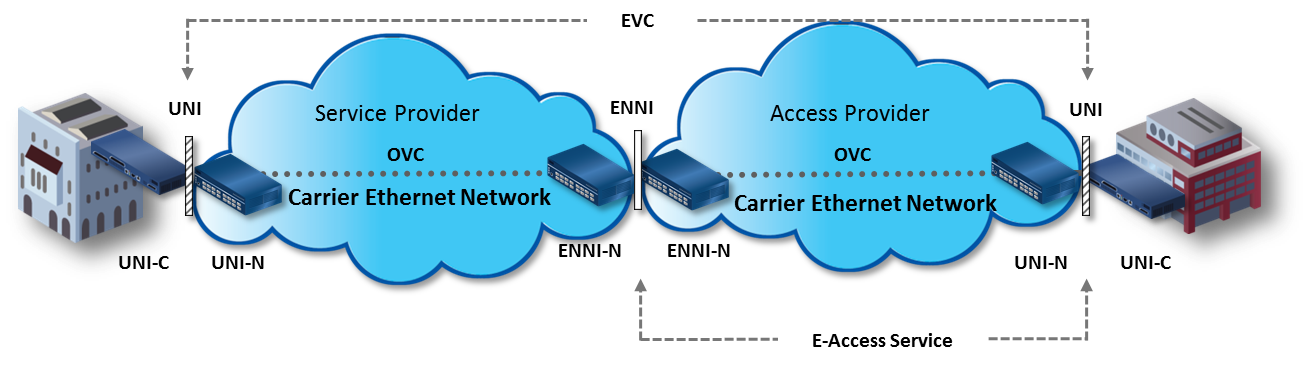
Ethernet service frames are transported across the CEN through virtual connections. [MEF 6.2] defines three service types: an E-Line which is a point-to-point Ethernet Virtual Connection (EVC), an E-LAN which is a multipoint-to-multipoint EVC and an E-Tree which uses a rooted multipoint EVC. The MEF’s service definition is built on virtual connections, as specified in [IEEE 802.1Q], established over lower-layer transport services, therefore, Ethernet service frames, as specified in [IEEE 802.3], can be transported over a variety of different technologies such as SONET/SDH, MPLS, bundled-copper and Fiber. The underlying transport mechanisms may vary on a link-by-link basis. Thus, service providers can offer CE services independent of the underlying transport technology.



*Figure 2 – Basic MEF Framework Reference Model*

Building on the basic reference model illustrated in Figure 2, Service Providers needed the capability to extend service delivery outside of their franchise. To enable this connectivity, the MEF created a UNI Tunneled Access [MEF 28] and an E-Access Service definition [MEF 33]. Figure 3 illustrates a CE service using an E-Access service [MEF 33]. As the Service Provider (SP) does not have the facilities to deliver CE service end-to-end, he uses an Access Provider (AP) from an ENNI to the end subscriber. By connecting together two OVCs, they can deliver the end-to-end service.

Another mean to deliver end-to-end connectivity is achieved by using a UNI Tunneled Access [MEF 28] which resembles an E-Access Service but has the AP UNI functionality located at both ENNI and Remote UNI.



*Figure 3 – E-Access Service Example*

The application of this service definition to mobile backhaul is described in [MEF 22.1]. The mobile backhaul application defines the addition of resiliency, availability and synchronization to the service definition.

## MEF Carrier Ethernet Service Attributes

As demonstrated in Figure 2, an EVC connects two UNIs together to deliver CE services. The service attributes and parameters for this service are defined in Ethernet Services Attributes [MEF 10.3]. The attributes detailing the interaction of layer 2 control protocols in multi-CEN environments is defined in [MEF 45]. The resulting service attributes are categorized per UNI, per EVC per UNI and per EVC, as shown in Table 1 below.

