

# **DOCSIS® Provisioning of EPON Specifications**

## **DPoEv2.0**

### **DPoE MAC and Upper Layer Protocols Interface Specification**

**DPoE-SP-MULPIv2.0-I13-180228**

**ISSUED**

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## Document Status Sheet

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## Annex C Common TLV Encodings (Normative)

The DPoE System MUST parse and apply the provisioning parameters defined by the TLVs contained within the CM provisioning files as part of the CM registration process and the dynamic configuration update process. Note that other TLVs are defined in Annex C of [MULPIv3.0], but those are not intended to be present in the configuration file and, therefore, are not covered in this section.

Sections C.1 through C.8 introduce new TLVs defined in the context of DPoE Specifications which are required to be supported by the DPoE System.

Sections C.10 through C.19 contain tables which enumerate whether support is required for a particular TLV by the DPoE System in this version of the DPoE specifications. Four columns are provided in the table; they are:

- TLV – TLV Number as defined in Annex C of [MULPIv3.0],
- Name – Descriptive Name associated with the TLV,
- Support Needed – indicating whether the support for the given TLV is required or not,
- Comments – Additional information regarding limitations for the support of the TLV or an explanation as to why the TLV need not be supported.

When the DPoE System encounters a TLV that is not supported, then the DPoE System MUST ignore the TLV and allow the D-ONU to register normally, following the DPoE Network registration process.

### C.1 [802.1ad] S-Tag and C-Tag Frame Classification Encodings

This field defines the parameters associated with [802.1ad] S-Tag and C-Tag frame classification.

| Type          | Length | Value |
|---------------|--------|-------|
| [22/23/60].14 | n      |       |

#### C.1.1 [802.1ad] S-TPID

The values of the field specify the matching parameters for the [802.1ad] S-TPID field.

If this parameter is not specified for an entry, then the DPoE System MUST use a default value of 0x88a8 for the [802.1ad] S-TPID field. If this parameter is not specified for a Classifier entry, then the DPoE System MUST configure via eOAMPDU the D-ONU to use a default value of 0x88a8 for the [802.1ad] S-TPID field. Other values of [802.1ad] S-TPID may be provisioned, as required.

The DPoE System MUST NOT match Ethernet frames without the [802.1ad] S-TPID to this entry. The D-ONU MUST NOT match Ethernet frames without the [802.1ad] S-TPID to this entry.

The S-VLAN TPID classifier is not intended to be used by itself. The DPoE System MUST reject a CM configuration file in which a S-VLAN TPID classifier is provisioned without a corresponding S-VLAN VID classifier.

| Type            | Length | Value           |
|-----------------|--------|-----------------|
| [22/23/60].14.1 | 2      | stpid (16 bits) |

**C.1.2 [802.1ad] S-VID**

The values of the field specify the matching parameters for the [802.1ad] S-VID field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] S-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] S-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.2 | 2      | This TLV comprises an encoded bit map, featuring one field: svid, as shown in the table below |

| Field name | Description                    | Size    |
|------------|--------------------------------|---------|
| Reserved   | Reserved, ignored on reception | 4 bits  |
| svid       | Encodes the S-VID field        | 12 bits |

**C.1.3 [802.1ad] S-PCP**

The values of the field specify the matching parameters for the [802.1ad] S-PCP field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] S-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] S-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.3 | 1      | This TLV comprises an encoded bit map, featuring one field: spcp, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 5 bits |
| spcp       | Encodes the S-PCP field        | 3 bits |

**C.1.4 [802.1ad] S-DEI**

The values of the field specify the matching parameters for the [802.1ad] S-DEI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] S-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] S-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.4 | 1      | This TLV comprises an encoded bit map, featuring one field: sdei, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 7 bits |
| sdei       | Encodes the S-DEI field        | 1 bit  |

**C.1.5 [802.1ad] C-TPID**

The values of the field specify the matching parameters for the [802.1ad] C-TPID field.

If this parameter is not specified for an entry, then the DPoE System MUST use a default value of 0x8100 for the [802.1ad] C-TPID field. If this parameter is not specified for an entry, then the D-ONU MUST use a default value of 0x8100 for the [802.1ad] C-TPID field. Other values of [802.1ad] C-TPID may be provisioned, as required.

The DPoE System MUST NOT match Ethernet frames without the [802.1ad] C-TPID to this entry. The D-ONU MUST NOT match Ethernet frames without the [802.1ad] C-TPID to this entry.

The C-VLAN TPID classifier is not intended to be used by itself. The DPoE System MUST reject a CM configuration file in which a C-VLAN TPID classifier is provisioned without a corresponding C-VLAN VID classifier.

| Type            | Length | Value           |
|-----------------|--------|-----------------|
| [22/23/60].14.5 | 2      | ctpid (16 bits) |

### C.1.6 [802.1ad] C-VID

The values of the field specify the matching parameters for the [802.1ad] C-VID field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] C-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] C-Tag to this entry.

Note that for DPoEv1.0 compliant devices the [22/23].11.2 TLV is used for configuration of the C-VID. For DPoEv2.0 compliant devices the [22/23].11.2 TLV is not used for configuration of the C-VID, instead [22/23/60].14.6 as defined in this subsection is used.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.6 | 2      | This TLV comprises an encoded bit map, featuring one field: cvid, as shown in the table below |

| Field name | Description                    | Size    |
|------------|--------------------------------|---------|
| Reserved   | Reserved, ignored on reception | 4 bits  |
| cvid       | Encodes the C-VID field        | 12 bits |

### C.1.7 [802.1ad] C-PCP

The values of the field specify the matching parameters for the [802.1ad] C-PCP field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] C-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] C-Tag to this entry.

Note that for DPoEv1.0 compliant devices the [22/23].11.1 TLV is used for configuration of the C-PCP. For DPoEv2.0 compliant devices the [22/23].11.1 TLV is not used for configuration of the C-PCP, instead [22/23/60].14.7 as defined in this subsection is used.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.7 | 1      | This TLV comprises an encoded bit map, featuring one field: cpcp, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 5 bits |
| cpcp       | Encodes the C-PCP field        | 3 bits |

**C.1.8 [802.1ad] C-CFI**

The values of the field specify the matching parameters for the [802.1ad] C-CFI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] C-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] C-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].14.8 | 1      | This TLV comprises an encoded bit map, featuring one field: ccfi, as shown in the table below |

| Field name | Description                                   | Size   |
|------------|-----------------------------------------------|--------|
| Reserved   | Reserved, ignored on reception                | 7 bits |
| ccfi       | Encodes the CFI field in the C-Tag TCI field. | 1 bit  |

**C.1.9 [802.1ad] S-TCI**

The values of the field specify the matching parameters for the [802.1ad] S-TCI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] S-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] S-Tag to this entry.

The DPoE System MUST reject any CM configuration file with S-TCI TLV present when S-PCP TLV, S-DEI TLV, or S-VID TLV is present within the same classifier.

| Type            | Length | Value          |
|-----------------|--------|----------------|
| [22/23/60].14.9 | 2      | stci (16 bits) |

**C.1.10 [802.1ad] C-TCI**

The values of the field specify the matching parameters for the [802.1ad] C-TCI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] C-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] C-Tag to this entry.

The DPoE System MUST reject any CM configuration file with C-TCI TLV present when C-PCP TLV, C-CFI TLV, or C-VID TLV is present within the same classifier.

| Type             | Length | Value          |
|------------------|--------|----------------|
| [22/23/60].14.10 | 2      | ctci (16 bits) |

**C.2 [802.1ah] Packet Classification Encodings**

This field defines the parameters associated with [802.1ah] packet classification, including the I-TAG, B-TAG, and B-DA/B-SA.

| Type          | Length | Value |
|---------------|--------|-------|
| [22/23/60].15 | n      |       |

**C.2.1 [802.1ah] I-TPID**

The values of the field specify the matching parameters for the [802.1ah] I-TPID field.

If this parameter is not specified for an entry, then the DPoE System MUST use a default value of 0x88e7 for the [802.1ah] I-TPID field. If this parameter is not specified for an entry, then the D-ONU MUST use a default value of 0x88e7 for the [802.1ah] I-TPID field. Other values of [802.1ah] I-TPID may be provisioned, as required.

The DPoE System MUST NOT match Ethernet frames without the [802.1ah] I-TAG tag to this entry. The D-ONU MUST NOT match Ethernet frames without the [802.1ah] I-TAG tag to this entry.

The I-TAG I-TPID classifier is not intended to be used by itself. The DPoE System MUST reject a CM configuration file in which a I-TAG I-TPID classifier is provisioned without a corresponding I-TAG I-SID classifier.

| Type            | Length | Value            |
|-----------------|--------|------------------|
| [22/23/60].15.1 | 2      | tipped (16 bits) |

**C.2.2 [802.1ah] I-SID**

The values of the field specify the matching parameters for the [802.1ah] I-SID field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] I-Tag tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] I-Tag tag to this entry.

| Type            | Length | Value          |
|-----------------|--------|----------------|
| [22/23/60].15.2 | 3      | isid (24 bits) |

**C.2.3 [802.1ah] I-TCI**

The values of the field specify the matching parameters for the [802.1ah] I-TCI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry.

