PCEP Extension for Flow Specification
draft-li-pce-pcep-flowspec-00

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Motivation

- Using PCEP to install a packet classification rule for LSPs
  - Distributing the flow specifications from PCE controller to network device without BGP protocol
  - When a TE-LSP is set up, the head end needs to know how to use it
    - What traffic to send on the LSP
  - PCEP allows an active PCE to set up or modify LSPs
    - So we need a way to tell the head end how to use the LSP

- This document specifies a set of extensions to PCEP to support dissemination of flow specifications.
  - The extensions include the instantiation, updation and deletion of flow specifications.
Requirements for PCEP extension

• Capability Advertisement
  – During PCEP session establishment, both the PCC and the PCE must announce their support of PCEP extensions for FlowSpec.

• PCEP FlowSpec Message
  – Sent by a PCE to a PCC to trigger creation, modification or deletion of a FlowSpec rule.

• Objects and TLVs
  – OPEN Object
    • PCE FlowSpec Capability TLV
  – FLOW Object
    • Flow Filter TLVs
  – ACTION Object
    • ACTION TLVs
OPEN Object

• The PCE-FLOWSPEC-CAPABILITY TLV is an optional TLV associated with the OPEN Object [RFC5440] to exchange PCE FlowSpec capability of PCEP speakers.

• Its format is shown in the following figure:

![Figure 1: PCE-FLOWSPEC-CAPABILITY TLV format](image-url)
FLOW Object

The FLOW object MUST be present within FlowSpec messages. The FLOW object carries a set of FlowSpec filter rules.

FLOW Object-Class is to be assigned by IANA.

Two FLOW Object-Type are defined so far:
- IPv4 FLOW: FLOW Object-Type is 1.
- IPv6 FLOW: FLOW Object-Type is 2.

The format of the FLOW object is as follows:

```
+-------------+-------------+-----------------+---------------+
<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Ref TLV</th>
<th>Value defined in</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD1</td>
<td>Destination IPv4 Prefix</td>
<td>1</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD2</td>
<td>Source IPv4 Prefix</td>
<td>2</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD3</td>
<td>IP Protocol</td>
<td>3</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD4</td>
<td>Port</td>
<td>4</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD5</td>
<td>Destination port</td>
<td>5</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD6</td>
<td>Source port</td>
<td>6</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD7</td>
<td>ICMP type</td>
<td>7</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD8</td>
<td>ICMP code</td>
<td>8</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD9</td>
<td>TCP flags</td>
<td>9</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD10</td>
<td>Packet length</td>
<td>10</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD11</td>
<td>DSCP</td>
<td>11</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD12</td>
<td>Fragment</td>
<td>12</td>
<td>RFC5575</td>
</tr>
<tr>
<td>TBD13</td>
<td>Flow Label</td>
<td>13</td>
<td>I-D.ietf-idr-flow-spec-v6</td>
</tr>
<tr>
<td>TBD14</td>
<td>Destination IPv6 Prefix</td>
<td>1</td>
<td>I-D.ietf-idr-flow-spec-v6</td>
</tr>
<tr>
<td>TBD15</td>
<td>Source IPv6 Prefix</td>
<td>2</td>
<td>I-D.ietf-idr-flow-spec-v6</td>
</tr>
<tr>
<td>TBD16</td>
<td>Next Header</td>
<td>3</td>
<td>I-D.ietf-idr-flow-spec-v6</td>
</tr>
</tbody>
</table>
```

Table 2: Flow Filter Types
The ACTION object MUST be present within FlowSpec messages when creating or updating the FlowSpec. The ACTION object carries a set of FlowSpec actions.

ACTION Object-Class is to be assigned by IANA. ACTION Object-Type is 1.

The format of the ACTION object body is:

```
<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Ref TLV</th>
<th>Value defined in</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD17</td>
<td>traffic-rate</td>
<td>TBD</td>
<td>I-D.ietf-ospf-flowspec-extensions</td>
</tr>
<tr>
<td>TBD18</td>
<td>traffic-action</td>
<td>TBD</td>
<td>I-D.ietf-ospf-flowspec-extensions</td>
</tr>
<tr>
<td>TBD19</td>
<td>traffic-marking</td>
<td>TBD</td>
<td>I-D.ietf-ospf-flowspec-extensions</td>
</tr>
<tr>
<td>TBD20</td>
<td>redirect-to-IPv4</td>
<td>TBD</td>
<td>I-D.ietf-ospf-flowspec-extensions</td>
</tr>
<tr>
<td>TBD21</td>
<td>redirect-to-IPv6</td>
<td>TBD</td>
<td>I-D.ietf-ospf-flowspec-extensions</td>
</tr>
<tr>
<td>16(*)</td>
<td>IPV4-LSP-IDENTIFIERS</td>
<td>-</td>
<td>I-D.ietf-pce-stateful-pce</td>
</tr>
<tr>
<td>19(*)</td>
<td>IPV6-LSP-IDENTIFIERS</td>
<td>-</td>
<td>I-D.ietf-pce-stateful-pce</td>
</tr>
<tr>
<td>17(*)</td>
<td>Symbolic-Path-Name</td>
<td>-</td>
<td>I-D.ietf-pce-stateful-pce</td>
</tr>
</tbody>
</table>
```

Table 3: Flow Action Types

(*) The type is defined in [I-D.ietf-pce-stateful-pce]
Overview of Procedures

- Firstly both the PCE and PCC advertise the PCE FlowSpec Capability during the PCE session initiation phase.

- On the PCEP session with PCE FlowSpec Capability
  - PCE communicates with PCC to
    - Create FlowSpec
    - Update FlowSpec
    - Withdraw FlowSpec
Example Usage

• Once PCE initiate tunnels, it needs to further decide what data needs to flow on the newly created tunnel.
• A flow specification can be created at the ingress to redirect the flow to the LSP as shown below.

```
1. PCEInitiate
   Message to initiate LSP
   (RTA-RTD)

2. FlowSpec
   Message to add flow
   (source - x.x.x.x, port - y)
   to redirect to LSP
   (RTA-RTD)
```
Next step

- Solicit comments & cooperation
- Revise this draft