LSP Object Flag field of Stateful PCE

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Abstract

RFC8231 describes a set of extensions to PCEP to enable stateful control of MPLS-TE and GMPLS Label Switched Paths (LSPs) via PCEP. One of the extensions is the LSP object which includes a Flag field and the length is 12 bits. However, 11 bits of the Flag field has been assigned in RFC8231, RFC8281 and RFC8623 respectively.

This document updates RFC8231 by defining a new LSP-EXTENDED-FLAG TLV for LSP object to extend the length of the flag.

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1. Introduction

[RFC5440] describes the Path Computation Element Protocol (PCEP) which is used between a Path Computation Element (PCE) and a Path Computation Client (PCC) (or other PCE) to enable computation of Multi-protocol Label Switching (MPLS) for Traffic Engineering Label Switched Path (TE LSP).

PCEP Extensions for the Stateful PCE Model [RFC8231] describes a set of extensions to PCEP to enable active control of MPLS-TE and Generalized MPLS (GMPLS) tunnels. One of the extensions is the LSP object which includes a Flag field and the length is 12 bits. However, 11 bits of the Flag field has been assigned in RFC8231, RFC8281 and RFC8623 respectively.

This document updates RFC8231 by defining a new LSP-EXTENDED-FLAG TLV for LSP object to extend the length of the flag.

2. Conventions used in this document

2.1. Terminology

The terminology is defined as [RFC5440] and [RFC8231].
2.2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Update

3.1. Flag Field in LSP Object

As Figure 1 shows, the LSP Object is defined in Section 7.3 of [RFC8231]. The LSP object contains a flag field indicating to a PCE that the LSP State Synchronization is in progress.

```
+-----------------+-
|     PLSP-ID     |
|                 |
+-----------------+-
|     Flag        |
+-----------------+-
|                 |
+-----------------+-
|  //             |
|  TLVs           |
+-----------------+-
```

Figure 1: Flag field in LSP Object

As defined in [RFC8231], the length of LSP Object Flag field is 12 bits and it defined the value from bit 5 to bit 11. The bits from 1 to 3 are assigned in [RFC8623], the bit value 4 is used in [RFC8281]. The details of the flag field and assigned bits are shown as follows.
### Table 1

<table>
<thead>
<tr>
<th>Value</th>
<th>Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ERO-compression</td>
<td>RFC8623</td>
</tr>
<tr>
<td>2</td>
<td>Fragmentation</td>
<td>RFC8623</td>
</tr>
<tr>
<td>3</td>
<td>P2MP</td>
<td>RFC8623</td>
</tr>
<tr>
<td>4</td>
<td>Create</td>
<td>RFC8281</td>
</tr>
<tr>
<td>5-7</td>
<td>Operational (3 bits)</td>
<td>RFC8231</td>
</tr>
<tr>
<td>8</td>
<td>Administrative</td>
<td>RFC8231</td>
</tr>
<tr>
<td>9</td>
<td>Remove</td>
<td>RFC8231</td>
</tr>
<tr>
<td>10</td>
<td>SYNC</td>
<td>RFC8231</td>
</tr>
<tr>
<td>11</td>
<td>Delegate</td>
<td>RFC8231</td>
</tr>
</tbody>
</table>

#### 3.2. The LSP-EXTENDED-FLAG TLV

All bits of the flag has been assigned except bit 0. This document proposes to define a new LSP-EXTENDED-FLAG TLV for LSP object to extend the length of the flag as the Figure 2 shown.

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           Type=TBD             |       Length                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Extended Flag                            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

**Figure 2: LSP-EXTENDED-FLAG TLV Format**

Extended Flag (32 bits), starting from the least significant bit. The bit 0 SHOULD be reserved. Other unassigned bits are reserved for future uses. They MUST be set to 0 on transmission and MUST be ignored on receipt.

The LSP-EXTENDED-FLAG MUST be included in the LSP object when the bit 0 of the Flag field carried in the LSP object set to 1. If the TLV is missing, the PCE will generate an error with Error-type=6 (Mandatory Object missing) and error-value TBD (LSP-EXTENDED-FLAG TLV missing) and close the session.
4. Security Considerations

TBA

5. Acknowledgements

TBA

6. IANA Considerations

6.1. LSP Object

[RFC8231] defines the LSP object; per that RFC, IANA created a registry to manage the value of the LSP object’s Flag field. IANA is requested to make allocations from the registry, as follows:

<table>
<thead>
<tr>
<th>Value</th>
<th>Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Indicate the LSP Extended Flag</td>
<td>[this document]</td>
</tr>
<tr>
<td>TBD</td>
<td>LSP-EXTENDED-FLAG TLV</td>
<td>[this document]</td>
</tr>
</tbody>
</table>

Table 2

6.2. PCEP-Error Object

The following error types and error values have been registered within the "PCEP-ERROR Object Error Types and Values" subregistry of the "Path Computation Element Protocol (PCEP) Numbers" registry:

<table>
<thead>
<tr>
<th>Error-Type</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Mandatory Object missing</td>
</tr>
<tr>
<td></td>
<td>Error-value</td>
</tr>
<tr>
<td></td>
<td>TBD: LSP-EXTENDED-FLAG TLV missing</td>
</tr>
</tbody>
</table>

Table 3

7. Normative References


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