MEF Specification

MEF x

(Letter Ballot Draft)

Legato - EVC Services YANG

Service Configuration & Activation

July 27 2017

Table to be deleted before publication		
Date	Draft version	Changes
April 25	Draft for Editing Session in FRA meeting	
May 2	Incorporated feedback from editing session in FRA Meeting	- "legato" in module names - updated figure 2 - included high level trees for modules - appendices: (A) mapping to 10.3/7.3 and (B) service topology
June calls review	Changes related to CfCB review of yang modules and this doc	- abstract: included text for files (JSON, XML) in zip distribution - sec 7 – evc yang overview o moved mef-legato-global o updated high level tree o included pointers to Appendix C.1.x for json schema - appendix B: evc-id retrieve with REST/JSON API example - appendix C: o C.1.x: High level JSON schema (swagger) for each yang module o C.2: XML view for an example EPL service (a-1 of mef 6.2)
July calls review	Changes related to CFCB review of yang modules and this doc	- General formatting of headings, captions, etc. - Abstract and C.1: link to pyang tool/swagger plugin to generate *.json files - Sec 6.1: clarified more on use of 'must' statements, updated high level trees - Appendix A: included additional items in tables - Appendix B: tweaked first sentence to clarify use for Service topology - Appendix C.1.x: updated swagger json schema - Appendix C.2.x: tweaked global profile info, xml data, included cos-profile example when pcp mechanism
July 26/27	Toronoto Meeting Review	- mef-legato-global changed to mef-global given re-use across other interfaces - updated yang version date

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1 List of Contributing Members

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

Editor Note 1: List to be updated with voters in CfCB for YANG Modules and opt-in.

Alpha Beta Networks	Desultory Network Equipment
Best in the West Service	Yuck Cluck Management
Complete Ethernet Hype	Zero Rate Solutions

2 Abstract

This document specifies the YANG modules for MEF 6.2 EVC based Services [1] and MEF 10.3 Ethernet Services Attributes [2]. These modules are for use in Service Orchestration Function (SOF) and to communicate the configuration state for Service attributes and values with other entities, such as Business Applications or Partners or Customers, specified in MEF 55 Lifecycle Service Orchestration Reference Architecture [3]. One use of these modules is for the use cases at Legato reference point for Service Configuration and Activation (SCA) specified in MEF 56 SCA (Legato) Interface Profile specification [5]. The elements of the YANG modules are aligned with the objects identified in MEF 7.3 Carrier Ethernet Service Information Model [4] and in [5].

This document normatively includes the following EVC Services YANG Modules in the distribution (Legato-YANG-Machinefiles.zip):

1. mef-global@2017-07-27.yang
2. mef-legato-service@2017-07-27.yang
3. mef-legato-interfaces@2017-07-27.yang
4. mef-types@2017-07-27.yang

In addition, the distribution (Legato-YANG-Machinefiles.zip) includes the following informative content:

a) YANG tree (@2017-07-27) for each of the YANG Modules

b) JSON (@2017-07-27) request/response format, for each of the YANG Modules, generated using PYANG tool (https://pypi.python.org/pypi/pyang) with Swagger plugin (https://github.com/ict-strauss/COP/tree/master/pyang_plugins) to use in a REST/http (http://swagger.io/) API, and,

c) Example XML configuration file with Netconf for an example EPL service described in Appendix A of MEF 6.2 [1].

3 Terminology and Acronyms

This section defines the terms used in this document. In many cases, the normative definitions to the terms from MEF Specifications 10.3 [2], 6.2 [1] and 55 [3] are included by reference.

Term	Definition	Source
NETCONF	Network Configuration Protocol	IETF RFC 6241 [8]
RESTCONF	REST (HTTP) based Protocol	IETF RFC 8040 [9]
RPC	Remote Procedure Call	IETF RFC 6241 [8]
YANG	A Data Modeling Language (YANG 1.1)	IETF RFC 7950 [7]

Table 1: Terminology and Acronyms

4 Compliance Levels

The key words "**MUST**", "**MUST NOT**", "**REQUIRED**", "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this document are to be interpreted as described in RFC 2119 [1]. All key words must be in upper case, 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 Scope

The scope of this document is to specify the YANG modules used in a Service Orchestration Function (SOF) [3] in support of Service Configuration and Activation (SCA) use cases [5] for EVC Services based on MEF 6.2 [1] and Ethernet Service Attributes specified in MEF 10.3 [2]. The elements in the modules align with the objects specified in MEF 7.3 [4] and in MEF 56 [5] as shown in Appendix A.

The modules in this document are for manipulating configuration and reading operational data using interface protocols such as NETCONF with XML encoding [7] or RESTCONF with XML or JSON encoding [9]. When the use case is EVC based Services, Service Configuration management via API requests/responses can occur across the following reference points [3] specified at a Service Provider (SP) SOF:

- Legato (from/to Business Applications) for Service Components in SP Domain

- Allegro (from/to Customer Application Coordinator) for Service Components in SP Domain
- Interlude (from/to Partner Domain's SOF) for Service Components in Partner Domain

In this phase, the focus is on all the elements of YANG modules to support the Legato Interface as shown in Figure 1 below:

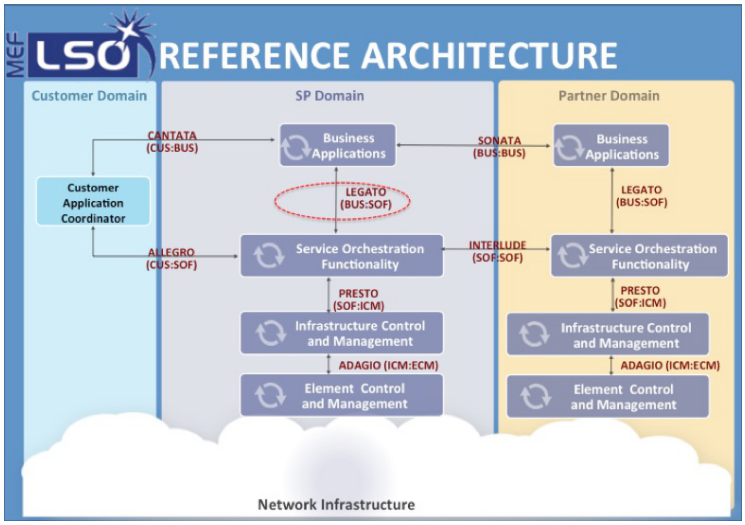

Figure 1: SOF as Server for MEF Services YANG

A future phase of this document might include operations with custom Remote Procedure Calls (RPCs), and event notifications such as for change of configured state.