|  |  |  |
| --- | --- | --- |
| UNI Service Attributes | EVC per UNI Service Attributes | EVC Service Attributes |
| UNI Identifier | UNI EVC ID | EVC Type |
| Physical Layer | CoS Identifiers | EVC ID |
| Synchronous Mode | Ingress Bandwidth Profile Per EVC | UNI List |
| Number of Links | Ingress Bandwidth Profile Per CoS Identifier | Maximum Number of UNIs |
| Service Frame Format | Egress Bandwidth Profile Per EVC | EVC Maximum Service Frame size |
| UNI Maximum Service Frame Size | Egress Bandwidth Profile  Per Egress Equivalence Identifier | CE-VLAN ID Preservation |
| Service Multiplexing | Egress Equivalence Class Identifier | CE-VLAN CoS Preservation |
| Bundling | Color Identifier | Unicast Data Service Frame Delivery |
| All to One Bundling | Source MAC Address Limit | Multicast Data Service Frame  Delivery |
| CE-VLAN ID for untagged and priority tagged Service Frames | Test MEG | Broadcast Data Service Frame Delivery |
| Maximum number of EVCs | Subscriber MEG | Layer 2 Control Protocol Processing |
| Ingress Bandwidth Profile  Per UNI |  | EVC Performance |
| Egress Bandwidth Profile  Per UNI |  |  |
| Layer 2 Control Protocols Processing |  |  |
| CE-VLAN ID / EVC Map |  |  |
| Link OAM |  |  |
| UNI MEG |  |  |
| E-LMI |  |  |
| UNI Resiliency |  |  |

*Table 1 – Ethernet Service Attributes*

As demonstrated in Figure 3, CE services can be delivered by connecting together OVCs through an ENNI, therefore using different Operator CENs. OVC Service attributes are defined in [MEF 26.1] External Network Network Interface (ENNI) – Phase 2.

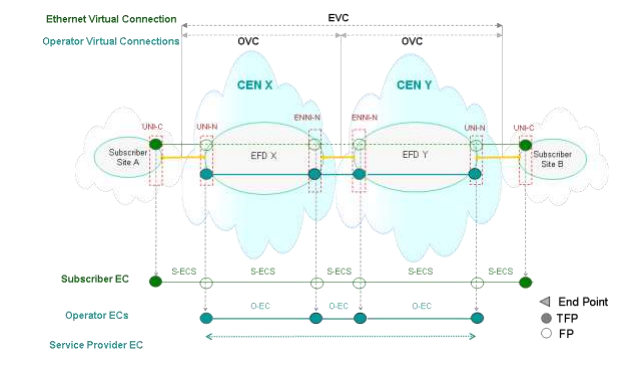
MEF has defined a set of three standardized Classes of Service (CoS) in [MEF 23.1], as well as a fourth for synchronization in [MEF 22.1]. As well, CoS performance objectives for a number of defined metrics are specified and grouped into performance tiers.

Link aggregation [IEEE 802.1AX] is used for UNI resiliency.

## MEF Carrier Ethernet Service Architecture

The MEF has defined a Carrier Ethernet architecture in [MEF 12.2]. This work is aligned with and builds on the topological constructs of the Ethernet layer architecture model in [ITU-T G.8010]. Figure 4 shows a base model of an Ethernet service and the relationship between the EVC, the OVC, as well as the underlying ECs including end points and flow points.

In addition, MEF has further detailed two modes of operation for configuration of the UNI-C and UNI-N. These are UNI Type 1 [MEF 13] and UNI Type 2 [MEF 20].

\

*Figure 4 – Base MEF Architecture*

## MEF Carrier Ethernet OAM

Connectivity monitoring can be achieved via Ethernet OAM mechanisms defined in

[ITU-T G.8013]. Additional specifications on the use of Service OAM for fault management and performance monitoring are defined in [MEF 30.1] and [MEF 35], respectively.

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

1. Summary of MEF Specifications

(This appendix does not form an integral part of this Recommendation)

Table 2 below lists the MEF specifications that are included by reference in this Recommendation. They are listed sequentially and grouped according to the sections in clause 5.

