



Letter Ballot

Mplify W101 LB

LSO Carrier Ethernet Service Schemas and Developer Guide

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1 List of Contributing Members

The following members of Mplify participated in the development of this document and have requested to be included in this list.

- Amartus
- Bloomberg
- Proximus

2 Abstract

This Mplify Standard consisting of this Developer Guide and its associated software artifacts (JSON/YAML Schemas) defines and describes the service-specific payload for the LSO APIs for a set of Service Functions – specifically, Service Order and Service Inventory, for Subscriber Ethernet and Operator Ethernet Services. The document starts with an overview of LSO Subscriber and Operator Ethernet Services. It then provides a basic information model for the Mplify Ethernet Service Attributes. The final sections describe the Data Model focused on the JSON/YAML Schemas associated with this specification.

This document can be thought of as a developer's guide for the Subscriber and Operator Ethernet Services Data Model and the schemas provided that embody the Data Model. Mplify Services are described by a set of Service Attributes. Each Service Attribute describes an aspect of the service that is agreed between the provider and the user of the service. The document that describes the Service Attributes for Subscriber Ethernet Services is MEF 10.4 [6] and Operator Ethernet Services is MEF 26.2 [8]. The corresponding Information Model representing these resources and attributes is MEF 7.4 [5].

This Standard normatively incorporates the following files by reference as if they were part of this document, from GitHub repository:

<https://github.com/MEF-GIT/MEF-LSO-Legato-SDK/commit/5bfb9b920a2c5c2674549cee6796b35f3f4a73a2>

3 Terminology and Abbreviations

This section defines the terms used in this document. In many cases, the normative definitions of terms are found in other documents. In these cases, the third column is used to provide the reference that is controlling, in other Mplify or external documents. If the reference includes an asterisk (*), the definition has been adapted from the original.

Term	Definition	Reference
Business Applications	The Service Provider functionality supporting Business Management Layer functionality (e.g., product catalog, order management, billing, relationship management, etc.)	MEF 55.1 [10]
BUS	See Business Applications	MEF 55.1 [10]
CEN	Carrier Ethernet Network	MEF 12.2 [7]
Carrier Ethernet Network	A network from a Service Provider or network Operator supporting the Mplify service and architecture models.	MEF 12.2 [7]
Data Model	A representation of concepts of interest to an environment in a form that is dependent on data repository, data definition language, query language, implementation language, and/or protocol (typically, but not necessarily, all five).	IETF RFC 3444 [3]
ENNI	External Network Network Interface	MEF 26.2 [8]
External Network Network Interface	A reference point representing the boundary between two Operator Carrier Ethernet Networks that are operated as separate administrative domains.	MEF 26.2 [8]
Ethernet Service	A connectivity service that carries Ethernet Frames irrespective of the underlying technology and that is specified using Service Attributes as defined in an Mplify Specification.	MEF 10.4 [6]
Information Model	A representation of concepts of interest to an environment in a form that is independent of data repository, data definition language, query language, implementation language, and protocol.	IETF RFC 3444 [3]
Order	One or more Service Order Items formulated into a fulfillment request made by a Client to a Server.	This document (derived from MEF 57.2)

Service Provider	In the context of this document, a Service Provider is an Ethernet Service Provider. In this document, we use Service Provider to include Super Operator as specified in MEF 26.2 (also referred to as SP/SO).	This Document
Subscriber Ethernet Service	In the context of this document, an Ethernet Service conforming to one of the six Subscriber Ethernet Services defined in MEF 6.3.	This Document

Table 1-Terminology

Term	Definition	Reference
BUS	Business	MEF 55.1 [10]
CEN	Carrier Ethernet Network	MEF 12.2 [7]
ENNI	External Network Network Interface	MEF 26.2 [8]

Table 2-Abbreviations

4 Compliance Levels

The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this document are to be interpreted as described in BCP 14 (RFC 2119 [2], RFC 8174 [4]) when, and only when, they appear in all capitals, as shown here. All key words must be in bold text.

Items that are **REQUIRED** (contain the words **MUST** or **MUST NOT**) are labeled as **[Rx]** for required. Items that are **RECOMMENDED** (contain the words **SHOULD** or **SHOULD NOT**) are labeled as **[Dx]** for desirable. Items that are **OPTIONAL** (contain the words **MAY** or **OPTIONAL**) are labeled as **[Ox]** for optional.

5 Numerical Prefixes

This document uses the prefix notation to indicate multiplier values as shown in Table 3-Numerical Prefix Conventions.

Decimal		Binary	
Symbol	Value	Symbol	Value
k	10^3	Ki	2^{10}
M	10^6	Mi	2^{20}
G	10^9	Gi	2^{30}
T	10^{12}	Ti	2^{40}
P	10^{15}	Pi	2^{50}
E	10^{18}	Ei	2^{60}
Z	10^{21}	Zi	2^{70}
Y	10^{24}	Yi	2^{80}

Table 3-Numerical Prefix Conventions

6 Introduction

LSO provides a programmatic interface for establishing automated exchange of information (i.e., Service Order, Service Inventory) between internal systems within a Service Provider or Operator and between a Service Provider and Customer. These APIs are hierarchically structure. The outer-most structure includes information relating to the access method (e.g., REST), next is information relating to the function being requested (e.g., Service Order or Inventory, etc.) and the inner-most structure contains information relating to the specific service, for example Carrier Ethernet Service.

The specific types of Ethernet Services are Subscriber and Operator Ethernet Services. Subscriber Ethernet Services are requested between a Customer and a Service Provider or a Service Provider and a Partner. Operator Ethernet Services are requested between a Service Provider (SP) and a Partner. The Service Attributes for Subscriber and Operator Ethernet Services are defined in MEF 10.4 [6] and MEF 26.2 [8] respectively. The corresponding Information Model that is used as a reference for JSON/YAML Subscriber and Operator Ethernet Services schemas is MEF 7.4 [5].

This specification is accompanied by a Data Model for Subscriber and Operator IP Services instantiated as a set of YAML schemas that can be used within the LSO APIs to perform Service Order, and request an Inventory for the Subscriber and Operator IP Services consisting of:

The Data Model for Subscriber Ethernet Services includes:

- EVC: An EVC is an association of two or more EVC End Points (EVC EPs).
- EVC End Point: An EVC End Point is a construct at a UNI that selects a subset of the Service Frames that pass over the UNI. An EVC End Point represents the logical attachment of an EVC to a UNI.
- Subscriber UNI: A construct that represents the Ethernet User Network Interface demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber.

The Data Model for Operator Ethernet Services includes:

- OVC: The Operator Virtual Connection is the building block for constructing an EVC spanning multiple Operator CENs. An OVC is an association of OVC End Points.

- OVC End Point: A logical entity at a given External Interface that is associated with a distinct set of frames passing over that External Interface. An OVC End Point represents the logical attachment of an OVC to an External Interface (a UNI or ENNI).
- Operator UNI: UNI used in Operator Ethernet Service solution where attributes are agreed to by the Service Provider/Super Operator and the Operator.
- Virtual UNI: An instantiation in one Operator CEN of functions that perform a portion of the Service Attributes observable at a UNI supported by a different Operator CEN.
- ENNI: A reference point representing the boundary between two or more Operator CENs that are operated as separate administrative domains.
- ENNI Service: A construct that represents the ENNI Service Attributes for an ENNI used by a particular SP/SO. For each instance of an ENNI, there can be multiple sets of ENNI Service Attributes.

The document contains the following sections:

- An overview of LSO Architecture (Section 7)
- An overview of IP Services Model (Section 8)
- An overview of Subscriber Ethernet Services (Section 9)
- An overview of Operator Ethernet Services (Section 10)
- Data Model Design Principles and Assumptions (Section 11)
- Data Models for Carrier Ethernet Services (Section 12)
- Relationship between the Entities (Section 13)
- Subscriber Ethernet Service Data Model (Section 14)
- Operator Ethernet Service Data Model (Section 15)
- Common Resource and Types (Section 16)
- Carrier Ethernet Service Level Specification (Section 17)
- Appendix A Usage Examples (Informative)

- Appendix B Service Order Operations

7 Overview of LSO Architecture

MEF 55.1 [10] describes the Reference Architecture for Lifecycle Service Orchestration (LSO) of Mplify-defined connectivity services. MEF 55.1 [10] defines seven LSO Reference Points that are abstract interconnection points between different domains - either within the service provider domain (intra-domain) or between service provider and other business entities (inter-domain). One of these LSO Reference Points is LSO Legato which defines the abstract boundary point between a Service Provider's or Partner's Business Application (BA) and Service Orchestration Functionality (SOF) for providing connectivity services provisioning.

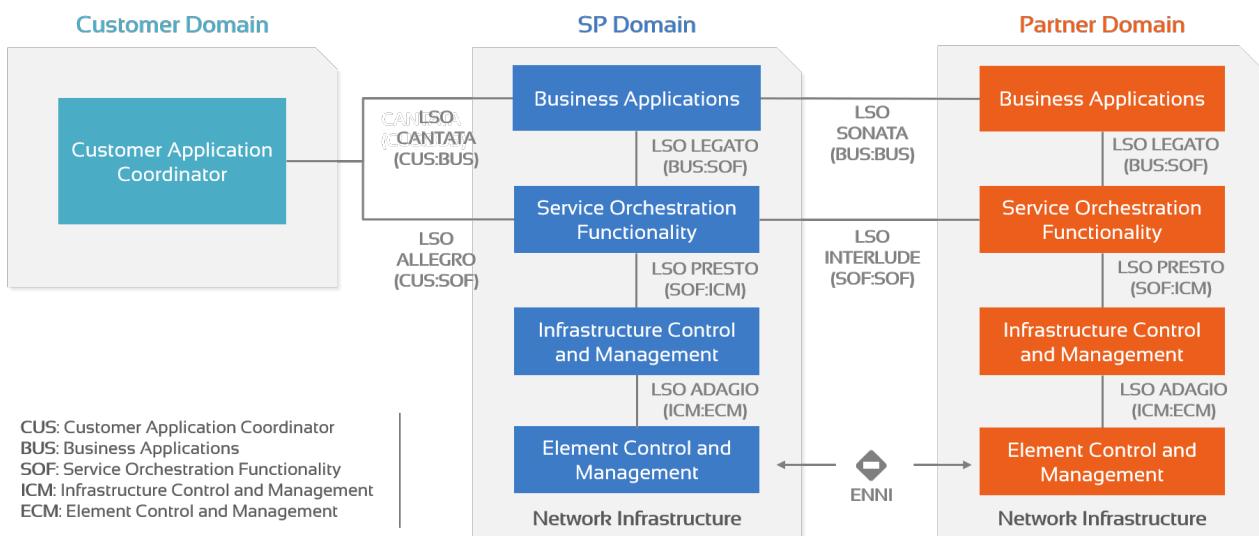


Figure 1-LSO Architecture Diagram

The access to automated service provisioning functionality is provided using the Service Provisioning API at LSO IRPs Allegro, Interlude and Legato. LSO IRPs provides a suite of APIs for ordering, inventory, etc. which are standardized by Mplify as LSO Service APIs, and which are made available by Mplify in a series of releases of the LSO Service SDK.

The LSO Service APIs comprise two parts: one is the service-independent functionality, or Basic API Structure, and the second is the service-specific payload, or Information Payload, as shown in diagram below.

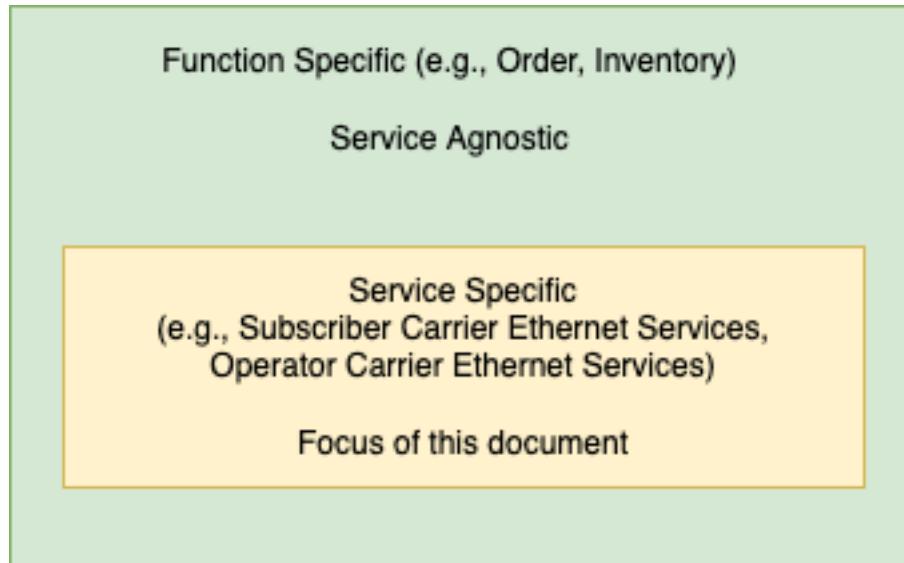


Figure 2-LSO API Envelope and Payload Structure

This document defines the service-specific payload, shown as YAML/JSON Data Model in the figure above, specifically for a MEF 3.0 Subscriber and Operator Ethernet Services as defined in MEF 10.4 [6] and MEF 26.2 [8] respectively. Both Subscriber Ethernet and Operator Ethernet Information Models are defined in MEF 7.4 [5]. The envelope resources of the API and association to specific payload resources will be discussed in detail later in this document.

8 Overview of Ethernet Services Model

The Carrier Ethernet Services model has nine main classes, CarrierEthernetEvc, CarrierEthernetEvcEndPoint, CarrierEthernetSubscriberUni, CarrierEthernetOvc, CarrierEthernetOvcEndPoint, CarrierEthernetOperatorUni, CarrierEthernetEnni, CarrierEthernetEnniService and CarrierEthernetVuni. An Ethernet Service is defined as either a Subscriber Ethernet Service or an Operator Ethernet Service.

A Subscriber Ethernet Service is an Ethernet Service that is provided by a Service Provider to two or more UNIs. In some Ethernet Services the Subscriber will have locations that are not all served by a single CEN Operator. Specifically, to support all Subscriber's UNIs one or more CEN Operators are required. This is where an Operator Ethernet Service is used.

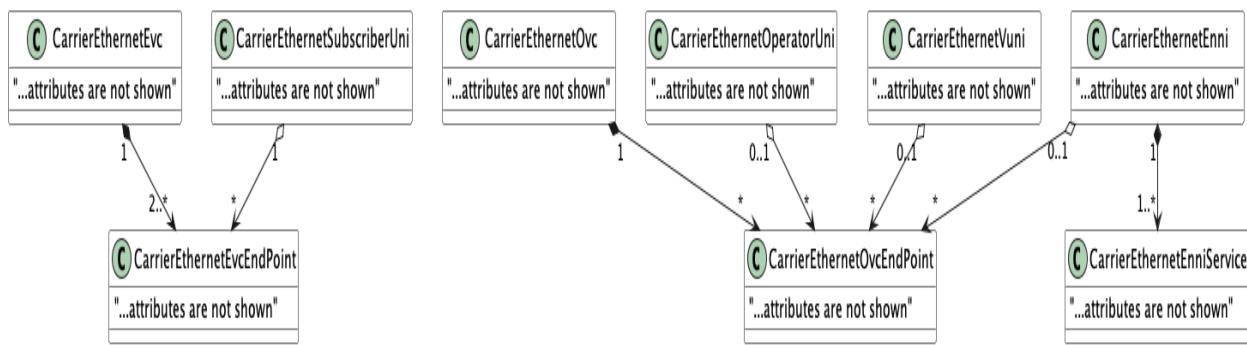


Figure 3-Ethernet Service Model Overview

The Ethernet Service Model supports Subscriber and Operator Carrier Ethernet Services. The Subscriber Carrier Ethernet service is composed of CarrierEthernetSubscriberUnis, CarrierEthernetEvcEndPoints and CarrierEthernetEvc. A two EVC network topology is shown in Figure 4.

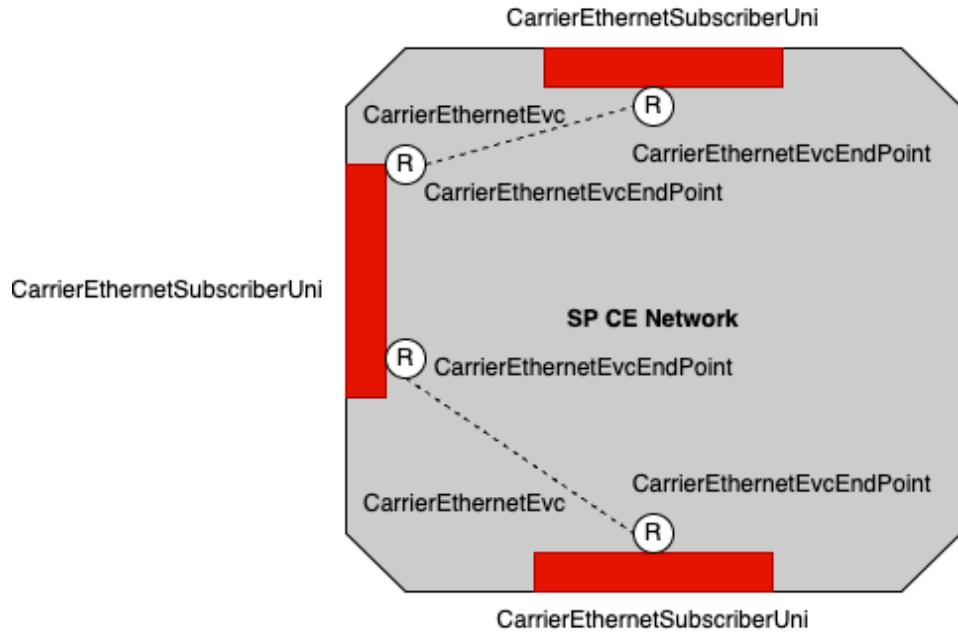


Figure 4-Subscriber Ethernet Service Topology

The Operator Carrier Ethernet service is composed of CarrierEthernetOperatorUnis, CarrierEthernetOvcEndPoints, CarrierEthernetEnni and CarrierEthernetOvc. An OVC network topology is shown in Figure 5.

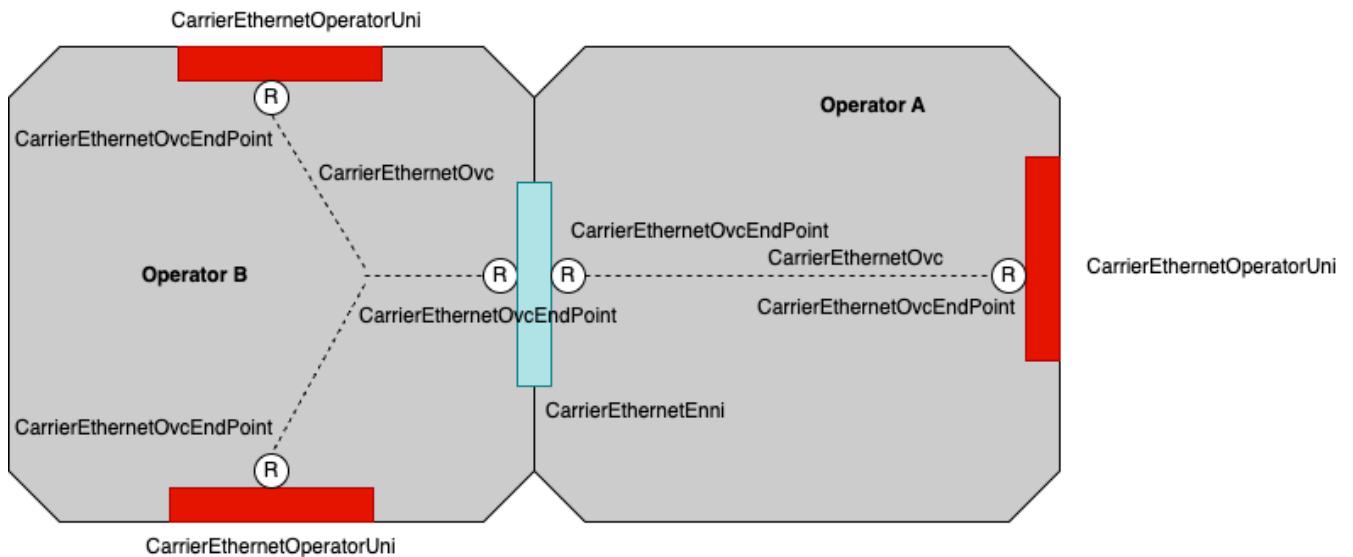


Figure 5-Operator Ethernet Service Topology

9 Overview of Subscriber Ethernet Services

This specification describes a data model for Mplify-defined Subscriber Ethernet Services. A Subscriber Ethernet Service is an Ethernet Service provided to an end user (the Subscriber) by a Service Provider. There is no restriction on the type of organization that can act as a Subscriber; for example, a Subscriber can be an enterprise, a mobile operator, an IT system integrator, a government department, etc. At its most basic, a Subscriber Ethernet Service provides connectivity for Ethernet frames between different parts of the Subscriber's network (usually at different physical locations) or between the Subscriber's network and an external network. The subsequent sub-sections provide background on the set of objects that are associated with a Subscriber Ethernet Service.

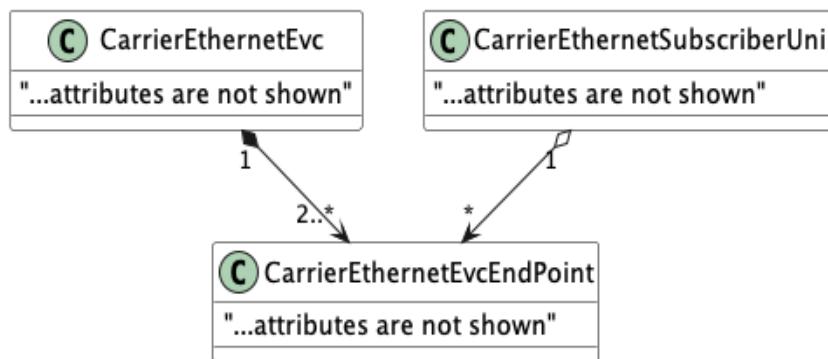


Figure 6-Subscriber Ethernet Service Model

9.1 Carrier Ethernet Subscriber UNI

A User Network Interface (UNI) is the demarcation point between the responsibility of the Service Provider (SP) and the responsibility of the Subscriber. A Subscriber is connected to the SP at one or more UNIs.

9.2 Carrier Ethernet EVC and Ethernet Virtual Connection End Points

A fundamental aspect of Subscriber Ethernet Services is the Ethernet Virtual Connection (EVC) is an association of two or more EVC End Points (EVC Eps). An EVC EP is a construct at a UNI that selects a subset of the Service Frames that pass over the UNI. The subset of Service Frames is specified via the value of the EVC EP Map Service Attributes.

10 Overview of Operator Ethernet Services

This specification describes a data model for Mplify-defined Carrier Ethernet Operator Services. When a Service Provider provides an end-to-end Subscriber IP Service to a Subscriber, they might not be able to implement the entire service using their own network - for instance, one of the Subscriber UNIs might not be in a geographic region where the Service Provider does not operate. In this case, the Service Provider must partner with another Operator who can reach that UNI. The Operator provides Carrier Ethernet connectivity service between the UNI and a point where they can interconnect with the SP's network as described in [8].

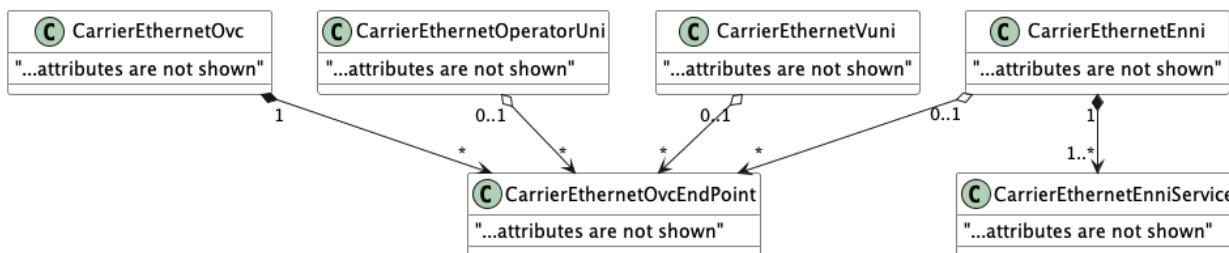


Figure 7-Operator Ethernet Service Model

10.1 Carrier Ethernet Operator UNI

A Carrier Ethernet Operator UNI is the supporting interface between a customer and SP/SO when the SP/SO is serving Carrier Ethernet Operator Services. The Carrier Ethernet Operator UNI is different from the Carrier Ethernet Subscriber UNI. They are different because the value of each Operator UNI Service Attribute is agreed by the SP/SO and the Operator while the value of each Subscriber UNI Service Attribute is agreed to by the Subscriber and Service Provider.

10.2 Carrier Ethernet OVC and OVC End Points

The Operator Virtual Connection (OVC) is the building block for constructing an EVC spanning multiple Operator CENs. In the same way that an EVC defines an association of UNIs, an OVC is an association of OVC End Points. An OVC End Point is a logical entity at a given External Interface that is associated with a distinct set of frames passing over that External Interface. An OVC End Point represents the logical attachment of an OVC to an External Interface (a UNI or ENNI) [8].

10.3 Carrier Ethernet ENNI and ENNI Service

An External Network Network Interface (ENNI) is the demarcation point between the responsibility of one Operator and another - in other words, it is the interface where two Operators interconnect. For each instance of an ENNI, there are multiple sets of ENNI Service

Attributes. The value for each ENNI Service Attribute in a set for an Operator CEN is specific to a SP/SO that is using the ENNI per [8]. Each such value is agreed to by the SP/SO and the Operator.

10.4 Carrier Ethernet VUNI

A Virtual UNI (VUNI) is the instantiation in one Operator CEN of functions that perform a portion of the Service Attributes observable at a UNI supported a different Operator CEN. Each VUNI is paired with a UNI, called a Remote UNI (RUNI) that is supported by an Operator CEN other than the Operator CEN containing the VUNI [8].

11 Data Model Design Principles and Assumptions

A Service Attribute for a Service can have a value that is a simple datatype such as an integer or string (or list of simple datatypes) or a value that is an object with multiple properties or a composition of objects. Within this document each simple value (integer, string, Boolean, etc.) is referred to as a Service-Specific Attribute. A Service-Specific Attribute could be a Service Attribute (in the case where the Service Attribute itself has a simple type) or it could be a parameter within a Service Attribute (if the Service Attribute is a structured object or a composition of such objects). The classification for each Service-Specific Attribute may be different across Service Function, Service Action, and Service Offering.

The Carrier Ethernet Service data model supports both ADD and MODIFY actions for Service Order for EVC, OVC, Subscriber UNI, Operator UNI, EVC End Point, OVC End Point, and ENNI. The Carrier Ethernet Service data model supports the retrieval for Inventory for all Service Order components.

[R1] The [PlaceRelationship](#) and
[CarrierEthernetPhysicalLink.physicalLink](#) of a UNI or ENNI cannot be
changed once it is ordered.

Instead, this is handled as an installation (UNI or ENNI at new location) and disconnect (UNI or ENNI at previous location), as there is often a requirement for a smooth transition with minimum downtime.

12 Data Models for Carrier Ethernet Services

The data models for the Carrier Ethernet Service configuration are expressed as a set of JSON schemas based on JSON schema draft 7 and encoded in YAML. These schemas accompany this document. This section explains the organization and structure of these schemas.

12.1 Organization and Structure of the Schemas

The schemas are organized into a file structure as shown in Figure 8.

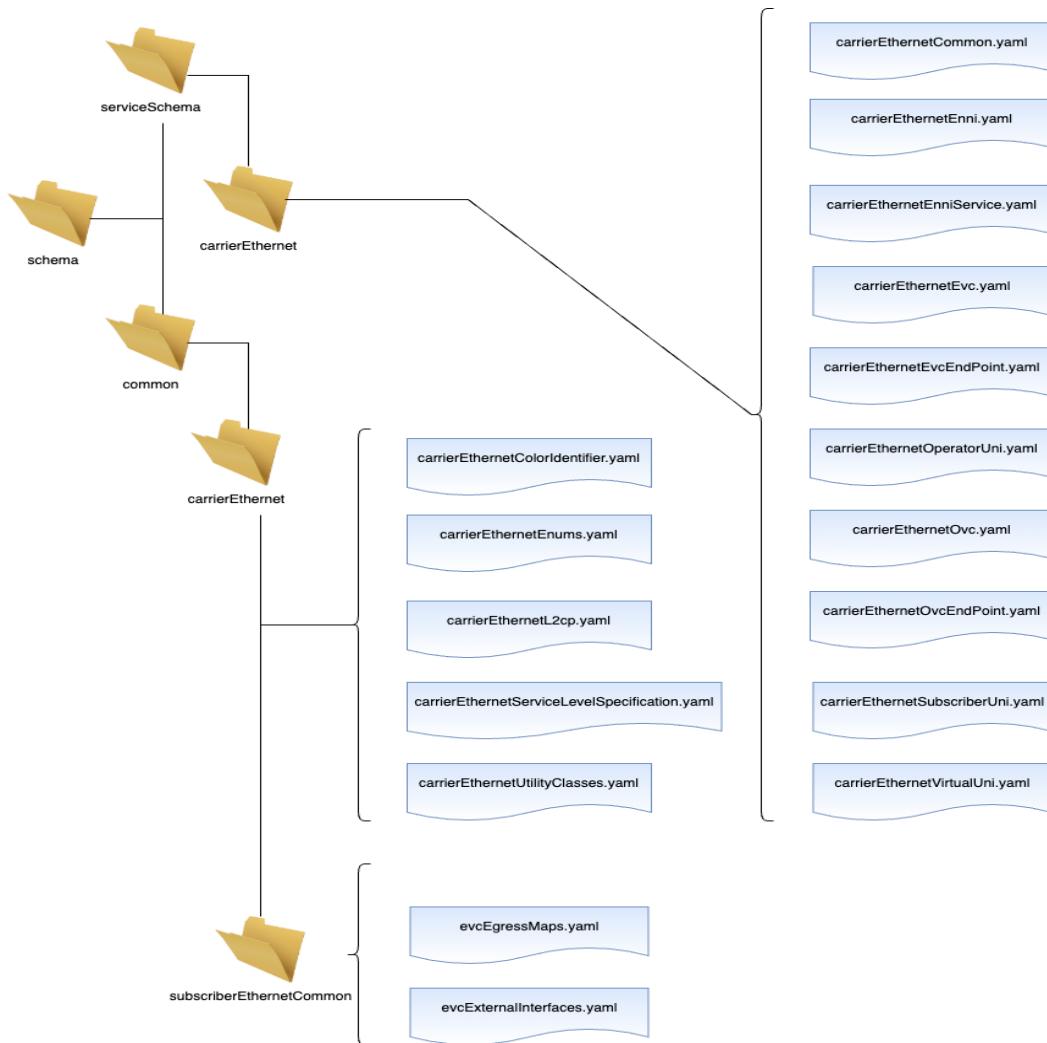


Figure 8-Schema Files Organization

The root directory for all YAML files is **schema** with subdirectories **common** and **serviceSchema**. The **common** directory has shared resources that are used by Product and Service schemas.