6 Introduction

MEF 6.2 EVC based Service [1] is an agreement between Subscriber (or Customer) and Service Provider (SP) described using MEF 10.3 Service Attributes [2]. The Service attributes specify the behavior as observed and understood by the Subscriber, ie., Intent [12]. The attributes and values are for: EVCs, EVC EndPoints at UNIs and UNIs. While MEF 10.3 provides a range of values for most attributes allowing for a wide variety of Services that can be defined by a SP, MEF 6.2 has specified specific service types such as E-Line, E-LAN and E-TREE with port and vlan based options, by restricting the allowed values for certain attributes in each case.

MEF 55 [3] has specified a reference architecture (shown above in Figure 1) with a SP's SOF used for orchestrating/automating the lifecycle of end-to-end service, e.g., MEF 6.2 EP-LAN. Table 5 in [3] provides a high level set of interactions across interface reference points and some such as for Legato are relevant for SOF. For example, based on a Customer order, the Business Application can request instantiation of a MEF 6.2 Service across Legato reference point. The SOF can describe to its clients, e.g., Business Application, the MEF Services and capabilities it is able to instantiate. The YANG modules specified in this document are used to facilitate such interactions across the reference points for configuration and activation.

The SOF, as server, can use the modules as input to determine the responses to RPCs across Legato reference point. Additionally, the modules are used to determine the content of requests sent across Presto reference point(s) to one or more Infrastructure Control and Management (ICM) domain controllers. How a SOF determines the content of request(s) sent across Presto is out of scope of this document.

6.1 Structure of YANG Modules

The structure consists of four cooperative but independent YANG Modules within their own namespaces. These modules depend on only two supporting YANG Modules for the importing of standard types from IETF RFC 6991 [10]: ietf-inet-types and ietf-yang-types. Figure 2 illustrates the relationship, i.e., import, among the "mef" modules specified in this document and Common YANG Data Types from IETF [10].

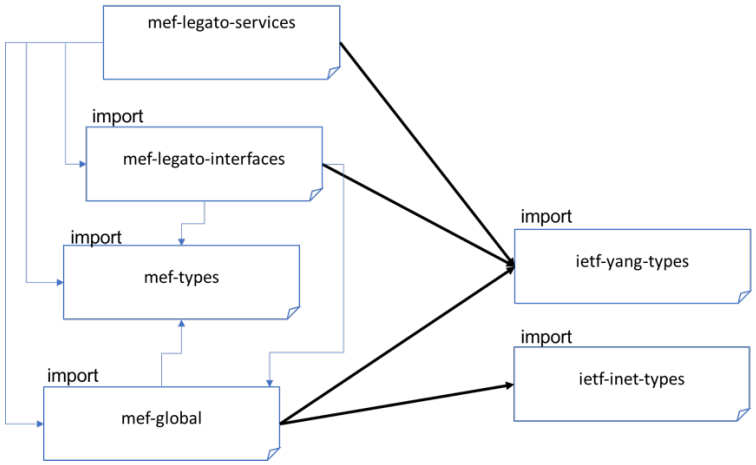

Figure 2: Relationship between YANG Modules

One of the fundamental technical goals undertaken was to implement all the MEF 6.2 and MEF 10.3 required data element type restrictions AND inter-data element data constraints within the YANG Modules themselves as a demonstration of how YANG can be used to reduce the amount of custom developed configuration data validation source code required to implement these specifications. This was done with use of "must" statements in the YANG module to allow for stricter checking of conditions and requirements. These checks are expected to be performed by the SOF and, in some cases, can also be done by the Business Applications entity before sending the request.

6.2 Namespace

The modules use Namespace Identifier (NID) as "mef" [11] and NSS-Root = yang [6] resulting in a yang-nss as urn:mef:yang:<module-name> for modules specified in this document. The <module-name> includes the metadata, i.e., legato, to indicate use of the module is at the Legato reference point in SOF entity shown in Figure 1.

7 EVC Services YANG Overview

The tree diagrams for the YANG Modules included in this document follows the conventions described in IETF draft-bjorklund-netmod-yang-tree-diagrams-01 [13].

7.1 mef-global

This module defines global configuration settings for shared profiles and related lists that may be referenced by more than one MEF Service. This module is a container for all global MEF Profiles, including Bandwidth Profiles, CoS Profiles, L2CP Profiles, SLS / Performance Objective Profiles, etc. These are expected to be slowly changing as they reflect the Products offered by the Service Providers to their Subscribers. Figure 3 shows a high level tree for the global module. See also Appendix C.1.1for a high level JSON Schema of this module.

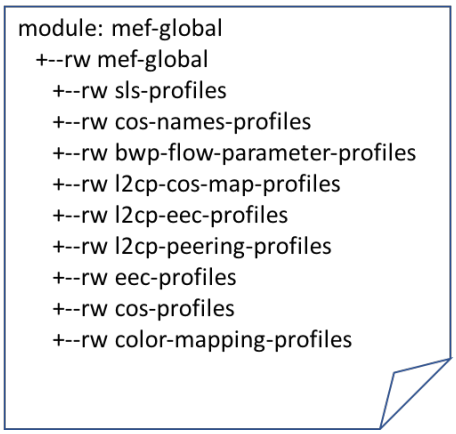

Figure 3: High Level Tree for Global

This module provides a common place to find "pick-lists" of reusable configuration elements. For example, multiple services can make use of the same Bandwidth Profiles as the global list includes the list of product bandwidth offerings currently available to all Subscribers for a specific Service Provider. The basic Lists specified within the module represent the configurable lists of the CENs, Subscribers, and Service Level Specifications being supported/managed. Service Level Specifications are made up of a list of the Performance Objectives that have been agreed to between the Service Provider and the Subscriber(s). The module's Profile Container includes the fundamental list of CoS and ECC Names that are to be used throughout the CENs.

As shown in Figure 2, this module imports other MEF and IETF modules.