The DPoE System MUST reject any CM configuration file with I-TCI TLV present when I-SID TLV, or I-PCP TLV or I-DEI TLV or I-UCA TLV is present within the same classifier.

| Type            | Length | Value          |
|-----------------|--------|----------------|
| [22/23/60].15.3 | 4      | itci (32 bits) |

**C.2.4 [802.1ah] I-PCP**

The values of the field specify the matching parameters for the [802.1ah] I-PCP field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].15.4 | 1      | This TLV comprises an encoded bit map, featuring one field: ipcp, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 5 bits |
| ipcp       | Encodes the I-PCP field        | 3 bits |

**C.2.5 [802.1ah] I-DEI**

The values of the field specify the matching parameters for the [802.1ah] I-DEI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].15.5 | 1      | This TLV comprises an encoded bit map, featuring one field: idei, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 7 bits |
| idei       | Encodes the I-DEI field        | 1 bit  |

**C.2.6 [802.1ah] I-UCA**

The values of the field specify the matching parameters for the [802.1ah] I-UCA field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] I-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].15.6 | 1      | This TLV comprises an encoded bit map, featuring one field: iuca, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 7 bits |
| iuca       | Encodes the I-UCA field        | 1 bit  |

**C.2.7 [802.1ah] B-TPID**

The values of the field specify the matching parameters for the [802.1ah] B-TPID field.

If this parameter is not specified for an entry, then the DPoE System MUST use a default value of 0x88a8 for the [802.1ah] B-TPID field. If this parameter is not specified for an entry, then the D-ONU MUST use a default value of 0x88a8 for the [802.1ah] B-TPID field. Other values of [802.1ah] B-TPID may be provisioned, as required.

The DPoE System MUST NOT match Ethernet frames without the [802.1ah] B-Tag to this entry. The D-ONU MUST NOT match Ethernet frames without the [802.1ah] B-Tag to this entry.

| Type            | Length | Value           |
|-----------------|--------|-----------------|
| [22/23/60].15.7 | 2      | btpid (16 bits) |

**C.2.8 [802.1ah] B-TCI**

The values of the field specify the matching parameters for the [802.1ah] B-TCI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet packets without the [802.1ah] B-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet packets without the [802.1ah] B-Tag to this entry.

The DPoE System MUST reject any CM configuration file with B-TCI TLV present when B-PCP TLV, B-DEI TLV or B-VID TLV is present within the same classifier.

| Type            | Length | Value          |
|-----------------|--------|----------------|
| [22/23/60].15.8 | 2      | btci (32 bits) |

### C.2.9 [802.1ah] B-PCP

The values of the field specify the matching parameters for the [802.1ah] B-PCP field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] B-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] B-Tag to this entry.

| Type            | Length | Value                                                                                         |
|-----------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].15.9 | 1      | This TLV comprises an encoded bit map, featuring one field: bpcp, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 5 bits |
| bpcp       | Encodes the B-PCP field.       | 3 bits |

### C.2.10 [802.1ah] B-DEI

The values of the field specify the matching parameters for the [802.1ah] B-DEI field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] B-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] B-Tag to this entry.

| Type             | Length | Value                                                                                         |
|------------------|--------|-----------------------------------------------------------------------------------------------|
| [22/23/60].15.10 | 1      | This TLV comprises an encoded bit map, featuring one field: bdei, as shown in the table below |

| Field name | Description                    | Size   |
|------------|--------------------------------|--------|
| Reserved   | Reserved, ignored on reception | 7 bits |
| bdei       | Encodes the B-DEI field        | 1 bit  |

### C.2.11 [802.1ah] B-VID

The values of the field specify the matching parameters for the [802.1ah] Backbone VLAN ID (B-VID) field.

If this parameter is specified for an entry, the DPoE System MUST NOT match Ethernet frames without [802.1ad] B-Tag to this entry. If this parameter is specified for an entry, the D-ONU MUST NOT match Ethernet frames without the [802.1ad] B-Tag to this entry.

| Type             | Length | Value                                                                                          |
|------------------|--------|------------------------------------------------------------------------------------------------|
| [22/23/60].15.11 | 2      | This TLV comprises an encoded bit map, featuring one field: B-VID, as shown in the table below |

| Field name | Description                    | Size    |
|------------|--------------------------------|---------|
| Reserved   | Reserved, ignored on reception | 4 bits  |
| bvid       | Encodes the B-VID field        | 12 bits |

**C.2.12 [802.1ah] B-DA**

The value of the field specifies the matching value for the Backbone MAC Destination Address (B-DA). If this parameter is omitted, then comparison of the B-DA for this entry is irrelevant.

| Type             | Length | Value         |
|------------------|--------|---------------|
| [22/23/60].15.12 | 6      | bda (48 bits) |

**C.2.13 [802.1ah] B-SA**

The value of the field specifies the matching value for the Backbone MAC Source Address (B-SA). If this parameter is omitted, then comparison of the B-SA for this entry is irrelevant.

| Type             | Length | Value         |
|------------------|--------|---------------|
| [22/23/60].15.13 | 6      | bsa (48 bits) |

**C.3 MPLS Classification Encodings**

This field defines the parameters associated with MPLS packet classification. An MPLS label stack encoding may include one or more label stack entries as described in [RFC 3032] and [RFC 5462]. This field matches the outermost MPLS label stack entry of the label stack encoding on the incoming packets.

| Type          | Length | Value |
|---------------|--------|-------|
| [22/23/60].17 | n      |       |

**C.3.1 MPLS TC bits**

The value of this field specifies the matching parameters for the MPLS Traffic Class field [RFC 5462].

| Type            | Length | Value                                         |
|-----------------|--------|-----------------------------------------------|
| [22/23/60].17.1 | 1      | MPLS Traffic Class (3 least significant bits) |

| Field name | Description                          | Size   |
|------------|--------------------------------------|--------|
| Reserved   | Reserved, ignored on reception       | 5 bits |
| mpls_tc    | Encodes the MPLS Traffic Class field | 3 bits |

**C.3.2 MPLS Label**

The value of this field specifies the matching parameters for the MPLS Label field.

| Type            | Length | Value                                  |
|-----------------|--------|----------------------------------------|
| [22/23/60].17.2 | 3      | MPLS Label (20 least significant bits) |

| Field name | Description                    | Size    |
|------------|--------------------------------|---------|
| Reserved   | Reserved, ignored on reception | 4 bits  |
| mpls_label | Encodes the MPLS Label field   | 20 bits |

**C.4 Ethernet LLC Packet Classification Encodings**

This field defines the parameters associated with Ethernet LLC packet classification. [MULPIV3.0].

| Type          | Length | Value |
|---------------|--------|-------|
| [22/23/60].10 | n      |       |

### C.4.1 Slow Protocol Subtype

The value of this field specifies the matching Slow Protocol subtype [802.3]. This classifier is intended to be used together with the Ethertype Classifier ([22/23/60].10.3) [MULPIv3.0]. Refer to [DPoE-MEFv2.0] for further details on the Slow Protocol Subtype.

| Type            | Length | Value                          |
|-----------------|--------|--------------------------------|
| [22/23/60].10.4 | 2      | SlowProtocol subtype (16 bits) |

## C.5 Metro Ethernet Service Profile (MESP)

This TLV defines the structure and format of individual parameters comprising the Metro Ethernet Service Profile (MESP), as defined in [DPoE-MEFv2.0]. [DPoE-MEFv2.0] also defines MESP requirements for SF and ASF on D-ONU and DPoE System. The Bandwidth Profile configuration rules and limitations are defined in [MEF 10.2], 7.11.1 Standard Bandwidth Profile Parameters and Algorithm

| Type | Length | Value |
|------|--------|-------|
| 72   | n      |       |

The DPoE System MUST reject any CM configuration file without exactly one instance of sub-TLVs 72.1 and 72.2 within the MESP TLV (72).

### C.5.1 MESP Reference

This TLV contains the MESP Reference.

| Type | Length | Value   |
|------|--------|---------|
| 72.1 | 2      | 1-65535 |

The supported range is 1 – 65535 and the value 0 is reserved.

### C.5.2 MESP Bandwidth Profile (MESP-BP)

This TLV defines the bandwidth profile for the given instance of MESP. For the detailed description and device behavior when implementing the following sub-TLVs, please refer to [MEF 10.2].

| Type | Length | Value |
|------|--------|-------|
| 72.2 | n      |       |

#### C.5.2.1 MESP-BP Committed Information Rate

The field is used to carry the value of the Committed Information Rate (CIR) [MEF 10.2] associated with the given MESP.

The CIR is expressed in the units of kbps. If not specified, the default value is zero, meaning no CIR.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.1 | 4      | CIR   |

#### C.5.2.2 MESP-BP Committed Burst Size

The field is used to carry the value of the Committed Burst Size (CBS) [MEF 10.2] associated with the given MESP.

The CBS is expressed in the units of Kbytes. If not specified, the default value is zero, meaning there is no CBS for that MESP.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.2 | 4      | CBS   |

### C.5.2.3 MESP-BP Excess Information Rate

The field is used to carry the value of the Excess Information Rate (EIR) [MEF 10.2] associated with the given MESP.

The EIR is expressed in the units of kbps. If not specified, the default value is zero, meaning no there is no EIR for that MESP.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.3 | 4      | EIR   |

### C.5.2.4 MESP-BP Excess Burst Size

The field is used to carry the value of the Excess Burst Size (EBS) [MEF 10.2] associated with the given MESP.

The EBS is expressed in the units of Kbytes. If not specified, the default value is zero, meaning there is no EBS for that MESP.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.4 | 4      | EBS   |

### C.5.2.5 MESP-BP Coupling Flag

The field is used to carry the value of the Coupling Flag (CF) [MEF 10.2] associated with the given MESP.