Both Subscriber and Operator Carrier Ethernet Service schemas are provided in the same directory. There is one file that provides common Carrier Ethernet Service resources that are shared with Subscriber and Operator service:

- `schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml` – provides classes shared among all Carrier Ethernet services.

12.1.1 Naming Conventions

In the schemas, class and type names are UpperCamelCase and Service Attribute/property names are lowerCamelCase.

13 Relationships Between Entities

This section describes the constraints and relationships between the primary Service Order Items for both Subscriber (EVC, UNI and EVC End Points) and Operator Ethernet Services (OVC, UNI, ENNI and OVC End Points).

The Subscriber Ethernet Service is associated with two or more UNIs each associated with an EVC End Point and End Points associated with EVC. The Operator Ethernet Service is one UNI and one ENNI associated with an OVC End Point and End Points associated with OVC.

13.1 Subscriber Ethernet Services Relationships Between Entities

A Mplify Service Order for Subscriber Ethernet Service has one or more Service Order Items which are components of the Service-agnostic envelope part of the MEF 99 API[11]. Each Service Order Item is associated to the Service-specific payload components (CarrierEthernetEvc, CarrierEthernetEvcEndPoint and CarrierEthernetSubscriberUni). The relationships between the envelope and payload components are shown in Figure 9.

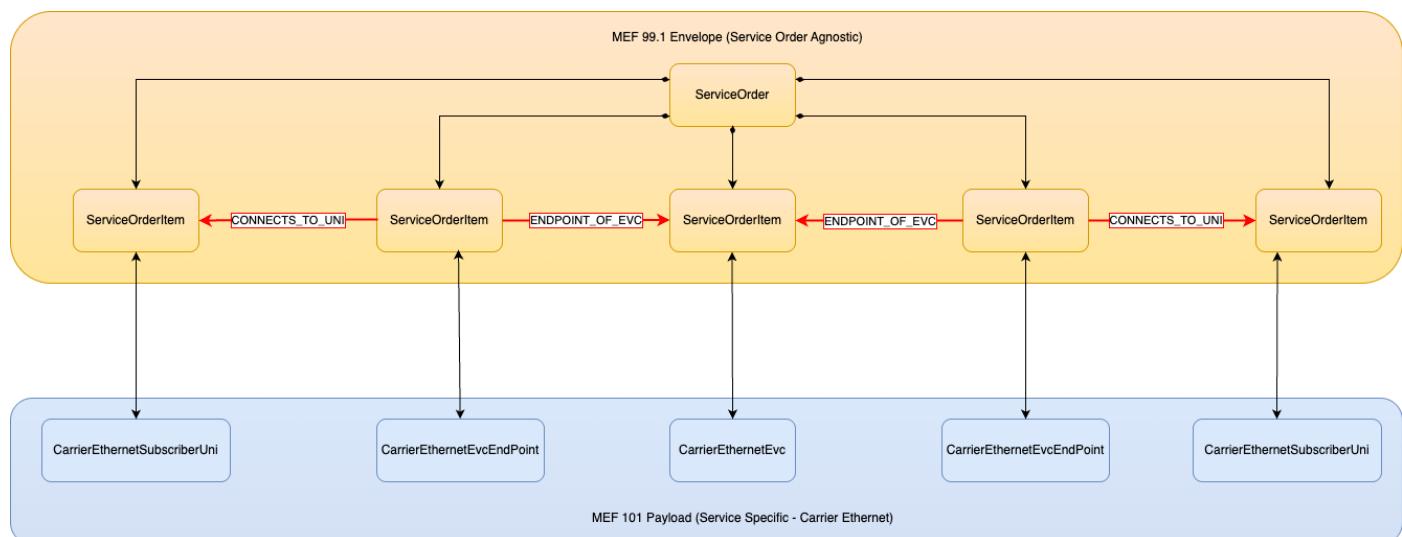


Figure 9-Subscriber Ethernet Service Order API Associations

#	Source Service	Relationship Type	Cardinality	Target Service
1	CarrierEthernetEvcEndPoint	ENDPOINT_OF_EVC ROOT_ENDPOINT_OF_EVC LEAF_ENDPOINT_OF_EVC	1	CarrierEthernetEvc
2	CarrierEthernetEvcEndPoint	CONNECTS_TO_UNI	1	CarrierEthernetSubscriberUni

Table 4-Service Relationship Roles Subscriber Carrier Ethernet

- [R2] For a service listed in Source Service column in Table 4, the Relationship Type field of the Service Order Item Relationship types **MUST** contain one the corresponding values shown in the Relationship Type column.
- [R3] For Service Order, the relationships to CarrierEthernetSubscriberUnis **MUST** be specified for every ADD of or MODIFY to a CarrierEthernetEvc.
- [R4] For Service Order, the relationships to CarrierEthernetSubscriberUnis **MUST** be specified for every ADD of or MODIFY to a CarrierEtherntEvcEndPoint.
- [R5] For a CarrierEthernetEvc, the relationship **MUST** reference a CarrierEthernetSubscriberUni.
- [R6] For a MODIFY to an CarrierEthernetEvc, the relationship to the CarrierEthernetSubscriberUni **MUST NOT** be modified from the value present in the Service Inventory.

[R6] indicates that once an CarrierEthernetEvc and CarrierEthernetEvcEndPoint are associated with a CarrierEthernetSubscriberUni, it cannot be associated with a different CarrierEthernetSubscriberUni.

A CarrierEthernetSubscriberUni and an CarrierEthernetEvcEndPoint may be included in the same Service Order as the CarrierEthernetEvc. The CarrierEthernetSubscriberUni is associated with a specific INSTALL_LOCATION, which is required at ADD and MODIFY. Once a CarrierEthernetSubscriberUni is associated with a specific location, the INSTALL_LOCATION cannot be modified and as, the same INSTALL_LOCATION value must be specified for every MODIFY.

The install location is captured in the service-agnostic part of the Service Order API. The value in the Place Relationship Role column in the table below is used in the *role* field of the *RelatedPlaceRefOrQuery* type.

Service	Place Relationship Role	Cardinality	CHANGE
CarrierEthernetSubscriberUni	INSTALL_LOCATION	1	Must be same value as Service Inventory.

Table 5-Place Relationship Role

- [R7] For a CarrierEthernetSubscriberUni, the Role field (role) of the Related Place (*RelatedPlaceRefOrQuery*) type, **MUST** contain one of the values shown in Place Relationship Role in Table 5.

[R8] For Service Order, the Related Place (*RelatedPlaceRefOrQuery*) **MUST** be specified for every ADD of, or MODIFY to, a CarrierEthernetSubscriberUni.

[R9] For a MODIFY to a CarrierEthernetSubscriberUni the Related Place **MUST NOT** be modified from the value present in the Service Inventory.

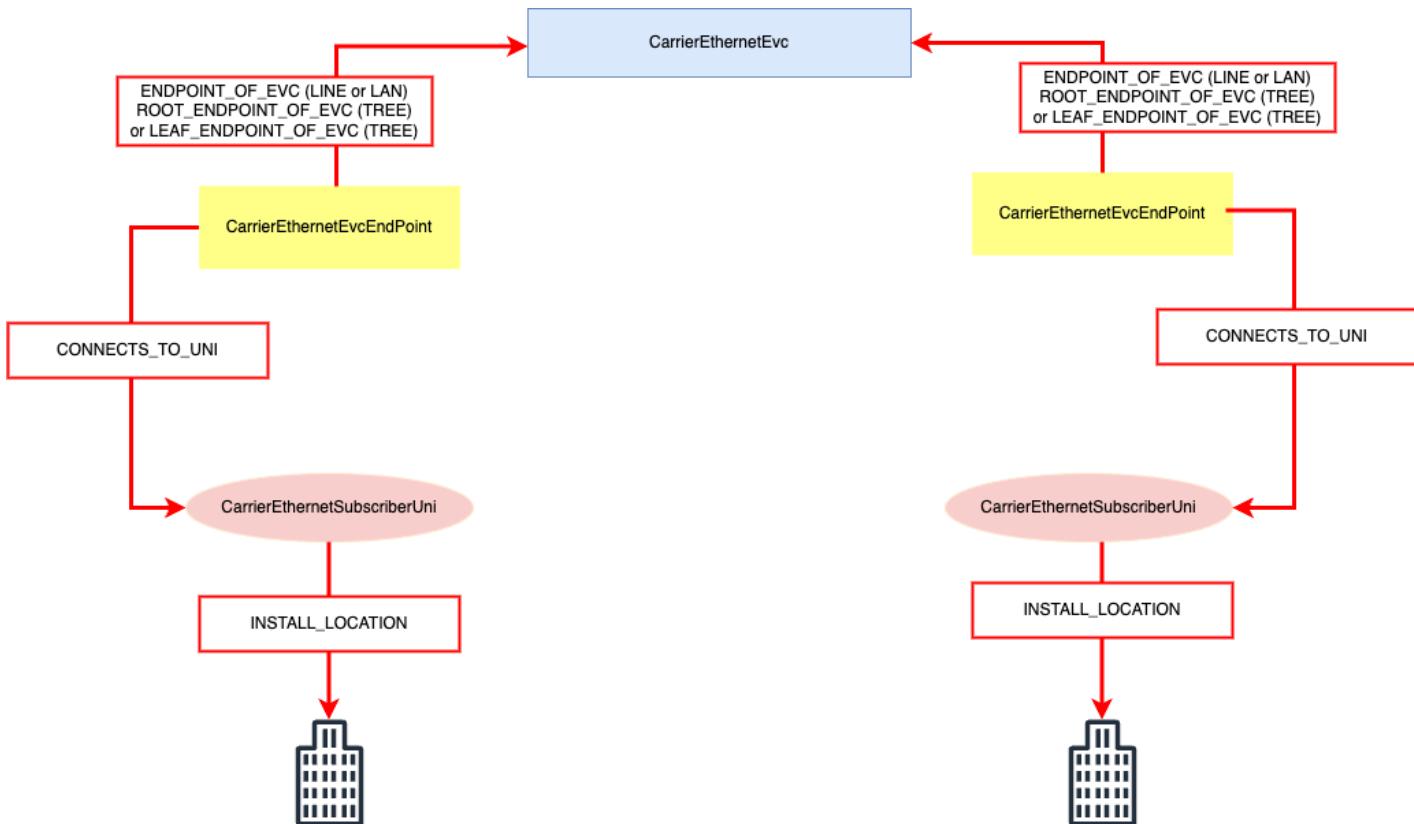


Figure 10-Subscriber Carrier Ethernet Services Entities and Relationships

13.2 Operator Ethernet Services Relationships Between Entities

A Mplify Service Order for an Operator Ethernet Service has one or more Service Order Items which are components of the Service-agnostic envelope part of the MEF 99.1 API[11]. Each Service Order Item is associated to the Service-specific payload components (CarrierEthernetOvc, CarrierEthernetOvcEndPoint, CarrierEthernetOperatorUni, CarrierEthernetEnni and CarrierEthernetEnniService. The relationships between the envelope and payload components are shown in Figure 11.

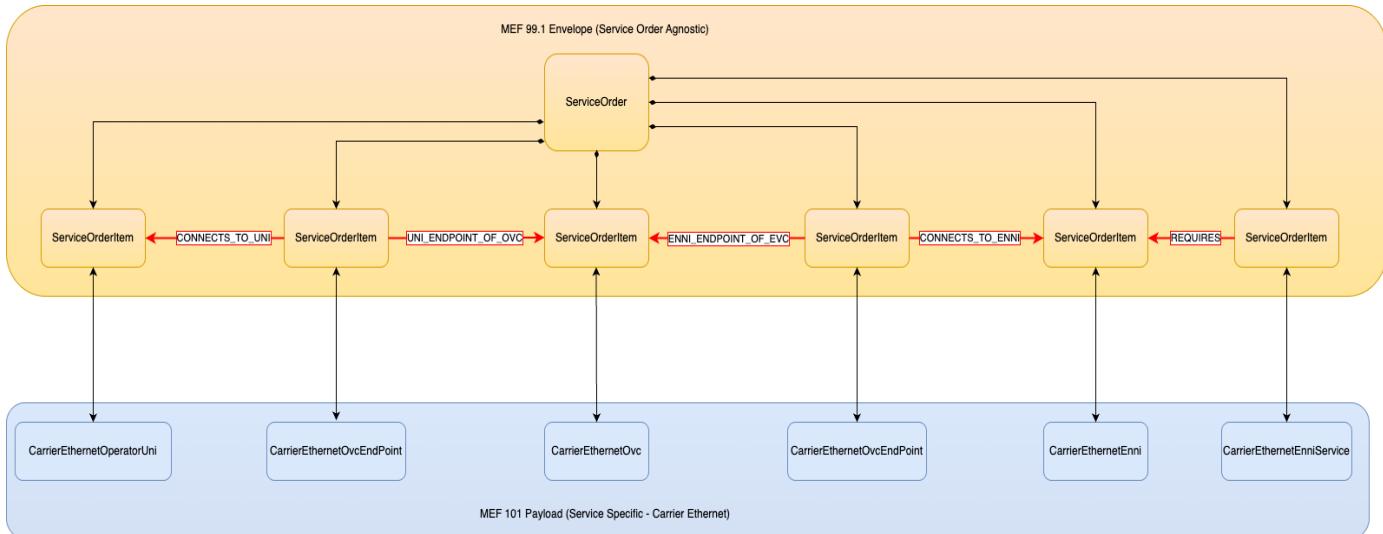


Figure 11-Operator Carrier Ethernet Service Order API Associations

#	Source Service	Relationship Type	Cardinality	Target Service
1	CarrierEthernetOvcEndPoint	UNI_ENDPOINT_OF_OVC	1	CarrierEthernetOvc
2	CarrierEthernetOvcEndPoint	ENNI_ENDPOINT_OF_OVC	1	CarrierEthernetOvc
3	CarrierEthernetOvcEndPoint	CONNECTS_TO_UNI	1	CarrierEthernetOperatorUni
4	CarrierEthernetOvcEndPoint	CONNECTS_TO_ENNI	1	CarrierEthernetEnni
5	CarrierEthernetEnni	REQUIRES	1..*	CarrierEthernetEnniService

Table 6-Service Relationship Roles Operator Carrier Ethernet

- [R10] For a service listed in Source Service column in Table 4, the Relationship Type field of the Service Order Item Relationship types **MUST** contain one the corresponding values shown in the Relationship Type column.
- [R11] For Service Order, the relationships to CarrierEthernetOperatorUnis **MUST** be specified for every ADD of or MODIFY to a CarrierEthernetOvc.
- [R12] For Service Order, the CarrierEthernetEnni **MUST** specify a EnniService specific to relationship between SP/SO.
- [R13] For Service Order, the relationships to CarrierEthernetEnni **MUST** be specified for every ADD of or MODIFY to an CarrierEthernetOvc.
- [R14] For Service Order, the relationships to CarrierEthernetOperatorUnis **MUST** be specified for every ADD of or MODIFY to a CarrierOvcEndPoint.
- [R15] For Service Order, the relationships to CarrierEthernetEnni **MUST** be specified for every ADD of or MODIFY to an CarrierEthernetOvcEndPoint.

- [R16] For a CarrierEthernetOvc, the relationship **MUST** reference a CarrierEthernetOperatorUni.
- [R17] For an CarrierEthernetOvc, the relationship **MUST** reference a CarrierEthernetEnni.
- [R18] For a MODIFY to a CarrierEthernetOvc, the relationship to the CarrierEthernetOperatorUni **MUST NOT** be modified from the value present in the Service Inventory.
- [R19] For a MODIFY to an CarrierEthernetOvc, the relationship to the ENNI **MUST NOT** be modified from the value present in the Service Inventory.

[R18] indicates that once an CarrierEthernetOvc and CarrierEthernetOvcEndPoint are associated with a CarrierEthernetOperatorUni, it cannot be associated with a different Operator UNI.

[R19] indicates that once a CarrierEthernetOvc and CarrierEthernetOvcEndPoint are associated with a CarrierEthernetEnni, it cannot be associated with a different CarrierEthernetEnni.

A CarrierEthernetOperatorUni and a CarrierEthernetOvcEndPoint may be included in the same Service Order as the CarrierEthernetOvc. The CarrierEthernetOperatorUni is associated with a specific INSTALL_LOCATION, which is required at ADD and MODIFY. Once a CarrierEthernetOperatorUni is associated with a specific location, the INSTALL_LOCATION cannot be changed and as, the same INSTALL_LOCATION value must be specified for every MODIFY.

The install location is captured in the service-agnostic part of the Service Order API. The value in the Place Relationship Role column in the table below is used in the *role* field of the *RelatedPlaceRefOrQuery* type.

Service	Place Relationship Role	Cardinality	CHANGE
CarrierEthernetOperatorUni	INSTALL_LOCATION	1	Must be same value as Service Inventory.
CarrierEthernetEnni	INSTALL_LOCATION	1	Must be same value as Service Inventory.

Table 7-Place Relationship Role

- [R20] For a CarrierEthernetOperatorUni, the Role field (role) of the Related Place (*RelatedPlaceRefOrQuery*) type, **MUST** contain one of the values shown in Place Relationship Role in Table 7.
- [R21] For Service Order, the Related Place (*RelatedPlaceRefOrQuery*) **MUST** be specified for every ADD of, or MODIFY to, a CarrierEthernetOperatorUni.

- [R22] For a MODIFY to a CarrierEthernetOperatorUni the Related Place **MUST NOT** be modified from the value present in the Service Inventory.
- [R23] For Service Order, the Related Place (*RelatedPlaceRefOrQuery*) **MUST** be specified for every ADD of, or MODIFY to, a CarrierEthernetEnni.
- [R24] For a MODIFY to a CarrierEthernetOperatorEnni the Related Place **MUST NOT** be modified from the value present in the Service Inventory.

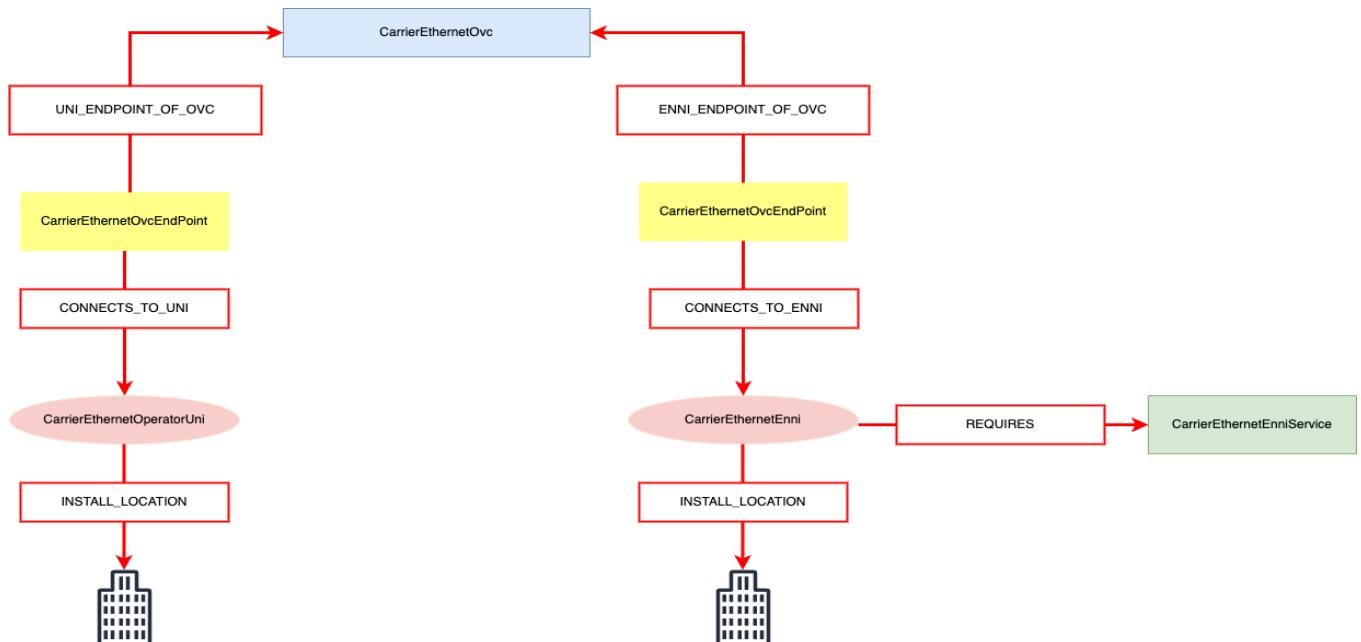


Figure 12-Operator Carrier Ethernet Entities and Relationships

14 Subscriber Carrier Ethernet Services Data Model

A Subscriber Carrier Ethernet Service is a Carrier Ethernet Service provided to an end user (the Subscriber) by a Service Provider. There is no restriction on the type of organization that can act as a Subscriber; for example, a Subscriber can be an enterprise, a mobile operator, an IT system integrator, a government department, etc. At its most basic, a Subscriber Carrier Ethernet Service provides connectivity for Carrier Ethernet frames between different parts of the Subscriber's network (usually at different physical locations). The set of potential services supported include E-Line (Point-to-Point EVC), E-LAN (Multipoint-to-Multipoint) and E-Tree (Rooted-Multipoint EVC).

The Resources and corresponding Attributes are listed in groups:

- Subscriber Carrier Ethernet Services Resource:
 - CarrierEthernetSubscriberUni
 - CarrierEthernetEvcEndPoint
 - CarrierEthernetEvc

14.1 CarrierEthernetSubscriberUni

The Ethernet User Network Interface demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber. Reference MEF 10.4 Section 9 Subscriber UNI Service Attributes [6]. The model below illustrates the payload component association to envelope components.

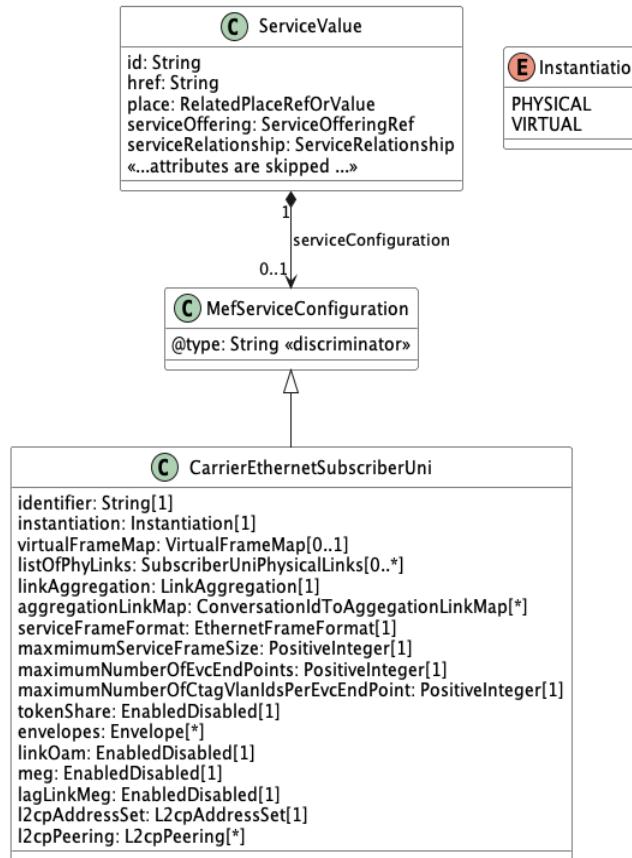


Figure 13-CarrierEthernetSubscriberUni Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetSubscriberUni.yaml			
\$id: urn:mef:iso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> "/[x20-\x7F]+"	1	String that is used to allow the Subscriber and Service Provider to uniquely identify the UNI for operations purposes. Reference MEF 10.4 Section 9.1 Subscriber UNI ID Service Attribute.
instantiation	Instantiation	1	The value is either Physical or Virtual. Reference MEF 10.4 Section 9.2 Subscriber UNI Instantiation Service Attribute.
virtualFrameMap	VirtualFrameMap	0..1	Maximum number of IPv4 routes supported by the service. Reference MEF 61.1 Section 10.5 IPVC Maximum Number of IPv4 Routes Service Attribute. Absence of this attribute corresponds to a value of “Unlimited”.
listOfPhysicalLinks	SubscriberUniPhysicalLinks	0..*	The value of the Subscriber UNI List of Physical Links Service Attribute is a list of 4-tuples (which may be empty if Virtual UNI is used) of the form <id,pl,fs,pt>, with one list item for each physical link. The value of id is an identifier for the physical link. The value of pl specifies a physical layer. fs indicates if synchronous Ethernet is used on the physical link corresponding to the 4-tuple

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetSubscriberUni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all			
			and has the value either Enabled or Disabled. The value of pt indicates if the Precision Time Protocol is used on the physical link corresponding to the 4-tuple and has the value either Enabled or Disabled. Reference MEF 10.4 Section 9.4 Subscriber UNI List of Physical Links Service Attribute.
linkAggregation	LinkAggregation	1	The value of the Subscriber UNI Link Aggregation Service Attribute is one of <i>2-Link Active/Standy, All Active, Other, or Not Applicable</i> . The value of this Service Attribute is dependent on the value of the Subscriber UNI Instantiation Service Attribute (Section 9.2) and the value of the Subscriber UNI List of Physical Links Service Attribute (Section 9.4). Reference MEF 10.4 Section 9.5 Subscriber UNI Link Aggregation Service Attribute.
aggregationLinkMap	ConversationIdToAggregationLinkMap	0..*	The value of the Subscriber UNI Port Conversation ID to Aggregation Link Map Service Attribute is either a Port Conversation ID to Aggregation Link Map as defined in IEEE Std 802.1AX –2014 [3] or <i>Not Applicable</i> . Reference MEF 10.4 Section 9.6 Subscriber UNI Port Conversation ID to Aggregation Link Map Service Attribute.
serviceFrameFormat	EthernetFrameFormat	1	This is a single value read only attribute. Reference MEF 10.4 Section 9.7 Subscriber UNI Service Frame Format Service Attribute and MEF 26.2 Section 14.7 Operator UNI Service Frame Format Service Attribute.
maximumServiceFrameSize	Integer	1	Specifies the maximum size of EI Frames that can be transmitted across EI. Reference MEF 10.4 Section 9.8 Subscriber UNI Maximum Service Frame Size Service Attribute. Reference MEF 26.2 Section 14.8 Operator UNI Maximum Service Frame Size Service Attribute. Reference MEF 26.2 Section 10.3 ENNI Maximum Frame Size Multilateral Attribute.
maximumNumberOfEvcEndPoints	Integer	1	An integer greater than or equal to 1 that limits the number of EVC End Points that can be located at the UNI. Reference MEF 10.4 Section 9.9 Subscriber UNI Maximum Number of EVC EPs Service Attribute. The maximum number of OVC End Points that the Operator CEN can support at the UNI. Reference MEF 26.2 Section 14.10 Operator UNI Maximum Number of OVC End Points Service Attribute.
maximumNumberOfCtagVlanIdsPerEvcEndPoint	Integer	1	An integer greater than or equal to 1 that limits the number of C-Tag VLAN IDs that can map to each EVC End Point. Reference MEF 10.4 Section 9.10 Subscriber UNI Maximum Number of C-Tag VLAN IDs per EVC EP Service Attribute. The maximum number of CE-VLAN ID values that can be mapped to an OVC End Point by the Operator CEN at the UNI. Reference MEF 26.2 Section 14.11 Operator UNI Maximum Number of CE-VLAN IDs per OVC End Point Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetSubscriberUni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all			
tokenShare	EnabledDisabled	1	Indicates whether Bandwidth Profile Envelopes containing more than one Bandwidth Profile Flow are supported by the Service Provider at the UNI. Reference MEF 10.4 Section 9.11 Subscriber UNI Token Share Service Attribute.
envelopes	Envelope	0..*	The Envelopes and Envelope Coupling Flag values to which Bandwidth Profile Flows can be mapped. Reference MEF 10.4 Section 9.12 Sub-scriber UNI Envelopes Service Attribute and MEF 26.2 Section 14.19 Operator UNI Envelopes Service Attribute.
linkOam	EnabledDisabled	1	The value of the Subscriber UNI Link OAM Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . The Subscriber UNI Link OAM Service Attribute controls when and how Link OAM per IEEE Std 802.3-2015 [5] is run on the physical links in the UNI.
meg	EnabledDisabled	1	The Subscriber UNI MEG Service Attribute indicates if the Service Provider has instantiated a MEG End Point at the UNI Maintenance Entity Group (MEG) Level. The value of the Subscriber UNI MEG Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 10.4 Section 9.14 Subscriber UNI MEG Service Attribute.
lagLinkMeg	EnabledDisabled	1	The value of the Subscriber UNI LAG Link MEG Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 10.4 Section 9.15 Subscriber UNI LAG Link MEG Service Attribute.
l2cpAddressSet	L2cpAddressSet	1	The Subscriber UNI L2CP Address Set Service Attribute is defined in MEF 45.1.
l2cpPeering	L2cpPeering	0..*	The Subscriber UNI L2CP Peering Service Attribute is defined in MEF 45.1.