7.2 mef-legato-services

This module implements the Carrier Ethernet Services as defined in MEF 10.3 [2] and MEF 6.2 [1]. It is a top-level module as opposed to augmenting a vendor-specific mount point in order to keep the Service Models more generic.

This module implements a list of MEF Services indexed by a Service ID (evc-id). It should be noted that given the requirement that there is only one EVC per MEF Service, the EVC ID is a

key to identify a specific EVC in the EVC container. The module also includes the SLS for the EVC. Figure 4 shows the high level tree for this module. The evc list is with key evc-id and the end-point list is with key uni-id. See also Appendix C.1.2 for a high level JSON Schema of this module.

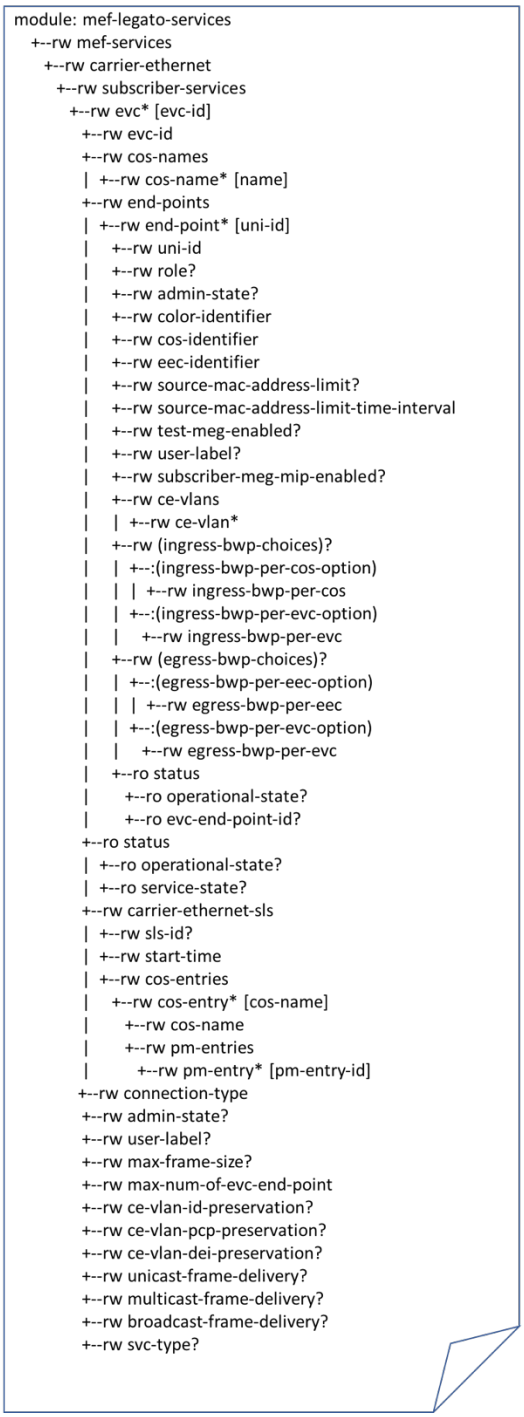

Figure 4: High Level Tree for Services

As shown in Figure 2, this module imports other MEF and IETF modules.

7.3 mef-legato-interfaces

This module implements the UNI functionality specified in MEF 10.3 [2] and MEF 6.2 [1] and includes the global UNI list (keyed by the string UNI-ID). Figure 5 shows a high level tree for the global module. See also Appendix C.1.3 for a high level JSON Schema of this module.

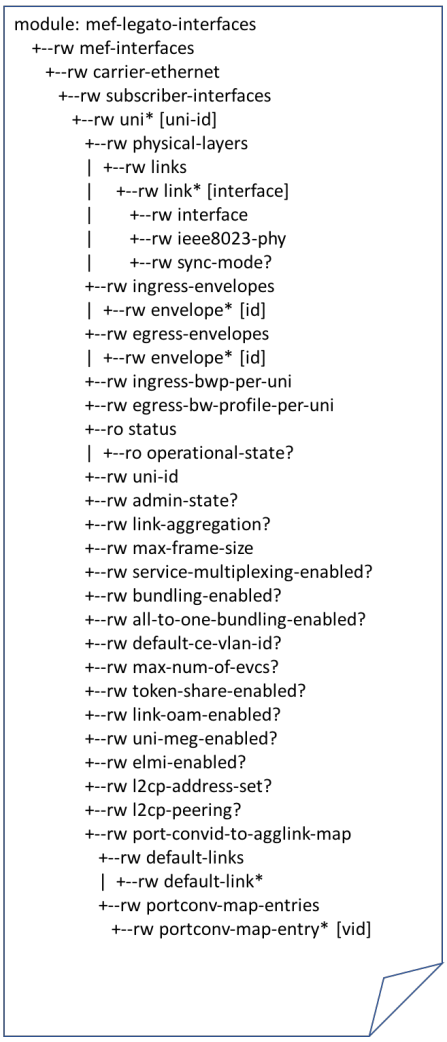

Figure 5: High Level Tree for Interfaces

As shown in Figure 2, this module imports other MEF and IETF modules.

7.4 mef-types

This module defines the YANG Type Definitions used by MEF Services YANG modules and contains only data type definitions. All MEF specific YANG Types are included in this file for the following reasons:

- The existence of a single source file to check for previously defined domain-specific types facilitates reuse of these types thus reducing the likelihood that redundant and potentially conflicting types will be defined within different MEF modules.

- The common maintenance task of extending or slightly modifying a common type can be done without a new revision of the more complex data modules. For example, adding a new entry to an enumeration type or adding a tighter string pattern restriction becomes a trivial upgrade operation.

- Improves the consistency of the NETCONF or RESTCONF configuration and status interfaces by promoting common naming conventions

8 References

[1] MEF Forum 6.2, *EVC Ethernet Services Definitions Phase 3*, August 2014.

[2] MEF Forum 10.3, *Ethernet Services Attributes Phase 3*, October 2013.

[3] MEF Forum 55, *Lifecycle Service Orchestration Reference Architecture*, March 2016.

[4] MEF Forum 7.3, *Carrier Ethernet Service Information Model*, February 2017.

[5] MEF Forum 56, *Service Configuration and Activation – (Legato) Interface Profile*, May 2017.