Two values are supported; i.e., 0 when the coupling flag is disabled (default) and 1 when the coupling flag is enabled.

| Type   | Length | Value                                                                                |
|--------|--------|--------------------------------------------------------------------------------------|
| 72.2.5 | 1      | 0: coupling flag disabled (default)<br>1: coupling flag enabled<br>2 – 255: reserved |

### C.5.2.6 MESP-BP Color Mode

The TLV is used to define the Color Mode (CM) [MEF 10.2] associated with the given MESP, indicating whether it is configured or not and what fields are used to extract the color information if the color aware mode is enabled.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.6 | n      |       |

The DPoE System MUST reject any CM configuration file without exactly one instance of sub-TLVs 72.2.6.1 and 72.2.6.2 within 72.2.6 and at least one instance of TLV 72.2.6.

#### C.5.2.6.1 MESP-BP-CM Color Identification Field

This TLV is used to indicate which of the field within the incoming frames is used to retrieve color information.

The supported values are indicated in the following table. There is no default value defined for this TLV.

| Type     | Length | Value                                                                                                                                                                                                                 |
|----------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 72.2.6.1 | 1      | 0: IPv4 ToS field<br>1: IPv6 DSCP field<br>2: PCP in S-Tag<br>3: PCP in C-Tag<br>4: PCP in I-Tag<br>5: PCP in B-Tag<br>6: DEI in S-Tag<br>7: CFI in C-Tag<br>8: DEI in I-Tag<br>9: DEI in B-Tag<br>10 - 255: reserved |

#### C.5.2.6.2 MESP-BP-CM Color Identification Field Value

This TLV is used to relay a specific value of the color identification field selected by TLV 72.2.6.1.

| Type     | Length | Value                                                                                                                      |
|----------|--------|----------------------------------------------------------------------------------------------------------------------------|
| 72.2.6.2 | 1      | This TLV comprises an encoded bit map, featuring two distinct fields: color, value, reserved, as shown in the table below. |

| Field name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Size   |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Value      | Encodes the target value of the color identification field identified by TLV 72.2.6.1.<br>The value is stored in the LSB positions of this 6 bit field. The size of this field is equal to:<br>6 when TLV 72.2.6.1 = 0. In this case, the 'Value' field encodes the Precedence, D, T and R fields from the IPv4 TOS field. The ECN field is not encoded<br>6 when TLV 72.2.6.1 = 1. In this case, the 'Value' field encodes the IPv6 DSCP field value. The ECN field is not encoded.<br>3 when TLV 72.2.6.1 = 2. In this case, the 'Value' field encodes the S-PCP field value.<br>3 when TLV 72.2.6.1 = 3. In this case, the 'Value' field encodes the C-PCP field value.<br>3 when TLV 72.2.6.1 = 4. In this case, the 'Value' field encodes the I-PCP field value.<br>3 when TLV 72.2.6.1 = 5. In this case, the 'Value' field encodes the B-PCP field value.<br>1 when TLV 72.2.6.1 = 6. In this case, the 'Value' field encodes the S-DEI field value.<br>1 when TLV 72.2.6.1 = 7. In this case, the 'Value' field encodes the C-CFI field value.<br>1 when TLV 72.2.6.1 = 8. In this case, the 'Value' field encodes the I-DEI field value.<br>1 when TLV 72.2.6.1 = 9. In this case, the 'Value' field encodes the B-DEI field value. | 6 bits |
| Color      | Encodes the color associated with the given color identification field value. The following values are supported:<br>0b00: green<br>0b01: yellow<br>0b10: red<br>0b11: reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2 bits |

For example, the TLV value of 0b00001101 identifies that the IPv4 TOS field value of 0b0000110 corresponds to color yellow (0b01).

#### C.5.2.7 MESP-BP Color Marking

The TLV is used to define the Color Marking (CR) associated with the given MESP, indicating whether it is configured or not and what fields are used to mark the color information if the color marking mode is enabled. The Color Marking can be applied to MEF service in either transport mode or encapsulation mode. For the MEF service in transport mode, the Color Marking will be applied to field in the Provider tag, including S-Tag, I-Tag and B-Tag. For MEF service in encapsulation service, the Color Marking will be applied to the field in Provider tags added during the encapsulation, including S-Tag, I-Tag and B-Tag; i.e., the provisioned Color Marking field in this TLV MUST be part of the provisioned encapsulation Provider tag in the L2VPN TLV of the MEF service.

| Type   | Length | Value |
|--------|--------|-------|
| 72.2.7 | n      |       |

The DPoE System MUST reject any CM configuration file without exactly one instance of sub-TLVs 72.2.7.1 and 72.2.7.2 within 72.2.7.

#### C.5.2.7.1 MESP-BP-CR Color Marking Field

This TLV is used to indicate which of the field within the incoming frames is used to save color information to.

The supported values are indicated in the following table. There is no default value defined for this TLV.

| Type     | Length | Value                                                                                                                               |
|----------|--------|-------------------------------------------------------------------------------------------------------------------------------------|
| 72.2.7.1 | 1      | 0: PCP in S-Tag<br>1: PCP in I-Tag<br>2: PCP in B-Tag<br>3: DEI in S-Tag<br>4: DEI in I-Tag<br>5: DEI in B-Tag<br>6 - 255: reserved |

#### C.5.2.7.2 MESP-BP-CR Color Marking Field Value

This TLV is used to relay a specific value of the color marking field selected by TLV 72.2.7.1.

| Type     | Length | Value                                                                                                                                                                                                                                                                                          |
|----------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 72.2.7.2 | 1      | This TLV comprises an encoded bit map, featuring two distinct fields: color, value, reserved, as shown in the table below. In the cases that the field size is 1 bit, the available Value will be 0 and 1. As the result, it is required to overload single Value for multiple Color Markings. |

| Field name | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Size   |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Value      | Encodes the target value of the color marking field identified by TLV 72.2.7.1.<br>The value is stored in the LSB positions of this 6 bit field. The size of this field is equal to:<br>3 when TLV 72.2.7.1 = 0. In this case, the 'Value' field encodes the S-PCP field value.<br>3 when TLV 72.2.7.1 = 1. In this case, the 'Value' field encodes the I-PCP field value.<br>3 when TLV 72.2.7.1 = 2. In this case, the 'Value' field encodes the B-PCP field value.<br>1 when TLV 72.2.7.1 = 3. In this case, the 'Value' field encodes the S-DEI field value.<br>1 when TLV 72.2.7.1 = 4. In this case, the 'Value' field encodes the I-DEI field value.<br>1 when TLV 72.2.7.1 = 5. In this case, the 'Value' field encodes the B-DEI field value. | N bits |
| Color      | Encodes the color associated with the given color marking field value. The following values are supported:<br>0b00: green<br>0b01: yellow<br>0b10: red<br>0b11: reserved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2 bits |

If the color marking is included, the green color marking and yellow color marking are required, while the red color marking is optional. The DPoE System MUST reject any CM configuration file that has color marking configuration in MESP but does not include both green color marking and yellow color marking in that specific MESP.

### C.5.3 MESP Name

The value of the field refers to a predefined DPoE System service configuration to be used for this MESP. This is similar in concept to the Service Class name (TLV 24/25.4).

| Type | Length                   | Value                                       |
|------|--------------------------|---------------------------------------------|
| 72.3 | 2 to n<br>(max size 254) | Zero-terminated string of ASCII characters. |

**NOTE:** The length includes the terminating zero.

When the MESP Name is used in a Service Flow or Aggregate Service Flow encoding, it indicates that all the unspecified MESP Parameters of the Service Flow need to be provided by the DPoE System. It is up to the operator to synchronize the definition of MESP Names in the DPoE System and in the configuration file.

## C.6 Aggregate Service Flow (ASF)

### C.6.1 Upstream Aggregate Service Flow Encodings

This field defines the parameters associated with the Upstream Aggregate Service Flow.

| Type | Length | Value |
|------|--------|-------|
| 70   | N      |       |

### C.6.2 Downstream Aggregate Service Flow Encodings

This field defines the parameters associated with the Downstream Aggregate Service Flow.

| Type | Length | Value |
|------|--------|-------|
| 71   | N      |       |

### C.6.3 ASF Reference

This TLV contains the ASF Reference.

| Type      | Length | Value     |
|-----------|--------|-----------|
| [70/71].1 | 2      | 1 – 65535 |

The supported range is 1 – 65535 and the value 0 is reserved.

The DPoE System MUST reject any CM configuration file without exactly one instance of TLV 70/71.1 within an instance of the ASF TLV 70/71.

### C.6.4 MESP Reference

This TLV contains the MESP Reference.

| Type       | Length | Value     |
|------------|--------|-----------|
| [70/71].37 | 2      | 1 - 65535 |

The supported range is 1 – 65535 and the value 0 is reserved.

The DPoE System MUST reject any CM configuration file without exactly one instance of TLV 70/71.37 TLV within an instance of the ASF TLV 70/71.

## C.7 Changes to DOCSIS TLV 24/25

### C.7.1 Aggregate Service Flow Reference

The Aggregate Service Flow Reference is used by the operator to provide Aggregate Service Flow configuration in a DPoE Network; the use of this encoding is defined in Section 7.3.

| Type             | Length | Value                            |
|------------------|--------|----------------------------------|
| [24/25/70/71].36 | 2      | Aggregate Service Flow Reference |

### C.7.2 Metro Ethernet Service Profile (MESP) Reference

The Metro Ethernet Service Profile (MESP) Reference is used to provide a reference to a set of MESP Parameters as defined by a particular MESP parameter set.

| Type             | Length | Value          |
|------------------|--------|----------------|
| [24/25/70/71].37 | 2      | MESP Reference |

### C.7.3 Serving Group Name

The Serving Group Name contains an ASCII string that identifies the Serving Group [DPoE-IPNEv2.0] configured on the DPoE System that the Service Flow belongs to.

| Type             | Length  | Value                                       |
|------------------|---------|---------------------------------------------|
| [24/25/70/71].38 | 2 to 16 | Zero-terminated string of ASCII characters. |

### C.7.4 SF Collection

Values carried in individual SF Collection sub-TLVs are used by the DPoE System to associate a pair of SF: one downstream SF and one upstream SF, to create a single bidirectional service instance.

