OSPF Extensions for Flow Specification

draft-liang-ospf-flowspec-extensions-02

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Motivation

◆   For the network only deploying IGP (Interior Gateway Protocol) (e.g. OSPF), it is expected to extend IGP to distribute FlowSpec info. The advantage is to mitigate the impacts of Denial-of-Service (DoS) attacks.

◆ This document also defines a new OSPFv2 FlowSpec Opaque Link State Advertisement (LSA) / OSPFv3 FlowSpec LSA encoding format that can be used to distribute FlowSpec info.

Use Cases for OSPF based FlowSpec Distribution (1/3)

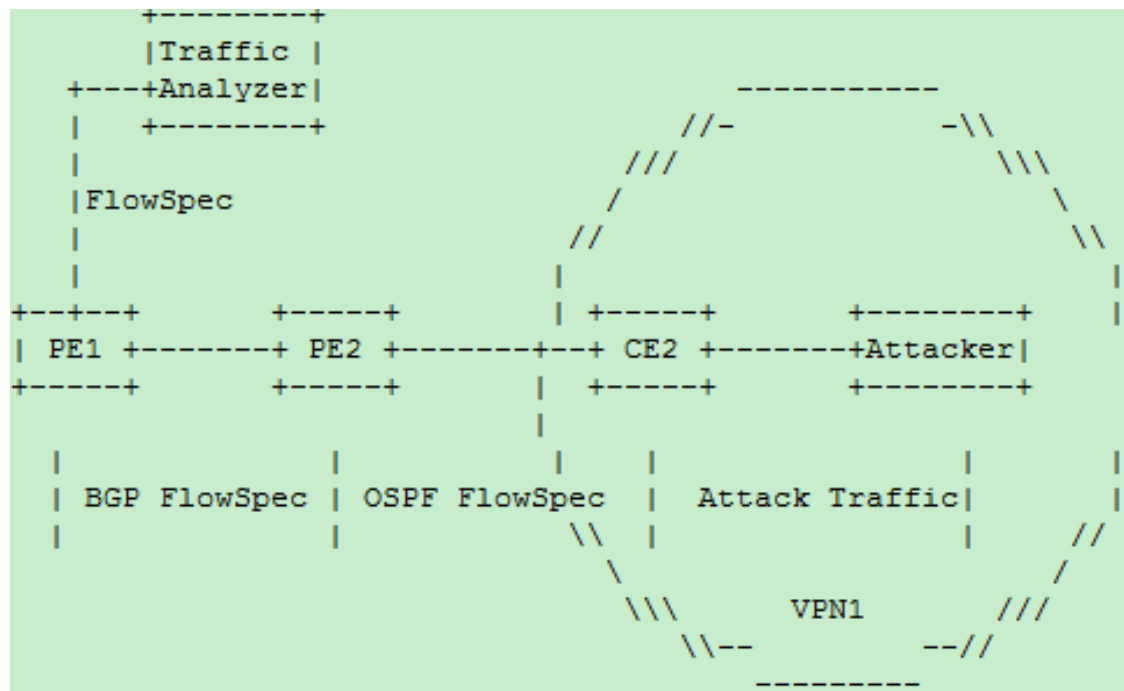BGP/MPLS VPN: Traffic Analyzer Deployed in Provider Network

Figure 1: Traffic Analyzer deployed in Provider Network

Use Cases for OSPF based FlowSpec Distribution (2/3)