Table 8-CarrierEthernetSubscriberUni Service Attributes

14.1.1 SubscriberUniPhysicalLinks

This is a 6-tuple that specifies UNI specific link attributes (in addition to the general physical link attributes). The components of the 6-tuple are: (1) Physical layer, (2) whether Synchronous Ethernet is enabled or disabled, (3) whether PTP is used on the link, (4) UNI connector type, (6) the UNI connector gender, and (6) whether auto-negotiation is used on the link.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetSubscriber.yaml			
Attribute Name	Type	Multiplicity	Description
physicalLink	CarrierEthernetPhysicalLink	1	Identifier of link.
synchronousEthernet	EnabledDisabled	1	Synchronous Ethernet enabled or disabled.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetSubscriber.yaml			
precisionTiming	EnabledDisabled	1	Precision timing enabled or disabled.
uniConnectorType	String Enum: <ul style="list-style-type: none">• SC• LC• RJ45• OTHER	1	This indicates the type of connector that is presented to the Subscriber.
uniConnectorGender	Gender	1	This indicates whether the Subscriber is presented with a SOCKET (common) or a PLUG (less common).
autoNegotiation	EnabledDisabled	1	IEEE Std 802.3-2018 Clause 28 and 37 - Indicates whether 802.3 autonegotiation is enabled on the UNI link.

Table 9-SubscriberUniPhysicalLinks Service Attributes

14.2 CarrierEthernetEvcEndPoint

A CarrierEthernetEvcEndPoint is a construct at a UNI that selects a subset of the Service Frames that pass over the UNI. A CarrierEthernetEvcEndPoint represents the logical attachment of an EVC to a UNI. Reference MEF 10.4 Section 10 EVC EP Service Attributes [6].

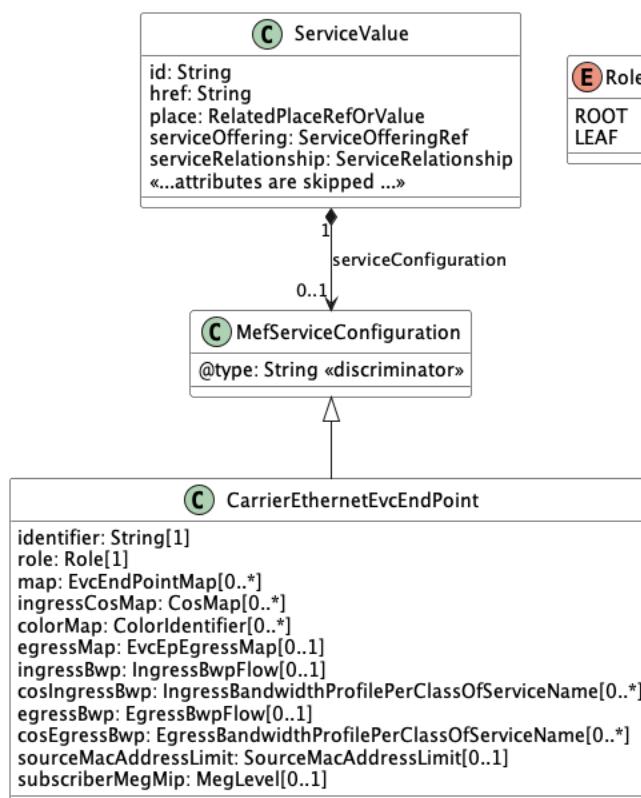


Figure 14-CarrierEthernetEvcEndPoint Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvcEndPoint.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-vc-end-point:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> "/[\x20-\x7F]+"	1	A string that is used to allow the Subscriber and Service Provider to uniquely identify the CarrierEthernetEvcEndPoint for operations purposes. Reference MEF 10.4 Section 10.1 EVC EP ID Service Attribute.
role	String Enum: <ul style="list-style-type: none">• ROOT• LEAF	1	This enumeration is indicating how external interface frames mapped to the EVC End Point can be forwarded. Reference MEF 10.4 Section 10.3 EVC EP Role Service Attribute.
map	EvcEndPointMap	0..*	MEF 10.4 sec. 10.4 - This is specifications for which ServiceFrames are mapped to the EVC End Point. The allowed values in MEF 10.4 are ALL, LIST, and UT/PT. Since Private services must be ALL, the map isn't needed for those services, and therefore the type does not include ALL. If the type is LIST, there must be a list of VLAN IDs specified.
ingressCosMap	CosMap	0..*	The CoS Map represents the mapping from fields in an Ingress EI Frame to a CoS Name. The map can be based on the EVC or OVC End Point, the S-Tag or C-Tag PCP value, or the DSCP field if the EI Frame is carrying an IP Packet. Reference MEF 10.4 Section 10.5 EVC EP Ingress Class of Service Map Service Attribute and MEF 26.2 Section 16.6 OVC End Point Class of Service Identifier Service Attribute.
colorMap	ColorIdentifier	0..*	Represents the Color Identifier. The Color Identifier is a pair of the form <F,M>. Reference MEF 10.4 Section 10.6 EVC EP Color Map Service Attribute.
egressMap	EvcEpEgressMap	0..1	Attribute is a map of the form <Corresponding Ingress Service Frame Class of Service Name, Corresponding Ingress Service Frame Color> to either <Egress Service Frame C-Tag PCP value, Egress Service Frame C-Tag DEI value> or Discard. Reference MEF 10.4 Section 10.7 EVC EP Egress Map Service Attribute.
ingressBwp	IngressBwpFlow	0..1	Attribute used to limit the rate of Ingress Service Frames mapped to an EVC End Point at a UNI. Reference MEF 10.4 Section 10.8 EVC EP Ingress Bandwidth Profile Service Attribute.
cosIngressBwp	IngressBandwidthProfilePerClassOfServiceName	0..*	For each CoS Name listed, Bandwidth Profile Flow parameters for all ingress EI Frames mapped to that CoS Name at the EVC End Point or OVC End Point. Reference MEF 26.2 Section 16.12 Ingress Bandwidth Profile per Class

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvcEndPoint.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-vc-end-point:v1.0.0:all			
			of Service Name Service and MEF 10.4 Section 10.9 EVC EP Class of Service Name Ingress Bandwidth Profile Service Attribute.
egressBwp	EgressBwpFlow	0..1	The EVC EP Egress Bandwidth Profile Service Attribute is used to limit the rate of all Egress Service Frames mapped to an EVC EP at a UNI (Section 7.10.2). The value of the EVC EP Egress Bandwidth Profile Service Attribute is either <i>None</i> or the 3-tuple <CIR, CIRmax, ER>. Reference MEF 10.4 Section 10.10 EVC EP Egress Bandwidth Profile Service Attribute.
cosEgressBwp	EgressBandwidthProfilePerClassOfServiceName	0..*	The EVC EP Class of Service Name Egress Bandwidth Profile Service Attribute is used to limit the rate of all Egress Service Frames with a given Class of Service Name, as determined at the ingress UNI for each frame per the EVC EP Ingress Class of Service Map Service Attribute. Reference MEF 10.4 Section 10.11 EVC EP Class of Service Name Egress Bandwidth Profile Service Attribute.
sourceMacAddressLimit	SourceMacAddressLimit	0..1	The value of the EVC EP Source MAC Address Limit Service Attribute is either <i>None</i> or the pair <N, τ> where N is an integer 1 and τ is a time duration. Reference MEF 10.4 Section 10.12 EVC EP Source MAC Address Limit Service Attribute.
subscriberMegMip	MegLevel	0..1	The value of the EVC EP Subscriber MEG MIP Service Attribute is either <i>None</i> or an integer in the range 0 – 7 that indicates the MEG Level of a Subscriber MEG MIP. Reference MEF 10.4 Section 10.13 EVC EP Subscriber MEG MIP Service Attribute.

Table 10-CarrierEthernetEvcEndPoint Service Attributes

NOTE: that EVC EP UNI attributes is not provided given the relationship to UNI is provided in the envelope part of API (i.e., MEF 99.1).

14.2.1 EvcEndPointMap

MEF 10.4 sec. 10.4 - This is specifications for which Service Frames are mapped to the EVC End Point. The allowed values in MEF 10.4 are ALL, LIST, and UT/PT. Since Private services must be ALL, the map isn't needed for those services, and therefore the type does not include ALL. If the type is LIST, there must be a list of VLAN IDs specified.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvcEndPoint.yaml			
Attribute Name	Type	Multiplicity	Description

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvcEndPoint.yaml			
vlanType	String Enum: <ul style="list-style-type: none">• LIST• UT/PT• ALL	1	An indication of the type of EVC End Point Map. If the value is UT/PT, then no additional information is required. If the value is LIST, then a list of C-VLAN ID values must be specified. If the value is ALL, then all Service Frames at the UNI where the EVC CP is located MUST be mapped to EVC EP.
vlanId	Integer	0..*	A list of VLAN IDs if the value of vlanType is "LIST" *** Validation Notes: This element must be specified if and only if EndPointMapEvc.vlanType= "LIST"

Table 11-EvcEndPointMap Service Attributes

14.2.2 EvcEpEgressMap

This map is a table with one entry for each CosName, that includes the CoSName, a PCP value for green frames, a PCP value for yellow frames, a DEI value for green frames and a DEI value for yellow frames. Any of the values can be DISCARD. This table is used at the UNI for EVCs.

Schema File Name: schema/common/carrierEthernet/subscriberEthernetCommon/evcEgressMaps.yaml			
Attribute Name	Type	Multiplicity	Description
evcEgressMapEntries	EvcEgressMapEntry	0..*	This is a table of EVC Egress Map entries. An empty list indicates a value of None. Per R140 in MEF 10.4, the value of the EVC EP Egress Map Service Attribute MUST NOT be None unless one of the conditions noted in the requirement is met.

Table 12-EvcEpEgressMap Service Attributes

14.2.3 EvcEgressMapEntry

A row in the EVC Egress Map. Contains a CoSName, PCPGreen, PCPYellow, DEIGreen, DEIYellow.

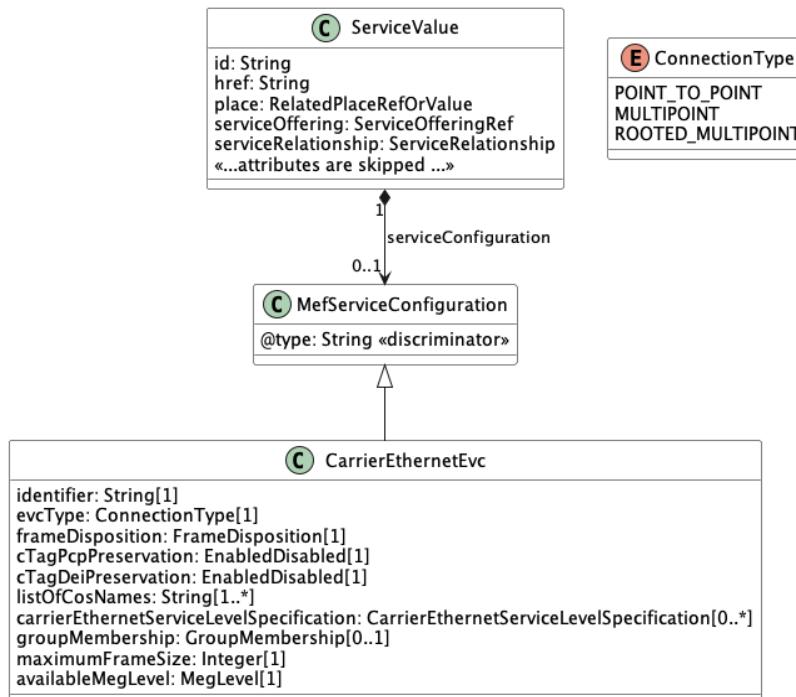
Schema File Name: schema/common/carrierEthernet/subscriberEthernetCommon/evcEgressMaps.yaml			
Attribute Name	Type	Multiplicity	Description
cosName	String	1	Class of Service Name.
pcpGreen	PcpValueAndDiscard	1	A PCP value (0-7) or DISCARD to use for Green Frames.
pcpYellow	PcpValueAndDiscard	1	A PCP value (0-7) or DISCARD to use for Yellow Frames.
deiGreen	DeiValueAndDiscard	1	A DEI value to use for Green frames. Validation Notes: This is optional ONLY if pcpGreen is set to DISCARD.

Schema File Name: schema/common/carrierEthernet/subscriberEthernetCommon/evcEgressMaps.yaml			
deiYellow	DeiValueAndDiscard	1	A DEI value to use for Green frames. Validation Notes: This is optional ONLY if pcpYellow is set to DISCARD.

Table 13-EvcEgressMapEntry Service Attributes

14.3 CarrierEthernetEvc

An EVC is an association of two or more EVC End Points (EVC EPs). Reference MEF 10.4 Section 7.8 Ethernet Virtual Connection, EVC End Point and EVC EP Map Service Attribute [6].


Figure 15-CarrierEthernetEvc Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvc.yaml \$Id: urn:mef:iso:spec:service:carrier-ethernet-evc:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> <i>"[\x20-\x7F]+"</i>	1	Use to identify an EVC within the SP network. Reference MEF 10.4 Section 8.1 EVC ID Service Attribute.
evcType	ConnectionTypeWithRooted	1	The value of the EVC Type Service Attribute is one of <i>Point-to-Point</i> , <i>Multipoint-to-Multipoint</i> , or <i>Rooted-Multipoint</i> . Reference MEF 10.4 Section 8.3 EVC Type Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEvc.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-evc:v1.0.0:all			
frameDisposition	FrameDisposition	1	The EVC Data Service Frame Disposition Service Attribute indicates whether different types of Service Frame are to be delivered by the EVC. Reference MEF 10.4 Section 8.4 EVC Data Service Frame Disposition Service Attribute.
cTagPcpPreservation	EnabledDisabled	1	The EVC C-Tag PCP Preservation Service Attribute can be used to preserve the value of the PCP field in C-Tagged Service Frames across an EVC. The value of the EVC C-Tag PCP Preservation Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 10.4 Section 8.5 EVC C-Tag PCP Preservation Service Attribute.
cTagDeiPreservation	EnabledDisabled	1	The EVC C-Tag DEI Preservation Service Attribute can be used to preserve the value of the DEI field in C-Tagged Service Frames across an EVC. The value of the EVC C-Tag DEI Preservation Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 10.4 Section 8.6 EVC C-Tag DEI Preservation Service Attribute.
listOfCosNames	String	1..*	List of Class of Service Names. Reference MEF 10.4 Section 8.7 EVC List of Class of Service Names Service Attribute.
carrierEthernetServiceLevelSpecification	CarrierEthernetSIs	0..*	The EVC Service Level Specification Service Attribute (SLS) is the technical details of the service level, in terms of Performance Objectives, agreed between the Service Provider and the Subscriber as part of the Service Level Agreement. A given SLS might contain 0, 1, or more Performance Objectives for each Performance Metric. Reference MEF 10.4 Section 8.8 EVC Service Level Specification Service Attribute.
groupMembership	EvcGroupMembership	0..1	The EVC Group Membership Service Attribute is used to specify an instance of the Multiple EVC Service Level Specification Service Attribute, if any, in which the EVC is used. Reference MEF 10.4 Section 10.9 EVC Group Membership Service Attribute.
maximumFrameSize	Integer	1	Maximum size of EI frames that can be carried over the EVC or OVC. Reference MEF 10.4 Section 8.10 EVC Maximum Service Frame Size Service Attribute.
availableMegLevel	MegLevel	1	The value of the EVC Available MEG Level Service Attribute is an integer from 0 to 7 or <i>None</i> . Reference MEF 10.4 Section 8.11 EVC Available MEG Level Service Attribute.

Table 14-CarrierEthernetEvc Service Attributes

NOTE: that EVC List of EVC EPs attributes is not provided given the relationship to EVC EP is provided in the envelope part of API (i.e., MEF 99.1).

15 Operator Carrier Ethernet Services Data Model

An Operator Carrier Ethernet Service is a Carrier Ethernet Service provided to an end user (the Subscriber) by a Service Provider.

The Resources and corresponding Attributes are listed in groups:

- Subscriber Carrier Ethernet Services Resource:
 - CarrierEthernetOperatorUni
 - CarrierEthernetEnni
 - CarrierEthernetEnniService
 - CarrierEthernetVirtualUni
 - CarrierEthernetOvcEndPoint
 - CarrierEthernetOvc

15.1 CarrierEthernetOperatorUni

This class represents the Operator UNI Service Attributes that are agreed on by the SP/SO and the Operator for each UNI. Reference MEF 26.2 Section 14 Operator UNI Service Attributes [8].

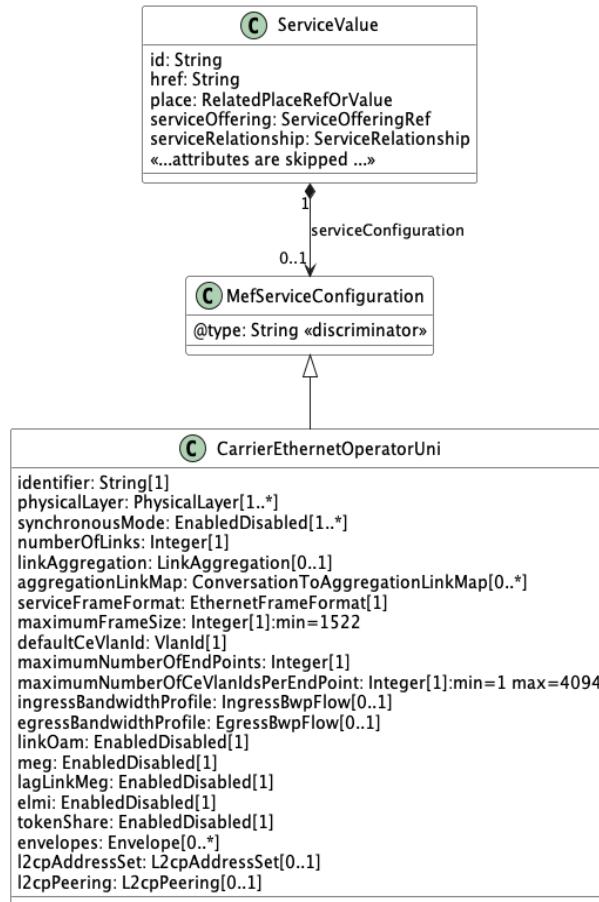


Figure 16-CarrierEthernetOperatorUni Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOperatorUni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
Identifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> <i>"[\x20-\x7F]+"</i>	1	An identifier for the UNI intended for management purposes. Reference MEF 26.2 Section 14.1 Operator UNI Identifier Service Attribute.
physicalLayer	CarrierEthernetPhysicalLink	1..*	The physical layer of each of the links supporting the Operator UNI. Reference MEF 26.2 Section 14.2 Operator UNI Physical Layer Service Attribute.
synchronousMode	EnabledDisabled	1..*	The value of the Operator UNI Synchronous Mode Service Attribute is a list with one item for each of the physical links implementing the UNI. Each item in the list takes on one of two values: <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 14.3 Operator UNI Synchronous Mode Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOperatorUni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all			
numberOfLinks	Integer	1	The number of physical links at the UNI. Reference MEF 26.2 Section 14.4 Operator UNI Number of Links Service Attribute.
linkAggregation	LinkAggregation	0..1	The Operator UNI Link Aggregation Service Attribute value is one of <i>None</i> , <i>2-Link Active/Standby</i> , <i>All Active</i> , or <i>Other</i> . The value of this Service Attribute is dependent on the value of the Operator UNI Number of Links Service Attribute. Reference MEF 26.2 Section 14.5 Operator UNI Link Aggregation Service Attribute.
aggregationLinkMap	ConversationIdToAggregationLinkMap	0..*	This is a Port Conversation ID to Aggregation Link Map as defined in IEEE Std 802.1AX – 2014. Reference MEF 26.2 Section 14.6 Operator UNI Port Conversation ID to Aggregation Link Map Service Attribute.
serviceFrameFormat	EthernetFrameFormat	1	The Operator UNI Service Frame Format Service Attribute has the value <i>Ethernet MAC Frame conforming to Clause 3 of IEEE 802.3-2012</i> . Reference MEF 26.2 Section 14.7 Operator UNI Service Frame Format Service Attribute.
maximumFrameSize	Integer <i>Min = 1522</i>	1	The value for the Operator UNI Maximum Service Frame Size is a strictly positive integer in bytes. Reference MEF 26.2 Section 14.8 Operator UNI Maximum Service Frame Size Service Attribute.
defaultCeVlanId	VlanId	1	The value of the Operator UNI Default CE-VLAN ID is an integer that is the CE-VLAN ID value assigned to Untagged Service Frames and Priority Tagged Service Frames. Reference Section 14.9 Operator UNI Default CD-VLAN ID Service Attribute.
maximumNumberOfEndPoints	Integer	1	The maximum number of OVC End Points that the Operator CEN can support at the UNI. Reference MEF 26.2 Section 14.10 Operator UNI Maximum Number of OVC End Points Service Attribute.
maximumNumberOfCeVlanIdsPerEndPoint	Integer <i>Minimum=1</i> <i>Maximum=4094</i>	1	The maximum number of CE-VLAN ID values that can be mapped to an OVC End Point by the Operator CEN at the UNI. Reference MEF 26.2 Section 14.11 Operator UNI Maximum Number of CE-VLAN IDs per OVC End Point Service Attribute.
ingressBandwidthProfile	IngressBwpFlow	0..1	The value of the Operator UNI Ingress Bandwidth Profile per UNI Service Attribute is <i>Parameters</i> or <i>Disabled</i> . Reference MEF 26.2 Section 14.12 Operator UNI Ingress Bandwidth Profile per UNI Service Attribute.
egressBandwidthProfile	EgressBwpFlow	0..1	The value of the Operator UNI Egress Bandwidth Profile per UNI Service Attribute is <i>Parameters</i> or <i>Disabled</i> . An

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOperatorUni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all			
			Operator UNI Egress Bandwidth Profile per UNI Service Attribute applies to all egress Service Frames at the UNI. Reference MEF 26.2 Section 14.13 Operator UNI Egress Bandwidth Profile per UNI Service Attribute.
linkOam	EnabledDisabled	1	The value is either Enable or Disabled. Reference MEF 26.2 Section 14.14 Operator Link OAM Service Attribute.
meg	EnabledDisabled	1	The value is either Enable or Disabled. Reference MEF 26.2 Section 14.15 Operator UNI MEG Service Attribute.
lagLinkMeg	EnabledDisabled	1	The value is either Enable or Disabled. Reference MEF 26.2 Section 14.16 Operator UNI LAG Link MEG Service Attribute.
elmi	EnabledDisabled	1	The value is either Enable or Disabled. Reference MEF 26.2 Section 14.17 Operator UNI E-LMI Service Attribute.
tokenShare	EnabledDisabled	1	The value is either Enable or Disabled. Reference MEF 26.2 Section 14.18 Operator UNI Token Share Service Attribute.
envelopes	Envelope	0..*	The Envelopes and Envelope Coupling Flag values to which Bandwidth Profile Flows can be mapped. Reference MEF 26.2 Section 14.19 Operator UNI Envelopes Service Attribute.
l2cpAddressSet	L2cpAddressSet	0..1	The Operator UNI L2CP Address Set Service Attribute is the L2CP Address Set Service Attribute defined in MEF 45 when applied to the UNI. Reference MEF 26.2 Section 14.20 Operator UNI L2CP Address Set Service Attribute.
l2cpPeering	L2cpPeering	0..*	The Operator UNI L2CP Peering Service Attribute is the L2CP Peering Service Attribute defined in MEF 45 when applied to the UNI. Reference MEF 26.2 Section 14.21 Operator UNI L2CP Peering Service Attribute.

Table 15-CarrierEthernetOperatorUni Service Attributes

15.2 CarrierEthernetEnni

The ENNI is a reference point representing the boundary between two or more Operator CENs that are operated as separate administrative domains. Reference MEF 26.2 Section 9 ENNI Common Attributes, Section 10 Operator Multilateral Attributes and Section 13 ENNI Service Attributes [8].

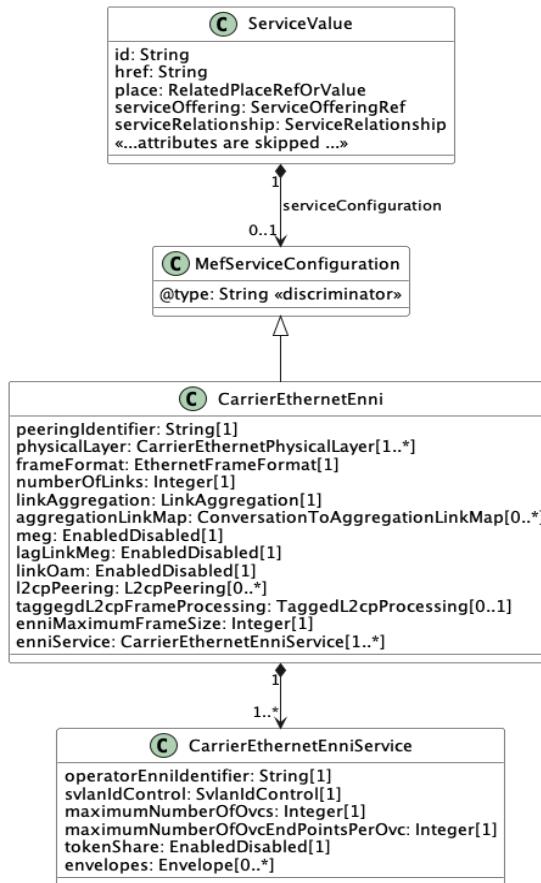


Figure 17-CarrierEthernetEnni Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEnni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-enni:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
peeringIdentifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> <i>"[x20-\x7F]+"</i>	1	An identifier for the ENNI intended for operations purposes by the interconnecting Operators at the ENNI. Reference MEF 26.2 Section 9.1 ENNI Peering Identifier Common Attribute.
physicalLayer	CarrierEthernetPhysicalLayer	1..*	The physical layer of each of the links supporting the ENNI. Reference MEF 26.1 Section 9.2 ENNI Physical Layer Common Attribute.
frameFormat	EthernetFrameFormat	1	The ENNI Frame Format Common Attribute has the value <i>Ethernet MAC Frame conforming to Clause 3 of IEEE 802.3-2012</i> . Reference MEF 26.2 Section 9.3 ENNI Frame Format Common Attribute.
numberOfLinks	Integer	1	The number of physical links in the ENNI. Reference MEF 26.2 Section 9.4 ENNI Number of Links Common Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEnni.yaml \$id: urn:mef:lsd:spec:service:carrier-ethernet-enni:v1.0.0:all			
linkAggregation	LinkAggregation	1	The value for the ENNI Number of Links Common Attribute is a strictly positive integer. This ENNI Common Attribute specifies the number of links that compose the ENNI. Reference MEF 26.2 Section 9.5 ENNI Link Aggregation Common Attribute.
aggregationLinkMap	ConversationIdToAggregationLinkMap	0..*	The ENNI Port Conversation ID to Aggregation Link Map Common Attribute is applicable only when the ENNI Link Aggregation Common Attribute has the value of <i>All Active</i> . Reference MEF 26.2 Section 9.6 ENNI Port Conversation ID to Aggregation Link Map Common Attribute.
meg	EnabledDisabled	1	The value of ENNI MEG Common Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 9.7 ENNI MEG Common Attribute.
lagLinkMeg	EnabledDisabled	1	The value of the ENNI LAG Link MEG Common Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 9.8 ENNI LAG Link MEG Common Attribute.
linkOam	EnabledDisabled	1	The value of the ENNI Link OAM Common Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 9.9 ENNI Link OAM Common Attribute.
Operator Multilateral Attributes			
l2cpPeering	L2cpPeering	0..*	Specifies the Layer 2 Control Protocols that are peered at the EI, as described in MEF 45.1. Reference MEF 26.2 Section 10.1 ENNI L2CP Peering Multilateral Attribute.
taggedL2cpFrameProcessing	TaggedL2cpProcessing	0..1	The ENNI Tagged L2CP Processing Multilateral Attribute is defined in MEF 45. Reference MEF 26.2 Section 10.2 ENNI Tagged L2CP Frame Processing Multilateral Attribute.
maximumFrameSize	Integer	1	Specifies the maximum size of EI Frames that can be transmitted across EI. Reference MEF 26.2 Section 10.3 ENNI Maximum Frame Size Multilateral Attribute.

Table 16-CarrierEthernetEnni Service Attributes

15.3 CarrierEthernetEnniService

The ENNI is a reference point representing the boundary between two or more Operator CENs that are operated as separate administrative domains. For each instance of an ENNI, there are multiple sets of ENNI Service Attributes. The value for each ENNI Service Attribute in a set for an Operator CEN is specific to a SP/SO that is using the ENNI. Reference MEF 26.2 Section 13 ENNI Service Attributes [8].