The DPoE System MUST combine the downstream SF and the upstream SF containing *SF Collection* TLVs with the same value to create a single bidirectional service instance. The DPoE System MUST ignore any *SF Collection* TLV included in downstream SF without a matching *SF Collection* TLV in any of the upstream SF present in the vCM configuration file. The DPoE System MUST ignore any *SF Collection* TLV included in upstream SF without a matching *SF Collection* TLV in any of the downstream SF present in the vCM configuration file.

| Type       | Length | Value                                                                                           |
|------------|--------|-------------------------------------------------------------------------------------------------|
| [24/25].44 | 2      | SF Collection reference number<br>Valid values: 0x00-01 to 0xFF-FF.<br>Reserved values: 0x00-00 |

## C.8 D-ONU Capabilities Encoding

The D-ONU Capabilities Encoding describes the capabilities of a particular D-ONU; i.e., implementation dependent limits on the particular features or number of features, which the D-ONU can support. It consists of a number of encapsulated type/length/value fields; these sub-types define the specific capabilities for the D-ONU in question.

These capabilities are reported by the D-ONU to the DPoE System via specific OAM messages; defined in [DPoE-OAMv2.0]. The DPoE System MUST use the values reported by the D-ONU via OAM messages to populate the corresponding DHCP TLVs, when sending these DHCP TLVs in the DHCP messages from the local vCM.

| Type | Length | Value               |
|------|--------|---------------------|
| 5.42 | n      | Capability sub-TLVs |

**NOTE:** DOCSIS CM Capabilities are included under TLV 5. All the DPoE D-ONU Capabilities Encodings are included under TLV 5.42. The sub-type fields defined are only valid within the encapsulated capabilities configuration setting string

The set of possible D-ONU Capability sub-TLVs are described below.

The vCM MUST include all of these capabilities within the Modem Capabilities option, within option 125 (for DHCPv4) and or option 17 (for DHCPv6) unless the description of the capability explicitly prohibits this. DPoE Networks does not support DOCSIS Registration Response messaging and therefore D-ONU capabilities are communicated only via DHCP messaging.

### C.8.1 DPoE Version Number

The DPoE Version number is a one byte value representing the DPoE OAM version supported by the D-ONU. Bits[7:4] of the value in this TLV represent the major version number, while Bits[3:0] of the value in this TLV represent the minor version number.

| Type   | Length | Value                        |
|--------|--------|------------------------------|
| 5.42.1 | 1      | major version: minor version |

| Field name | Description   | Size   |
|------------|---------------|--------|
| majver     | Major version | 4 bits |
| minver     | Minor version | 4 bits |

### C.8.2 Number of Unicast LLIDs Supported (Bidirectional)

This field shows the maximum number of Unicast LLIDs that the D-ONU supports.

| Type   | Length | Value |
|--------|--------|-------|
| 5.42.2 | 2      |       |

**NOTE:** The minimum number of LLIDs that a D-ONU must support is defined in [DPoE-ARCHv2.0].

### C.8.3 Number of Multicast LLIDs Supported (Downstream Only)

This field shows the maximum number of Multicast LLIDs that the D-ONU supports.

| Type   | Length | Value |
|--------|--------|-------|
| 5.42.3 | 2      |       |

### C.8.4 MESP Support (Metro Ethernet Service Profile)

Value is a bitmask which defines feature support for Color Marking, Color Awareness (for both SF and ASF) and Smart Color Dropping capabilities, for the D-ONU [DPoE-MEFv2.0].

| Type   | Length | Value                                                                                                                                                           |
|--------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.42.4 | 1      | Bit #0 = Color Marking (at SF level)<br>Bit #1 = Color Awareness (at SF level)<br>Bit #2 = Smart Color Dropping (at SF and ASF Levels)<br>Bit #3 to #7 reserved |

A value of 1 means the feature is supported, a value of 0 means the D-ONU does not support this MESP feature.

### C.8.5 Number of D-ONU Ports

This value specifies the number of S interfaces supported on the D-ONU.

| Type   | Length | Value    |
|--------|--------|----------|
| 5.42.5 | 1      | 1 to 255 |

### C.8.6 EPON Data Rate Support

This value specifies the data rates supported by the D-ONU on the EPON network.

| Type   | Length | Value                                                             |
|--------|--------|-------------------------------------------------------------------|
| 5.42.6 | 1      | 0 = 1G up /1G down<br>1 = 1G up /10G down<br>2 = 10G up /10G down |

The EPON data rate supported by the D-ONU is obtained by the DPoE System during D-ONU registration.

### C.8.7 Service OAM

This field indicates the Service OAM capabilities supported by the D-ONU.

| Type   | Length | Value                       |
|--------|--------|-----------------------------|
| 5.42.7 | n      | Retired (SOAM Capabilities) |

## C.9 Network Timing Profile

This subtype specifies a Network Timing Profile configured on the DPoE System which provides a match criteria for the Timing Profile Name. EToD [1588v2] provisioning parameters [DPoE-IPNEv2.0] are configured via a Network Timing Profile. The Network Timing Profile TLV is referenced from the L2VPN encoding via the Network Timing Profile Reference. The CPE interfaces (CMIM) to which the Network Timing Profile applies are the interfaces CMIM) to which the L2VPN encoding applies. The DPoE System MUST configure the appropriate CMIM ports with the configuration profile settings of Network Timing Profile. If the DPoE System has a CM configuration file that includes different Network Timing Profile subtypes configured within different L2VPN encodings that are associated to the same CMIM, the DPoE System MUST select the Network Timing Profile under the L2VPN encoding with the smallest VPNID.

| Type | Length | Value |
|------|--------|-------|
| 73   | N      |       |

### C.9.1 Network Timing Profile Reference

The Network Timing Profile Reference is used to associate an L2VPN Service Flow to a Network Timing Profile Name in the CM configuration file. A valid Network Timing Profile subtype encoding contains one instance of this subtype.

| Type | Length | Value                            |
|------|--------|----------------------------------|
| 73.1 | 2      | Network Timing Profile Reference |

### C.9.2 Network Timing Profile Name

This subtype contains an ASCII string that identifies a Network Timing Profile Name configured on the DPoE System. A valid Network Timing Profile subtype encoding contains one instance of this subtype.

| Type | Length  | Value                                       |
|------|---------|---------------------------------------------|
| 73.2 | 2 to 16 | Zero-terminated string of ASCII characters. |

The DPoE System MUST reject any CM configuration file with a Network Timing Profile subtype encoding containing zero or multiple instances of the Profile Name encoding.

## C.10 Top Level TLVs

**Table 7 - Top Level TLVs**

| TLV | Name                                       | Support Needed | Comments                                                                                                                                                                                                                            |
|-----|--------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0   | Pad                                        | MUST           |                                                                                                                                                                                                                                     |
| 1   | Downstream Frequency                       | MUST NOT       | Not applicable, as there is only one downstream channel, the EPON itself.                                                                                                                                                           |
| 2   | Upstream Channel ID                        | MUST NOT       | Not applicable, as there is only one upstream channel, the EPON itself.                                                                                                                                                             |
| 3   | Network Access Control Object              | MUST           |                                                                                                                                                                                                                                     |
| 4   | DOCSIS 1.0 Class of Service                | MUST NOT       | No reason to carry this support forward to DPoE specification.                                                                                                                                                                      |
| 5   | Modem Capabilities                         | MUST           | Added to DPoEv2.0 to support TLV 5.42 D-ONU Capabilities Encoding, was not supported in v1.0. Note that these are NOT in the CM Config file, but in the DHCP from vCM to DHCP Server.                                               |
| 6   | CM Message Integrity Check                 | MAY            | The operator network is considered to be secure and this TLV is not needed as the DPoE System is getting the file directly from the TFTP Server. This TLV may be supported for backwards compatibility.                             |
| 7   | CMTS Message Integrity Check               | MAY            | The operator network is considered to be secure and this TLV is not needed as the DPoE System is getting the file directly from the TFTP Server. This TLV may be supported for backwards compatibility.                             |
| 9   | SW Upgrade Filename                        | MUST           |                                                                                                                                                                                                                                     |
| 10  | SNMP Write Access Control                  | SHOULD NOT     | Operator feedback was that this TLV is not needed for this version of the specifications.                                                                                                                                           |
| 11  | SNMP MIB Object                            | MUST           | See the TLV 11 section for more details.                                                                                                                                                                                            |
| 14  | CPE Ethernet MAC Address                   | SHOULD NOT     | Operator feedback was that this TLV is not needed for this version of the specifications.                                                                                                                                           |
| 17  | Baseline Privacy                           | MUST NOT       | Encryption is different on EPON, and configurable controls are limited. You can configure Traffic Key lifetime per-PON and per-Link. This doesn't correspond directly to TLV 17 items, however.<br>See Annex C.12 for more details. |
| 18  | Max Number of CPEs                         | MUST           |                                                                                                                                                                                                                                     |
| 19  | TFTP Server Timestamp                      | MUST NOT       | ONUs do not access the configuration file server, so there's no middle man or hackable entity like a CM to worry about.                                                                                                             |
| 20  | TFTP Server Provisioned Modem IPv4 Address | MUST NOT       | ONUs have IP addresses proxied by the DPoE System. Thus this TLV has little value.                                                                                                                                                  |
| 21  | SW Upgrade IPv4 TFTP Server                | MUST           |                                                                                                                                                                                                                                     |
| 22  | Upstream Packet Classification             | MUST           | See Annex C.13 for more details.                                                                                                                                                                                                    |
| 23  | Downstream Packet Classification           | MUST           | See Annex C.13 for more details.                                                                                                                                                                                                    |
| 24  | Upstream SF                                | MUST           | See Annex C.14 for more details.                                                                                                                                                                                                    |
| 25  | Downstream SF                              | MUST           | See Annex C.14 for more details.                                                                                                                                                                                                    |
| 26  | Payload Header Suppression                 | MUST NOT       | EPON doesn't define header suppression.                                                                                                                                                                                             |
| 28  | Maximum Number of Classifiers              | SHOULD NOT     | This is admission control for classification resources.                                                                                                                                                                             |