[6] MEF Assigned Names and Numbers (MANN), https://wiki.mef.net/display/MANN/MEF+Assigned+Names+and+Numbers

[7] IETF RFC 7950, *The YANG 1.1 Data Modeling Language*, August 2016

[8] IETF RFC 6241, *Network Configuration Protocol (NETCONF)*. June 2011

[9] IETF RFC 8040, *RESTCONF Protocol*, January 2017

[10] IETF RFC 6991, *Common YANG Data Types*, July 2013

[11] IETF RFC 7818, URN Namespace for MEF Documents, March 2016.

[12] ONF TR-523, *Intent NBI – Definition and Principles*, October 2016.

[13] IETF draft, https://tools.ietf.org/html/draft-ietf-netmod-yang-tree-diagrams-01

Appendix A Mapping – Service Attribute to YANG

This appendix provides a mapping of YANG names to the MEF 7.3 [4] UML Objects as well as to the Service Attributes from MEF 10.3 [2] or MEF 6.2 [1] for EVC Services. The UML objects from MEF 56 [5] are not shown since the only difference is the addition of a prefix (“sca”).

The specific path for container or leaf can be obtained from the YANG files.

272 ## A.1 UNI Service Attributes

MEF 10.3 or MEF 6.2 UNI Service Attribute	MEF 7.3 UML Object Name	YANG schema path in mef-legato-interfaces, under: /mef-interfaces /carrier-ethernet /subscriber-interfaces /uni
UNI ID	serviceProviderUniId	uni-id
Physical Layer	physicalLayerList	/physical-layers /links /link /ieee8023-phy
Synchronous Mode	syncModeList	/physical-layers /links /link /sync-mode
Number of Links	numberOfLinks	(size of link list)
UNI Resiliency	linkAggregation	link-aggregation
	portConvsIdToAggLinkMapList	port-convid-to-agglink-map
Service Frame Format	frameFormat	(Not needed since one type)
UNI Maximum Service Frame Size	maxFrameSize	max-frame-size
Service Multiplexing	serviceMultiplexingEnabled	service-multiplexing-enabled
CE-VLAN ID for Un-tagged and Priority Tagged Service Frames	defaultCeVlanId	default-ce-vlan-id
CE-VLAN ID/EVC Map	See Table 3	See Table 3 since object in mef-legato-services module under: /carrier-ethernet /subscriber-services /evc /end-points /end-point
Maximum number of EVCs	maxNumOfEvcs	max-num-of-evcs
Bundling	bundlingEnabled	bundling-enabled
All to One Bundling	allToOneBundlingEnabled	all-to-one-bundling-enabled
Token Share	tokenShareEnabled	token-share-enabled
Envelopes	_envelopeList	ingress-envelopes/envelope egress-envelopes/envelope

Ingress Bandwidth Profile Per UNI	_bwpFlowIngressSpUni	ingress-bwp-profile-per-uni
Egress Bandwidth Profile Per UNI	_bwpFlowEgressSpUni	egress-bwp-profile-per-uni
Link OAM	linkOamEnabled	link-oam-enabled
UNI MEG	uniMegEnabled	uni-meg-enabled
E-LMI	elmiEnabled	elmi-enabled
UNI L2CP Address Set	l2cpAddressSet	l2cp-address-set
UNI L2CP Peering	l2cpPeeringList	l2cp-peering

Table 2: Mapping for UNI Service Attributes

Additional objects such status (Admin, operation) have not been included in Table 2 since focus is on those attributes in MEF 10.3/6.2 specifications.

276 ## A.2 EVC per UNI Service Attributes

MEF 10.3 or MEF 6.2 EVC per UNI Service Attribute	MEF 7.3 UML Object Name	YANG schema path in mef-legato-services, under: /mef-services /carrier-ethernet /subscriber-services /evc /end-points /end-point
UNI EVC ID	evcEndPointId	/status /evc-end-point-id
	evcEndPointRole	role
Class of Service Identifier for Data Service Frame	_cosIdentifierList	cos-identifier
Class of Service Identifier for L2CP Service Frame	(see cosIdentifierList)	(see cos-identifier)
Class of Service Identifier for SOAM Service Frame	(see cosIdentifierList)	(see cos-identifier)
Color Identifier for Service Frame	_colorIdentifier	color-identifier
Egress Equivalence Class Identifier for Data Service Frames	_eecIdentifierList	eec-identifier
Egress Equivalence Class Identifier for L2CP Service Frames	(see eecIdentifierList)	(see eec-identifier)
Egress Equivalence Class Identifier for SOAM Service Frames	(see eecIdentifierList)	(see eec-identifier)
Ingress Bandwidth Profile per EVC	_ingressBwpFlowPerSep	/ingress-bwp-choices /ingress-bwp-per-evc-option /ingress-bwp-pe-evc
Egress Bandwidth Profile per EVC	_egressBwpFlowPerSep	/egress-bwp-choices /egress-bwp-per-evc-option /egress-bwp-per-evc
Ingress Bandwidth Profile per Class of Service Identifier	(see BwpFlow)	/ingress-bwp-choices /ingress-bwp-per-cos-option /ingress-bwp-per-cos /bwp-flow-per-cos
Egress Bandwidth Profile per Egress Equivalence Class	(see BwpFlow)	/egress-bwp-choices /egress-bwp-per-cos-option /egress-bwp-per-cos /bwp-flow-per-cos

Source MAC Address Limit	sourceMacAddressLimit	source-mac-address-limit
Test MEG	testMegEnabled	test-meg-enabled
Subscriber MEG MIP	subscriberMegMipEnabled	subscriber-meg-mip-enabled
	evcEndPointMap	ce-vlans (since MEF 7.3 modeled this as part of EVC End Point)

277 **Table 3: Mapping for EVC per UNI Service Attributes**

278 Additional objects such status (Admin, operation) have not been included in Table 3 since focus
279 is on those attributes in MEF 10.3/6.2 specifications.