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEnniService.yaml \$id: urn:ietf:iso:spec:service:carrier-ethernet-enni-service:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
operatorEnnIdentifier	String <i>Min length=1</i> <i>Max length=45</i> <i>Pattern=pattern:</i> "/[x20-\x7F]+"	1	An identifier for the ENNI intended for management purposes. Reference MEF 26.2 Section 13.1 Operator ENNI Identifier Service Attribute.
svlanIdControl	SvlanIdControl	1	The value of the S-VLAN ID Control Service Attribute is <i>Full</i> or <i>Partial</i> . Reference MEF 26.2 Section 13.2 S-VLAN ID Control Service Attribute.
maximumNumberOfOvcs	Integer	1	The maximum number of OVCs that the Operator CEN can support at the ENNI. Reference MEF 26.2 Section 13.3 Maximum Number of OVCs Service Attribute.
maximumNumberOfOvcEndPointsPerOvc	Integer	1	The maximum number of OVC End Points that the Operator CEN can support at the ENNI for an OVC. Reference MEF 26.2 Section 13.4 Maximum Number of OVC End Points per OVC Service Attribute.
tokenShare	EnabledDisabled	1	The value of the ENNI Token Share Service Attribute is either Enabled or Disabled. Reference MEF 26.2 Section 13.5 Section 13.5 ENNI Token Share Service Attribute.
envelopes	Envelope	0..*	The value of the ENNI Envelopes is a list of pairs of the form <x,y> where x is an Envelope ID and y is the Envelope Coupling Flag value. Reference MEF 26.2 Section 13.6 ENNI Envelopes Service Attribute.

Table 17-CarrierEthernetEnniService Attributes

15.4 CarrierEthernetVirtualUni

The ENNI is a reference point representing the boundary between two or more Operator CENs that are operated as separate administrative domains. Reference MEF 26.2 Section 15 Virtual UNI (VUNI), Feeder OVC and Remote UNI (RUNI) [8].

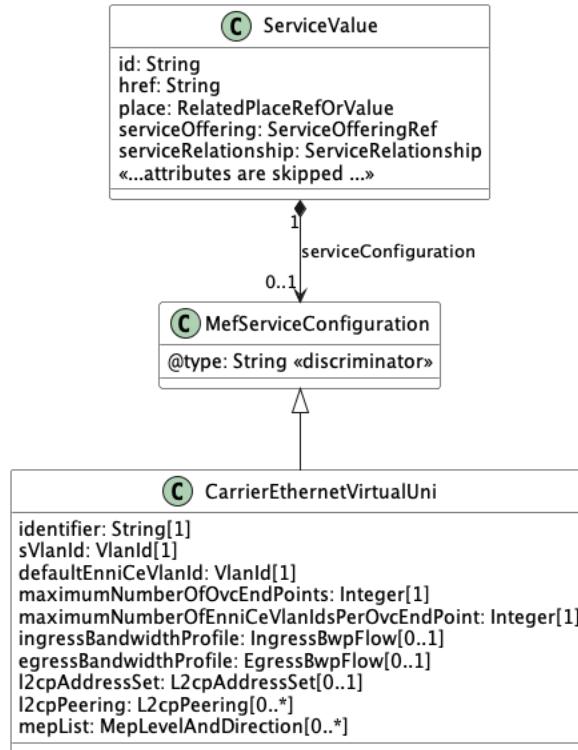


Figure 18-CarrierEthernetVirtualUni Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEnni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-virtual-uni:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String Min length=1 Max length=45 Pattern=pattern: "[\x20-\x7F]+"	1	An identifier for the instance of the VUNI intended for operations purposes. Reference MEF 26.2 Section 15.1.1 VUNI Identifier Service Attribute.
sVlanId	VlanId	1	The value of the VUNI S-VLAN ID Service Attribute is an integer in the range 1, 2,...,4094 that uniquely identifies the VUNI at the ENNI. Reference MEF 26.2 Section 15.1.2 VUNI S-VLAN ID Service Attribute.
defaultEnniCeVlanId	VlanId	1	The value of the VUNI Default ENNI CE-VLAN ID Service Attribute is an integer in the range 1,...,4094. The VUNI Default ENNI CE-VLAN ID Service Attribute is needed for the definition of the ENNI CE-VLAN ID for an ENNI Frame. Reference MEF 26.2 Section 15.1.3 VUNI Default ENNI CE-VLAN ID Service Attribute.
maximumNumberOfOvcEndPoints	Integer	1	The maximum number of OVC End Points that can be in the VUNI. Reference MEF 26.2 Section 15.1.4 VUNI Maximum Number of OVC End Points Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetEnni.yaml \$id: urn:mef:iso:spec:service:carrier-ethernet-virtual-uni:v1.0.0:all			
maximumNumberOfEnniCeVlanIdsPerOvcEndPoint	Integer	1	The maximum number of ENNI CE-VLAN ID values that can be mapped to an OVC End Point that is in the VUNI. Reference MEF 26.2 Section 15.1.5 VUNI Maximum Number of ENNI CE-VLAN IDs per OVC End Point Service Attribute.
ingressBandwidthProfile	IngressBwpFlow	0..1	The value of the VUNI Ingress Bandwidth Profile Service Attribute is either <i>Parameters</i> or <i>Disabled</i> . Reference MEF 26.2 Section 15.1.6 VUNI Ingress Bandwidth Profile Service Attribute.
egressBandwidthProfile	EgressBwpFlow	0..1	The value of the VUNI Egress Bandwidth Profile Service Attribute is either <i>Parameters</i> or <i>Disabled</i> . Reference MEF 26.2 Section 15.1.7 VUNI Egress Bandwidth Profile Service Attribute.
l2cpAddressSet	L2cpAddressSet	0..1	The VUNI L2CP Address Set Service Attribute is the L2CP Address Set Service Attribute defined in MEF 45 when applied to the VUNI. Reference MEF 26.2 Section 15.1.8 VUNI L2CP Address Set Service Attribute.
l2cpPeering	L2cpPeering	0..*	The VUNI L2CP Peering Service Attribute is the L2CP Peering Service Attribute defined in MEF 45 when applied to the VUNI. See MEF 45 for the possible values and requirements for this Service Attribute. Reference MEF 26.2 Section 15.1.9 VUNI L2CP Peering Service Attribute.
mepList	MepLevelAndDirection	0..*	The value of the VUNI Maintenance End Point List Service Attribute is a list MEG Levels, one for each MEP that is instantiated. Reference MEF 26.2 Section 15.1.10 VUNI Maintenance End Point List Service Attribute.

Table 18-CarrierEthernetVirtualUni Service Attributes

15.5 CarrierEthernetOvcEndPoint

This class represents the Operator UNI Service Attributes that are agreed on by the SP/SO and the Operator for each UNI. Reference MEF 26.2 Section 16.1 OVC End Point Service Attributes [8].

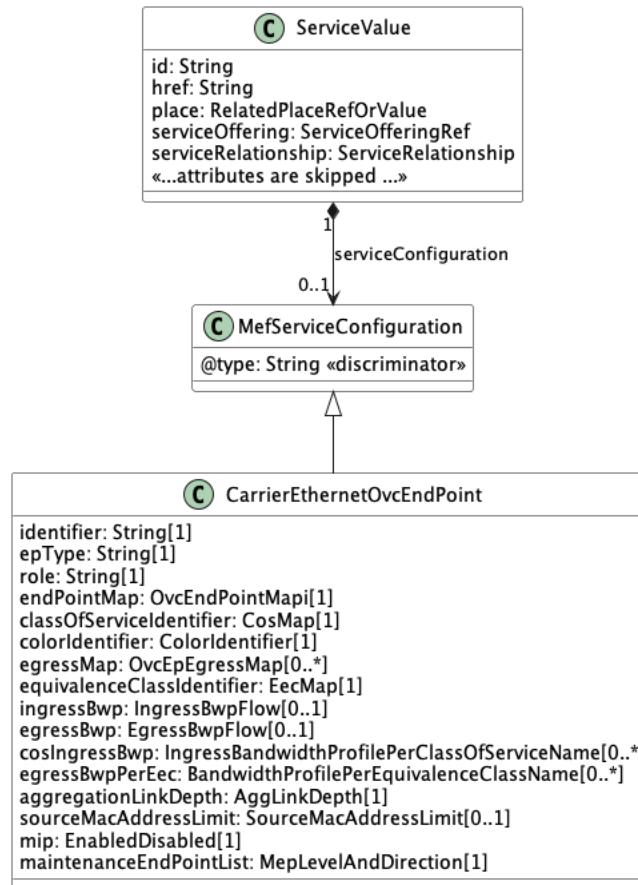


Figure 19-CarrierEthernetOvcEndPoint Model

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOvcEndPoint.yaml \$Id: urn:mef:iso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String Min length=1 Max length=45 Pattern=pattern: "[\x20-\x7F]+"	1	The value of the OVC End Point Identifier Service Attribute is a string that is used to allow the SP/SO and Operator to uniquely identify the OVC End Point for operations purposes. Reference MEF 16.1 OVC End Point Identifier Service Attribute.
epType	String Enum: <ul style="list-style-type: none">• UNI• ENNI	1	The value of the OVC End Point External Interface Type Service Attribute is either <i>UNI</i> or <i>NNI</i> . Reference MEF 26.2 Section 16.2 OVC End Point External Interface Type Service Attribute.
role	String Enum: <ul style="list-style-type: none">• ROOT• LEAF	1	String enumeration representing OVC End Point Role. Reference MEF 26.2 Section 16.4 OVC End Point Role Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOvcEndPoint.yaml \$id: urn:ietf:rfc:service:carrier-ethernet-ovc-end-point:v1.0.0:all			
	• TRUNK		
endPointMap	OvcEndPointMap	1	The value of the OVC End Point Map Service Attribute specifies which EI Frames are mapped to the OVC End Point within an Operator CEN. Reference MEF 26.2 Section 16.5 OVC End Point Map Service Attribute.
classOfServiceIdentifier	CosMap	1	The value of the OVC End Point Class of Service Identifier Service Attribute is a triple of the form $\langle F, M, P \rangle$ where F is a protocol field in the ingress EI Frame, M is a map that maps each possible value of the field F and the absence of the field F to a Class of Service Name and P is a map of Layer 2 Control Protocol types. Reference MEF 26.2 Section 16.6 OVC End Point Class of Service Identifier Service Attribute.
colorIdentifier	ColorIdentifier	1	The value of the OVC End Point Color Identifier Service Attribute is a pair of the form $\langle F, M \rangle$ where F is a field in the ingress EI Frame and M is a mapping between each possible value of the field F and a Color. Reference MEF 26.2 Section 16.7 OVC End Point Color Identifier Service Attribute.
egressMap	OvcEpEgressMap	0..*	The value of the OVC End Point Egress Map Service Attribute is a set of mappings that determine the content of the S-Tag or C-Tag of an egress EI Frame. Reference MEF 26.2 Section 16.8 OVC End Point Egress Map Service Attribute.
egressEquivalenceClassIdentifier	EecMap	1	The value of the OVC End Point Egress Equivalence Class Identifier Service Attribute is a triple of the form $\langle F, M, P \rangle$ where F is a protocol field in the egress EI Frame, M is a map that maps each possible value of the field F and the absence of the field F to an Egress Equivalence Class Name and P is a map of L2CP type to Egress Equivalence Class Name. Reference MEF 26.2 Section 16.9 OVC End Point Egress Equivalence Class Identifier Service Attribute.
ingressBwp	IngressBwpFlow	0..1	The value of the Ingress Bandwidth Profile per OVC End Point is <i>Parameters</i> or <i>Disabled</i> . The Ingress Bandwidth Profile per OVC End Point Service Attribute describes ingress policing by the Operator CEN on all ingress EI Frames mapped to a given OVC End Point. Reference MEF 26.2 Section 16.10 Ingress Bandwidth Profile per OVC End Point Service Attribute.
egressBwp	EgressBwpFlow	0..1	The value of the Egress Bandwidth Profile per OVC End Point Service Attribute is <i>Parameters</i> or <i>Disabled</i> . The Egress Bandwidth Profile per OVC End Point Service Attribute describes the length and arrival time

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOvcEndPoint.yaml \$id: urn:ietf:iso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all			
			characteristics of all egress EI Frames that are mapped to a given OVC End Point. Reference MEF 26.2 Section 16.11 Egress Bandwidth Profile per OVC End Point Service Attribute.
cosIngressBwp	IngressBandwidthProfilePerClassOfServiceName	0..*	For each CoS Name listed, Bandwidth Profile Flow parameters for all ingress EI Frames mapped to that CoS Name at the EVC End Point or OVC End Point. Reference MEF 26.2 Section 16.12 Ingress Bandwidth Profile per Class of Service Name Service.
egressBwpPerEec	BandwidthProfilePerEquivalenceClassName	0..*	For each EEC Name listed, Bandwidth Profile Flow parameters, for all egress EI Frames mapped to that EEC Name at the OVC End Point. Reference MEF 26.2 Section 16.13 Egress Bandwidth Profile per Egress Equivalence Class Name Service Attribute.
aggregationLinkDepth	AggLinkDepth	1	This is a pair of <VLAN ID, link depth> indicating that a given VLAN ID maps to a given number of links in the Port Conversation ID to Aggregation Link Map. Reference MEF 26.2 Section 16.14 OVC End Point Aggregation Link Depth Service Attribute.
sourceMacAddressLimit	SourceMacAddressLimit	0..1	The value of the OVC End Point Source MAC Address Limit Service Attribute can be either the pair $\langle N, \tau \rangle$ where N is a strictly positive integer and τ is a time interval or <i>Disabled</i> . Reference MEF 26.2 Section 16.15 OVC End Point Source MAC Address Limit Service Attribute.
mip	EnabledDisabled	1	The value of the OVC End Point MIP Service Attribute is either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 16.16 OVC End Point MIP Service Attribute.
maintenanceEndPointList	MepLevelAndDirection	1	The value of the OVC End Point Maintenance End Point List Service Attribute is a list of pairs, one for each MEP that is instantiated. Each pair is of the form $\langle l, d \rangle$ where l equals the MEG Level, and d is the direction for the MEP, either <i>Up</i> or <i>Down</i> . Reference 16.17 OVC End Point Maintenance End Point List Service Attribute.

Table 19-CarrierEthernetOvcEndPoint Service Attributes

NOTE: that OVC EP UNI nor ENNI attributes are not provided given the relationship to UNI or ENNI is provided in the envelope part of API (i.e., MEF 99.1).

15.6 AggLinkDepth

For an Operator Service, this is a pair of <VLAN ID, link depth> indicating that a given VLAN ID maps to a given number of links in the Port Conversation ID to Aggregation Link Map.

Schema File Name: schema/common/carrierEthernet/carrierEthernetUtilityClasses.yaml			
Attribute Name	Type	Multiplicity	Description
vlanId	Integer minimum: 1 maximum: 4094	1	The VLAN ID.
lagDepth	Integer minimum: 1	1	The number of Link Aggregation links available to the VLAN.

Table 20-AggLinkDepth Service Attributes

15.7 CarrierEthernetOvc

The Operator Virtual Connection (OVC) is the building block for constructing an EVC spanning multiple Operator CENs. Reference MEF 26.2 Section 8.8 Operator Virtual Connection.

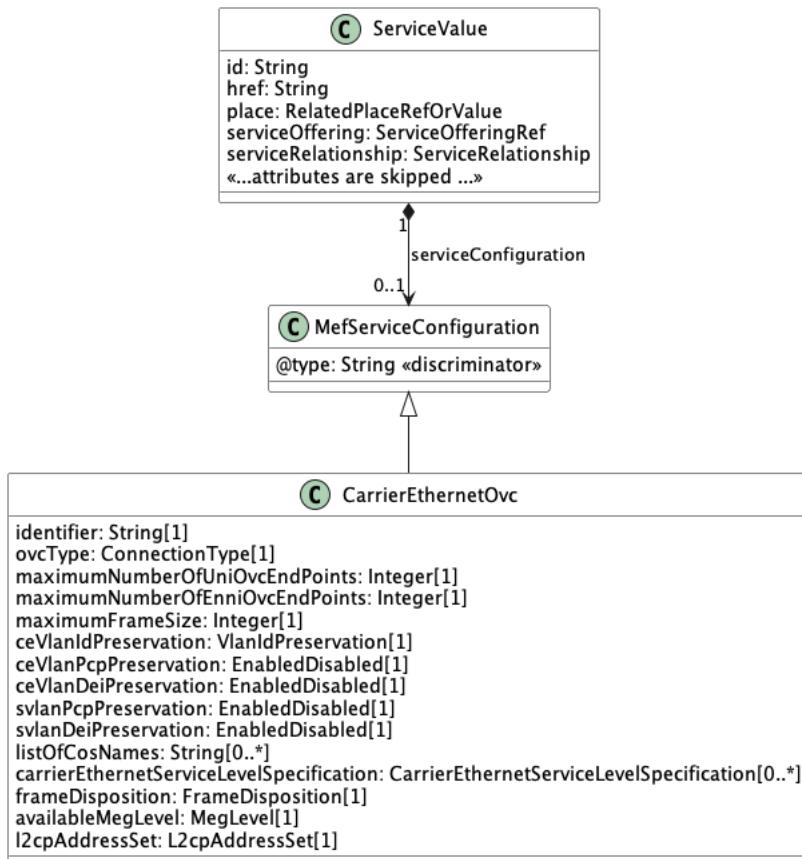


Figure 20-CarrierEthernetOvcModel

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOvc.yaml \$id: urn:mef:ls0:spec:service:carrier-ethernet-ovc:v1.0.0:all			
Attribute Name	Type	Multiplicity	Description
identifier	String Min length=1 Max length=45 Pattern=pattern: "[\x20-\x7F]+"	1	An identifier for the OVC intended for management purposes. Reference MEF 26.2 Section 12.1 OVC Identifier Service Attribute.
ovcType	ConnectionTypeWithRooted	1	There are three values for the OVC Type Service Attribute: <i>Point-to-Point</i> , <i>Multipoint-to-Multipoint</i> , and <i>Rooted-Multipoint</i> . Reference MEF 26.2 Section 12.2 OVC Type Service Attribute.
maximumNumberOfUniOvcEndPoints	Integer Minimum: 0	1	The bound on the number of OVC End Points at different UNIs that can be associated by the OVC. Reference MEF 26.2 Section 12.4 Maximum Number of UNI OVC End Points Service Attribute.
maximumNumberOfEnniOvcEndPoints	Integer Minimum: 1	1	The bound on the number of OVC End Points at ENNIs that can be associated by the OVC. Reference MEF 26.2 Section 12.5 Maximum Number of ENNI OVC End Points Service Attribute.
maximumFrameSize	Integer	1	Maximum size of EI frames that can be carried over the EVC or OVC. Reference MEF 26.2 Section 12.6 OVC Maximum Frame Size Service Attribute.
ceVlanIdPreservation	VlanIdPreservation	1	Enumeration for VLAN ID Preservation. Reference MEF 26.2 Section 12.7 OVC CE-VLAN ID Preservation Service Attribute.
ceVlanPcpPreservation	EnabledDisabled	1	The value of OVC CE-VLAN PCP Preservation Service Attribute can be either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 12.8 OVC CE-VLAN PCP Preservation Service Attribute.
ceVlanDeiPreservation	EnabledDisabled	1	The value of the OVC CE-VLAN DEI Preservation Service Attribute can be either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 12.9 OVC CE-VLAN DEI Preservation Service Attribute.
svlanPcpPreservation	EnabledDisabled	1	The value of the OVC S-VLAN PCP Preservation Service Attribute can be either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 12.10 OVC S-VLAN PCP Preservation Service Attribute.
svlanDeiPreservation	EnabledDisabled	1	The value of the OVC S-VLAN DEI Preservation Service Attribute can be either <i>Enabled</i> or <i>Disabled</i> . Reference MEF 26.2 Section 12.11 OVC S-VLAN DEI Preservation Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetOvc.yaml \$id: urn:mef:lsd:spec:service:carrier-ethernet-ovc:v1.0.0:all			
listOfCosNames	String	0..*	Used to specify all the Class of Service Names supported by an OVC. Reference MEF 26.2 Section 12.12 OVC List of Class of Service Names Service Attribute.
carrierEthernetServiceLevelSpecification	CarrierEthernetSls	0..1	The value of the OVC Service Level Specification Service Attribute. The OVC Service Level Specification Service Attribute (SLS) is the technical specification of the service level agreed to by the Operator and the SP/SO. Reference MEF 26.2 Section 12.13 OVC Service Level Specification Service Attribute.
frameDisposition	FrameDisposition	1	The value of the OVC Frame Delivery Service Attribute is a 3-tuple where each element equals one of <i>Discard</i> , <i>Deliver Unconditionally</i> , or <i>Deliver Conditionally</i> . Reference MEF 26.2 Section 12.14 OVC Frame Delivery Service Attribute.
availableMegLevel	MegLevel	0..1	The value of the OVC Available MEG Level Service Attribute is an integer from 0 to 7 or <i>None</i> . Reference MEF 26.2 Section 12.15 OVC Available MEG Level Service Attribute.
l2cpAddressSet	L2cpAddressSet	1	The OVC L2CP Address Set Service Attribute is the L2CP Address Set Service Attribute that is defined in Section 8.1 of MEF 45.1. Reference MEF 26.1 Section 12.16 OVC L2CP Address Set Service Attribute.

Table 21-CarrierEthernetOvc Service Attributes

NOTE: that OVC List of OVC EPs attributes is not provided given the relationship to OVC EP is provided in the envelope part of API (i.e., MEF 99.1).

16 Common Resources and Types

This section is structure like the previous section but focuses on common resources and types used by the Service Attributes. Most of these are structured to support a variety of Carrier Ethernet Services. This section details the data types and enumerations that are used by the Carrier Ethernet Service model.

16.1 CarrierEthernetPhysicalLink

A 2-tuple of the form `{id, physicalLink}`. The value of `id` is an identifier for the physical link. The value of `physicalLink` is the specific Ethernet physical layer type.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
<code>id</code>	<code>String</code> <code>minLength: 1</code> <code>maxLength: 45</code> <code>pattern: "[\x20-\x7F]+"</code>	<code>1</code>	An identifier for the physical link. This must be specified for all external interfaces.
<code>physicalLink</code>	<code>String</code> <ul style="list-style-type: none">• "1BASE5"• "2BASE_TL"• "10BASE2"• "10BASE5"• "10BASE_F"• "10BASE_F_"• "10BASE_F_"• "10BASE_F_"• "10BASE_T"• "10BASE_T_"• "10BASE_TS"• "10BASE_TE"• "10BROAD36"• "10PASS_TS"• "100BASE_BX10"• "100BASE_FX"• "100BASE_LX10"• "100BASE_T"• "100BASE_T1"• "100BASE_T2"• "100BASE_T4"• "100BASE_TX"• "100BASE_X"• "1000BASE_BX1 "• "1000BASE_CX"• "1000BASE_KX"• "1000BASE_LX"• "1000BASE_LX10• "1000BASE_PX1"• "1000BASE_PX2"• "1000BASE_RHA"• "1000BASE_RHB"	<code>1</code>	An Ethernet physical layer. This must be specified for all external interfaces.

	<ul style="list-style-type: none">• "1000BASE_RHC"• "1000BASE_SX"• "1000BASE_T"• "1000BASE_T1"• "1000BASE_X"• "2_5GBASE_KX"• "2_5GBASE_T"• "2_5GBASE_T1"• "5GBASE_KR"• "5GBASE_T"• "5GBASE_T1"• "10GBASE_CX4"• "10GBASE_E"• "10GBASE_ER"• "10GBASE_EW"• "10GBASE_KR"• "10GBASE_KX4"• "10GBASE_L"• "10GBASE_LR"• "10GBASE_LRM"• "10GBASE_LW"• "10GBASE_LX4"• "10GBASE_R"• "10GBASE_S"• "10GBASE_SR"• "10GBASE_SW"• "10GBASE_T"• "10GBASE_T1"• "10GBASE_W"• "10GBASE_X"• "25GBASE_CR"• "25GBASE_CR_S"• "25GBASE_ER"• "25GBASE_KR"• "25GBASE_KR_S"• "25GBASE_LR"• "25GBASE_SR"• "25GBASE_T"• "40GBASE_CR4"• "40GBASE_ER4"• "40GBASE_FR"• "40GBASE_KR4"• "40GBASE_LR4"• "40GBASE_R"• "40GBASE_SR4"• "40GBASE_T"• "50GBASE_CR"• "50GBASE_ER"• "50GBASE_FR"• "50GBASE_KR"• "50GBASE_LR"• "50GBASE_SR"• "100GBASE_CR1"• "100GBASE_CR2"• "100GBASE_CR4"• "100GBASE_DR"• "100GBASE_ER4"• "100GBASE_KP4"	
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	<ul style="list-style-type: none"> • "100GBASE_KR2" • "100GBASE_KR4" • "100GBASE_LR4" • "100GBASE_R" • "100GBASE_SR10" • "100GBASE_SR2" • "100GBASE_SR4" • "200GBASE_CR4" • "200GBASE_DR4" • "200GBASE_ER4" • "200GBASE_FR4" • "200GBASE_KR4" • "200GBASE_LR4" • "200GBASE_SR4" • "400GBASE_DR4" • "400GBASE_ER8" • "400GBASE_FR8" • "400GBASE_LR8" • "400GBASE_SR16" • "400GBASE_SR4_2" • "400GBASE_SR8" • "OTHER" 		
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Table 22-CarrierEthernetPhysicalLink Attributes

16.2 ColorFromDei

This Class is referenced when the color comes from the C-tag DEI field (for EVCs and OVCs) or the S-tag DEI field for OVCs. MEF 10.4 (EVCs) and MEF 26.2 (OVCs) requires that DEI=0 means Green and DEI=1 means Yellow, so no map is needed.

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
mapType	String Enum: DEI	1	Color map type.

Table 23-ColorFromDei Attributes

16.3 ColorFromDscp

This Class is referenced when the color comes from the DSCP field. It is a list of DSCP Entries where each entry has three components: (1) A list of DSCP values, (2) a color for IPv4 packets with one of those DSCP values, and (3) a color for IPv6 packets with one of those DSCP values. Any DSCP value that is not specified and any Frame that does not include an IP packet is Green.

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
mapType	String Enum: DSCP	1	Color map type.

colorFromDscpMap	ColorFromDscpEntr y	1..*	Frame Color.
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Table 24-ColorFromDscp Attributes

16.4 ColorFromDscpEntry

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
dscpList	Integer Min=0 Max=63	1..*	This is a list of DSCP value.
Ipv4Color	FrameColor	1	Frame color for IPv4.
Ipv6Color	FrameColor	1	Frame color for IPv6.

Table 25-ColorFromDscpEntry Attributes

16.5 ColorFromEp

The color of each Ingress Frame is determined solely from the EVC or OVC End Point. In other words, the EP declares all frames GREEN or all frame YELLOW.

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
mapType	String Enum: ENDPOINT	1	Color map type.
epColor	FrameColor	1	Frame Color.

Table 26-ColorFromEp Attributes

16.6 ColorFromPCP

This Class is referenced when the color comes from the S-tag or C-tag PCP field. Each of the 8 possible PCP values maps to a color. If there is no tag, the frame is Green.

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
mapType	String Enum: PCP	1	Color map type.
colorFromPcpMap	ColorFromPCPMapEntry	8..8	This is a list of 8 Color mappings, one for each PCP value.

Table 27-ColorFromPCP Attributes

16.7 ColorFromPCPMapEntry

Schema File Name: schema/common/carrierEthernet/carrierEthernetColorIdentifier.yaml			
Attribute Name	Type	Multiplicity	Description
pcpValue	PcpValue	1	PCP value.
pcpColor	FrameColor	1	Frame color.

Table 28-ColorFromPCPMapEntry Attributes

16.8 ColorIdentifier

MEF 10.4 sec. 10.6 - The value of the EVC EP Color Map Service Attribute is a pair of the form < F, M > where: F is one of the values ENDPOINT, DEI, PCP, or DSCP and M is a map that can be used to assign Color to each Ingress Service Frame. (The form of M depends on the value of F.). The EVC EP Color Map Service Attribute is the mechanism by which the Color for an Ingress Service Frame that is mapped to an EVC EP is indicated by the content in the Service Frame header.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
colorFromEp	ColorFromEp	0..1	The color of each Ingress Frame is determined solely from the EVC or OVC End Point. In other words, the EP declares all frames GREEN or all frame YELLOW.
colorFromDei	ColorFromDei	0..1	This Class is referenced when the color comes from the C-tag DEI field (for EVCs and OVCs) or the S-tag DEI field for OVCs. MEF 10.4 (EVCs) and MEF 26.2 (OVCs) requires that DEI=0 means Green and DEI=1 means Yellow, so no map is needed.
colorFromPcp	ColorFromPcp	0..1	This Class is referenced when the color comes from the S-tag or C-tag PCP field. Each of the 8 possible PCP values maps to a color. If there is no tag, the frame is Green.
colorFromDscp	ColorFromDscp	0..1	This Class is referenced when the color comes from the DSCP field. It is a list of DSCP Entries where each entry has three components: (1) A list of DSCP values, (2) a color for IPv4 packets with one of those DSCP values, and (3) a color for IPv6 packets with one of those DSCP values. Any DSCP value that is not specified and any Frame that does not include an IP packet is Green.

Table 29-ColorIdentifier Attributes

16.9 ColorMode

This enumeration indicates whether the Color Identifier of the Service Frame is considered by the Bandwidth Profile Algorithm.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- COLOR_AWARE
- COLOR_BLIND

16.10 ConnectionTypeWithRooted

This is for EVC or OVC connection types, including point to point, multi-point and rooted multi-point. Reference MEF 26.2 Section 12.2 OVC Type Service Attribute and MEF 10.4 Section 8.3 EVC Type Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- POINT_TO_POINT
- MULTIPONT
- ROOTED_MULTIPONT

16.11 ConversationIdToAggregationLinkMap

This is a 2-tuple <x,y> where x is a list of Port Conversation IDs or ranges of Port Conversation IDs (a Port Conversation ID is a VLAN ID or 0 for untagged frames) and y is a list of Link Numbers.