| TLV | Name                                           | Support Needed | Comments                                                                                                                                                       |
|-----|------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29  | Privacy Enable                                 | MUST           | This TLV enables/disables device certificate authentication and traffic encryption functions on the DPoE System and D-ONU. See [DPoE-SECv2.0] for more detail. |
| 32  | Manufacturer Code Verification Certificate     | MUST           |                                                                                                                                                                |
| 33  | Co-Signer Code Verification Certificate        | MUST           |                                                                                                                                                                |
| 34  | SNMPv3 Kickstart Value                         | SHOULD         | SNMPv3 support is not mandatory                                                                                                                                |
| 35  | Subscriber Mgmt Control                        | MUST           |                                                                                                                                                                |
| 36  | Subscriber Mgmt CPE IPv4 List                  | MUST           |                                                                                                                                                                |
| 37  | Subscriber Mgmt Filter Groups                  | MUST           |                                                                                                                                                                |
| 38  | SNMPv3 Notification Receiver                   | MUST           |                                                                                                                                                                |
| 39  | Enable 2.0 Mode                                | MUST NOT       | EPON PHY is not DOCSIS PHY.                                                                                                                                    |
| 40  | Enable Test Modes                              | MUST NOT       | Not applicable to EPON ONUs.                                                                                                                                   |
| 41  | Downstream Channel List                        | MUST NOT       | ONUs lock to a single DS PON channel.                                                                                                                          |
| 42  | Static Multicast MAC Address                   | SHOULD         |                                                                                                                                                                |
| 43  | DOCSIS Extension Field                         | MUST           | See Annex C.16, Annex C.17, and Annex C.18 for more detail.                                                                                                    |
| 45  | Downstream Unencrypted Traffic (DUT) Filtering | SHOULD NOT     | Not needed for this version of the specifications.                                                                                                             |
| 53  | SNMPv1v2c Coexistence                          | MUST           |                                                                                                                                                                |
| 54  | SNMPv3 Access View                             | MUST           |                                                                                                                                                                |
| 55  | SNMP CPE Access Control                        | SHOULD NOT     | There are currently no requirements to support this in this version of the specifications.                                                                     |
| 56  | Channel Assignment                             | MUST NOT       | There is no channel bonding in EPON.                                                                                                                           |
| 58  | SW Upgrade IPv6 TFTP Server                    | MUST           |                                                                                                                                                                |
| 59  | TFTP Server Provisioned Modem IPv6 Address     | MUST           |                                                                                                                                                                |
| 60  | Upstream Drop Packet Classification            | MUST           | See Annex C.19 for more details                                                                                                                                |
| 61  | Subscriber Mgmt CPE IPv6 Prefix List           | MUST           |                                                                                                                                                                |
| 62  | Upstream Drop Classifier Group ID              | MUST           |                                                                                                                                                                |
| 63  | Subscriber Mgmt Control Max CPE IPv6 Prefix    | MUST           |                                                                                                                                                                |
| 64  | CMTS Static Multicast Session Encoding         | MUST           |                                                                                                                                                                |
| 65  | L2VPN MAC Aging Encoding                       | MUST           |                                                                                                                                                                |
| 66  | Management Event Control Encoding              | SHOULD NOT     | Not needed for this version of the specifications.                                                                                                             |
| 67  | Subscriber Mgmt CPE IPv6 List                  | MUST           |                                                                                                                                                                |
| 70  | US Aggregate Service Flow                      | MUST           |                                                                                                                                                                |
| 71  | DS Aggregate Service Flow                      | MUST           |                                                                                                                                                                |
| 72  | Metro Ethernet Service Profile                 | MUST           |                                                                                                                                                                |
| 73  | Network Timing Profile                         | MUST           |                                                                                                                                                                |
| 79  | UNI Control Encodings                          | MUST           |                                                                                                                                                                |
| 255 | End-of-Data                                    | MUST           |                                                                                                                                                                |

## C.11 TLV 11

The following table, Table 8, specifies those TLV-11 CM SNMP MIB objects that **MUST** be supported by the DPoE System. Please refer to [DPoE-OSSiv2.0] for detailed requirements. The intent is to list only those objects that are currently in use (or planned to be in use) in CM provisioning files.

**Table 8 - TLV 11**

| TLV-11 OID Name                 | Support Needed | Comments                                                                                                                                                                                                                |
|---------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| docsDevFilterIpDefault          | MUST           | A value of 'accept' MUST be supported. A value of 'discard' MAY be supported. A DPoE System MUST ignore TLV 11 with the docsDevFilterIpDefault SNMP object with the value of 'discard', if this value is not supported. |
| docsDevFilterIpStatus           | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpControl          | MUST           | 'Policy' control is not required. Only 'accept' and 'discard' MUST be supported in this version of the specifications.                                                                                                  |
| docsDevFilterIpIfIndex          | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpDirection        | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpBroadcast        | MUST           | A value of 'false' MUST be supported. A value of 'true' MAY be supported.                                                                                                                                               |
| docsDevFilterIpSaddr            | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpSmask            | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpDaddr            | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpDmask            | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpProtocol         | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpSourcePortLow    | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpSourcePortHigh   | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpDestPortLow      | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpDestPortHigh     | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpTos              | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpTosMask          | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterIpContinue         | SHOULD NOT     | No "policy" treatment                                                                                                                                                                                                   |
| docsDevFilterIpPolicyId         | SHOULD NOT     | No "policy" treatment                                                                                                                                                                                                   |
| docsDevFilterLLCUnmatchedAction | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterLLCIfIndex         | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterLLCProtocol        | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterLLCProtocolType    | MUST           |                                                                                                                                                                                                                         |
| docsDevFilterLLCStatus          | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessCommunity        | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessControl          | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessInterfaces       | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessIp               | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessIpMask           | MUST           |                                                                                                                                                                                                                         |
| docsDevNmAccessStatus           | MUST           |                                                                                                                                                                                                                         |

## C.12 Security (TLV 17)

**Table 9 - TLV 17**

| TLV  | Name                          | Support Needed | Comments                      |
|------|-------------------------------|----------------|-------------------------------|
| 17.1 | Authorize Wait Timeout        | MUST NOT       | None of these apply for EPON. |
| 17.2 | Reauthorize Wait Timeout      | MUST NOT       | None of these apply for EPON. |
| 17.3 | Authorization Grace Time      | MUST NOT       | None of these apply for EPON. |
| 17.4 | Operational Wait Timeout      | MUST NOT       | None of these apply for EPON. |
| 17.5 | Rekey Wait Timeout            | MUST NOT       | None of these apply for EPON. |
| 17.6 | TEK Grace Time                | MUST NOT       | None of these apply for EPON. |
| 17.7 | Authorize Reject Wait Timeout | MUST NOT       | None of these apply for EPON. |
| 17.8 | SA Map Wait Timeout           | MUST NOT       | None of these apply for EPON. |
| 17.9 | SA Map Max Retries            | MUST NOT       | None of these apply for EPON. |

## C.13 Classification (TLVs 22 and 23)

**Table 10 - TLV 22 and 23**

| TLV                | Name                           | Support Needed | Comments                                                                                                  |
|--------------------|--------------------------------|----------------|-----------------------------------------------------------------------------------------------------------|
| 22.1<br>23.1       | Classifier Reference           | MUST           |                                                                                                           |
| 22.3<br>23.3       | SF Reference                   | MUST           |                                                                                                           |
| 22.5<br>23.5       | Rule Priority                  | MUST           |                                                                                                           |
| 22.6<br>23.6       | ClassifierActivationState      | SHOULD NOT     | Without deferred activation, there's no reason to support this TLV in this version of the specifications. |
| 22.9.1<br>23.9.1   | IPv4 TOSRange and Mask         | MUST           |                                                                                                           |
| 22.9.2<br>23.9.2   | IP Protocol                    | MUST           |                                                                                                           |
| 22.9.3<br>23.9.3   | IPv4 Source Address            | MUST           |                                                                                                           |
| 22.9.4<br>23.9.4   | IPv4 Source Mask               | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix.            |
| 22.9.5<br>23.9.5   | IPv4 Destination Address       | MUST           |                                                                                                           |
| 22.9.6<br>23.9.6   | IPv4 Destination Mask          | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix.            |
| 22.9.7<br>23.9.7   | TCP/UDP Source Port Start      | MUST           |                                                                                                           |
| 22.9.8<br>23.9.8   | TCP/UDP Source Port End        | MUST           |                                                                                                           |
| 22.9.9<br>23.9.9   | TCP/UDP Destination Port Start | MUST           |                                                                                                           |
| 22.9.10<br>23.9.10 | TCP/UDP Destination Port End   | MUST           |                                                                                                           |
| 22.10.1<br>23.10.1 | Ethernet DMAC                  | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix.            |
| 22.10.2<br>23.10.2 | Ethernet SMAC                  | MUST           |                                                                                                           |