280

A.3 EVC Service Attributes

MEF 10.3 or MEF 6.2 EVC Service Attribute	MEF 7.3 UML Object Name	YANG schema path in mef-legato-service, under: /mef-services /carrier-ethernet /subscriber-services /evc
EVC Type	connectionType	connection-type
EVC ID	evcId	evc-id
UNI List	_evcEndPointList	end-points/end-point (see 'role' in Table 3 for UNI Role)
Maximum Number of UNIs	maxNumOfEvcEndPoints	max-num-of-evc-end-point
Unicast Service Frame Delivery	unicastFrameDelivery	unicast-frame-delivery
Multicast Service Frame Delivery	multicastFrameDelivery	multicast-frame-delivery
Broadcast Service Frame Delivery	broadcastFrameDelivery	broadcast-frame-delivery
CE-VLAN ID Preservation	ceVlanIdPreservation	ce-vlan-id-preservation
CE-VLAN CoS Preservation	ceVlanPcpPreservation ceVlanDeiPreservation	ce-vlan-pcp-preservation ce-vlan-dei-preservation
EVC Performance	_carrierEthernetSls	carrier-ethernet-sls
EVC Maximum Service Frame Size	maxFrameSize	max-frame-size
	cosNameList	cos-names
		svc-type (for MEF 6.2 Services, or, Other)

Table 4: Mapping to EVC Service Attributes

Additional objects such status (service, Admin, operation) have not been included in Table 3 since focus is on those attributes in MEF 10.3/6.2 specifications.

Appendix B Service Topology

While the YANG Modules can be used for Configuration and Activation, it can also be used to retrieve Service Topology at the Legato reference point. The relevant information is available in the EVC Service Attributes - EVC Type and UNI List (with Role) for each EVC ID. The YANG Module mef-legato-services (see also Figure 4) has the necessary information to construct graph of Service Topology as follows:

- All EVCs: evc list
    - Specific EVC in evc list: key as evc-id
- All EVCs at a given UNI: end-points list
    - Specific UNI, i.e., key as uni-id
- For a given evc-id
    - evc end-point at uni-id and leaf role, and,
    - leaf connection-type
    - leaf svc-type, i.e., MEF 6.2 Service or other

The Service topology graph can be for a specific EVC (key as evc-id) or for all EVCs in the evc list within a SP CEN. The operational use cases queryAllServices or queryService, as described in MEF 56 [5], can be used to determine the instantiated Service(s) in the CEN. As example, Figure 6 shows a Swagger (editor2) output using mef-legato-services*.json file to highlight REST/JSON GET operation (shown with annotations) for retrieving an EVC by evc-id. The response could be filtered to identify the Connection Type and Endpoints list for the EVC as well as the role and uni-id for each Endpoint.

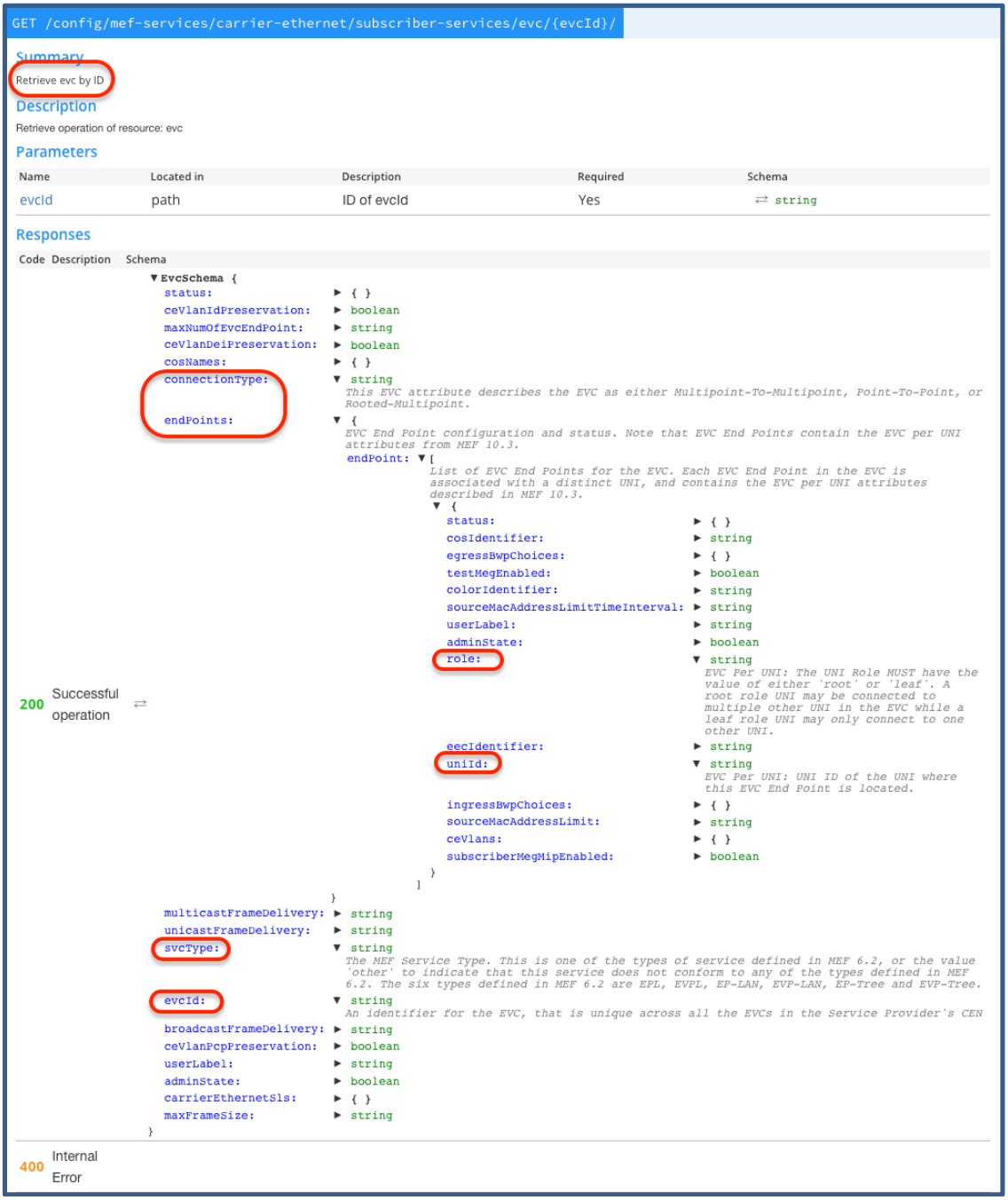

Figure 6: Example GET Operation to retrieve by evc-id

B.1 Example MEF 6.2 Service Topologies

The topology graph with the information from the GET operation is a Service view as observed at the Legato reference point and, does not include the detailed network topology of ports, nodes and links that might be visible to ICM(s). A graphical user interface can use the retrieved information to show the topology for one or more services such as Figures 13, 14, 16 and 17 in MEF 6.2 [1].