This set of MEF specifications is based on CE 2.0, but there are variations to include the latest specification revisions and also to exclude information modelling and data model specifications.

|  |  |  |
| --- | --- | --- |
| MEF | Title | Group Name |
| 6.2 [MEF 6.2] | EVC Ethernet Services Definitions Phase 3 | Service Definition |
| 10.3 [MEF 10.3] | Ethernet Services Attributes Phase 3 | Service Attributes |
| 12.2 [MEF 12.2] | Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer - Basic Elements | Architecture |
| 13 [MEF 13] | User Network Interface (UNI) Type 1 Implementation Agreement | Architecture |
| 20 [MEF 20] | UNI Type 2 Implementation Agreement | Architecture |
| 22.1 [MEF 22.1] | Mobile Backhaul Phase 2 Implementation Agreement | Service Definition |
| 22.1.1 [MEF 22.1] | Mobile Backhaul Phase 2 Implementation Agreement - Amendment 1 (small cells) | Service Definition |
| 23.1 [MEF 23.1] | Class of Service Phase 2 Implementation Agreement | Service Attributes |
| 26.1 [MEF 26.1] | External Network Network Interface (ENNI)–Phase 2 | Service Attributes |
| 28 [MEF 28] | External Network Network Interface (ENNI) Support for UNI Tunnel Access and Virtual UNI | Service Definition |
| 30.1 [MEF 30.1] | Service OAM Fault Management Implementation Agreement Phase 2 | OAM |
| 30.1.1 [MEF 30.1] | Service OAM Fault Management Implementation Agreement Phase 2 - Amendment 1 | OAM |
| 33 [MEF 33] | Ethernet Access Services Definition | Service Definition |
| 35 [MEF 35] | Service OAM Performance Monitoring Implementation Agreement | OAM |
| 35.0.1 [MEF 35] | SOAM PM Implementation Agreement Amendment | OAM |
| 35.0.2 [MEF 35] | Service OAM Performance Monitoring Implementation Agreement Amendment 2 | OAM |
| 45 [MEF 45] | Multi-CEN L2CP | Service Attributes |

*Table 2 – Table of Reference to MEF Specifications*

The following Appendix sub-sections provides a brief summary of the content of the referenced MEF specifications.

* 1. Architecture Documents

**MEF 12.2 – Carrier Ethernet Network Architecture Framework Part 2: Ethernet Services Layer (October 11, 2013)**

MEF 12.2 provides the architecture framework to model the Ethernet Services Layer of MEF compliant Carrier Ethernet Networks. The Ethernet Service Layer architecture framework describes the high-level topological and functional constructs used to model the various architectural components of the Ethernet Service Subscriber and Provider networks, their associated functional elements, and their interconnect relationships. The architecture framework also describes the relationship between Ethernet Services Layer interfaces, functional elements and their reference points, and other architectural elements in the Transport Layer (TRAN) and Application (APP) Layers of the MEF 4 “Generic Architecture Framework”.

**MEF 13 – User Network Interface (UNI) Type 1 Implementation Agreement (November 2005)**

MEF 13 specifies an implementation agreement for MEF User to Network Interface (UNI) Type 1. The main objective of MEF 13 is to specify the MEF UNI characteristics and operation in manual configuration mode. This allows existing Ethernet devices (switch, router, work-station, etc.) acting as CEs to be instantly compliant to MEF 13 with no additional software or hardware upgrades. The main functionality of MEF 13 is to allow data-plane Ethernet connectivity between the UNI-C and UNI-N. MEF 13 references MEF UNI Requirements and Framework for all concepts, constructs and terminology. The UNI Type 1 mode provides bare minimum data-plane connectivity services with no control-plane or management-plane capabilities.

**MEF 20 – User Network Interface (UNI) Type 2 Implementation Agreement (July 2008)**

MEF 20 specifies an Implementation Agreement (IA) for MEF User to Network Interface (UNI) Type 2. MEF 20 adds new functionalities to MEF UNI Type 1 [MEF13], such as E-LMI based on MEF 16, Link OAM based on clause 57 of IEEE 802.3, Service OAM based on ITU-T Y.1731 and IEEE 802.1ag and Protection using Link Aggregation based on clause 43 of IEEE 802.3.