This is used in the Port Conversation to Aggregation Link Map for the UNI and ENNI.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
conversationIDs	ConversationIdRange	1..*	802.1AX-2014 sec. 6.6.2.1 - A Port Conversation ID is a VLAN ID (1 to 4094) or 0 to represent untagged and priority-tagged frames.
aggLinkList	Integer minimum=1	1..*	802.1AX-2014 sec. 6.6.2.1 - An ordered list of Aggregation Link Numbers.

Table 30-ConversationIdToAggregationLinkMap Attributes

16.12 ConversationIdRange

A range of ConversationID (either a VLAN Id or 0 for untagged frames).

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
start	Integer minimum=0 maximum=4094	1	The starting Conversation ID of the range or the only Conversation ID if there is no end value.
end	Integer minimum=0 maximum=4094	1	The final Conversation ID in the range.

Table 31-ConversationIdRange Attributes

16.13 CosIdentifier

The CosIdentifier represents the Class of Service Identifier. Each ingress EI Frame mapped to the given EVC/OVC End Point has a single Class of Service. The Class of Service can be determined from inspection of the content of the ingress EI Frame. It is associated with the SepCosIdPac, or the PcpCosIdPac or the DscpCosIdPac (when the Class of Service Identifier mapping type is Service End Point or PCP values or DSCP values respectively). In the case of PCP, when an OVC End Point is at an ENNI but not in a VUNI, the PcpCosIdPac refers to the value of the S-Tag PCP field. When an OVC End Point is at a UNI or in a VUNI, or for any EVC End Point, the Pcp-CosIdPac refers to the value of the C-Tag PCP field. EI Frames of L2CP protocols may be identified by a Class of Service Identifier, mapping to specified CoS Name. Reference MEF 10.4 Section 10.5 EVC EP Ingress Class of Service Map Service Attribute and MEF 26.2 Section 16.6 OVC End Point Class of Service Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
cosName	String	1	This attribute denotes the Class of Service name that the CosIdentifier maps to.
l2cpProtocolList	L2cpProtocol	0..*	This attribute lists the L2CP protocols that map to the Class of Service name.
sepCosIdPac	SepCosIdPac	0..1	Pointer to SepCosIdPac.
pcpCosIdPac	PcpCosIdPac	0..1	Pointer to PcpCosIdPac.
dscpCosIdPac	DscpCosIdPac	0..2	This attribute represents the relationship between the CosName and the DscpCosIdPac when the cosMappingType in CosMap is DSCP and the cosName is not only for L2CP.

Table 32-CosIdentifier Attributes

16.14 CosMap

The CoS Map represents the mapping from fields in an Ingress EI Frame to a CoS Name. The map can be based on the EVC or OVC End Point, the S-Tag or C-Tag PCP value, or the DSCP field if the EI Frame is carrying an IP Packet. Reference MEF 10.4 Section 10.5 EVC EP Ingress Class of Service Map Service Attribute and MEF 26.2 Section 16.6 OVC End Point Class of Service Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
cosMappingType	CosMappingType	1	This attribute identifies which field is used for the CoS Mapping.
cosMapping	CosIdentifier	1	This attribute is a list of mappings, one per CoS Name. Each entry identifies the CoS IDs that map to the specified CoS Name.

Table 33-CosMap Attributes

16.15 CosMappingType

This enumeration is for selecting which frame field is being used in the Class of Service Map. Reference MEF 10.4 Section 10.5 EVC EP Ingress Class of Service Map Service Attribute and MEF 26.2 Section 16.6 OVC End Point Class of Service Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- PCP
 - Priority Code Point
- END_POINT
 - End Point
- DSCP
 - Differentiated Services Code Point

16.16 DataSize

A value and a unit of measure that specifies a data size for example for a buffer or a burst size.

Schema File Name: schema/common/common.yaml			
Attribute Name	Type	Multiplicity	Description
dataSizeValue	Integer	1	The value in the data size. For example, if a burst size is 40 KBYTES, this element is 40.
dataSizeUnits	DataServiceUnits	1	The unit of measure in the data size. For example, if a burst size is 40 KBYTES, this element is KBYTES. Note that the units indicate binary values, e.g., KBYTES is 1024 bytes.

Table 34-DataService Attributes

16.17 DataServiceUnits

Data size in multiples of bytes (e.g., BYTES or MBYTES).

Contains Enumeration Literals:

Schema File Name: schema/common/common.yaml

Contains Enumeration Literals:

- BYTES
- KBYTES
- MBYTES
- GBYTES
- TBYTES
- PBYTES
- EBYTES
- ZBYTES
- YBYTES

16.18 DeiValueAndDiscard

This enumeration lists the DEI value for color or discard and is used for Egress Map. 0 - Set egress frame DEI field to be 0 when the Egress Map determines based on CoS Name (and Ingress Color). 1 - Set egress frame DEI field to be 1 when the Egress Map determines based on CoS Name (and Ingress Color). DISCARD - Discard the egress frame when the Egress Map determines based on CoS Name (and Ingress Color).

Schema File Name: schema/common/carrierEthernet/carrierEthernetEnums.yaml

Contains Enumeration Literals:

- DISCARD
- 0
- 1

16.19 DscpCosIdPac

Represents the object class represents CoS Identifier that maps the IP DSCP values to the Class of Service Name(s). It can map a list of DSCP values to two different Class of Service Names, one for ingress EI Frames carrying an IPv4 packet and a different one for ingress EI Frames carrying an IPv6 packet. It also can map a list of DSCP values (both IPv4 and IPv6) to one Class of Service Name. Reference MEF 10.4 Section 10.5.1.3 EVC EP Ingress Class of Service Map Service Attribute Based on Internet Protocol and MEF 26.2 Section 16.6.2.1.3 OVC End Point Class of Service Identifier Service Attribute for Ingress Data EI Frames Based on Internet Protocol.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
dscpValueList	DscpValues	1	This attribute is a list of DSCP values that maps to a CoS Name. If NO_IP_PACKET is included here, the ipVersion must be IPV4_AND_IPV6.
ipVersion	IpVersion	1	Pointer to IpVersion.

Table 35-DscpCosIdPac Attributes

16.20 DscpEecIdPac

This represents the IP DSCP values that map to a given Egress Equivalence Class Name (specified in EecIdentifier), for either EI Frames carrying IPv4 Packets, IPv6 Packets, or both. Reference MEF 26.2 Section 16.9.2.1.2 OVC End Point Egress Equivalence Class Identifier Service Attribute for Egress Data EI Frames Based on Internet Protocol.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
dscpValueList	DscpValues	1	This attribute is a list of DSCP values that maps to a CoS Name. If NO_IP_PACKET is included here, the ipVersion must be IPV4_AND_IPV6.
ipVersion	IpVersion	1	Pointer to IpVersion.

Table 36-DscpEecIdPac Attributes

16.21 DscpValues

DSCP values (0-63) with option to select No IP Packets or All values.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
dscpValues	Integer minimum: 0 maximum: 63	1..*	A list of unique 6-bit (0-63) DSCP values.
dscpOptions	String Enum: <ul style="list-style-type: none">• NO_IP_PACKET• ALL_VALUES	1	Enumeration with options NO_IP_PACKET or ALL_VALUES (0-63).
minProperties: 1 maxProperties: 1 NOTE: The option is to select either dscpValues or dscpOptions.			

Table 37-DscpValues Attributes

16.22 EeIdentifier

The EeIdentifier represents the Egress Equivalence Class Identifier. Each egress EI Frame mapped to the given OVC End Point has a single Egress Equivalence Class. The Egress Equivalence Class can be determined from inspection of the content of the egress EI Frame. It is associated with the PcpEeIdPac, or the DscpEeIdPac representing mapping to S-Tag PCP, C-Tag PCP or DSCP respectively). EI Frames of L2CP protocols may be identified by an Egress Equivalence Class Identifier, mapping to specific Egress Equivalence Class Name. It is possible to have only a single Egress Equivalence Class Name. For an OVC End Point at an ENNI that is not in a VUNI, pcpEeIdPac refers to the value of the S-Tag PCP field. For an OVC End Point at a UNI or in a VUNI, pcpEeIdPac refers to the value of the C-Tag PCP field. Reference MEF 26.2 Section 16.9 OVC End Point Egress Equivalence Class Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
eeName	String	1	This attribute denotes the Egress Equivalence Class Name that the EeIdentifier maps to.
l2cpProtocolList	L2cpProtocol	0..*	This attribute lists the L2CP protocols that map to the Egress Equivalence Class Name.

pcpEeclIdPac	PcpEeclIdPac	1	Pointer to PcpEeclIdPac.
dscpEeclIdPac	DscpEeclIdPac	0..2	This attribute represents the relationship between the EeclIdentifier and a DscpEeclIdPac if the eecMappingType in EecMap is DSCP and the eecName is not only for L2CP.

Table 38-EeclIdentifier Attributes

16.23 EecMap

The Egress Equivalence Class Map represents the mapping from fields in an Egress EI Frame to an Egress Equivalence Class Name. The map can be based on the S-Tag or C-Tag PCP value, or the DSCP field if the EI Frame is carrying an IP Packet. Reference MEF 26.2 Section 16.9 OVC End Point Egress Equivalence Class Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
eecMappingType	EecMappingType	1	Pointer to EecMappingType.
eecMapping	EeclIdentifier	1..*	This attribute is a list of mappings, one per EEC Name. Each entry identifies the EEC IDs that map to the specified EEC Name.

Table 39-EecMap Attributes

16.24 EecMappingType

This enumeration is for selecting which frame field being used in the Egress Equivalence Class Map. Reference MEF 26.2 Section 16.9 OVC End Point Egress Equivalence Class Identifier Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- DSCP
- PCP

16.25 EgressBandwidthProfilePerClassName

List of pairs of the form <x,y> where x is Class of Service Name that is in the value of the EVC or OVC List of Class of Service Names Service Attribute for the EVC or OVC that associates the EVC or OVC End Point and y is EgressBwpFlow. Reference MEF 10.4 Section 10.11 EVC EP Class of

Service Name Egress Bandwidth Profile Service Attribute and MEF 26.2 Section 16.13 Egress Bandwidth Profile per Class of Service Name Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
classOfServiceName	String	1	Class of Service Name.
egressBwpFlow	EgressBwpFlow	1	Pointer to EgressBwpFlow.

Table 40-EgressBandwidthProfilePerClassName Attributes

16.26 EgressBwpFlow

The EgressBwpFlow object class represents the Bandwidth Profile Flow which includes the bandwidth profile parameters CIR, CIRmax, and ER.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
cir	Information Rate	1	Committed Information Rate.
cirMax	InformationRate	1	Committed Information Rate maximum.
couplingFlag	Boolean	1	Attribute represents coupling flag. Determines whether unused committed bandwidth for this Bandwidth Profile Flow is made available as excess bandwidth for this Bandwidth Profile Flow or as commit-ted bandwidth for the next lower-ranked Bandwidth Profile Flow. 0/False means overflow green tokens are used as green tokens in the next lowest BWP Flow in the Envelope. 1/True means they are used as yellow tokens for this BWP Flow.
colorMode	ColorMode	1	Attribute represents color mode. Indicates whether Service Frames for this Band-width Profile Flow that are identified as Yellow on input to the Bandwidth Profile Algorithm can be declared Green or not.
envelopeId	String	1	This attribute identifies the Envelope that the Bandwidth Profile belongs to.
envelopeRank	Integer	1	This attribute denotes the rank of the bandwidth profile flow in the envelope.
tokenRequestOffset	Integer	1	Attribute represents Token Request Off-set. Adjusts the bandwidth consumed by each Service Frame in the Bandwidth Profile Flow relative to the length of the Service Frame.

Table 41-EgressBwpFlow Attributes

16.27 EnabledDisabled

Enumeration used to indicate state as ENABLED or DISABLED.

Schema File Name: schema/common/common.yaml

Contains Enumeration Literals:

- ENABLED
- DISABLED

16.28 Envelope

Bandwidth Profiles are organized into Envelopes. Multiple Bandwidth Profiles in an envelope can share bandwidth resources. Each Envelope has a name and a Coupling Flag for Index Zero (CF0) that indicates whether unused green tokens are discarded or converted to yellow tokens. All Bandwidth Profile Flows in the same envelope satisfy the same criterion listed in R230 of MEF 26.2.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
envelopeId	String Min length -1 Max length = 45 Pattern: "[\x20-\x7F]+"	1	MEF 10.4 sec. 9.12 and MEF 26.2 sec. 14.19 - The attribute is a string that identifies the Envelope.
couplingFlagForIndexZero	Boolean	1	MEF 10.4 sec. 9.12 and MEF 26.2 sec. 14.19 - This attribute denotes the coupling flag for index zero. FALSE for 0 (overflow) Green tokens are discarded) and TRUE for 1 (overflow Green tokens can be used as Yellow tokens).

Table 42-Envelope Attributes

16.29 EthernetFrameFormat

This is a single value read only attribute. Reference MEF 10.4 Section 9.7 Subscriber UNI Service Frame Format Service Attribute and MEF 26.2 Section 14.7 Operator UNI Service Frame Format Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- ETHERNET

16.30 EvcGroupMembership

Specifies an instance of the Multiple EVC Service Level Specification Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
id	String	1	One of the values in an instance of Multiple EVC Service Level Specification Service Attribute.
cosName_G	String	1	Entry in the value of EVC List of Class of Service Names.
sg	String	0..*	Subset of ordered EVC EP pairs constructed from the value of the EVC List of EVC EPs Service Attribute.

Table 43-EvcGroupMembership Attributes

16.31 FrameColor

Frame color is either Green or Yellow.

Schema File Name: schema/common/carrierEthernet/carrierEthernetEnums.yaml

Contains Enumeration Literals:

- GREEN
- YELLOW

16.32 FrameDispEnum

When the value is conditionally, the specific condition must be addressed by the users. What conditions should be supported are not in the scope. Reference MEF 10.4 Section 8.4 EVC Data Service Frame Disposition Service Attribute and MEF 26.2 Section 12.14.1 OVC Frame Disposition.

Contains Enumeration Literals:

- DISCARD
- CONDITIONALLY
- UNCONDITIONALLY

16.33 FrameDisposition

A 3-tuple that indicates how Unicast, Multicast, and Broadcast Frames are delivered by the service. For each, the value can be UNCONDITIONAL, the frames are delivered without condition, CONDITIONAL, the frames are delivered based on conditions agreed to between buyer and seller (e.g., based on learned addresses), and DISCARD.

Schema File Name: schema/carrierEthernet/carrierEthernetUtilityClasses.yaml			
Attribute Name	Type	Multiplicity	Description
unicast	FrameDispEnum	1	Pointer to Frame Delivery enumeration.
multicast	FrameDispEnum	1	Pointer to Frame Delivery enumeration.
broadcast	FrameDispEnum	1	Pointer to Frame Delivery enumeration.

Table 44-FrameDisposition Attributes

16.34 Gender

File: /schema/common/common.yaml

Enumeration representing the gender of the connector presented to the Subscriber.

Contains Enumeration Literals:

- SOCKET
- PLUG

16.35 InformationRate

A value and a unit of measure that specifies an Information Rate.

Schema File Name: schema/common/common.yaml			
Attribute Name	Type	Multiplicity	Description
irValue	Number Minimum: 0	1	The value in the information rate. For example if the information rate is 70 kbps this element is 70.
irUnits	InformationRateUnits	1	The unit of measure for the Information Rate. For example, if the Information Rate is 70KBPS this element is KBPS. Note that the values are decimal values. 1 KBPS is 1000 bits per second and 1MBPS is 1,000,000 bits per second.

Table 45-InformationRate Attributes

16.36 InformationRateUnits

File: /schema/common/common.yaml

Enumeration of information rates (such as MBPS)

Contains Enumeration Literals:

- BPS
- KBPS
- MBPS
- GBPS
- TBPS
- PBPS
- EBPS
- ZBPS
- YBPS

16.37 IngressBandwidthProfilePerClassName

List of pairs of the form <x,y> where x is Class of Service Name that is in the value of the EVC or OVC List of Class of Service Names Service Attribute for the EVC or OVC that associates the EVC or OVC End Point and y is IngressBwpFlow. Reference MEF 10.4 Section 10.9 EVC EP Class of Service Name Ingres Bandwidth Profile Service Attribute and MEF 26.2 Section 16.12 Ingress Bandwidth Profile per Class of Service Name Service Attribute.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
classOfServiceName	String	1	Class of Service Name.
ingressBwpFlow	IngressBwpFlow	1	Pointer to IngressBwpFlow.

Table 46-IngressBandwidthProfilePerClassName Attributes

16.38 IngressBwpFlow

The IngressBwpFlow object class represents the Bandwidth Profile Flow which includes the bandwidth profile parameters such as CIR, CIRmax, EIR, EIRmax, CBS, EBS, Coupling Flag, Color Mode, etc. The IngressBwpFlow is associated with one of CarrierEthernetOperatorUni, CarrierEthernetSub-scriberUni, CarrierEthernetVuni, BandwidthProfilePerClassName,

BandwidthPro-filePerEecName; and with Envelope. Reference MEF 10.4 Section 12 Bandwidth Profiles and MEF 26.2 Section 17 Bandwidth Profiles.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
cir	Information Rate	1	Committed Information Rate.
cirMax	InformationRate	1	Committed Information Rate maximum.
cbs	DataSize	1	Constant Burst Size.
eir	InformationRate	1	Excess Information Rate.
eirMax	InformationRate	1	Excess Information Rate maximum.
ebs	DataSize	1	Excess Burst Size.
couplingFlag	Boolean	1	Attribute represents coupling flag. Determines whether unused committed bandwidth for this Bandwidth Profile Flow is made available as excess bandwidth for this Bandwidth Profile Flow or as committed bandwidth for the next lower-ranked Bandwidth Profile Flow. 0/FALSE means overflow green tokens are used as green tokens in the next lowest BWP Flow in the Envelope. 1/TRUE means they are used as yellow tokens for this BWP Flow.
colorMode	ColorMode	1	Attribute represents color mode. Indicates whether Service Frames for this Band-width Profile Flow that are identified as Yellow on input to the Bandwidth Profile Algorithm can be declared Green or not.
envelopeId	String	1	This attribute identifies the Envelope that the Bandwidth Profile belongs to.
envelopeRank	Integer	1	This attribute denotes the rank of the bandwidth profile flow in the envelope.
tokenRequestOffset	Integer	1	Attribute represents Token Request Off-set. Adjusts the bandwidth consumed by each Service Frame in the Bandwidth Profile Flow relative to the length of the Service Frame.

Table 47-IngressBwpFlow Attributes

16.39 IpVersion

Enumeration used for IP versions.

File: /schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- IPv4
- IPv6

16.40 L2cpAddressSet

Enumeration listing the L2CP Address Set. Reference MEF 45.1 Section 8.1 L2CP Address Set Service Attribute. CTA - CEVLAN Tag Aware for VLAN-based services where the CE-VLAN ID is used to map a frame to a service. CTB - CVLAN Tag Blind for Port-based services where the CE-VLAN ID not used to map a frame to a service. CTB2 - CVLAN Tag Blind Option 2 for point-to-point Port-based services that support the EPL Option 2 L2CP processing.

File: /schema/common/carrierEthernet/carrierEthernetEnums.yaml

Contains Enumeration Literals:

- CTA
- CTB
- CTB2

16.41 L2cpPeering

This is a list that specifies the L2CP Protocol Identifier and the Destination Address in use by the protocol entity. Reference MEF 45.1 Section 8.2 L2CP Peering Service Attribute.

Schema File Name: schema/common/carrierEthernet/carrierEthernetL2cp.yaml			
Attribute Name	Type	Multiplicity	Description
protocolID	L2cpProtocol	1	This specifies the Protocol Type for the L2CP. It consists of a field specification (ETHERTYPE or LLC), the EtherType or LLC value, and an optional subtype.
destinationAddress	String pattern: "[0-9a-fA-F][0-9a-fA-F]([.-][0-9a-fA-F][0-9a-fA-F])\{5\}"	1	The Destination MAC Address of the L2CP to be peered in the standard format of 6 hex bytes separated by hyphen (-).
linkIdList	String minLength: 1 maxLength: 45 pattern: "[\x20-\x7F]+"	0..*	Identifiers for the links on which the specified protocol will be peered. If no links are specified, the protocol is peered on all links.

Table 48-L2cpPeering Attributes

16.42 L2cpProtocol

Defines a L2CP protocol (LLC address type or EtherType) with possible subtype. Reference MEF 45.1 Section 8.2 L2CP Peering Service Attribute.

Schema File Name: schema/common/carrierEthernet/carrierEthernetL2cp.yaml			
Attribute Name	Type	Multiplicity	Description
l2cpProtocolType	String Enum: “ETHERTYPE” “LLC”	1	The protocol field to inspect to identify the L2CP.
llcAddressOrEtherType	Integer minimum:0	1	The EtherType value or LLC value.
subType	Integer	1	The EtherType can be modified by an optional sub-type.

Table 49-L2cpProtocol Attributes

16.43 LinkAggregation

Data type representing Link Aggregation types as used in MEF 10.4 and MEF 26.2. NONE-No Link Aggregation is used. 2_LINK_ACTIVE_STANDBY-The SP network uses Link Aggregation as in either Clause 5.6.1 of IEEE Std 802.1AX-2008 [2] or Clause 6.7.1 of IEEE Std 802.1AX-2014 with one Link Aggregation Group (LAG) across the links supporting the UNI/ENNI such that all Service Frames are carried on only one of the two links when both links are operational. ALL_ACTIVE-The SP Network uses Link Aggregation as specified in Clause 5.3 of IEEE Std 802.1AX-2014, including the use of the version 2 LACPDUAs as specified in Clause 5.3.1h of IEEE Std 802.1AZ-2014, with one Link Aggregation Group (LAG) across the links. OTHER-The Operator/Subscriber/Service Provider agree on another other resiliency mechanism.

File: /schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- NONE
- 2_LINK_ACTIVE_SUMMARY
- ALL_ACTIVE
- OTHER

16.44 MegLevel

This datatype defines the MEG Level and MEP direction. Reference MEF 26.2 Section 16.17 OVC End Point Maintenance End Point List Service Attribute.

File: /schema/common/carrierEthernet/carrierEthernetEnums.yaml

Contains Enumeration Literals:

- “NONE”
- “0”
- “1”
- “2”
- “3”
- “4”
- “5”
- “6”
- “7”

16.45 MepLevelAndDirection

This datatype defines the MEG Level and MEP direction. Reference MEF 26.2 Section 16.17 OVC End Point Maintenance End Point List Service Attribute.

Schema File Name: schema/common/carrierEthernet/carrierEthernetUtilityClasses.yaml			
Attribute Name	Type	Multiplicity	Description
level	Integer minimum:0 maximum:7	1	The MEG level.
mepDirection	String Enum: “UP” “DOWN”	1	Indicates whether this is an Up MEP or Down MEP.

Table 50-MepLevelAndDirection Attributes

16.46 PcpCosIdPac

The PcpCosIdPac object class represents the PCP values that map to a given Class of Service Name (specified in CosIdentifier). For an EVC End Point, or an OVC End Point at UNI or in a VUNI, the PCP values are from the C-Tag in the ingress EI frames. For an OVC End Point at an ENNI and not in a VUNI, the PCP values are from the S-Tag in the ingress EI frames. Reference MEF 10.4 Section

10.5.1.2 EVC EP Ingress Class of Service Map Service Attribute Based on Priority Code Point Field and MEF 26.2 Section 16.6.2.1.2 OVC End Point Class of Service Identifier Service Attribute for Ingress Data EI Frames Based on C-Tag Priority Code Point.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
pcpValueList	PcpOrUntagged	1..*	This attribute is a list of PCP values that map to the CoS Name.

Table 51-PcpCosIdPac Attributes

16.47 PcpEecIdPac

This represents the PCP values that map to a given Egress Equivalence Class Name (specified in EecIdentifier). For an OVC End Point at UNI or in a VUNI, the PCP values are from the C-Tag in the egress EI frames. For an OVC End Point at an ENNI and not in a VUNI, the PCP values are from the S-Tag in the egress EI frames. Reference MEF 26.2 Section 16.9.1.1 OVC End Point Egress Equivalence Class Identifier Service Attribute for Egress Data ENNI Frames Mapped to an OVC End Point at an ENNI that is not a VUNI.

Schema File Name: schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml			
Attribute Name	Type	Multiplicity	Description
pcpValueList	PcpOrUntagged	1..*	This attributes a list of PCP values that map to Egress Equivalence Class Name.

Table 52-PcpEecIdPac Attributes

16.48 PcpValueAndDiscard

This enumeration lists the one of PCP values or DISCARD.

File: /schema/common/carrierEthernet/subscriberEthernetCommon/evcEgressMaps.yaml

Contains Enumeration Literals:

- DISCARD
- 0
- 1
- 2
- 3
- 4
- 5

- 6
- 7

16.49 PcpOrUntagged

This enumeration lists the one of PCP values or UNTAGGED.

File: /schema/common/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- UNTAGGED
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

16.50 PcpValue

This enumeration lists the one of PCP values.

File: /schema/common/carrierEthernet/carrierEthernetEnums.yaml

Contains Enumeration Literals:

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7

16.51 SepCosIdPac

Represents the CoS Identifier that maps the EVC End Point or the OVC End Point to a Class of Service Name. NOTE: This object does not have attributes. Reference MEF 26.2 Section 16.6.2 OVC End Point Class of Service Identifier Service Attribute for an OVC End Point in a VUNI or at a UNI and MEF 10.4 Section 10.5.1.1 EVC EP Ingress Class of Service Map Attribute Based on EVC EP.

16.52 SourceMacAddressLimit

This limits the number of source MAC addresses that can be used in ingress external interface frame mapped to the End Point of all types over a time interval. Reference MEF 26.2 Section 16.15 OVC End Point Source MAC Address Limit Service Attribute and MEF 10.4 Section 10.12 EVC EP Source MAC Address Limit Service Attribute.

Schema File Name: schema/common/carrierEthernet/carrierEthernetUtilityClasses.yaml			
Attribute Name	Type	Multiplicity	Description
limit	Integer	1	The number of MAC source addresses that will not subject an Ingress EI Frame to discard during the time interval.
interval	TimeDuration	1	The time interval in seconds over which the source address limit is evaluated.

Table 53-SourceMacAddressLimit Attributes

16.53 TaggedL2cpProcessing

Enumeration representing either 802.1 compliant or not compliant. Reference MEF 45.1 Section 8.3 ENNI Tagged L2CP Frame Processing Multilateral Attribute.

File: /schema/serviceSchema/carrierEthernet/carrierEthernetCommon.yaml

Contains Enumeration Literals:

- 802_1_COMPLIANT
- 802_1_NON_COMPLIANT

16.54 TimeDuration

This class is used to describe durations expressed as a 2-tuple, (value,units). The units from from nanoseconds to years.

Schema File Name: schema/common/common.yaml

Attribute Name	Type	Multiplicity	Description
timeDurationValue	Integer minimum: 0	1	The value of the duration. For example, if the duration is 20ms, this element is 20.
timeDurationUnits	TimeDurationUnits	1	The unit of measure in the duration. For example, if an interval is 2ms, this element is MS.

Table 54-TimeDuration Attributes

16.55 TimeDurationUnits

Enumeration listing the units of measure for a Time Duration.

File: /schema/common/common.yaml

Contains Enumeration Literals:

- “NS”
- “US”
- “MS”
- “SEC”
- “MIN”
- “HOUR”
- “DAY”
- “WEEK”
- “MONTH”
- “YEAR”

16.56 VlanId

Data type with single attribute, vlanId which is defined as a Integer. Value 1 to 4094.

File: /schema/common/common.yaml

17 Carrier Ethernet Service Level Specification

The EVC Service Level Specification Service Attribute (SLS) is the technical details of the service level, in terms of Performance Objectives, agreed between the Service Provider and the Subscriber as part of the Service Level Agreement. A given SLS might contain 0, 1 or more Performance Objective for each Performance Metric [6].

The OVC Service Level Specification Service Attribute (SLS) is the technical specification of the service level agreed to by the Operator and the SP/SO. For any given SLS, a performance objective may or may not be specified [8].