Appendix C Example Legato Interface Encoding

C.1 Swagger JSON Schema for YANG Modules

JSON request/response format was generated using PYANG tool (https://pypi.python.org/pypi/pyang), with Swagger plugin (https://github.com/ict-strauss/COP/tree/master/pyang_plugins), for each of the YANG Modules and have been included in the ZIP distribution. These can be used in REST API (http://swagger.io/) calls – PUT, POST, DELETE, GET – to change the state of attributes for the Service. Appendices C.1.2, C.1.1, and, C.1.3 shows the high level schema with description for each object.

C.1.1 High Level Swagger JSON Schema for mef-global

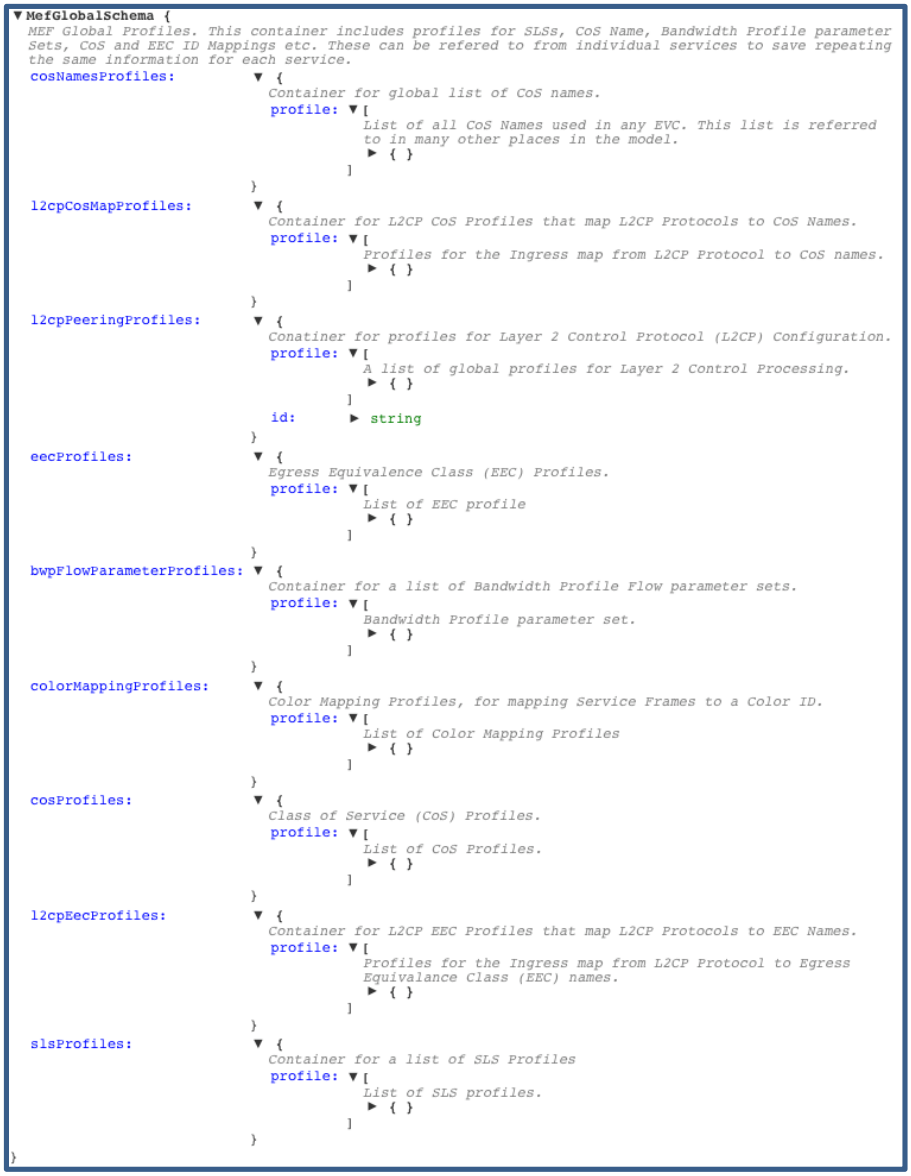

Figure 7: Swagger JSON Schema for mef-global

C.1.2 High Level Swagger JSON Schema for mef-legato-services

Figure 8: Swagger JSON Schema for mef-legato-services

C.1.3 High Level Swagger JSON Schema for mef-legato-interfaces

Figure 9: Swagger JSON Schema for mef-legato-interfaces

C.2 XML Data for Example EPL Service

This appendix describes the use of YANG Modules specified in this document in the context of an Example EVC based MEF Service described in Appendix A of MEF 6.2 [1]. The distibution (zip) includes the XML file for this example

C.2.1 Example XML Data

One simple example, compared to others in Appendix A of MEF 6.2 [1], is for a Transport-oriented Ethernet Private Line with limited capabilities, e.g., no Ingress Bandwidth Profile, minimal interaction with client's data frames, etc.. The values for various attributes are as in Table 26-28 of MEF 6.2 [1]. Additionally, the CoS Names and SLS profile are in Table 25 of MEF 6.2 [1].

First, the relevant profiles from those shown for meg-legato-global in Figure 3 were completed for the example A.1 of MEF 6.2. Table 5 shows the source for values used in the profiles.