* 1. Service Attribute Documents

**MEF 10.3 - Ethernet Services Attributes Phase 3 (October 2013)**

The attributes of Ethernet Services observable at a User Network Interface (UNI) and from User Network Interface to User Network Interface (UNI to UNI) are defined. In addition, a framework for defining specific instances of Ethernet Services is described.

**MEF 23.1 - Carrier Ethernet Class of Service – Phase 2 (January 2012)**

MEF 23.1 (MEF CoS IA) specifies a set of Class of Service Names called CoS Labels that can be used by Operators, Service Providers and their Subscribers to indicate the performance expectations to be associated with a given set of frames that comprise a CoS Frame Set. The MEF CoS IA includes standards for CoS and Color identification as well as performance objectives and supporting requirements. The CoS Labels are envisioned as a subset of all of the Class of Service Names an Operator may provide. The MEF CoS IA facilitates: Ethernet service interoperability and consistency between Operators, use of a common CoS Label set for Subscribers to utilize and use of performance objectives that support key applications.

**MEF 26.1 - External Network Network Interface (ENNI) – Phase 2 (January 2012)**

The Metro Ethernet Network Architecture Framework specifies a reference point that is the interface between two Metro Ethernet Networks (MENs), where each Operator MEN is under the control of a distinct administrative authority. This reference point is termed the External Network Network Interface or ENNI. The ENNI is intended to support the extension of Ethernet services across multiple Operator MENs. MEF 26.1 specifies the requirements at the ENNI reference point as well as the interface functionality in sufficient detail to ensure interoperability between two Operator MENs including Link OAM. MEF 26.1 also defines the connectivity attributes UNI to UNI, UNI to ENNI, and ENNI to ENNI such that multiple Operator MENs can be interconnected and the Ethernet services and attributes in MEF 6.2 and MEF 10.3 can be realized.

**MEF 45 Multi-CEN L2CP (2Q2014)**

MEF 45 specifics the service attributes and requirements for handling Layer 2 Control Protocol (L2CP) Frames in a Carrier Ethernet Network.

* 1. Service Definition Documents

**MEF 6.2 - EVC Ethernet Services Definitions - Phase 3 (April 7, 2014)**

MEF 6.2 defines three Service constructs called Ethernet Service Types and six Ethernet Services with Service Attributes and parameters as specified in MEF 10.3, “Ethernet Services Attributes” and in MEF (to be published), “Multi-CEN Layer 2 Control Protocol”. These Service Types are used to create Point-to-Point, Multipoint-to-Multipoint, and Rooted-Multipoint Ethernet Services that are either Port or VLAN based.

**MEF 28 – External Network Network Interface (ENNI) Support for UNI Tunnel Access and Virtual UNI (October 2010)**

The External Network Network Interface (ENNI) is a reference point that describes the interface between two Metro Ethernet Networks (MENs) and is intended to support the transparent extension of Ethernet services across multiple Network Operator MENs, where each Network Operator MEN is under the control of a distinct administrative authority. MEF 28 extends the ENNI by defining the UNI Tunnel Access (UTA) which associates a Virtual UNI (VUNI), a remote UNI, and at least one supporting OVC.

**MEF 33 - Ethernet Access Services Definition (January 2012)**

MEF 33 defines Ethernet Access Services, which are OVC-based Ethernet services in contrast to the EVC-based services which are defined in MEF 6.2 Metro Ethernet Services Definitions Phase 3. MEF 33 uses the UNI service attributes and parameters options defined in the MEF 6.2 and ENNI and OVC service attributes defined in MEF 26.2 Technical Specification “External Network Network Interface (ENNI) – Phase 2” and applies them to create new Ethernet access services between a UNI and an ENNI. These new carrier-to-carrier Ethernet access services enable Ethernet Service Providers to reach out-of-franchise customer locations through an Ethernet Access Provider's network, and deliver E-Line and E-LAN service types end to end. MEF 33 defines the UNI, OVC, OVC per UNI, OVC End Point per ENNI, and ENNI requirements for point-to-point OVC-based Ethernet services. In addition, an informative appendix is provided showing use cases of some of the defined services.