| TLV                  | Name                                             | Support Needed | Comments                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22.10.3<br>23.10.3   | Ethertype/DSAP/MacType                           | MUST           | type=1 MUST be supported. type=3 does not apply to EPON. Other values MAY be supported.                                                                                                                   |
| 22.11.1<br>23.11.1   | [802.1Q] User Priority                           | MUST           |                                                                                                                                                                                                           |
| 22.11.2<br>23.11.2   | [802.1Q] VLAN ID                                 | MUST           |                                                                                                                                                                                                           |
| 22.12.1<br>23.12.1   | IPv6 TrafficClassRange and Mask                  | MUST           |                                                                                                                                                                                                           |
| 22.12.2<br>23.12.2   | IPv6 Flow Label                                  | MUST           |                                                                                                                                                                                                           |
| 22.12.3<br>23.12.3   | IPv6 Next Header Type                            | MUST           |                                                                                                                                                                                                           |
| 22.12.4<br>23.12.4   | IPv6 Source Address                              | MUST           |                                                                                                                                                                                                           |
| 22.12.5<br>23.12.5   | IPv6 Source Prefix Length                        | MUST           |                                                                                                                                                                                                           |
| 22.12.6<br>23.12.6   | IPv6 Destination Address                         | MUST           |                                                                                                                                                                                                           |
| 22.12.7<br>23.12.7   | IPv6 Destination Prefix Length                   | MUST           |                                                                                                                                                                                                           |
| 22.13<br>23.13       | CM Interface Mask (CMIM) Encoding                | MUST           | Downstream CMIM is used only by the DPoE System to bind a downstream Service Flow to an upstream Service Flow associated with the same CMIM. The binding creates a single bidirectional service instance. |
| 22.14<br>23.14       | [802.1ad] S-VLAN Packet Classification Encodings | MUST           | TLV for [802.1ad] S-VLAN classifier.                                                                                                                                                                      |
| 22.14.1<br>23.14.1   | [802.1ad] S- TPID                                | MUST           |                                                                                                                                                                                                           |
| 22.14.2<br>23.14.2   | [802.1ad] S-VID                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.3<br>23.14.3   | [802.1ad] S-PCP                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.4<br>23.14.4   | [802.1ad] S-DEI                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.5<br>23.14.5   | [802.1ad] C-TPID                                 | MUST           |                                                                                                                                                                                                           |
| 22.14.6<br>23.14.6   | [802.1ad] C-VID                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.7<br>23.14.7   | [802.1ad] C-PCP                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.8<br>23.14.8   | [802.1ad] C-CFI                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.9<br>23.14.9   | [802.1ad] S-TCI                                  | MUST           |                                                                                                                                                                                                           |
| 22.14.10<br>23.14.10 | [802.1ad] C-TCI                                  | MUST           |                                                                                                                                                                                                           |
| 22.15<br>23.15       | [802.1ah] I-TAG Packet Classification Encodings  | MUST           | TLV for [802.1ah] I-TAG classifier.                                                                                                                                                                       |
| 22.15.1<br>23.15.1   | [802.1ah] I-TPID                                 | MUST           |                                                                                                                                                                                                           |
| 22.15.2<br>23.15.2   | [802.1ah] I-SID                                  | MUST           |                                                                                                                                                                                                           |
| 22.15.3<br>23.15.3   | [802.1ah] I-TCI                                  | MUST           |                                                                                                                                                                                                           |

| TLV                  | Name                                  | Support Needed | Comments                                                                                                 |
|----------------------|---------------------------------------|----------------|----------------------------------------------------------------------------------------------------------|
| 22.15.4<br>23.15.4   | [802.1ah] I-PCP                       | MUST           |                                                                                                          |
| 22.15.5<br>23.15.5   | [802.1ah] I-DEI                       | MUST           |                                                                                                          |
| 22.15.6<br>23.15.6   | [802.1ah] I-UCA                       | MUST           |                                                                                                          |
| 22.15.7<br>23.15.7   | [802.1ah] B-TPID                      | MUST           |                                                                                                          |
| 22.15.8<br>23.15.8   | [802.1ah] B-TCI                       | MUST           |                                                                                                          |
| 22.15.9<br>23.15.9   | [802.1ah] B-PCP                       | MUST           |                                                                                                          |
| 22.15.10<br>23.15.10 | [802.1ah] B-DEI                       | MUST           |                                                                                                          |
| 22.15.11<br>23.15.11 | [802.1ah] B-VID                       | MUST           |                                                                                                          |
| 22.15.12<br>23.15.12 | [802.1ah] B-DA                        | MUST           |                                                                                                          |
| 22.15.13<br>23.15.13 | [802.1ah] B-SA                        | MUST           |                                                                                                          |
| 22.16<br>23.16       | ICMPv6                                | MUST           |                                                                                                          |
| 22.17.1<br>23.17.1   | MPLS TC bits                          | MUST           |                                                                                                          |
| 22.17.2<br>23.17.2   | MPLS Label                            | MUST           |                                                                                                          |
| 22.43<br>23.43       | Vendor-specific Classifier Parameters | MUST           | Type 43 TLVs within classifiers MUST be supported for purposes of MEF configuration. See [DPoE-MEFv2.0]. |
| 23.43.5.1            | VPN Identifier                        | MUST           |                                                                                                          |
| 23.43.8              | General Extension Information         | MUST           | Vendor ID of 0xFFFFF                                                                                     |

## C.14 Service Flows and Aggregate (TLVs 24, 25, and 70, 71)

Table 11 - TLV 24, 25, and 70, 71

| TLV                    | Name                                  | Support Needed | Comments                                                                                             |
|------------------------|---------------------------------------|----------------|------------------------------------------------------------------------------------------------------|
| 24.1 25.1<br>70.1 71.1 | SF Reference<br>ASF Reference         | MUST           |                                                                                                      |
| 24.4<br>25.4           | Service Class Name                    | MUST           |                                                                                                      |
| 24.6<br>25.6           | Quality of Service Parameter Set Type | MUST           | A value of 0x7 MUST be supported. Registration MUST be denied if a value other than 0x7 is received. |
| 24.7<br>25.7           | Traffic Priority                      | MUST           |                                                                                                      |
| 24.8                   | Upstream Max Sustained Traffic Rate   | MUST           |                                                                                                      |
| 25.8                   | Downstream Max Sustained Traffic Rate | MUST           |                                                                                                      |
| 24.9<br>25.9           | Maximum Traffic Burst                 | MUST           |                                                                                                      |
| 24.10<br>25.10         | Minimum Reserved Traffic Rate         | MUST           |                                                                                                      |

| TLV                | Name                                    | Support Needed | Comments                                                                                                                                                                                                                                |
|--------------------|-----------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24.11<br>25.11     | Assumed Min Rate Packet Size            | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.12<br>25.12     | Timeout for Active QoS Parameters       | SHOULD NOT     | There is no deferred admission/activation behavior in this version of the specifications.                                                                                                                                               |
| 24.13<br>25.13     | Timeout for Admitted QoS Parameters     | SHOULD NOT     | There is no deferred admission/activation behavior in this version of the specifications.                                                                                                                                               |
| 24.14              | Maximum Concatenated Burst              | MUST NOT       | This is a DOCSIS network specific parameter which does not translate to a DPoE network.                                                                                                                                                 |
| 25.14              | Maximum Downstream Latency              | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.15              | SF Scheduling Type                      | MUST           | Two values MUST be supported for this version of the specifications:<br>2 for Best Effort<br>4 for Real Time Polling Service<br>Other values MAY be supported.                                                                          |
| 24.16              | Request/Transmission Policy             | MUST           | The only bit that MUST be supported is Bit 4 (must not piggyback requests).                                                                                                                                                             |
| 24.17              | Nominal Polling Interval                | MUST           | This TLV is used with the Real Time Polling Scheduling Type.                                                                                                                                                                            |
| 25.17              | Downstream Resequencing                 | MUST NOT       | Not applicable to EPON.                                                                                                                                                                                                                 |
| 24.18              | Tolerated Poll Jitter                   | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.19              | Unsolicited Grant Size                  | SHOULD NOT     | This TLV is not needed to support the BE and RTP scheduling types.                                                                                                                                                                      |
| 24.20              | Nominal Grant Interval                  | SHOULD NOT     | This TLV is not needed to support the BE and RTP scheduling types.                                                                                                                                                                      |
| 24.21              | Tolerated Grant Jitter                  | SHOULD NOT     | This TLV is not needed to support the BE and RTP scheduling types.                                                                                                                                                                      |
| 24.22              | Grants Per Interval                     | SHOULD NOT     | This TLV is not needed to support the BE and RTP scheduling types.                                                                                                                                                                      |
| 24.23<br>25.23     | IP ToS Overwrite                        | MUST           |                                                                                                                                                                                                                                         |
| 24.26              | Multiplier to Number of Bytes Requested | MUST NOT       | Not applicable to EPON.                                                                                                                                                                                                                 |
| 24.27              | Upstream Peak Traffic Rate              | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 25.27              | Downstream Peak Traffic Rate            | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.31<br>25.31     | SF Required Attribute Mask              | MUST           | This attribute is used to steer SFs to an IP-SG.                                                                                                                                                                                        |
| 24.32<br>25.32     | SF Forbidden Attribute Mask             | MAY            | The use of this attribute is not required, though may be used to, steer SFs to an IP-SG.                                                                                                                                                |
| 24.33<br>25.33     | SF Attribute Aggregation Rule Mask      | MUST NOT       | Not applicable to EPON.                                                                                                                                                                                                                 |
| 24.34<br>25.34     | Application Identifier                  | SHOULD NOT     | This TLV is used to extend admission control decisions based on PCMM policies. There is no PCMM support in this version of the specifications.                                                                                          |
| 24.35.1<br>25.35.1 | Minimum Buffer Size                     | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.35.2<br>25.35.2 | Target Buffer Size                      | MUST           | TLV 24.35.2 is used for setting ONU LLID queue size (upstream SF). TLV 25.35.2 is used for setting ONU Port queue size (downstream SF). If it is not specified, then the ONU LLID or Port queue size is set to vendor determined value. |
| 24.35.3<br>25.35.3 | Maximum Buffer Size                     | SHOULD NOT     |                                                                                                                                                                                                                                         |
| 24.36<br>25.36     | Aggregate Service Flow Reference        | MUST           |                                                                                                                                                                                                                                         |