Profile	Relevant values for example A.1 of MEF 6.2	Source for Values
sls	pm-entries: <fd, ifdv, flr, A> for CoS Name = Krypton	Table 25 of MEF 6.2 (EVC Performance Attributes and Parameters per CoS Offering)
cos-names	Krypton	
cos	single CoS Name based on EVC ID = EPL1	Table 28 (EVC Attributes) of MEF 6.2
l2cp-cos-map	Same as Data Service Frames, i.e., Krypton with List of protocols = {all}	Table 5 and Table 27 (EVC per UNI Attributes) of MEF 6.2
eec	Krypton	Not included in Table 27 of MEF 6.2 since no Egress Bandwidth Profile
l2cp-eec	Same as Data Service Frames, i.e., Krypton with List of protocols = {all}	Not included in Table 27 of MEF 6.2 since no Egress Bandwidth Profile
color-mapping	color-id=evc evc-color-name=green	Not included in Table 27 of MEF 6.2
bwp-flow-parameter l2cp-peering		Not Applicable for example A.1 of MEF 6.2

Table 5: Configuration of Global Profiles

Second, the configuration of attributes for UNIs, Endpoints, and EVC were completed as per the example. The XML output for the RPC to edit configuration is as shown in file <MEF6.2-A1-example.xml> included in the distribution (zip).

```
<?xml version="1.0" encoding="UTF-8"?>
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="4">
   <edit-config xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0">
      <target>
```

```
352            <candidate />
353         </target>
354         <test-option>test-then-set</test-option>
355         <error-option>rollback-on-error</error-option>
356         <config>
357            <mef-global xmlns="urn:mef:yang:mef-global">
358               <sls-profiles>
359                  <profile>
360                     <id>SLS-EPL1</id>
361                     <time-interval>25920000</time-interval>
362                     <pm-cos-name-entries>
363                        <pm-cos-name-entry>
364                           <cos-name>krypton</cos-name>
365                           <delta-t>1</delta-t>
366                           <threshold-c>50</threshold-c>
367                           <consecutive-interval-n>10</consecutive-interval-n>
368                           <pm-entries>
369                              <pm-entry>
370                                 <id>fd</id>
371                                 <one-way-frame-delay-pm>
372                                    <percentile>99.9</percentile>
373                                    <objective>10</objective>
374                                 </one-way-frame-delay-pm>
375                              </pm-entry>
376                              <pm-entry>
377                                 <id>ifdv</id>
378                                 <one-way-inter-frame-delay-variation-pm>
379                                    <percentile>99.9</percentile>
380                                    <frame-pair-separation>1</frame-pair-separation>
381                                    <objective>1</objective>
382                                 </one-way-inter-frame-delay-variation-pm>
383                              </pm-entry>
384                              <pm-entry>
385                                 <id>flr</id>
386                                 <one-way-frame-loss-ratio>
387                                    <objective>0.01</objective>
388                                 </one-way-frame-loss-ratio>
389                              </pm-entry>
390                              <pm-entry>
391                                 <id>availability</id>
392                                 <one-way-availability-pm>
393                                    <objective>99.999</objective>
394                                 </one-way-availability-pm>
395                              </pm-entry>
396                           </pm-entries>
397                        </pm-cos-name-entry>
398                        <pm-cos-name-entry>
399                           <cos-name>argon</cos-name>
400                           <delta-t>1</delta-t>
401                           <threshold-c>75</threshold-c>
402                           <consecutive-interval-n>10</consecutive-interval-n>
403                           <pm-entries>
404                              <pm-entry>
405                                 <id>fd</id>
406                                 <one-way-frame-delay-pm>
407                                    <percentile>99</percentile>
408                                    <objective>20</objective>
409                                 </one-way-frame-delay-pm>
410                              </pm-entry>
411                              <pm-entry>
```

```
                        <id>flr</id>
                        <one-way-frame-loss-ratio>
                           <objective>0.2</objective>
                        </one-way-frame-loss-ratio>
                     </pm-entry>
                     <pm-entry>
                        <id>availability</id>
                        <one-way-availability-pm>
                           <objective>99.9</objective>
                        </one-way-availability-pm>
                     </pm-entry>
                  </pm-entries>
               </pm-cos-name-entry>
               <pm-cos-name-entry>
                  <cos-name>neon</cos-name>
                  <delta-t>1</delta-t>
                  <threshold-c>100</threshold-c>
                  <consecutive-interval-n>10</consecutive-interval-n>
                  <pm-entries>
                     <pm-entry>
                        <id>fd</id>
                        <one-way-frame-delay-pm>
                           <percentile>95</percentile>
                           <objective>30</objective>
                        </one-way-frame-delay-pm>
                     </pm-entry>
                     <pm-entry>
                        <id>flr</id>
                        <one-way-frame-loss-ratio>
                           <objective>0.3</objective>
                        </one-way-frame-loss-ratio>
                     </pm-entry>
                     <pm-entry>
                        <id>availability</id>
                        <one-way-availability-pm>
                           <objective>99</objective>
                        </one-way-availability-pm>
                     </pm-entry>
                  </pm-entries>
               </pm-cos-name-entry>
            </pm-cos-name-entries>
         </profile>
      </sls-profiles>
      <cos-names-profiles>
         <cos-name>
            <name>krypton</name>
            <name>argon</name>
            <name>neon</name>
         </cos-name>
      </cos-names-profiles>
      <l2cp-cos-map-profiles>
         <profile>
            <id>L2CPcosmap</id>
            <map-entries>
               <any-or-map-entries>
                  <any>
                    <all></all>
                  </any>
               </any-or-map-entries>
            </map-entries>
```

```
472                </profile>
473             </l2cp-cos-map-profiles>
474             <cos-profiles>
475                <profile>
476                   <id>L2CPCoS</id>
477                   <l2cp-cos-id>L2CPcosmap</l2cp-cos-id>
478                   <cos-id>
479                      <evc>
480                         <cos-evc>
481                            <evc-cos-name>krypton</evc-cos-name>
482                         </cos-evc>
483                      </evc>
484                   </cos-id>
485                </profile>
486                <profile>
487                   <id>EPL1CoS</id>
488                   <cos-id>
489                      <evc>
490                         <evc-cos-name>krypton</evc-cos-name>
491                      </evc>
492                   </cos-id>
493                </profile>
494             </cos-profiles>
495             <l2cp-eec-profiles>
496                <profile>
497                   <id>L2CPeecmap</id>
498                   <map-entries>
499                      <any-or-map-entries>
500                         <any>
501                           <all></all>
502                         </any>
503                      </any-or-map-entries>
504                   </map-entries>
505             </l2cp-eec-profiles>
506             <eec-profiles>
507                <profile>
508                   <id>L2CPEEC</id>
509                   <l2cp-eec-id>L2CPeecmap</l2cp-eec-id>
510                   <eec-id>
511                      <pcp>
512                         <eec-pcp>
513                            <default-pcp-eec-name>krypton</ default-pcp-eec-name>
514                         </eec-ppc>
515                      </pcp>
516                   </eec-id>
517                </profile>
518                <profile>
519                   <id>EEC</id>
520                   <eec-id>
521                      <pcp>
522                         <eec-pcp>
523                            <default-pcp-eec-name>krypton</ default-pcp-eec-name>
524                         </eec-ppc>
525                      </pcp>
526                   </eec-id>
527                </profile>
528             </eec-profiles>
529             <color-mapping-profiles>
530                <profile>
531                   <id>EPL1color</id>
```

```
                <color-id>
                   <evc>
                      <color-evc>
                        <evc-color-name>green</evc-color-name>
                      </color-evc>
                   </evc>
                </color-id>
             </profile>
          </color-mapping-profiles>
       </mef-global>
       <mef-interfaces xmlns="urn:mef:yang:mef-legato-interfaces">
          <carrier-ethernet>
             <subscriber-interfaces>
                <uni>
                   <physical-layers>
                      <links>
                         <link>
                            <interface>1</interface>
                            <ieee8023-phy>ieee8023-1000BASE-SX</ieee8023-phy>
                            <sync-mode>false</sync-mode>
                         </link>
                      </links>
                   </physical-layers>
                   <uni-id>U1</uni-id>
                   <link-aggregation>none</link-aggregation>
                   <max-frame-size>1522</max-frame-size>
                   <service-multiplexing-enabled>false</service-multiplexing-enabled>
                   <bundling-enabled>false</bundling-enabled>
                   <all-to-one-bundling-enabled>true</all-to-one-bundling-enabled>
                   <default-ce-vlan-id>1</default-ce-vlan-id>
                   <max-num-of-evcs>1</max-num-of-evcs>
                   <token-share-enabled>false</token-share-enabled>
                   <link-oam-enabled>false</link-oam-enabled>
                   <uni-meg-enabled>false</uni-meg-enabled>
                   <elmi-enabled>false</elmi-enabled>
                   <l2cp-address-set>CTB-2</l2cp-address-set>
                </uni>
             </subscriber-interfaces>
          </carrier-ethernet>
       </mef-interfaces>
       <mef-services xmlns="urn:mef:yang:mef-legato-services">
          <carrier-ethernet>
             <subscriber-services>
                <evc>
                   <evc-id>EPL1</evc-id>
                   <cos-names>
                      <cos-name>
                         <name>krypton</name>
                      </cos-name>
                   </cos-names>
                   <end-points>
                      <end-point>
                         <uni-id>U1</uni-id>
                         <role>Root</role>
                         <source-mac-address-limit>false</source-mac-address-limit>
                         <subscriber-meg-mip-enabled>false</subscriber-meg-mip-enabled>
                         <ce-vlans>
                            <ce-vlan>
                               <vid>1..4094</vid>
                            </ce-vlan>
```

```
                        </ce-vlans>
                        <test-meg-enabled>false</test-meg-enabled>
                     </end-point>
                  </end-points>
                  <carrier-ethernet-sls>
                     <sls-id>SLS-EPL1</sls-id>
                     <start-time>January 1, 00:00</start-time>
                     <cos-entries>
                        <cos-entry>
                           <cos-name>krypton</cos-name>
                           <pm-entries>
                              <pm-entry>
                                 <pm-entry-id>fd</pm-entry-id>
                                 <pm-entry-id>ifdv</pm-entry-id>
                                 <pm-entry-id>flr</pm-entry-id>
                                 <pm-entry-id>availability</pm-entry-id>
                                 <end-point-pairs>
                                    <sls-uni-exclusions />
                                 </end-point-pairs>
                              </pm-entry>
                           </pm-entries>
                        </cos-entry>
                     </cos-entries>
                  </carrier-ethernet-sls>
                  <connection-type>point-to-point</connection-type>
                  <max-frame-size>1522</max-frame-size>
                  <max-num-of-evc-end-point>2</max-num-of-evc-end-point>
                  <ce-vlan-id-preservation>True</ce-vlan-id-preservation>
                  <ce-vlan-pcp-preservation>True</ce-vlan-pcp-preservation>
                  <unicast-frame-delivery>unconditional</unicast-frame-delivery>
                  <multicast-frame-delivery>unconditional</multicast-frame-delivery>
                  <broadcast-frame-delivery>unconditional</broadcast-frame-delivery>
                  <svc-type>epl</svc-type>
               </evc>
            </subscriber-services>
         </carrier-ethernet>
      </mef-services>
   </config>
</edit-config>
</rpc>
```