**MEF 22.1 – Mobile Backhaul Phase 2 Implementation Agreement (January 2012)**

MEF 22.1 identifies the requirements for MEF Ethernet Services and MEF External Interfaces (EIs such as UNIs) for use in Mobile Backhaul networks based on MEF specifications. In addition, new interface and service attributes have been specified where needed. The services and requirements in this Implementation Agreement are based on the services defined in MEF 6.2 as well as the attributes in MEF 10.3 and this IA. The aim is to be flexible to support a wide range of Ethernet service based mobile network deployments.

**MEF 22.1.1 – Mobile Backhaul Phase 2 Amendment 1 (March 26, 2014)**

MEF 22.1.1 is an amendment to MEF 22.1 that addresses the addition of technical content that may be required in certain small cells use cases.

* 1. OAM Documents

**MEF 30.1 - Service OAM Fault Management Implementation Agreement: Phase 2 (April 2013)**

MEF 30.1 specifies an Implementation Agreement (IA) for Service Operations, Administration, and Maintenance (OAM) that builds upon the framework and requirements specified by MEF 17. In particular, this IA specifies Service OAM requirements for Maintenance Entity Groups (MEGs) and for Fault Management (FM). Service OAM in general and FM in particular are defined in IEEE 802.1Q and ITU-T Y.1731. This IA details how to use these functions to achieve the MEF requirements of Service OAM in general and Service OAM FM in particular. MEF 30.1 is corrected by MEF 30.1.1 “Corrected Requirement Number for MEF 30.1 (April 2014)”.

**MEF 35 - Service OAM Performance Monitoring Implementation Agreement (April 2012)**

MEF 35 specifies an Implementation Agreement (IA) for Service Operations, Administration, and Maintenance (SOAM) that satisfies and extends the Performance Monitoring (PM) framework and requirements described in MEF 17. Existing PM functions are defined by ITU-T Y.1731, ITU-T G.8021 and ITU-T G.8021 Amendment 1. MEF 35 details how to use these functions in order to achieve the requirements of MEF SOAM PM. MEF 35 is amended by MEF 35.0.1 – SOAM PM Implementation Agreement Amendment 1 (October 2013) for Dual-Ended Synthetic Loss and by MEF 35.0.2 – Service OAM Performance Monitoring Implementation Agreement (October 2013) for Threshold Crossing Alerts.

1. Summary of changes from G.8011/Y.1307 (2012)

(This appendix does not form an integral part of this Recommendation)

This Appendix provides a brief summary of the changes from the previous edition of G.8011/Y.1307

It should be noted, that this edition of G.8011/Y.1307 has been prepared in cooperation with MEF. The intent is that this edition of G.8011/Y.1307 is a Carrier Ethernet (CE) summary Recommendation that introduces CE, provides normative references to an appropriate set of MEF specifications from CE 2.0, and retains any information specific to ITU-T from the G.8011/Y.1307 series.

* 1. G.8011/Y.1307 comparison

The structure of the previous G.8011/Y.1307 is not retained in this edition. The intent is that all of the details of description and definition of Ethernet Service characteristics are contained in the referenced MEF specifications. The table below summarizes where to find the equivalent content.

|  |  |
| --- | --- |
| **Topic in G.8011**/Y.1307 **-2012 (clause)** | **MEF reference** |
| Ethernet Services (4) | MEF 10.3 |
| Ethernet Service views (6.3) | MEF 12.2 |
| EVC service attributes (7) | MEF 10.3 |
| EC service attributes (7.2)   * Link type * survivabilty | No explicit, but the concepts exist   * MEF 12.2 ETH connection * MEF 10.3 Resiliency performance * MEF 22.1 MEN resiliency[[2]](#footnote-3) |
| UNI service attributes (8) | MEF 10.3 |
| ENNI attributes (9) | MEF 26.1, G.8012, G.8012.1 |
| Connectivity Monitoring (10) | MEF 30.1, MEF 35 |
| Extended UNI (Annex) | MEF 12.2 |
| G.8010 & EC topology (Appendix) | MEF 12.2 |