| TLV                              | Name                           | Support Needed | Comments                                                                                                                                                                                                                                                  |
|----------------------------------|--------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24.37<br>25.37<br>70.37<br>71.37 | MESP Reference                 | MUST           |                                                                                                                                                                                                                                                           |
| 24.41<br>25.41                   | Data Rate Unit Setting         | MUST           | This setting provides a new data rate multiplier TLV as follows: bits/s → Kbits/s → Mbit/s → Gbit/s, increasing the maximum data rate to the maximum value of $2^{32}-1$ Gbit/s.                                                                          |
| 24.43                            | Vendor-specific QoS Parameters | MUST           | Type 43 TLVs within service flows MUST be supported for purposes of MEF configuration. See [DPoE-MEFv2.0].                                                                                                                                                |
| 24.43.5.1                        | VPN Identifier                 | MUST           |                                                                                                                                                                                                                                                           |
| 24.43.8                          | General Extension Information  | MUST           | Vendor ID of 0xFFFFF                                                                                                                                                                                                                                      |
| 24.44<br>25.44                   | SF Collection                  | MUST           | Values carried in individual SF Collection TLVs are used by the DPoE System to associate a pair of SF: one downstream SF (via SF Collection DS TLV), and one upstream SF (SF Collection in US SF TLV), to create a single bidirectional service instance. |

## C.15 Device Management (TLVs 38, 53 and 54)

Table 12 - TLV 38, 53 and 54

| TLV    | Name                                              | Support Needed | Comments                        |
|--------|---------------------------------------------------|----------------|---------------------------------|
| 34.1   | SNMPv3 Kickstart Security Name                    | SHOULD         | SNMPv3 support is not mandatory |
| 34.2   | SNMPv3 Kickstart Manager Public Number            | SHOULD         | SNMPv3 support is not mandatory |
| 38.1   | SNMPv3 Notification Receiver IPv4 Address         | MUST           |                                 |
| 38.2   | SNMPv3 NotificationReceiverUDPPort Number         | MUST           |                                 |
| 38.3   | SNMPv3 Notification Receiver Trap Type            | MUST           |                                 |
| 38.4   | SNMPv3 Notification Receiver Timeout              | MUST           |                                 |
| 38.5   | SNMPv3 Notification Receiver Retries              | MUST           |                                 |
| 38.6   | SNMPv3 Notification Receiver Filtering Parameters | MUST           |                                 |
| 38.7   | SNMPv3 Notification Receiver Security Name        | MUST           |                                 |
| 38.8   | SNMPv3 Notification Receiver IPv6 Address         | MUST           |                                 |
| 53.1   | SNMPv1v2c Community Name                          | MUST           |                                 |
| 53.2   | SNMPv1v2c Transport Address Access                | MUST           |                                 |
| 53.2.1 | SNMPv1v2c Transport Address                       | MUST           |                                 |
| 53.2.2 | SNMPv1v2c Transport Address Mask                  | MUST           |                                 |
| 53.3   | SNMPv1v2c Access View Type                        | MUST           |                                 |
| 53.4   | SNMPv1v2c Access View Name                        | MUST           |                                 |
| 54.1   | SNMPv3 Access View Name                           | MUST           |                                 |
| 54.2   | SNMPv3 Access View Subtree                        | MUST           |                                 |

| TLV  | Name                    | Support Needed | Comments |
|------|-------------------------|----------------|----------|
| 54.3 | SNMPv3 Access View Mask | MUST           |          |
| 54.4 | SNMPv3 Access View Type | MUST           |          |

## C.16 TLV 43

Table 13 - TLV 43

| TLV   | Name                                               | Support Needed | Comments                                                                                                                         |
|-------|----------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| 43.1  | CM Load Balancing Policy ID                        | MUST NOT       | Not applicable to EPON.                                                                                                          |
| 43.2  | CM Load Balancing Priority                         | MUST NOT       | Not applicable to EPON.                                                                                                          |
| 43.3  | CM Load Balancing Group ID                         | MUST NOT       | Not applicable to EPON.                                                                                                          |
| 43.4  | CM Ranging Class ID Extension                      | MUST NOT       | Not applicable to EPON.                                                                                                          |
| 43.5  | L2VPN Encoding                                     | MUST           |                                                                                                                                  |
| 43.6  | Extended CMTS MIC Configuration Setting            | MAY            | ONUs do not request configuration files, thus tampering is not a concern. This TLV may be supported for backwards compatibility. |
| 43.7  | Source Address Verification Authorization Encoding | MUST           |                                                                                                                                  |
| 43.8  | General Extension Information                      | MUST           |                                                                                                                                  |
| 43.9  | Cable Modem Attribute Masks                        | MUST NOT       | This is really bonding-specific, thus not applicable to EPON.                                                                    |
| 43.10 | IP Multicast Join Authorization Encoding           | MUST           |                                                                                                                                  |
| 43.11 | Service Type Identifier                            | SHOULD NOT     | This TLV is not applicable to DPoE Networks in this version of the specifications.                                               |

## C.17 [DPoE-MEFv2.0] and [L2VPN] (TLVs 43.5, 45, and 65)

See [DPoE-MEFv2.0] for more information on the expected use and support for these TLVs in this version of DPoE specifications.

Table 14 - TLV 43.5, 45, and 65

| TLV        | Name                      | Support Needed | Comments |
|------------|---------------------------|----------------|----------|
| 43.5.1     | VPN Identifier            | MUST           |          |
| 43.5.2     | NSI Encapsulation Subtype | MUST           |          |
| 43.5.2.1   | Other                     | SHOULD NOT     |          |
| 43.5.2.2   | [802.1Q]                  | MUST           |          |
| 43.5.2.3   | [802.1ad]                 | MUST           |          |
| 43.5.2.4   | MPLS Peer                 | MUST           |          |
| 43.5.2.5   | L2TPv3 Peer               | SHOULD NOT     |          |
| 43.5.2.6   | [802.1ah]                 | MUST           |          |
| 43.5.2.6.1 | [802.1ah] I-Tag TCI       | MUST           |          |
| 43.5.2.6.2 | [802.1ah] B-DA            | MUST           |          |
| 43.5.2.6.3 | [802.1ah] B-TCI           | MUST           |          |
| 43.5.2.6.4 | [802.1ah] I-TPID          | MUST           |          |
| 43.5.2.6.5 | [802.1ah] I-PCP           | MUST           |          |
| 43.5.2.6.6 | [802.1ah] I-DEI           | MUST           |          |
| 43.5.2.6.7 | [802.1ah] I-UCA           | MUST           |          |