The following performance metrics are supported as part of an SLS:

1. One-way Frame Delay Performance Metric
2. One-way Mean Frame Delay Performance Metric
3. One-way Frame Delay Range Performance Metric
4. One-way Inter-Frame Delay Variation Performance Metric
5. One-way Frame Loss Ratio Performance Metric
6. One-way Availability Performance Metric
7. One-way High Loss Intervals Performance Metric
8. One-way Consecutive High Loss Intervals Performance Metric
9. One-way Composite Performance Metric (only supported by EVC, not OVC)
10. One-way Group Availability Performance Metric

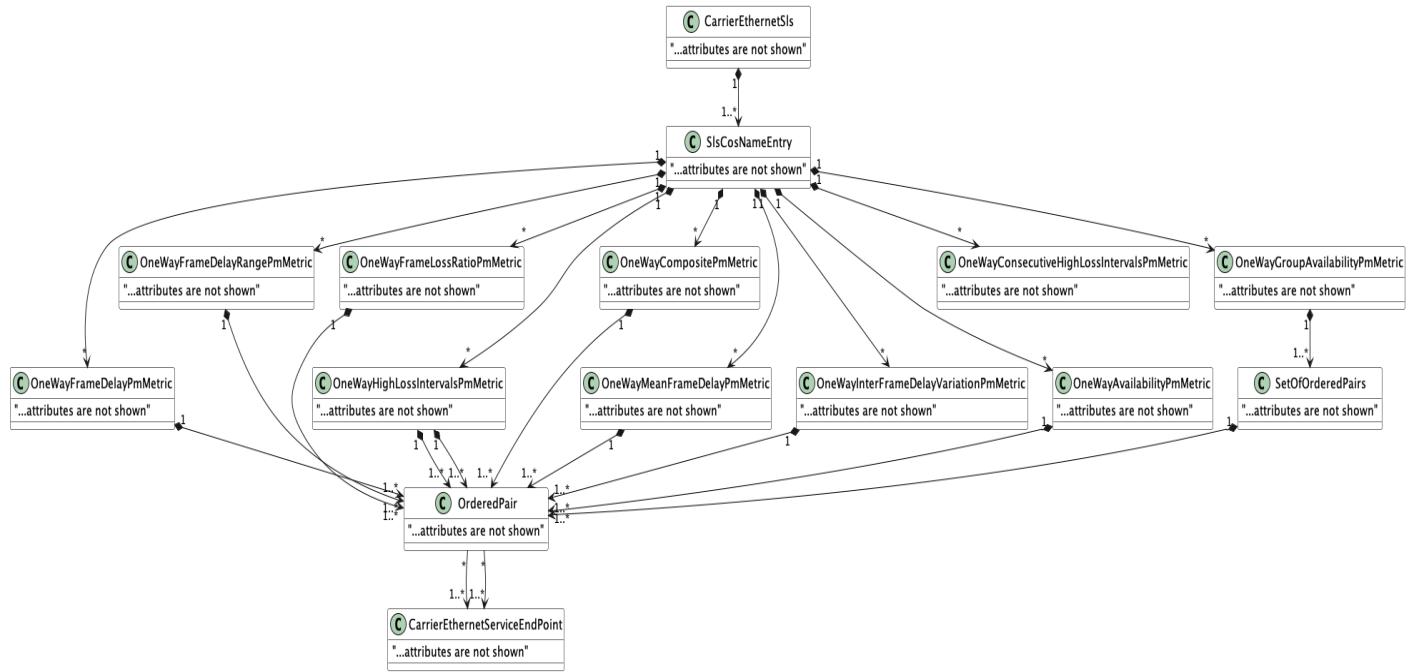


Figure 21-Service Level Specification Model

Figure 22 below provides an example of the value for the EVC Service Level Specification Attribute. Some observations:

- Performance Metrics and Objectives are specified for the *Gold* and *Silver* Class of Service Names for the EVC.
- A single value of t_s and a single value of T apply to all Class of Service Names.
- Different values of Δt , C , and n apply to Gold and Silver.
- Two instances of the One-way Delay Performance Metric apply to *Gold*. There is a different set of order EVC EP pairs, a different percentile and a different objective for each instance. This could be due to EVC EP *c* being geographically distant from EVC EPs *a* and *b*.
- The One-way Frame Delay Range Performance Metric and One-way Availability Performance along with corresponding objectives apply to *Gold*.
- The One-way Availability Performance Metric applies to *Silver*.

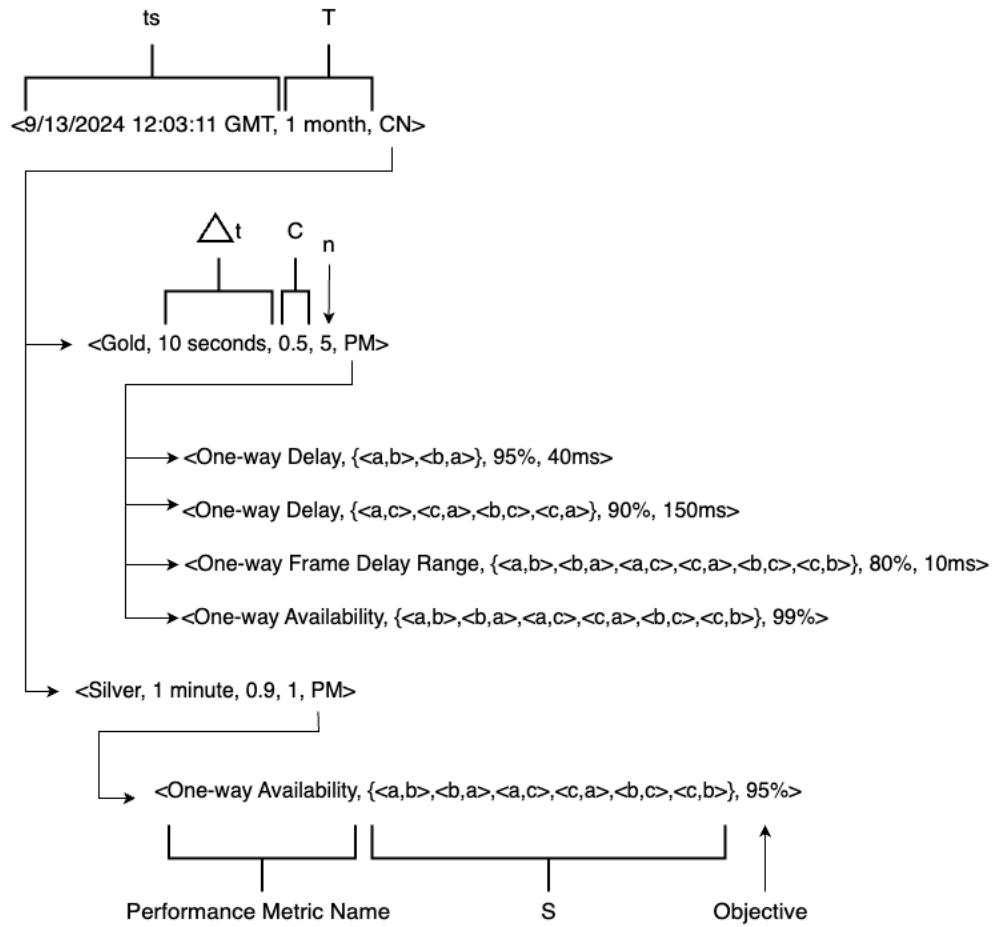


Figure 22-E/OVC Service Level Specification Service Attribute Value Example

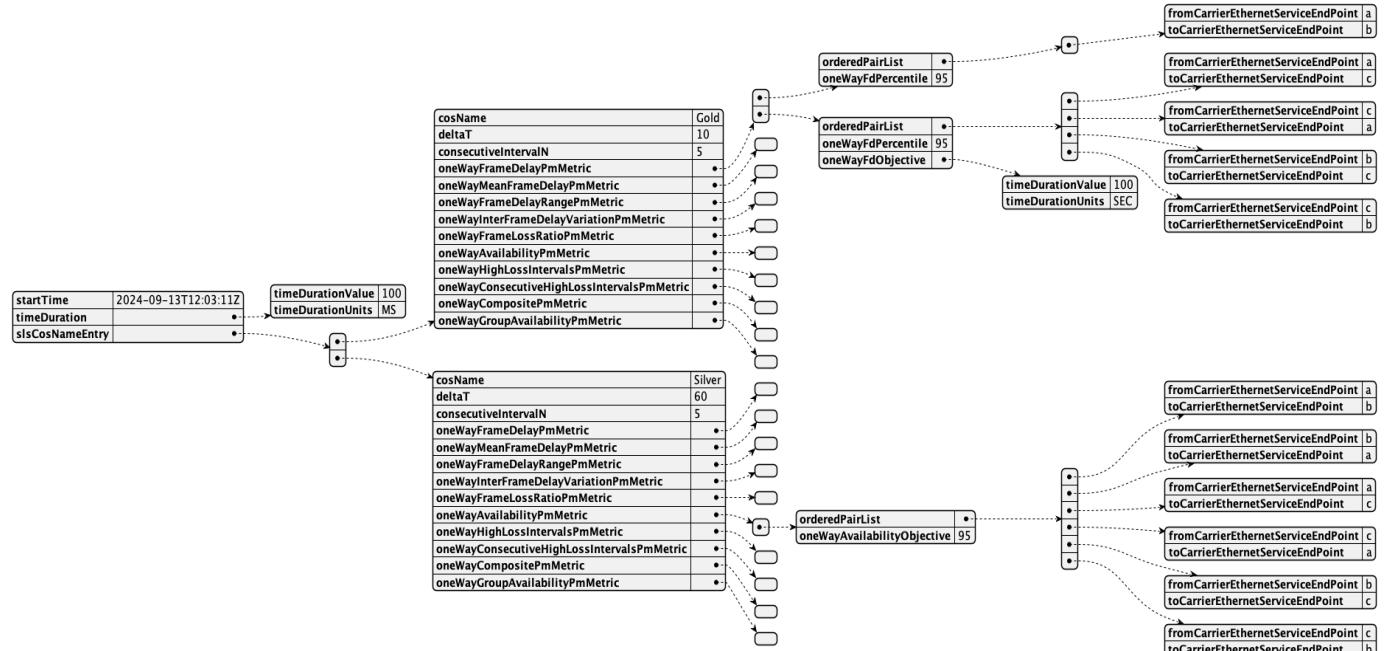


Figure 23-Carrier Ethernet SLS JSON Example

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
timeDuration	TimeDuration	1	The timeDuration (referred to as T in MEF 10.4
startTime	Date-Time	1	This represents the date and time for the start of the SLS. It is the beginning of the first timeInterval.
slsCosNameEntry	SlscosNameEntry	1	Pointer to SLS CoS Name Entry.

Table 55-CarrierEthernetServiceLevelSpecification Attributes

17.1 SlscosNameEntry

This is the specification of Performance Metrics (and parameters) for one Class of Service. The first element is the CoS Name. This MUST be unique, i.e. there cannot be two instances of this Class with the same CoS Name. The CoS Name is followed by three parameters and then lists of Performance Metrics.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
cosName	String	1	This is the CoS Name for this PM Entry. *** Validation Notes: The CoS Name should be included in the OVC List of Class of Service Names (AccessElineOvc.listOfClassOfServiceNames) for Operator Ethernet Services and the EVC List of Class of Service Names (CarrierEthernetEvcCommon.listOfCosNames) for Subscriber Ethernet Services.
deltaT	Integer minimum: 1	1	MEF 10.4 sec. 8.8 and MEF 26.2 sec. 12.13 - deltaT is a time duration in seconds much smaller than timeInterval. This is used, primarily, in calculations associated with Availability, High Loss Intervals and Consecutive High Loss Intervals. MEF 10.4 and MEF 26.2 refer to this as Δt and the k-th interval starting at t_s is referred to as Δt_k (k is subscript). *** Validation Notes: deltaT is a time duration in seconds much smaller than timeInterval (e.g. 10 seconds).
thresholdC	Number minimum: 0 maximum: 1	1	MEF 10.4 sec. 8.8 and MEF 26.2 sec. 12.13 - thresholdC is a real number in the range [0,1] used as a threshold to determine whether a given time interval Δt_k has high loss.
consecutiveIntervalN	Integer minimum: 1	1	MEF 10.4 sec. 8.8 and MEF 26.2 sec. 12.13 – consecutiveIntervalN is an integer ≥ 1 , used to identify

			how many consecutive Δtk intervals must have high loss to trigger a change in Availability.
oneWayFrameDelayPmMetric	OneWayFrameDelayPmMetric	0..*	MEF 10.4 sec. 8.8.2 and MEF 26.2 sec. 12.13.2 – oneWayFrameDelayPmMetric is a reference to zero or more instances of One Way Frame Delay Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Frame Delay. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayMeanFrameDelayPmMetric	OneWayMeanFrameDelayPmMetric	0..*	MEF 10.4 sec. 8.8.3 and MEF 26.2 sec. 12.13.3 – oneWayMeanFrameDelayPmMetric is a reference to zero or more instances of One-Way Mean Frame Delay Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Mean Frame Delay. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayMeanFrameDelayPmMetric	OneWayMeanFrameDelayRangePmMetric	0..*	MEF 10.4 sec. 8.8.3 and MEF 26.2 sec. 12.13.3 – oneWayMeanFrameDelayPmMetric is a reference to zero or more instances of One Way Mean FrameDelay Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Mean Frame Delay. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayFrameDelayRangePmMetric	OneWayFrameDelayRangePmMetric	0..*	MEF 10.4 sec. 8.8.4 and MEF 26.2 sec. 12.13.4 – oneWayFrameDelayRangePmMetric is a reference to zero or more instances of One-Way Frame Delay Range Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Frame Delay Range. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayInterFrameDelayVariationPmMetric	OneWayInterFrameDelayVariationPmMetric	0..*	MEF 10.4 sec. 8.8.5 and MEF 26.2 sec. 12.13.5 – oneWayInterFrameDelayVariationPmMetric is a reference to zero or more instances of One Way Inter

			Frame Delay Variation Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Inter Frame Delay Variation. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayFrameLossRatioPmMetric	OneWayFrameLostRatioPmMetric	0..*	MEF 10.4 sec. 8.8.6 and MEF 26.2 sec. 12.13.6 – oneWayFrameLossRatioPmMetric is a reference to zero or more instances of One-Way Frame Loss Ratio Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Frame Loss Ratio. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayAvailabilityPmMetric	OneWayAvailabilityPmMetric	0..*	MEF 10.4 sec. 8.8.7 and MEF 26.2 sec. 12.13.7 - oneWayAvailabilityPmMetric is a reference to zero or more instances of One-Way Availability Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Availability. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayHighLossIntervalPmMetric	OneWayHighLossIntervalPmMetric	0..*	MEF 10.4 sec. 8.8.8 and MEF 26.2 sec. 12.13.8 – oneWayHighLossIntervalsPmMetric is a reference to zero or more instances of One-Way High Loss Intervals Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way HLI. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayConsecutiveHighLossIntervalPmMetric	OneWayConsecutiveHighLossIntervalPmMetric	0..*	MEF 10.4 sec. 8.8.9 and MEF 26.2 sec. 12.13.9 – oneWayConsecutiveHighLossIntervalsPmMetric is a reference to zero or more instances of One Way Consecutive High Loss Intervals Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way CHLI. If there are multiple instances for this Class of Service, then at least

			one of the parameters must be different between the instances.
oneWayCompositePmMetric	OneWayCompositePmMetric	0..*	MEF 10.4 sec. 8.8.10 - oneWayCompositePmMetric is a reference to zero or more instances of One-Way Composite Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Composite Performance. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.
oneWayGroupAvailabilityPmMetric	OneWayGroupAvailabilityPmMetric	0..*	MEF 10.4 sec. 8.8.11 and MEF 26.2 sec. 12.13.10 – oneWayGroupAvailabilityPmMetric is a reference to zero or more instances of One-Way Group Availability Performance Metric. Each reference contains a set of parameters and performance objective for the Performance Metric. If there are 0 instances, then this Class of Service does not have an objective for One Way Group Availability. If there are multiple instances for this Class of Service, then at least one of the parameters must be different between the instances.

Table 56-SIsCosNameEntry Attributes

17.2 OneWayFrameDelayPmMetric

MEF 10.4 sec. 8.8.2 and MEF 26.2 sec. 12.13.2 - One Way Frame Delay Performance Metric consisting of 2 parameters, a list of Ordered End Point Pairs (referred to as S in MEF 10.4 and MEF 26.2), a percentile (referred to as Pd in MEF 10.4 and MEF 26.2), and the One-Way Frame Delay Objective.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairsList	OrderedPair	1..*	MEF 10.4 sec. 8.8.1.1 and MEF 26.2 sec. 12.13.1.1 - The set (referred to as S in MEF 10.4 and MEF 26.2) of ordered pairs of EVC or OVC End Points over which this Performance Metric parameters and objective apply. *** Validation Notes: Each EVC or OVC End Point in the pair must be one of the End Points in the service, they cannot be the same End Point, and at least one of them must be a root End Point.
oneWayFdPercentile	Percentage	1	MEF 10.4 sec. 8.8.2 and MEF 26.2 sec. 12.13.2 (Pd) - A percentage in (0,100] for Frame Delay metric. *** Validation Notes: This must be greater than 0.

oneWayFdObjective	TimeDuration	1	MEF 10.4 sec. 8.8.2 and MEF 26.2 sec. 12.13.2 - The Performance Objective for this Performance Metric (this CoS and these 2 parameters). This is a unit of time greater than 0.
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Table 57-OneWayFrameDelayPmMetric Attributes

17.3 OneWayMeanFrameDelayPmMetric

Data type representing One-way Mean Frame Delay Performance Metric. Reference MEF 10.4 Section 8.8.3 One-way Mean Frame Delay Performance Metric and MEF 26.2 Section 12.13.3 One-way Mean Frame Delay Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
oneWayMfdObjective	Time	1	Mean Frame Delay objective.

Table 58-OneWayMeanFrameDelayPmMetric Attributes

17.4 OneWayFrameDelayRangePmMetric

Data type representing One-way Frame Delay Range Performance Metric. Reference MEF 10.4 Section 8.8.4 One-way Frame Delay Range Performance Metric and MEF 26.2 Section 12.13.4 One-way Frame Delay Range Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
oneWayFdrPercentile	Percentage	1	Frame Delay Range percentile.
oneWayFdrObjective	Time	1	Frame Delay Range objective.

Table 59-OneWayFrameDelayRangePmMetric Attributes

17.5 OneWayInterFrameDelayVariationPmMetric

Data type representing One-way Inter-Frame Delay Performance Metric. Reference MEF 10.4 Section 8.8.5 One-way Inter-Frame Delay Performance Metric and MEF 26.2 Section 12.13.5 One-way Inter-Frame Delay Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
timeDuration	Time	1	Time duration.
oneWayIfdvPercentile	Percentage	1	Inter-Frame Delay Variation percentile.
oneWayIfdvObjective	Time	1	Inter-frame Delay Variation objective.

Table 60-OneWayInterFrameDelayVariationPmMetric Attributes

17.6 OneWayFrameLossRatioPmMetric

Data type representing One-way Frame Loss Ratio Performance Metric. Reference MEF 10.4 Section 8.8.6 One-way Frame Loss Ratio Performance Metric and MEF 26.2 Section 12.13.6 One-way Frame Loss Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
oneWayFrameLossRatioObjective	Percentage	1	Frame Loss Ratio objective.

Table 61-OneWayFrameLossPmMetric Attributes

17.7 OneWayAvailabilityPmMetric

Data type representing One-way Availability Performance Metric. Reference MEF 10.4 Section 8.8.7 One-way Availability Performance Metric and MEF 26.2 Section 12.13.7 One-way Availability Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
oneWayAvailabilityObjective	Percentage	1	Availability objective.

Table 62-OneWayAvailabilityPmMetric Attributes

17.8 OneWayHighLossIntervalPmMetric

Data type representing One-way High Loss Intervals Performance Metric. Reference MEF 10.4 Section 8.8.8 One-way High Loss Intervals Performance Metric and MEF 26.2 Section 12.13.8 One-way High Loss Intervals Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
oneWayHighLossIntervalsObjective	Integer	1	High Loss Intervals objective.

Table 63-OneWayHighLossIntervalPmMetric Attributes

17.9 OneWayConsecutiveHighLossIntervalPmMetric

Data type representing One-way Consecutive High Loss Intervals Performance Metric. Reference MEF 10.4 Section 8.8.9 One-way Consecutive High Loss Intervals Performance Metric and MEF 26.2 Section 12.13.9 One-way Consecutive High Loss Intervals Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
consecutiveNumberP	Integer	1	The number of high loss intervals that constitute a consecutive high loss interval.
oneWayChliObjective	Integer	1	Performance objective as a non-negative integer.

Table 64-OneWayConsecutiveHighLossIntervalPmMetric Attributes

17.10 OneWayCompositePmMetric

Data type representing One-way Composite Performance Metric. Reference MEF 10.4 Section 8.8.10 One-way Composite Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
orderedPairs	OrderedPair	1..*	A non-empty subset of the ordered pairs of OVC/EVC End Points.
compositePerformanceIndicatorThreshold	Number	1	Composite Performance Indicator threshold which if exceeded suggests an unacceptable time interval.

compositeFrameLoss	Integer	1	Composite indicator for One-way Frame Loss equal to 0 or 1.
compositeFrameDelay	Integer	1	Composite indicator for One-way Frame Delay equal to 0 or 1
compositeFrameDelayVariation	Integer	1	Composite indicator for One-way Frame Delay Variation equal to 0 or 1
oneWayFdThreshold	Time	1	Frame Delay threshold.
oneWayIfdvThreshold	Time	1	Inter-Frame Delay Variation threshold.
cpmObjective	Percentage	1	Performance objective.

Table 65-OneWayCompositePmMetric Attributes

17.11 OneWayGroupAvailabilityPmMetric

Data type representing One-way Group Availability Performance Metric. Reference MEF 10.4 Section 8.8.11 One-way Group Availability Performance Metric and MEF 26.2 Section 12.13.10 One-way Group Availability Performance Metric.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
setOfOrderedPairs	SetOfOrderedPairs	1..*	Set of Ordered Pairs.
minimumNumberOfSetsAvailableK	Integer	1	Specified number of sets of ordered EVC End Point Pair available during characterized percentage of time measurement.
oneWayGroupAvailabilityObjective	Percentage	1	Group Availability objective.

Table 66-OneWayGroupAvailabilityPmMetric Attributes

17.12 OrderedPair

Performance Metrics (except for Group Availability) are specified for a list of Ordered End Point Pairs. In other words, a Frame Delay objective (for example) is specified from (A to B) and from (C to D). This class defines one Ordered End Point Pair.

Schema File Name: schema/common/carrierEthernet/carrierEthermetServiceLevelSpecification.yaml			
Attribute Name	Type	Multiplicity	Description
toCarrierEthernetServiceEndPoint	String	1	This is the EVC End Point ID for an EVC End Point in the service or OVC End Point in the service.
fromCarrierEthernetServiceEndPoint	String	1	This is the EVC End Point ID for an EVC End Point in the service or OVC End Point in the service.

Table 67-OrderedPair Attributes**17.13 Percentage**

A rate, number, or amount in each hundred.

Schema File Name:**schema/common/common.yaml**

Minimum:0

Maximum: 100

Type: Number

Table 68-Percentage Attributes

Appendix A Usage examples (Informative)

This appendix aims to provide an extensive set of examples to cover:

- Different Service Order configuration variants,
- Basic Service Order API walkthrough to order a Carrier Ethernet Service,
- Common modifications,
- Deletion of a Carrier Ethernet Service
- List of Service Orders

The examples are delivered in two forms:

- As part of this document – to allow comments and rich explanation.
- As a Postman collection – for ease of use in testing.

A.1 High-level Flow

The Interface Reference Points each form a set of APIs that service different functions in the end-to-end flow.

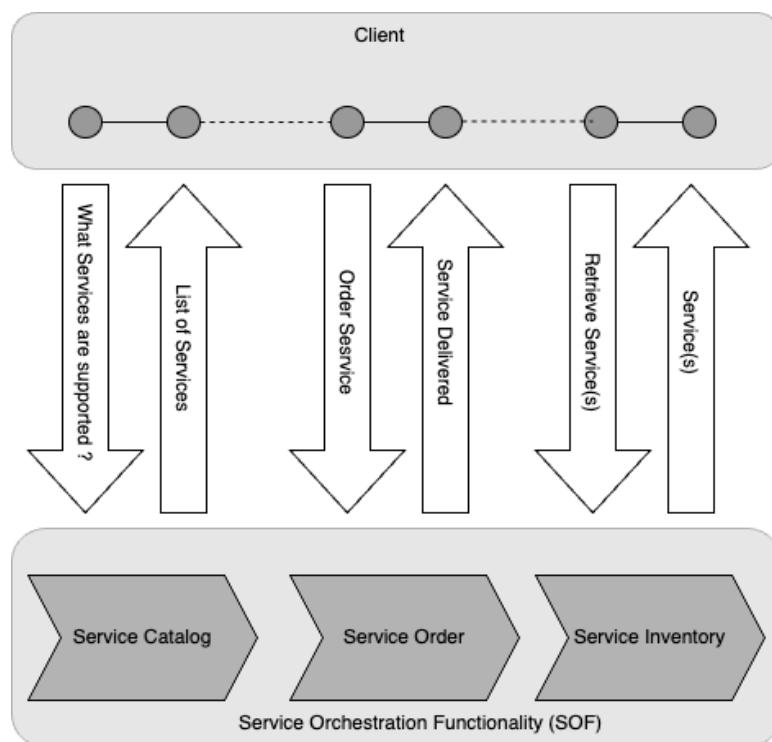


Figure 24-Service End-to-End Function Flow

Service Catalog – allows the Client to query SOF for available Services as well as what attributes are fixed and/or elastics with values/ranges.

Service Order – allows the Client to request the SOF to initiate and complete the fulfillment process of installation of a Service Offering, an update to an existing Service, or a disconnect of an existing Service.

Service Inventory – allows the Client to retrieve information about existing Service instances from the SOF's Service Inventory.

All the above-mentioned APIs are provided in the SDK together with accompanying Developer Guides. Please refer to those documents for more details and examples of functional APIs.

A.2 Integration of Service Specification into the Service Order API

The Service Order API is service-agnostic in the meaning that they serve as an interaction between the Client and the Server (SOF) and they do not contain any service-specific information in their specifications. To pass the service-specific information, an extension pattern is used. This applies to any of the Service APIs that carry service-specific information: Service Catalog, Service Order and Service Inventory [11].

The extension hosting type in the API data model is `MefServiceConfiguration`. The `@type` attribute of that type must be set of a value that uniquely identifies the service specification. See Figure 25 and Figure 26. A unique identifier for Mplify standard service specifications is in URN format and is assigned by Mplify. This identifier is provided as root schema `$id` and in service specification documentation.

The example below shows a header of a Carrier Ethernet Subscriber UNI, where `$id: urn:mef:lso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all` the above-mentioned URN:

```
$id: urn:mef:lso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all
$schema: http://json-schema.org/draft-07/schema#
title: MEF LSO Service - Carrier Ethernet Subscriber UNI Specification
```

In this case, this will be in format of examples below:

- `urn:mef:lso:spec:service:carrier-ethernet-subscriber-uni:v1.0.0:all`
- `urn:mef:lso:spec:service:carrier-ethernet-evc:v1.0.0:all`
- `urn:mef:lso:spec:service:carrier-ethernet-evc-end-point:v1.0.0:all`

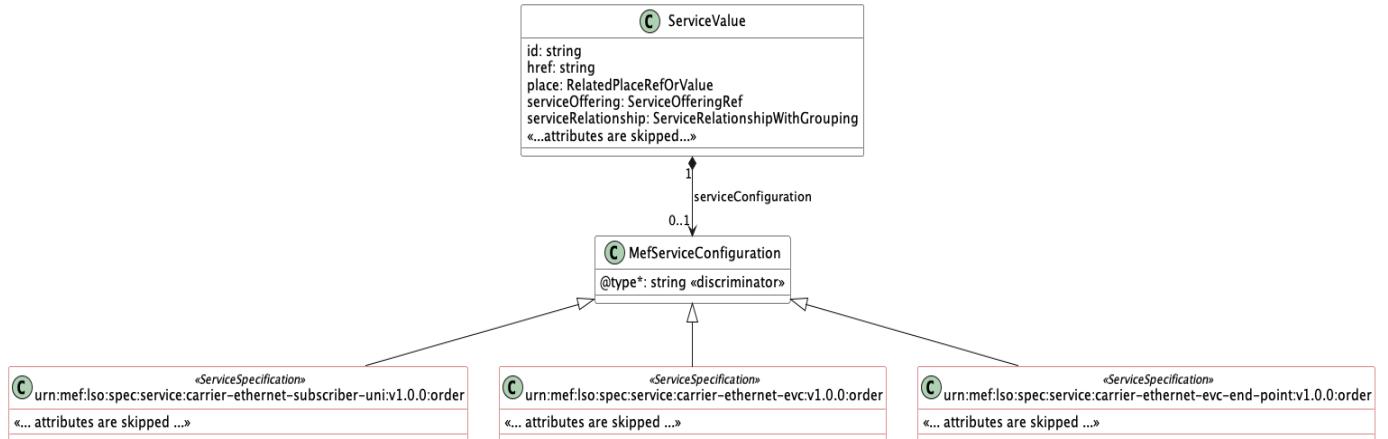


Figure 25-Extension Pattern: Subscriber Carrier Ethernet Service-Specific Extensions

- urn:mef:lso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all
- urn:mef:lso:spec:service:carrier-ethernet-ovc:v1.0.0:all
- urn:mef:lso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all
- urn:mef:lso:spec:service:carrier-ethernet-enni:v1.0.0:all
- urn:mef:lso:spec:service:carrier-ethernet-enni-service:v1.0.0:all
- urn:mef:lso:spec:service:carrier-ethernet-virtual-uni:v1.0.0:all

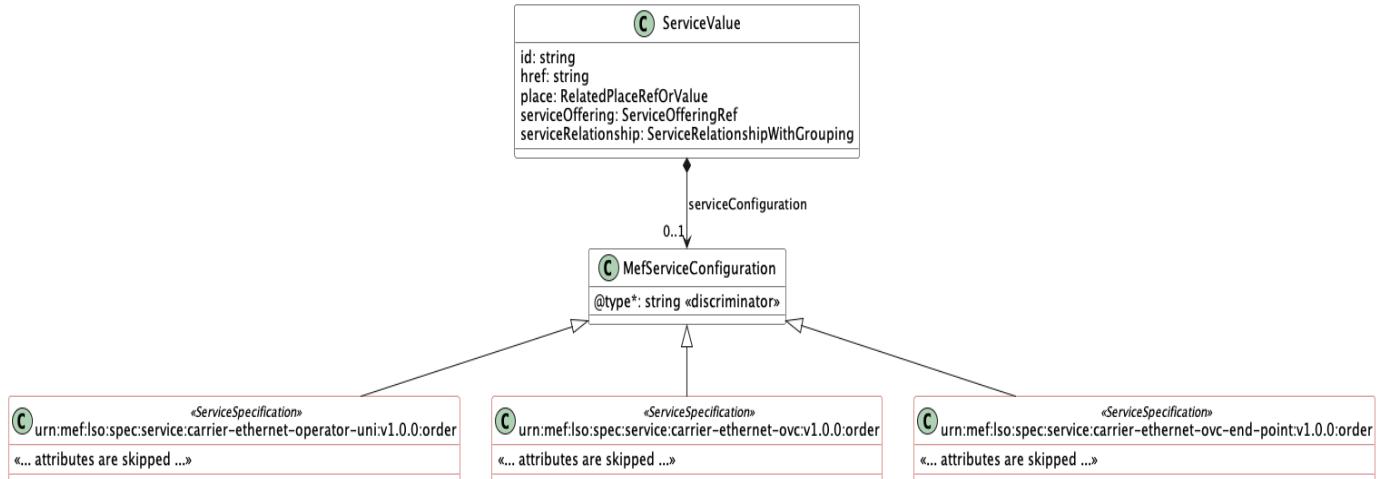


Figure 26-Extension Pattern: Operator Carrier Ethernet (1 of 2)

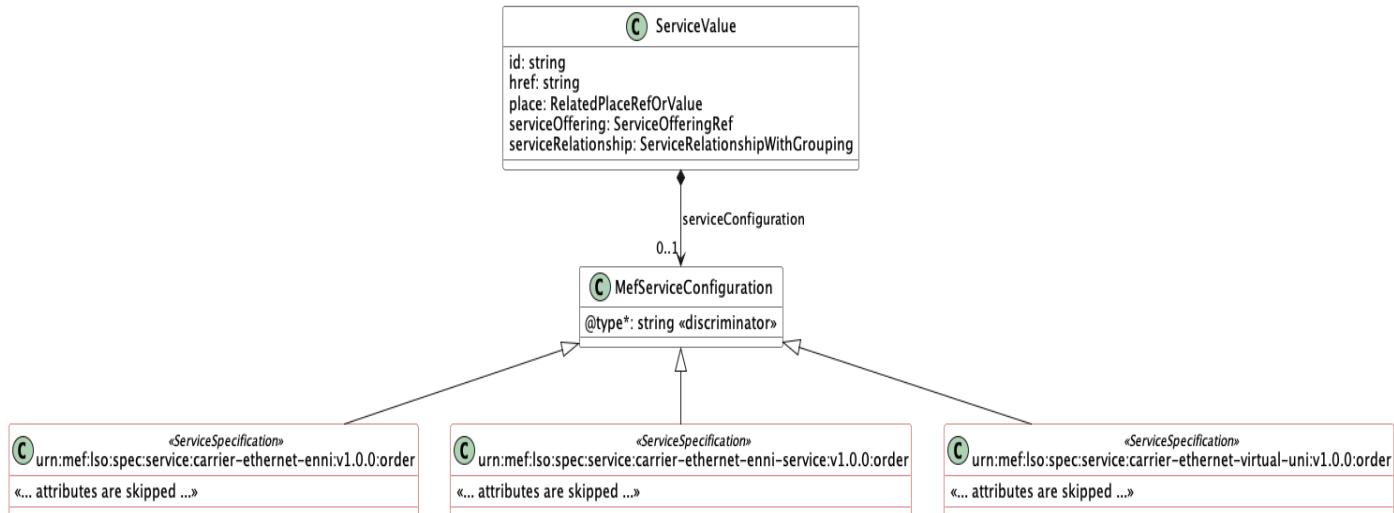


Figure 27-Extension Pattern: Operator Carrier Ethernet (2 of 2)

Use of non-Mplify standard service definitions is allowed. In such a case the schema identifier must be agreed upon between the Client and the SOF.