* 1. G.8011.x/Y.1307.x comparison

The structure of Recommendations ITU-T G.8011.1/Y.1307.1 (2013), ITU-T G.8011.2/Y.1307.2 (2013), ITU-T G.8011.3/Y.1307.3 (2013), ITU-T G.8011.4/Y.1307.4 (2013), and ITU-T G.8011.5/Y.1307.5 (2013) (i.e., one Recommendation per Ethernet service) is not retained in this edition. As a result these recommendations are superseded by this edition of G.8011/Y.1307. The intent is that all of the details of description and definition of Ethernet Service characteristics are contained in the referenced MEF specifications. In the case of the functional models, most of these are examples of the implementation of the service. The base functional model still exists in the noted references, but the examples are not. The table below summarizes where to find the equivalent content that is not already indicated in the previous table.

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| --- | --- |
| **Topic in G.8011.1/Y.1307.1 -2013** | **reference** |
| EPL EVC & UNI service attributes | MEF 6.2 |
| EPL ENNI attributes | MEF 26.1 |
| EPL type 1 – options 1 & 2 | MEF 6.2, MEF 12.2, MEF 45   * EPL Options 1 & 2 |
| EPL type 2 | G.8001, G.707, G.709 |

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| **Topic in G.8011.2**/**Y.1307 .2-2013** | **MEF reference** |
| EVPL EVC & UNI service attributes | MEF 6.2 |
| EVPL ENNI attributes | MEF 26.1 |
| EVPL type 1, 2 & 3 | MEF 6.2, MEF 12.2, MEF 45   * Service multiplexing |

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| **Topic in G.8011.3/Y.1307 .3-2013** | **reference** |
| EVPLAN EVC & UNI service attributes | MEF 6.2 |
| EVPLAN ENNI attributes | MEF 26.1 |
| EVPLAN type 1, 2 & 3 | MEF 6.2, MEF 12.2, MEF 45   * Service multiplexing |
| Loop prevention – split horizon, spanning tree | IEEE 802.1Q, G.8021, G.8021.1, G.8032 |

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| **Topic in G.8011.4/Y.1307 .4-2013** | **reference** |
| EVP-tree & EP-tree EVC & UNI service attributes | MEF 6.2 |
| EVP-tree ENNI attributes | MEF 26.1 |
| EVP-tree type 1, 2 & 3 | MEF 6.2, MEF 12.2, MEF 45   * Service multiplexing |
| EVP-tree protection | MEF 12.2, G.8021, G.8021.1 |

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| **Topic in G.8011.5/Y.1307 .5-2013** | **reference** |
| EPLAN EVC & UNI service attributes | MEF 6.2 |
| EPLAN ENNI attributes | MEF 26.1 |
| EPLAN type 1 & 2   * Flow port group, spanning tree | MEF 6.2, MEF 12.2, IEEE 802.1Q , G.8021, G.8021.1, G.8032 |

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1. The term manageability in the MEF CE 2.0 context includes network management (generic information models and protocol specific models), as well as fault management and performance monitoring OAM protocols. For clarity, and since only the latter aspects are included, this is referred to as OAM in the rest of this Recommendation. [↑](#footnote-ref-2)
2. The mechanisms though are out of scope for MEF and not listed. These could include:

   • ITU-T G.8031 – Ethernet linear protection

   • ITU-T G.8032 – Ethernet ring protection

   • IEEE 802.1AX – Link aggregation

   • IEEE 802.1Q (RSTP, MSTP, GVRP, MVRP) – Spanning Tree Restoration

   • IEEE 802.1aq – Shortest path bridging

   • other SDH, OTH, Ethernet or MPLS restoration schemes [↑](#footnote-ref-3)