| TLV         | Name                                         | Support Needed | Comments                 |
|-------------|----------------------------------------------|----------------|--------------------------|
| 43.5.2.6.8  | [802.1ah] I-SID                              | MUST           |                          |
| 43.5.2.6.9  | [802.1ah] B-TPID                             | MUST           |                          |
| 43.5.2.6.10 | [802.1ah] B-PCP                              | MUST           |                          |
| 43.5.2.6.11 | [802.1ah] B-DEI                              | MUST           |                          |
| 43.5.2.6.12 | [802.1ah] B-VID                              | MUST           |                          |
| 43.5.2.8    | [802.1ad] S-TPID                             | MUST           |                          |
| 43.5.3      | Enable eSAFE DHCP Snooping                   | MUST           |                          |
| 43.5.4      | CM Interface Mask                            | MUST           |                          |
| 43.5.5      | Attachment Group ID                          | SHOULD NOT     |                          |
| 43.5.6      | Source Attachment Individual ID              | SHOULD NOT     |                          |
| 43.5.7      | Target Attachment Individual ID              | SHOULD NOT     |                          |
| 43.5.8      | Ingress User Priority                        | SHOULD NOT     |                          |
| 43.5.9      | UserPriorityRange                            | SHOULD NOT     |                          |
| 43.5.10     | L2VPN SA-Descriptor                          | MUST NOT       | BPI does not apply here. |
| 43.5.13     | L2VPN Mode                                   | MUST           |                          |
| 43.5.14     | DPoE TPID Translation                        | MUST           |                          |
| 43.5.14.1   | Upstream outmost TPID Translation            | MUST           |                          |
| 43.5.14.2   | Downstream outmost TPID Translation          | MUST           |                          |
| 43.5.14.3   | Upstream S-TPID Translation                  | MUST           |                          |
| 43.5.14.4   | Downstream S-TPID Translation                | MUST           |                          |
| 43.5.14.5   | Upstream B-TPID Translation                  | MUST           |                          |
| 43.5.14.6   | Downstream B-TPID Translation                | MUST           |                          |
| 43.5.14.7   | Upstream I-TPID Translation                  | MUST           |                          |
| 43.5.14.8   | Downstream I-TPID Translation                | MUST           |                          |
| 43.5.16     | DAC Disable/Enable                           | MUST           |                          |
| 43.5.18     | Pseudowire-Class                             | MUST           |                          |
| 43.5.19     | Service Delimiter                            | MUST           |                          |
| 43.5.19.1   | C-VID                                        | MUST           |                          |
| 43.5.19.2   | S-VID                                        | MUST           |                          |
| 43.5.19.3   | I-SID                                        | MUST           |                          |
| 43.5.19.4   | B-VID                                        | MUST           |                          |
| 43.5.20.1   | VPLS Class                                   | MUST           |                          |
| 43.5.20.2   | E-Tree Role                                  | MUST           |                          |
| 43.5.20.3   | E-Tree Root VID                              | MUST           |                          |
| 43.5.20.4   | E-Tree Leaf VID                              | MUST           |                          |
| 43.5.21.1   | Route Distinguisher                          | MUST           |                          |
| 43.5.21.2   | Route Target(import)                         | MUST           |                          |
| 43.5.21.3   | Route Target(export)                         | MUST           |                          |
| 43.5.27     | L2VPN L2 Multipoint Forwarding Mode          | MUST           |                          |
| 45.1        | Downstream Unencrypted Traffic (DUT) Control | SHOULD NOT     |                          |
| 45.2        | Downstream Unencrypted Traffic (DUT) CMIM    | SHOULD NOT     |                          |
| 65.1        | L2VPN MAC Aging Mode                         | MUST           |                          |
| 83          | L2CP Management                              | MUST           |                          |
| 83.1        | CMIM                                         | MUST           |                          |
| 83.2        | L2CP Mode                                    | MUST           |                          |
| 83.3        | L2CP L2PT D-MAC Address                      | MUST           |                          |

| TLV  | Name        | Support Needed | Comments |
|------|-------------|----------------|----------|
| 83.4 | L2CP Filter | MUST           |          |

## C.18 Customer (Subscriber) Management (TLV 43.7)

Table 15 - TLV 43.7

| TLV      | Name                              | Support Needed | Discussion     |
|----------|-----------------------------------|----------------|----------------|
| 43.7.1   | SAV Group Name Subtype            | MUST           |                |
| 43.7.2   | SAV Static Prefix Rule Subtype    | MUST           |                |
| 43.7.2.1 | SAV Static Prefix Address Subtype | MUST           | IPv4 and IPv6. |
| 43.7.2.2 | SAV Static Prefix Length Subtype  | MUST           | IPv4 and IPv6. |

## C.19 Upstream Drop Classification (TLV 60)

Table 16 - TLV 60

| TLV     | Name                                             | Support Needed | Comments                                                                                       |
|---------|--------------------------------------------------|----------------|------------------------------------------------------------------------------------------------|
| 60.1    | Classifier Reference                             | MUST           |                                                                                                |
| 60.5    | Rule Priority                                    | MUST           |                                                                                                |
| 60.9.1  | IPv4 TOSRange and Mask                           | MUST           |                                                                                                |
| 60.9.2  | IP Protocol                                      | MUST           |                                                                                                |
| 60.9.3  | IPv4 Source Address                              | MUST           |                                                                                                |
| 60.9.4  | IPv4 Source Mask                                 | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix. |
| 60.9.5  | IPv4 Destination Address                         | MUST           |                                                                                                |
| 60.9.6  | IPv4 Destination Mask                            | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix. |
| 60.9.7  | TCP/UDP Source Port Start                        | MUST           |                                                                                                |
| 60.9.8  | TCP/UDP Source Port End                          | MUST           |                                                                                                |
| 60.9.9  | TCP/UDP Destination Port Start                   | MUST           |                                                                                                |
| 60.9.10 | TCP/UDP Destination Port End                     | MUST           |                                                                                                |
| 60.10.1 | Ethernet DMAC                                    | MUST           | Mask can't be arbitrary bits. Must be used to define "most significant bits" a la IPv6 Prefix. |
| 60.10.2 | Ethernet SMAC                                    | MUST           |                                                                                                |
| 60.10.3 | Ethertype/DSAP/MacType                           | MUST           | type=1 MUST be supported. type=3 does not apply to EPON. Other type values MAY be supported.   |
| 60.11.1 | [802.1Q] User Priority                           | MUST           |                                                                                                |
| 60.11.2 | [802.1Q] VLAN ID                                 | MUST           |                                                                                                |
| 60.12.1 | IPv6 TrafficClassRange and Mask                  | MUST           |                                                                                                |
| 60.12.2 | IPv6 Flow Label                                  | MUST           |                                                                                                |
| 60.12.3 | IPv6 Next Header Type                            | MUST           |                                                                                                |
| 60.12.4 | IPv6 Source Address                              | MUST           | .                                                                                              |
| 60.12.5 | IPv6 Source Prefix Length                        | MUST           |                                                                                                |
| 60.12.6 | IPv6 Destination Address                         | MUST           |                                                                                                |
| 60.12.7 | IPv6 Destination Prefix Length                   | MUST           |                                                                                                |
| 60.13   | CM Interface Mask (CMIM) Encoding                | MUST           |                                                                                                |
| 60.14   | [802.1ad] S-VLAN Packet Classification Encodings | MUST           | TLV for [802.1ad] S-VLAN classifier.                                                           |

| TLV      | Name                                            | Support Needed | Comments                                                                                                                                                                                                                                |
|----------|-------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 60.14.1  | [802.1ad] S- TPID                               | MUST           |                                                                                                                                                                                                                                         |
| 60.14.2  | [802.1ad] S-VID                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.3  | [802.1ad] S-PCP                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.4  | [802.1ad] S-DEI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.5  | [802.1ad] C-TPID                                | MUST           |                                                                                                                                                                                                                                         |
| 60.14.6  | [802.1ad] C-VID                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.7  | [802.1ad] C-PCP                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.8  | [802.1ad] C-CFI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.9  | [802.1ad] S-TCI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.14.10 | [802.1ad] C-TCI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.   | [802.1ah] I-TAG Packet Classification Encodings | MUST           | TLV for [802.1ah] I-TAG classifier.                                                                                                                                                                                                     |
| 60.15.1  | [802.1ah] I-TPID                                | MUST           |                                                                                                                                                                                                                                         |
| 60.15.2  | [802.1ah] I-SID                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.3  | [802.1ah] I-TCI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.4  | [802.1ah] I-PCP                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.5  | [802.1ah] I-DEI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.6  | [802.1ah] I-UCA                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.7  | [802.1ah] B-TPID                                | MUST           |                                                                                                                                                                                                                                         |
| 60.15.8  | [802.1ah] B-TCI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.9  | [802.1ah] B-PCP                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.10 | [802.1ah] B-DEI                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.11 | [802.1ah] B-VID                                 | MUST           |                                                                                                                                                                                                                                         |
| 60.15.12 | [802.1ah] B-DA                                  | MUST           |                                                                                                                                                                                                                                         |
| 60.15.13 | [802.1ah] B-SA                                  | MUST           |                                                                                                                                                                                                                                         |
| 60.16    | ICMPv6                                          | MUST           |                                                                                                                                                                                                                                         |
| 60.17.1  | MPLS TC bits                                    | MUST           |                                                                                                                                                                                                                                         |
| 60.17.2  | MPLS Label                                      | MUST           |                                                                                                                                                                                                                                         |
| 60.43    | Vendor-specific Classifier Parameters           | MUST           | These TLVs will be "supported" in that vendor-proprietary TLVs can be specified in the configuration file, but their implementation is up to the vendor.<br>There currently are no standard DPoE vendor-specific classifier parameters. |

## C.20 Subscriber Management (TLV18 and TLV35)

Multiple TLVs are available allowing the operator to manage subscriber traffic through a DOCSIS CM (e.g., TLV18, TLV35, TLV36, TLV61, TLV63, and TLV66). The following text presents the similarities and differences based on the primary entity responsible for enforcing the management settings—the DPoE System or the vCM/ONU. The example below uses only TLV18 and TLV35 for illustration purposes.

TLV18 (*Max Number of CPEs*) enforces the number of physical CPE devices (each characterized with unique CPE MAC address) that can be connected directly to the D-ONU (and indirectly, to the associated vCM). This TLV does not enforce any limitations on the number active of IP addresses or data sessions across the connected CPE devices.

TLV35 (*Subscriber Management Control*) enforces the maximum number of IP addresses that can be used at any time by CPE devices connected directly to the D-ONU (and indirectly, to the associated vCM). This TLV does not enforce any limitations on the number of CPE devices connected to the D-ONU.

For example, if the vCM configuration file contains TLV18 with the value of 10 and TLV35 with the value of 0, the DPoE System is expected to drop all subscriber IPv4 traffic, even though up to 10 CPE devices can be connected to

the D-ONU. Conversely, if the vCM configuration file contains TLV35 with the value of 10 and TLV18 with the value of 0, 1, or TLV18 is absent altogether, only one CPE device can be connected to the D-ONU, but up to 10 IPv4 addresses can be assigned at any time.

Typically, either TLV18 or TLV35 is used in a vCM configuration file. Given the difference in the operation of TLV18 and TLV35, these TLVs are not intended to be interchangeable.