A.3 Service Order Create Process

The `ServiceOrderCreate` process is initiated by the Buyer/Client with the determination of the one or more `ServiceOrderItems` that will be part of a Service Order using the `ServiceOrderCreate`. Each Service Order Item through the Extension pattern is associated with a Mplify Service specific payload component (i.e., `CarrierEthernetSubscriberUni`, `CarrierEthernetEvcEndPoint`, `CarrierEthernetEvc`).

The Buyer/Client sends a request with a `ServiceOrderCreate` type in the body. The SOF performs request validation, assigns an `id`, and returns `ServiceOrder` type in the response body, with a state set to `acknowledged`. From this point, the `ServiceOrder` is ready for further processing. The Buyer/Client can track the progress of the process by either subscribing for notifications (Asynchronous operation) or by periodically polling (Synchronous operation) the `ServiceOrder`. The two patterns are illustrated in sequence diagrams below.

A.3.1 Interaction Flow – Polling process (Synchronous)

The sequence flow for the Synchronous or Polling process begins with a Buyer/Client initiating a build request for a `ServiceOrder_Create` with one or more `ServiceOrderItems`. `ServiceOrderItems` include, but are not limited to Operator UNI, Operator OVC End Point and OVC and associated relationships between resources.

The sequence begins with the Buyer/Client building the ServiceOrderCreate including the set of ServiceOrderItems. In the Synchronous operation of the API once the REST POST operation is sent the Buyer/Client needs to poll (REST GET) to determine the state of the request.

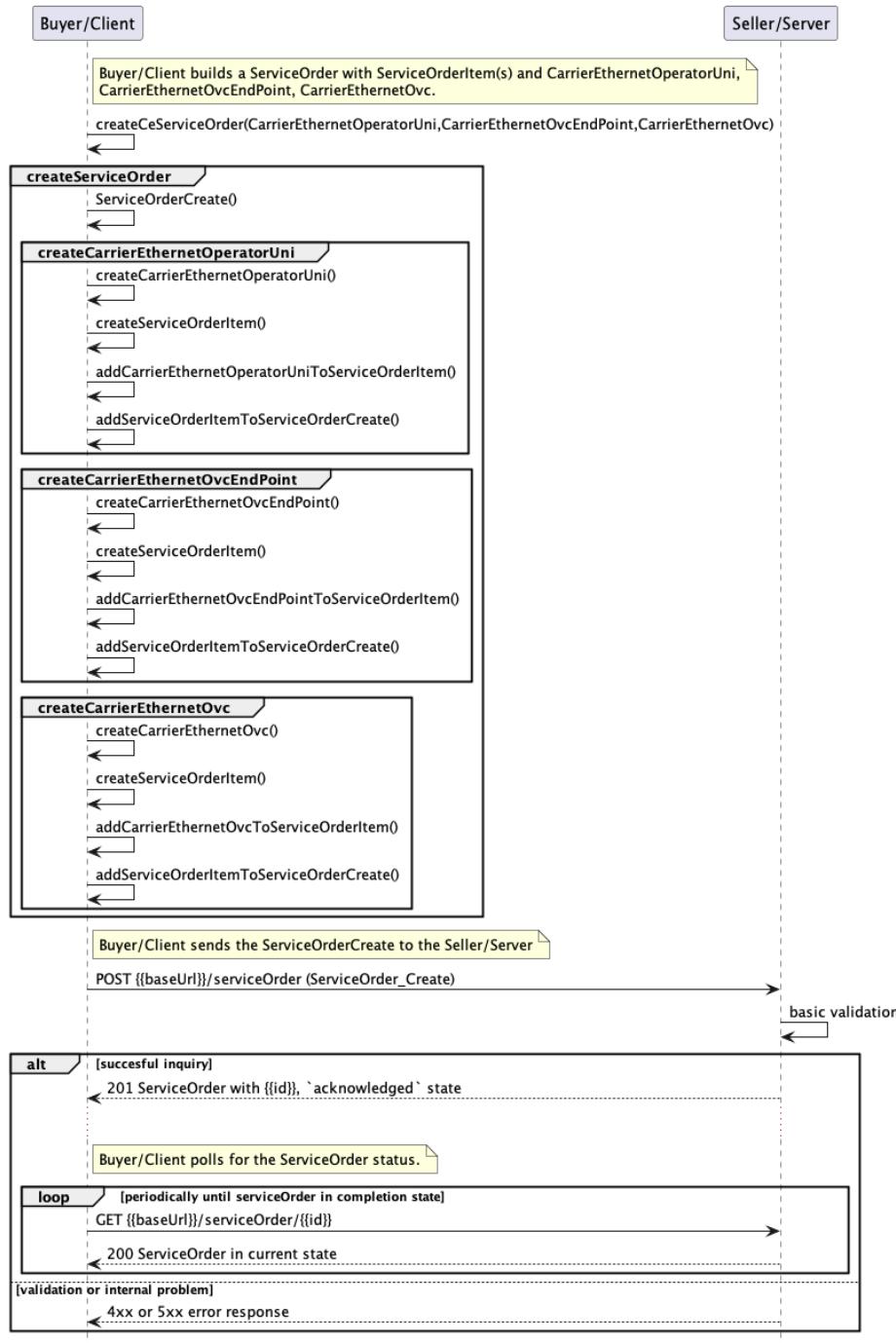


Figure 28-Service Order Polling process (Synchronous)

A.3.2 Interaction Flow – Notification process (Asynchronous)

The sequence flow for the Asynchronous or Notification process begins with the Buyer/Client subscribing to Service Order asynchronous events. The Buyer/Client informs the Seller/Server the callback URL to send notifications.

The Buyer/Client builds a request for a ServiceOrder_Create with one or more ServiceOrderItems. ServiceOrderItems include, but are not limited to Operator UNI, Operator OVC End Point and OVC and associated relationships between resources.

The Buyer/Client sends the ServiceOrderCreate in a REST POST to the Seller/Server. The Seller/Server will send asynchronous events with state updates the Buyer/Client.

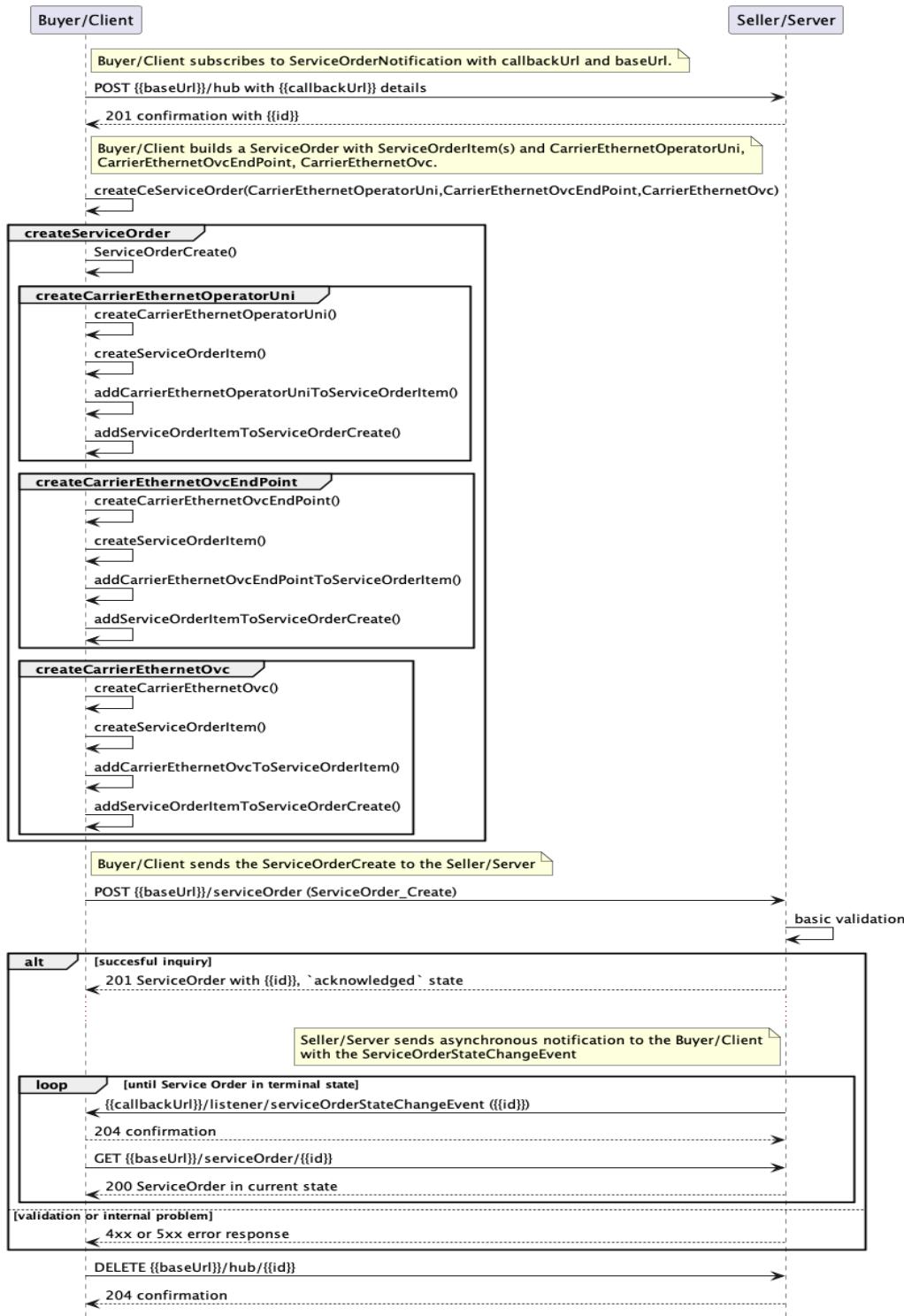


Figure 29- Service Order Notification process (Asynchronous)

Appendix B Service Order Operations

The following section provide details on the set of Service Order operations that is supported with the MEF 99.1 Service Ordering Management API (Envelope) and MEF 101 Service Schemas (Payload). The current set of operations available include:

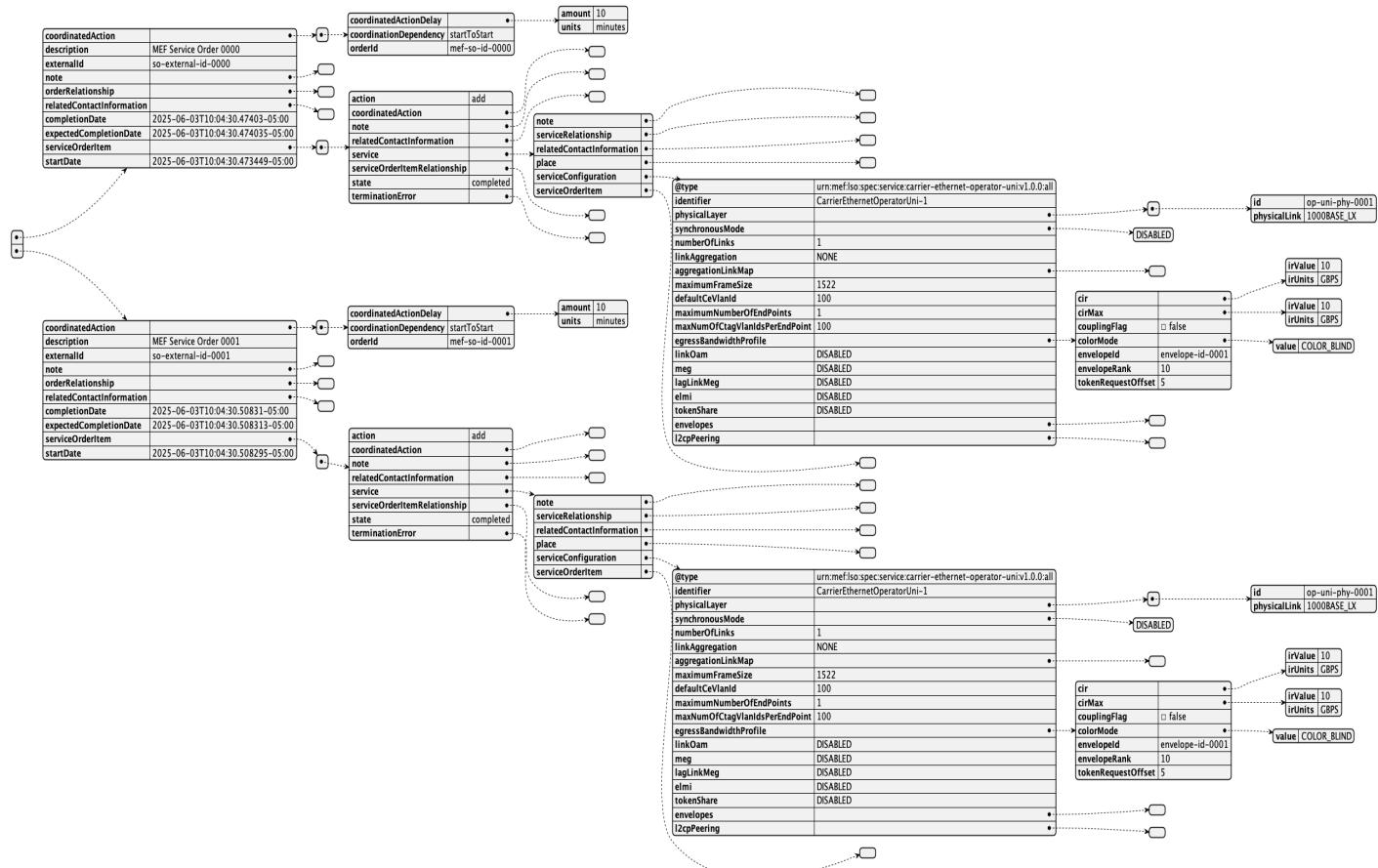
- GET /serviceOrder – List or find Service Order objects.
- POST /serviceOrder – Creates a Service Order.
- GET /serviceOrder/{id} – Retrieves a Service Order by ID.
- POST /hub – Register a listener
- DELETE /hub/{id} – Unregister a listener.
- GET /hub/{id} – Retrieve an Event Subscription by ID.

The remainder of this section will provide detailed JSON example of the REST operations and responses.

B.1 UC1: GET /serviceOrder and Response

The following section provides an example for a retrieval of list of Service Orders given query parameters: state, orderDate, completionDate, expectedCompletionDate, startDate. The REST request is:

```
GET /{{baseUrl}}/mefApi/legato/serviceOrderingManagement/v6/serviceOrder
```


Figure 30-List Service Order Response

The following snippet presents the actual JSON for the example Service Order List response. There are Operator UNIs in the response.

```
[
  {
    "coordinatedAction": [
      {
        "coordinatedActionDelay": {
          "amount": 10,
          "units": "minutes"
        },
        "coordinationDependency": "startToStart",
        "orderId": "mef-so-id-0000"
      }
    ],
    "description": "MEF Service Order 0000",
    "externalId": "so-external-id-0000",
    "note": [],
    "orderRelationship": [],
    "relatedContactInformation": [],
    "completionDate": "2025-06-03T10:04:30.47403-05:00",
    "expectedCompletionDate": "2025-06-03T10:04:30.474035-05:00",
    "serviceOrderItem": [
      ...
    ]
  }
]
```

```
{  
    "action": "add",  
    "coordinatedAction": [],  
    "note": [],  
    "relatedContactInformation": [],  
    "service": {  
        "note": [],  
        "serviceRelationship": [],  
        "relatedContactInformation": [],  
        "place": [],  
        "serviceConfiguration": {  
            "@type": "urn:mef:lso:spec:service:carrier-ethernet-operator-  
uni:v1.0.0:all",  
            "identifier": "CarrierEthernetOperatorUni-1",  
            "physicalLayer": [  
                {  
                    "id": "op-uni-phy-0001",  
                    "physicalLink": "1000BASE_LX"  
                }  
            ],  
            "synchronousMode": [  
                "DISABLED"  
            ],  
            "numberOfLinks": 1,  
            "linkAggregation": "NONE",  
            "aggregationLinkMap": [],  
            "maximumFrameSize": 1522,  
            "defaultCeVlanId": 100,  
            "maximumNumberOfEndPoints": 1,  
            "maxNumOfCtagVlanIdsPerEndPoint": 100,  
            "egressBandwidthProfile": {  
                "cir": {  
                    "irValue": 10,  
                    "irUnits": "GBPS"  
                },  
                "cirMax": {  
                    "irValue": 10,  
                    "irUnits": "GBPS"  
                },  
                "couplingFlag": false,  
                "colorMode": {  
                    "value": "COLOR_BLIND"  
                },  
                "envelopeId": "envelope-id-0001",  
                "envelopeRank": 10,  
                "tokenRequestOffset": 5  
            },  
            "linkOam": "DISABLED",  
            "meg": "DISABLED",  
            "lagLinkMeg": "DISABLED",  
            "elmi": "DISABLED",  
            "tokenShare": "DISABLED",  
            "envelopes": [],  
            "l2cpPeering": []  
        },  
        "serviceOrderItem": []  
    },  
    "serviceOrderItemRelationship": [],  
    "state": "completed",  
    "terminationError": []  
}
```

```
        ],
        "startDate": "2025-06-03T10:04:30.473449-05:00"
    },
    {
        "coordinatedAction": [
            {
                "coordinatedActionDelay": {
                    "amount": 10,
                    "units": "minutes"
                },
                "coordinationDependency": "startToStart",
                "orderId": "mef-so-id-0001"
            }
        ],
        "description": "MEF Service Order 0001",
        "externalId": "so-external-id-0001",
        "note": [],
        "orderRelationship": [],
        "relatedContactInformation": [],
        "completionDate": "2025-06-03T10:04:30.50831-05:00",
        "expectedCompletionDate": "2025-06-03T10:04:30.508313-05:00",
        "serviceOrderItem": [
            {
                "action": "add",
                "coordinatedAction": [],
                "note": [],
                "relatedContactInformation": [],
                "service": {
                    "note": [],
                    "serviceRelationship": [],
                    "relatedContactInformation": [],
                    "place": [],
                    "serviceConfiguration": {
                        "@type": "urn:mef:lso:spec:service:carrier-ethernet-operator-
uni:v1.0.0:all",
                        "identifier": "CarrierEthernetOperatorUni-1",
                        "physicalLayer": [
                            {
                                "id": "op-uni-phy-0001",
                                "physicalLink": "1000BASE_LX"
                            }
                        ],
                        "synchronousMode": [
                            "DISABLED"
                        ],
                        "numberOfLinks": 1,
                        "linkAggregation": "NONE",
                        "aggregationLinkMap": [],
                        "maximumFrameSize": 1522,
                        "defaultCeVlanId": 100,
                        "maximumNumberOfEndPoints": 1,
                        "maxNumOfCtagVlanIdsPerEndPoint": 100,
                        "egressBandwidthProfile": {
                            "cir": {
                                "irValue": 10,
                                "irUnits": "GBPS"
                            },
                            "cirMax": {
                                "irValue": 10,
                                "irUnits": "GBPS"
                            }
                        },
                        "multicastForwarding": [
                            {
                                "group": "224.0.0.1"
                            }
                        ]
                    }
                }
            }
        ]
    }
}
```

```
        "couplingFlag": false,
        "colorMode": {
            "value": "COLOR_BLIND"
        },
        "envelopeId": "envelope-id-0001",
        "envelopeRank": 10,
        "tokenRequestOffset": 5
    },
    "linkOam": "DISABLED",
    "meg": "DISABLED",
    "lagLinkMeg": "DISABLED",
    "elmi": "DISABLED",
    "tokenShare": "DISABLED",
    "envelopes": [],
    "l2cpPeering": []
},
"serviceOrderItem": []
},
"serviceOrderItemRelationship": [],
"state": "completed",
"terminationError": []
}
],
"startDate": "2025-06-03T10:04:30.508295-05:00"
}
]
```

B.2 UC2: POST /serviceOrder and Response

The following section provides an example of a Service Order Create with all support actions (ADD, MODIFY, DELETE) and corresponding response. The payload for the request is shown in Figure 31. The example is for an Access E-Line service. The REST request:

```
POST /{baseUrl}/mefApi/legato/serviceOrderingManagement/v6/serviceOrder
```

The Service Order Request shown in Figure 31 is a partial request for the diagram to be readable. See the complete request in JSON following the JSON figure that follows.