C.2.2 Example XML Data: cos-profile – PCP

When Class of Service Identifier mechanism based on PCP, then the global profile for CoS can be constructed with values as in Table 25 of MEF 6.2 for Krypton, Argon and Neon. In addition, a CoS Name of ‘discard’ can be assigned for PCP values = {7,6,4,2,0}. This cos-profile is included as part of global profile in the file MEF 6.2-A1-example for reference.

```
            <profile>
               <id>EPL2CoS</id>
               <cos-id>
                  <pcp>
                     <cos-pcp>
                        <pcp>
                           <pcp-value>7</pcp-value>
                           <discard-or-cos-name>
                              <discard />
                           </discard-or-cos-name>
                        </pcp>
```

```
                        <pcp>
                           <pcp-value>6</pcp-value>
                           <discard-or-cos-name>
                              <discard />
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>5</pcp-value>
                           <discard-or-cos-name>
                              <cos-name>krypton</cos-name>
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>4</pcp-value>
                           <discard-or-cos-name>
                              <discard />
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>3</pcp-value>
                           <discard-or-cos-name>
                              <cos-name>argon</cos-name>
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>2</pcp-value>
                           <discard-or-cos-name>
                              <discard />
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>1</pcp-value>
                           <discard-or-cos-name>
                              <cos-name>neon</cos-name>
                           </discard-or-cos-name>
                        </pcp>
                        <pcp>
                           <pcp-value>0</pcp-value>
                           <discard-or-cos-name>
                              <discard />
                           </discard-or-cos-name>
                        </pcp>
                     </cos-pcp>
                  </pcp>
               </cos-id>
            </profile>
```