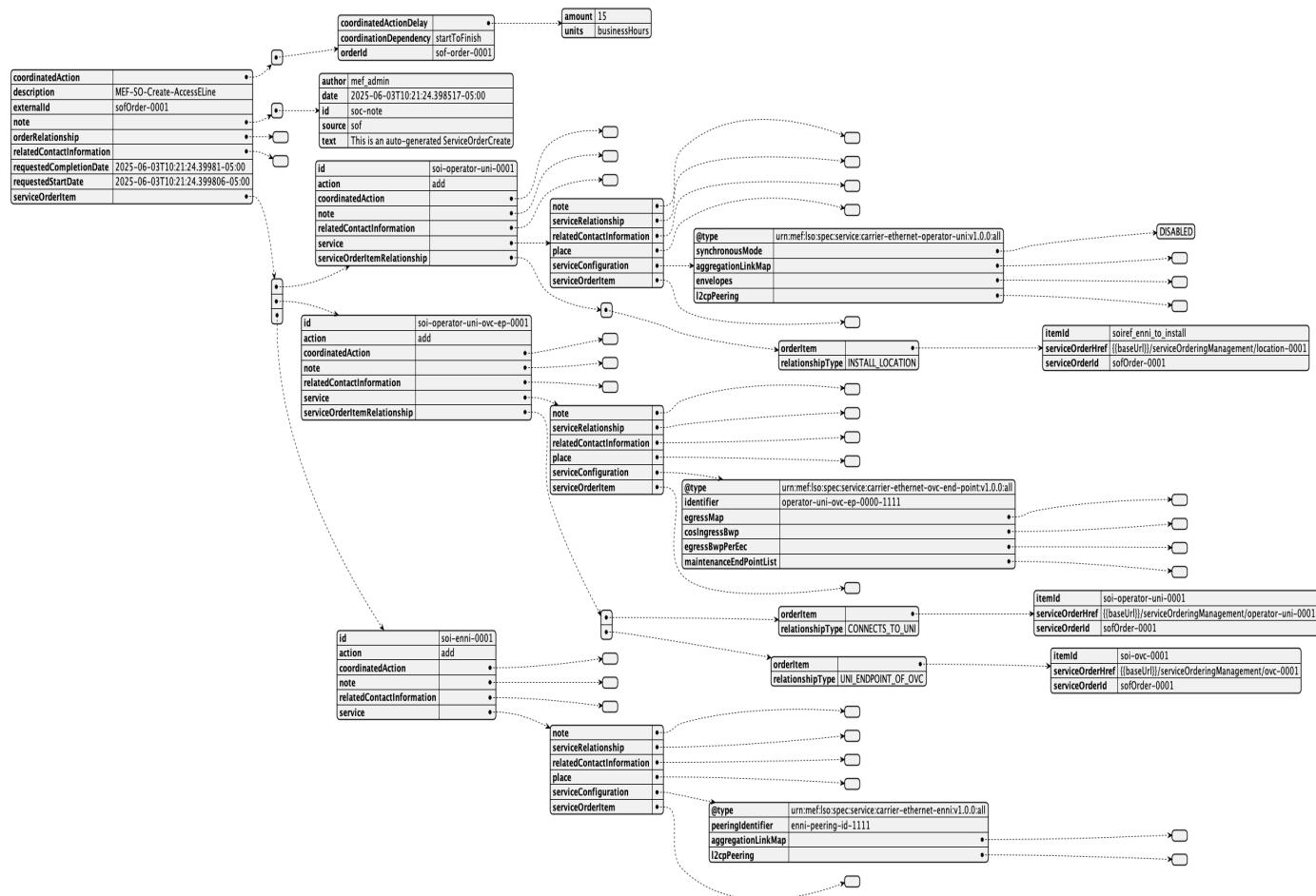


Figure 31-Service Order Request-action=ADD

The following snippet presents the actual JSON for the example Service Order Create request. There are six (6) Service Order Items for Access Eline service: Operator UNI, Operator UNI OVC End Point, ENNI, ENNI Service, ENNI OVC End Point and OVC.

```
{  
    "coordinatedAction" : [ {  
        "coordinatedActionDelay" : {  
            "amount" : 15,  
            "units" : "businessHours"  
        },  
        "coordinationDependency" : "startToFinish",  
        "orderId" : "sof-order-0001"  
    } ],  
    "description" : "MEF-SO-Create-AccessELine",  
    "externalId" : "sofOrder-0001",  
    "note" : [ {  
        "author" : "mef_admin",  
        "date" : "2025-06-03T10:21:24.398517-05:00",  
        "id" : "soc-note",  
        "source" : "sof",  
        "text" : "This is an auto-generated ServiceOrderCreate"  
    } ]  
}
```

```
    } ],
    "orderRelationship" : [ ],
    "relatedContactInformation" : [ ],
    "requestedCompletionDate" : "2025-06-03T10:21:24.39981-05:00",
    "requestedStartDate" : "2025-06-03T10:21:24.399806-05:00",
    "serviceOrderItem" : [ {
        "id" : "soi-operator-uni-0001",
        "action" : "add",
        "coordinatedAction" : [ ],
        "note" : [ ],
        "relatedContactInformation" : [ ],
        "service" : {
            "note" : [ ],
            "serviceRelationship" : [ ],
            "relatedContactInformation" : [ ],
            "place" : [ ],
            "serviceConfiguration" : {
                "@type" : "urn:mef:lso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all",
                "physicalLayer" : [ {
                    "id" : "operator-uni-0001",
                    "physicalLink" : "1000BASE_LX"
                } ],
                "synchronousMode" : [ "DISABLED" ],
                "aggregationLinkMap" : [ ],
                "envelopes" : [ ],
                "l2cpPeering" : [ ]
            },
            "serviceOrderItem" : [ ]
        },
        "serviceOrderItemRelationship" : [ {
            "orderItem" : {
                "itemId" : "soiref_enni_to_install",
                "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/location-0001",
                "serviceOrderId" : "sofOrder-0001"
            },
            "relationshipType" : "INSTALL_LOCATION"
        } ]
    }, {
        "id" : "soi-operator-uni-ovc-ep-0001",
        "action" : "add",
        "coordinatedAction" : [ ],
        "note" : [ ],
        "relatedContactInformation" : [ ],
        "service" : {
            "note" : [ ],
            "serviceRelationship" : [ ],
            "relatedContactInformation" : [ ],
            "place" : [ ],
            "serviceConfiguration" : {
                "@type" : "urn:mef:lso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all",
                "identifier" : "operator-uni-ovc-ep-0000-1111",
                "endPointMap" : {
                    "ovcEndPointMapFormT" : [ ],
                    "ovcEndPointMapFormV" : [ ],
                    "ovcEndPointMapFormU" : [ {
                        "ceVlanIdList" : {
                            "vlanIdList" : [ 100, 101, 102, 103 ]
                        }
                    } ],
                    "ovcEndPointMapFormE" : [ ]
                }
            }
        }
    }
],
```

```
        "egressMap" : [ ],
        "cosIngressBwp" : [ ],
        "egressBwpPerEec" : [ ],
        "maintenanceEndPointList" : [ ]
    },
    "serviceOrderItem" : [ ]
},
"serviceOrderItemRelationship" : [
    "orderItem" : {
        "itemId" : "soi-operator-uni-0001",
        "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/operator-uni-0001",
        "serviceOrderId" : "sofOrder-0001"
    },
    "relationshipType" : "CONNECTS_TO_UNI"
},
{
    "orderItem" : {
        "itemId" : "soi-ovc-0001",
        "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/ovc-0001",
        "serviceOrderId" : "sofOrder-0001"
    },
    "relationshipType" : "UNI_ENDPOINT_OF_OVC"
}
},
{
    "id" : "soi-enni-0001",
    "action" : "add",
    "coordinatedAction" : [ ],
    "note" : [ ],
    "relatedContactInformation" : [ ],
    "service" : {
        "note" : [ ],
        "serviceRelationship" : [ ],
        "relatedContactInformation" : [ ],
        "place" : [ ],
        "serviceConfiguration" : {
            "@type" : "urn:mef:lso:spec:service:carrier-ethernet-enni:v1.0.0:all",
            "peeringIdentifier" : "enni-peering-id-1111",
            "physicalLayer" : [
                {
                    "id" : "enni-phy-id-0001",
                    "physicalLink" : "1000BASE_CX"
                }
            ],
            "aggregationLinkMap" : [ ],
            "l2cpPeering" : [ ]
        },
        "serviceOrderItem" : [ ]
    },
    "serviceOrderItemRelationship" : [
        "orderItem" : {
            "itemId" : "INSTALL_LOCATION_Z",
            "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/location-0002",
            "serviceOrderId" : "sofOrder-0001"
        },
        "relationshipType" : "INSTALL_LOCATION"
    },
    {
        "orderItem" : {
            "itemId" : "soi-enni-service-0001",
            "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/enni-service-0001",
            "serviceOrderId" : "sofOrder-0001"
        },
        "relationshipType" : "REQUIRES"
    }
],
{
    "Mplify W101" : "Mplify Alliance 2025. All rights reserved. Any reproduction of this document, or any portion thereof, shall contain the following statement: 'Reproduced with permission of Mplify Alliance.' No user of this document is authorized to modify any of the information contained herein."
}
```

```
"id" : "soi-enni-service-0001",
"action" : "add",
"coordinatedAction" : [ ],
"note" : [ ],
"relatedContactInformation" : [ ],
"service" : {
    "note" : [ ],
    "serviceRelationship" : [ ],
    "relatedContactInformation" : [ ],
    "place" : [ ],
    "serviceConfiguration" : {
        "@type" : "urn:mef:lso:spec:service:carrier-ethernet-enni-service:v1.0.0:all",
        "operatorEnniIdentifier" : "operator-enni-id-0001",
        "svlanIdControl" : {
            "value" : "FULL"
        },
        "maximumNumberOfOvcs" : 1,
        "maximumNumberOfOvcEndPointsPerOvc" : 1,
        "tokenShare" : "DISABLED",
        "envelopes" : [ ]
    },
    "serviceOrderItem" : [ ]
},
"serviceOrderItemRelationship" : [ ]
},
{
"id" : "soi-enni-ovc-ep-0001",
"action" : "add",
"coordinatedAction" : [ ],
"note" : [ ],
"relatedContactInformation" : [ ],
"service" : {
    "note" : [ ],
    "serviceRelationship" : [ ],
    "relatedContactInformation" : [ ],
    "place" : [ ],
    "serviceConfiguration" : {
        "@type" : "urn:mef:lso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all",
        "identifier" : "ovc-ep-0000-2222",
        "endPointMap" : {
            "ovcEndPointMapForm" : "FORM_E",
            "ovcEndPointMapFormT" : [ ],
            "ovcEndPointMapFormV" : [ ],
            "ovcEndPointMapFormU" : [ ],
            "ovcEndPointMapFormE" : [ {
                "sVlanIdList" : {
                    "vlanIdList" : [ 100, 101, 102, 103 ]
                }
            } ]
        },
        "egressMap" : [ ],
        "cosIngressBwp" : [ ],
        "egressBwpPerEec" : [ ],
        "maintenanceEndPointList" : [ ]
    },
    "serviceOrderItem" : [ ]
},
"serviceOrderItemRelationship" : [ {
    "orderItem" : {
        "itemId" : "soi-enni-0001",
        "serviceOrderHref" : "{{baseUrl}}/serviceOrderingManagement/operator-enni-0001",
        "serviceOrderId" : "sofOrder-0001"
    }
}]
```

```
        },
        "relationshipType" : "CONNECTS_TO_ENNI"
    },
    {
        "orderItem" : {
            "itemId" : "soi-ovc-0001",
            "serviceOrderHref" : "{baseUrl}/serviceOrderingManagement/ovc-0001",
            "serviceOrderId" : "sofOrder-0001"
        },
        "relationshipType" : "ENNI_ENDPOINT_OF_OVC"
    }
},
{
    "id" : "soi-ovc-0001",
    "action" : "add",
    "coordinatedAction" : [ ],
    "note" : [ ],
    "relatedContactInformation" : [ ],
    "service" : {
        "note" : [ ],
        "serviceRelationship" : [ ],
        "relatedContactInformation" : [ ],
        "place" : [ ],
        "serviceConfiguration" : {
            "@type" : "urn:mef:lso:spec:service:carrier-ethernet-ovc:v1.0.0:all",
            "maximumNumberOfUniOvcEndPoints" : 1,
            "maximumNumberOfEnniOvcEndPoints" : 1,
            "ceVlanIdPreservation" : "PRESERVE",
            "ceVlanPcpPreservation" : "ENABLED",
            "ceVlanDeiPreservation" : "ENABLED",
            "listOfCosNames" : [ "best-effort" ]
        },
        "serviceOrderItem" : [ ]
    },
    "serviceOrderItemRelationship" : [ ]
}
}
```

The SOF response to the `CreateServiceOrder` is a `ServiceOrder` which is shown below. The main types used for the response are `ServiceOrder` and `ServiceOrderItem`. The one or more `ServiceOrderItems` will reference a specific Carrier Ethernet resource as part of the payload and association(s) to other `ServiceOrderItems` as an attribute in the envelope. The response echoes back all the attributes as provided by the Client/Buyer and contains the same number of `ServiceOrderItems` as in the request.

The Service Order Request Response shown in Figure 32 is a partial request for the diagram to be readable. See the complete request in JSON following the JSON figure that follows.

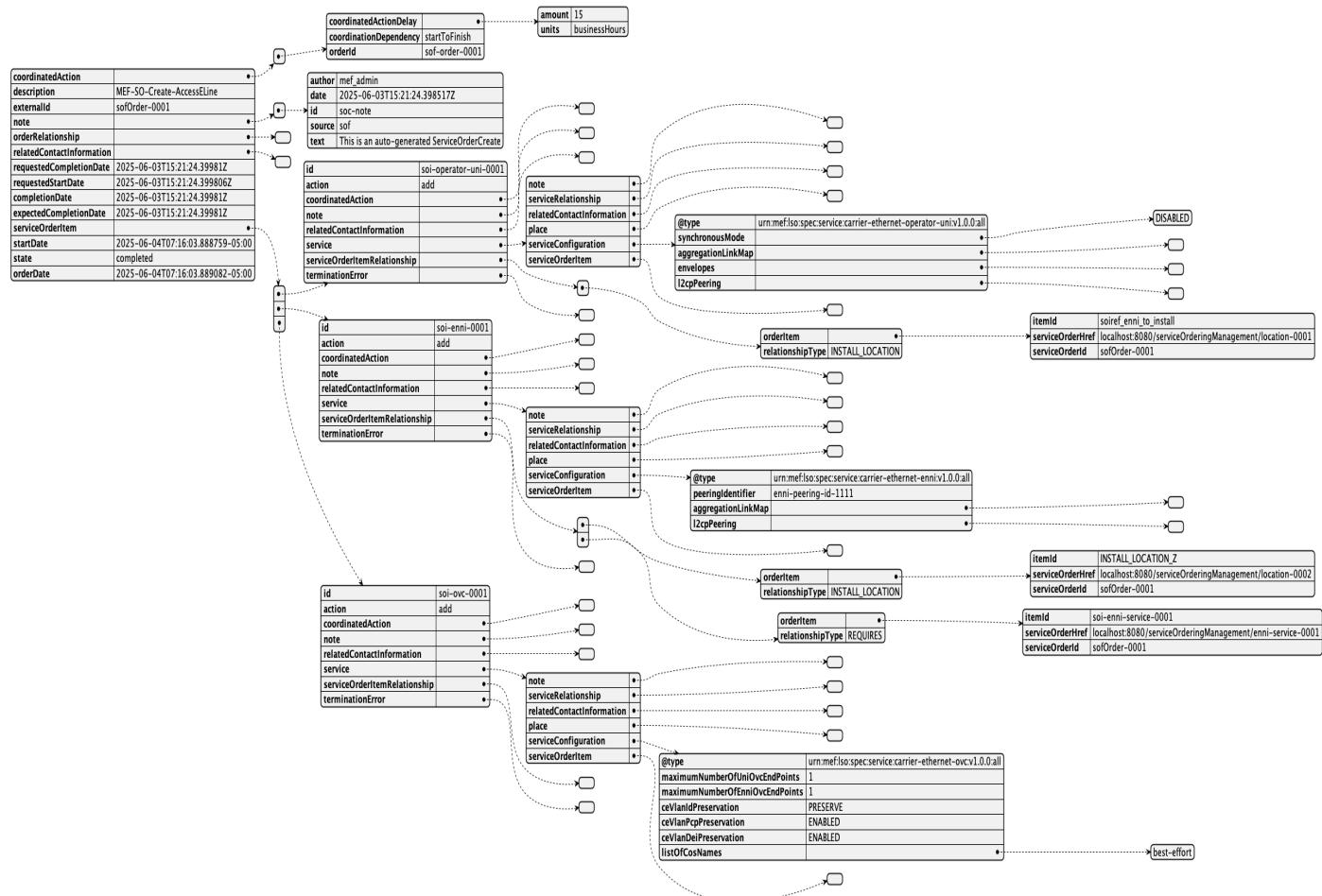


Figure 32-Service Order Response

The following snippet presents the actual JSON for the example Service Order Create response. There are six (6) Service Order Items for Access Eline service: Operator UNI, Operator UNI OVC End Point, ENNI, ENNI Service, ENNI OVC End Point and OVC.

```
{
    "coordinatedAction": [
        {
            "coordinatedActionDelay": {
                "amount": 15,
                "units": "businessHours"
            },
            "coordinationDependency": "startToFinish",
            "orderId": "sof-order-0001"
        }
    ],
    "description": "MEF-SO-Create-AccessELine",
    "externalId": "sofOrder-0001",
    "note": [
        {
            "author": "mef_admin",
            "date": "2025-06-03T15:21:24.398517Z",
            "text": "This is an auto-generated ServiceOrderCreate"
        }
    ]
}
```

```
"id": "soc-note",
  "source": "sof",
  "text": "This is an auto-generated ServiceOrderCreate"
},
],
"orderRelationship": [],
"relatedContactInformation": [],
"requestedCompletionDate": "2025-06-03T15:21:24.39981Z",
"requestedStartDate": "2025-06-03T15:21:24.399806Z",
"completionDate": "2025-06-03T15:21:24.39981Z",
"expectedCompletionDate": "2025-06-03T15:21:24.39981Z",
"serviceOrderItem": [
  {
    "id": "soi-operator-uni-0001",
    "action": "add",
    "coordinatedAction": [],
    "note": [],
    "relatedContactInformation": [],
    "service": {
      "note": [],
      "serviceRelationship": [],
      "relatedContactInformation": [],
      "place": [],
      "serviceConfiguration": {
        "@type": "urn:mef:lso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all",
        "physicalLayer": [
          {
            "id": "operator-uni-0001",
            "physicalLink": "1000BASE_LX"
          }
        ],
        "synchronousMode": [
          "DISABLED"
        ],
        "aggregationLinkMap": [],
        "envelopes": [],
        "l2cpPeering": []
      },
      "serviceOrderItem": []
    },
    "serviceOrderItemRelationship": [
      {
        "orderItem": {
          "itemId": "soiref_enni_to_install",
          "serviceOrderHref": "localhost:8080/serviceOrderingManagement/location-0001",
          "serviceOrderId": "sofOrder-0001"
        },
        "relationshipType": "INSTALL_LOCATION"
      }
    ],
    "terminationError": []
  },
  {
    "id": "soi-operator-uni-ovc-ep-0001",
    "action": "add",
    "coordinatedAction": [],
    "note": [],
    "relatedContactInformation": [],
    "service": {
      "note": []
    }
  }
]
```

```
"serviceRelationship": [],
"relatedContactInformation": [],
"place": [],
"serviceConfiguration": {
    "@type": "urn:mef:lso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all",
    "identifier": "operator-uni-ovc-ep-0000-1111",
    "endPointMap": {
        "ovcEndPointMapFormT": [],
        "ovcEndPointMapFormV": [],
        "ovcEndPointMapFormU": [
            {
                "ceVlanIdList": {
                    "vlanIdList": [
                        100,
                        101,
                        102,
                        103
                    ]
                }
            }
        ],
        "ovcEndPointMapFormE": []
    },
    "egressMap": [],
    "cosIngressBwp": [],
    "egressBwpPerEec": [],
    "maintenanceEndPointList": []
},
"serviceOrderItem": []
},
"serviceOrderItemRelationship": [
{
    "orderItem": {
        "itemId": "soi-operator-uni-0001",
        "serviceOrderHref": "localhost:8080/serviceOrderingManagement/operator-uni-0001",
        "serviceOrderId": "sofOrder-0001"
    },
    "relationshipType": "CONNECTS_TO_UNI"
},
{
    "orderItem": {
        "itemId": "soi-ovc-0001",
        "serviceOrderHref": "localhost:8080/serviceOrderingManagement/ovc-0001",
        "serviceOrderId": "sofOrder-0001"
    },
    "relationshipType": "UNI_ENDPOINT_OF_OVC"
}
],
"terminationError": []
},
{
    "id": "soi-enni-0001",
    "action": "add",
    "coordinatedAction": [],
    "note": [],
    "relatedContactInformation": [],
    "service": {
        "note": [],
        "serviceRelationship": []
    }
}
```

```
"relatedContactInformation": [],
"place": [],
"serviceConfiguration": {
    "@type": "urn:mef:lso:spec:service:carrier-ethernet-enni:v1.0.0:all",
    "peeringIdentifier": "enni-peering-id-1111",
    "physicalLayer": [
        {
            "id": "enni-phy-id-0001",
            "physicalLink": "1000BASE_CX"
        }
    ],
    "aggregationLinkMap": [],
    "l2cpPeering": []
},
"serviceOrderItem": []
},
"serviceOrderItemRelationship": [
{
    "orderItem": {
        "itemId": "INSTALL_LOCATION_Z",
        "serviceOrderHref": "localhost:8080/serviceOrderingManagement/location-0002",
        "serviceOrderId": "sofOrder-0001"
    },
    "relationshipType": "INSTALL_LOCATION"
},
{
    "orderItem": {
        "itemId": "soi-enni-service-0001",
        "serviceOrderHref": "localhost:8080/serviceOrderingManagement/enni-service-0001",
        "serviceOrderId": "sofOrder-0001"
    },
    "relationshipType": "REQUIRES"
}
],
"terminationError": []
},
{
    "id": "soi-enni-service-0001",
    "action": "add",
    "coordinatedAction": [],
    "note": [],
    "relatedContactInformation": [],
    "service": {
        "note": [],
        "serviceRelationship": [],
        "relatedContactInformation": [],
        "place": [],
        "serviceConfiguration": {
            "@type": "urn:mef:lso:spec:service:carrier-ethernet-enni-service:v1.0.0:all",
            "operatorEnniIdentifier": "operator-enni-id-0001",
            "svlanIdControl": {
                "value": "FULL"
            },
            "maximumNumberOfOvcs": 1,
            "maximumNumberOfOvcEndPointsPerOvc": 1,
            "tokenShare": "DISABLED",
            "envelopes": []
        },
        "serviceOrderItem": []
    }
}
```

```
        },
        "serviceOrderItemRelationship": [],
        "terminationError": []
    },
    {
        "id": "soi-enni-ovc-ep-0001",
        "action": "add",
        "coordinatedAction": [],
        "note": [],
        "relatedContactInformation": [],
        "service": {
            "note": [],
            "serviceRelationship": [],
            "relatedContactInformation": [],
            "place": [],
            "serviceConfiguration": {
                "@type": "urn:mef:lso:spec:service:carrier-ethernet-ovc-end-point:v1.0.0:all",
                "identifier": "ovc-ep-0000-2222",
                "endPointMap": {
                    "ovcEndPointMapForm": "FORM_E",
                    "ovcEndPointMapFormT": [],
                    "ovcEndPointMapFormV": [],
                    "ovcEndPointMapFormU": [],
                    "ovcEndPointMapFormE": [
                        {
                            "svlanIdList": {
                                "vlanIdList": [
                                    100,
                                    101,
                                    102,
                                    103
                                ]
                            }
                        }
                    ]
                },
                "egressMap": [],
                "cosIngressBwp": [],
                "egressBwpPerEec": [],
                "maintenanceEndPointList": []
            },
            "serviceOrderItem": []
        },
        "serviceOrderItemRelationship": [
            {
                "orderItem": {
                    "itemId": "soi-enni-0001",
                    "serviceOrderHref": "localhost:8080/serviceOrderingManagement/operator-enni-0001",
                    "serviceOrderId": "sofOrder-0001"
                },
                "relationshipType": "CONNECTS_TO_ENNI"
            },
            {
                "orderItem": {
                    "itemId": "soi-ovc-0001",
                    "serviceOrderHref": "localhost:8080/serviceOrderingManagement/ovc-0001",
                    "serviceOrderId": "sofOrder-0001"
                },
                "relationshipType": "ENNI_ENDPOINT_OF_OVC"
            }
        ]
    }
}
```

```
        }
    ],
    "terminationError": []
},
{
    "id": "soi-ovc-0001",
    "action": "add",
    "coordinatedAction": [],
    "note": [],
    "relatedContactInformation": [],
    "service": {
        "note": [],
        "serviceRelationship": [],
        "relatedContactInformation": [],
        "place": [],
        "serviceConfiguration": {
            "@type": "urn:mef:lso:spec:service:carrier-ethernet-ovc:v1.0.0:all",
            "maximumNumberOfUniOvcEndPoints": 1,
            "maximumNumberOfEnniOvcEndPoints": 1,
            "ceVlanIdPreservation": "PRESERVE",
            "ceVlanPcpPreservation": "ENABLED",
            "ceVlanDeiPreservation": "ENABLED",
            "listOfCosNames": [
                "best-effort"
            ]
        },
        "serviceOrderItem": []
    },
    "serviceOrderItemRelationship": [],
    "terminationError": []
}
],
"startDate": "2025-06-04T07:16:03.888759-05:00",
"state": "completed",
"orderDate": "2025-06-04T07:16:03.889082-05:00"
}
```

B.2.1 UC2b: Action-Modify

This section guides through all the steps of Service Order API that is needed to be performed to successfully modify a service.

NOTE: SOF is free to mandate some of these steps.

NOTE: As the examples of steps in many cases will replicate the service-specific information, in some of the snippets some parts of it will be omitted for better readability.

There are rules for all request items for creation requests (Service Order):

- item.action must be set to modify
- item.service.id must be provided.
- service.serviceConfiguration must contain all desired configurations

B.2.2 UC2c: Action-Delete

This section guides through all the steps of Service Order API that is needed to be performed to successfully delete a service.

NOTE: SOF is free to mandate some of these steps.

There are rules for all request items for creation requests (Service Order):

- item.action for each Service Order Item must be set to delete

B.3 UC3: GET /serviceOrder/{id} and Response

The following section provides an example for a retrieval of a Service Order with a unique identifier. The REST request is:

```
GET /{{baseUrl}}/mefApi/legato/serviceOrderingManagement/v6/serviceOrder/{id}
```

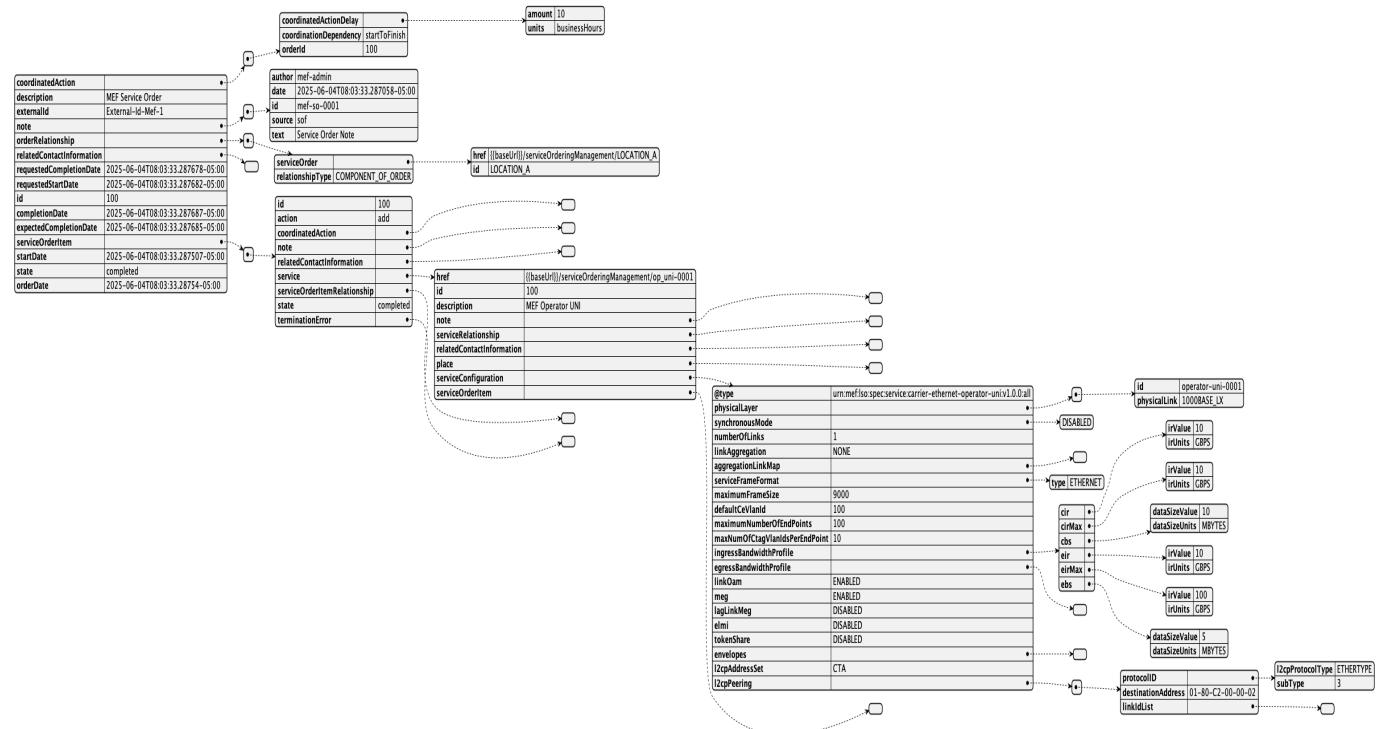


Figure 33- GET Service Order by ID Response

The following snippet presents the actual JSON for the example Service Order by ID response. There is one Operator UNI in the response.

{

```
"coordinatedAction": [
    {
        "coordinatedActionDelay": {
            "amount": 10,
            "units": "businessHours"
        },
        "coordinationDependency": "startToFinish",
        "orderId": "100"
    }
],
"description": "MEF Service Order",
"externalId": "External-Id-Mef-1",
"note": [
    {
        "author": "mef-admin",
        "date": "2025-06-04T08:03:33.287058-05:00",
        "id": "mef-so-0001",
        "source": "sof",
        "text": "Service Order Note"
    }
],
"orderRelationship": [
    {
        "serviceOrder": {
            "href": "{baseUrl}/serviceOrderingManagement/LOCATION_A",
            "id": "LOCATION_A"
        },
        "relationshipType": "COMPONENT_OF_ORDER"
    }
],
"relatedContactInformation": [],
"requestedCompletionDate": "2025-06-04T08:03:33.287678-05:00",
"requestedStartDate": "2025-06-04T08:03:33.287682-05:00",
"id": "100",
"completionDate": "2025-06-04T08:03:33.287687-05:00",
"expectedCompletionDate": "2025-06-04T08:03:33.287685-05:00",
"serviceOrderItem": [
    {
        "id": "100",
        "action": "add",
        "coordinatedAction": [],
        "note": [],
        "relatedContactInformation": [],
        "service": {
            "href": "{baseUrl}/serviceOrderingManagement/op_uni-0001",
            "id": "100",
            "description": "MEF Operator UNI",
            "note": [],
            "serviceRelationship": [],
            "relatedContactInformation": [],
            "place": [],
            "serviceConfiguration": {
                "@type": "urn:mef:lso:spec:service:carrier-ethernet-operator-uni:v1.0.0:all",
                "physicalLayer": [
                    {
                        "id": "operator-uni-0001",
                        "physicalLink": "1000BASE_LX"
                    }
                ],
                "synchronousMode": [
                    "DISABLED"
                ]
            }
        }
    }
]
```

```
        ],
        "numberOfLinks": 1,
        "linkAggregation": "NONE",
        "aggregationLinkMap": [],
        "serviceFrameFormat": {
            "type": "ETHERNET"
        },
        "maximumFrameSize": 9000,
        "defaultCeVlanId": 100,
        "maximumNumberOfEndPoints": 100,
        "maxNumOfCtagVlanIdsPerEndPoint": 10,
        "ingressBandwidthProfile": {
            "cir": {
                "irValue": 10,
                "irUnits": "GBPS"
            },
            "cirMax": {
                "irValue": 10,
                "irUnits": "GBPS"
            },
            "cbs": {
                "dataSizeValue": 10,
                "dataSizeUnits": "MBYTES"
            },
            "eir": {
                "irValue": 10,
                "irUnits": "GBPS"
            },
            "eirMax": {
                "irValue": 100,
                "irUnits": "GBPS"
            },
            "ebs": {
                "dataSizeValue": 5,
                "dataSizeUnits": "MBYTES"
            }
        },
        "egressBandwidthProfile": {},
        "linkOam": "ENABLED",
        "meg": "ENABLED",
        "lagLinkMeg": "DISABLED",
        "elmi": "DISABLED",
        "tokenShare": "DISABLED",
        "envelopes": [],
        "l2cpAddressSet": "CTA",
        "l2cpPeering": [
            {
                "protocolID": {
                    "l2cpProtocolType": "ETHERTYPE",
                    "subType": 3
                },
                "destinationAddress": "01-80-C2-00-00-02",
                "linkIdList": []
            }
        ]
    },
    "serviceOrderItem": []
},
"serviceOrderItemRelationship": [],
"state": "completed",
"terminationError": []
```

```
        },
    ],
    "startDate": "2025-06-04T08:03:33.287507-05:00",
    "state": "completed",
    "orderDate": "2025-06-04T08:03:33.28754-05:00"
}
```

B.4 UC4: POST /hub and Response

The following section provides an example register for a Service Order Management notification service from the Seller/Server. The REST POST request with REST Body is:

```
POST /{{baseUrl}}/mefApi/legato/serviceOrderingManagement/v6/hub/
{
  "callback": "clientUri://",
  "query": "eventType=serviceOrderStateChangeEvent,serviceOrderStateChangeEvent,serviceOrderInformationRequiredEvent"
}
```

The REST successful (201 Created) Response is shown below:

```
{
  "callback": "clientUri://",
  "id": "Event-Id-10",
  "query": "eventType=serviceOrderStateChangeEvent,serviceOrderStateChangeEvent,serviceOrderInformationRequiredEvent"
}
```

B.5 UC5: DELETE /hub/{id} and Response

The following section provides an example unregister for a Service Order Management notification service from the Seller/Server. The REST DELETE request is:

```
DELETE /{{baseUrl}}/mefApi/legato/serviceOrderingManagement/v6/hub/{id}
```

A successful DELETE will have a REST Response of 204 (No Content).

B.6 UC6: GET /hub/{id} and Response

The following section provides an example retrieval for a Service Order Management Event Subscription by unique identifier. The REST GET request is:

```
GET /{{baseUrl}}/mefApi/legato/serviceOrderingManagement/v6/hub/{id}
```

The REST successful (201 Created) Response is shown below:

```
{
  "callback": "clientUri://",
  "id": "Event-ID-10",
```

```
"query":  
"eventType=serviceOrderStateChangeEvent,serviceOrderStateChangeEvent,serviceOrderInformationRequi  
redEvent"  
}
```

18 References

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Copyright © 2018 IETF Trust and the persons identified as the document authors. All rights reserved.
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Appendix C Acknowledgements

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

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