BGP/MPLS VPN: Traffic Analyzer Deployed in Customer Network
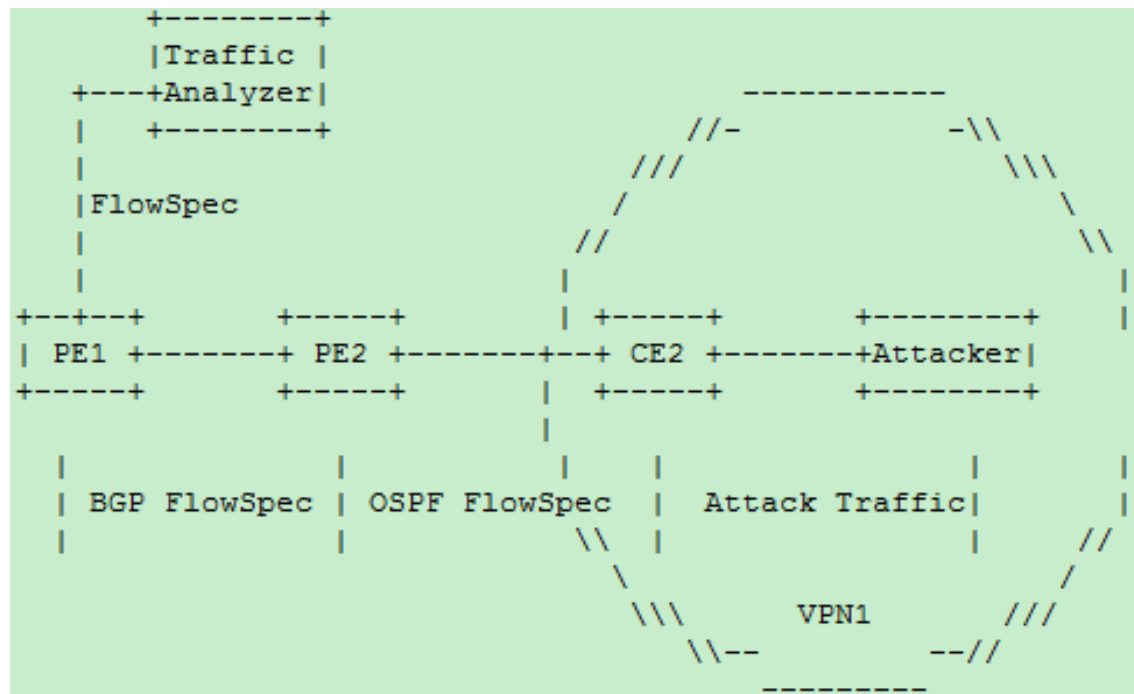
Figure 2: Traffic Analyzer deployed in Customer Network

Use Cases for OSPF based FlowSpec Distribution (3/3)

OSPF Campus Network

```
              +--------+
              |Traffic |
      +---+Analyzer|
      |      +--------+
      |
      |FlowSpec
      |
      |
+--+-------+              +---------+              +--------+
| Router A +-----------+ Router B +--------+Attacker|
+---------+              +---------+              +--------+

      |                    |                    |
      |      OSPF FlowSpec  |   Attack Traffic   |
      |                    |                    |
```

Figure 3: OSPF Campus Network

OSPF Extensions for FlowSpec Info ------ OSPFv2

This document defines a new OSPF flow specification Opaque LSA encoding format that can be used to distribute traffic flow specifications. This new OSPF FlowSpec Opaque LSA is extended based on [RFC5250].

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            LS age             |    Options    |    LS type    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Opaque Type  |               Opaque ID                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Advertising Router                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      LS sequence number                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         LS checksum           |             length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                                                               +
|                            TLVs                               |
+                                                               +
|                            ...                                |
```
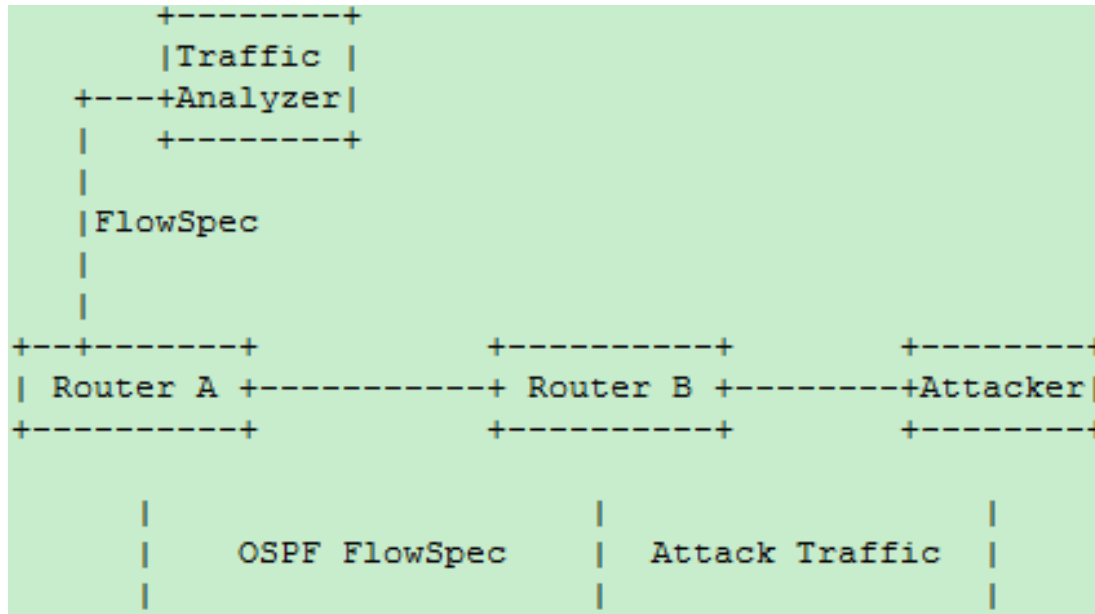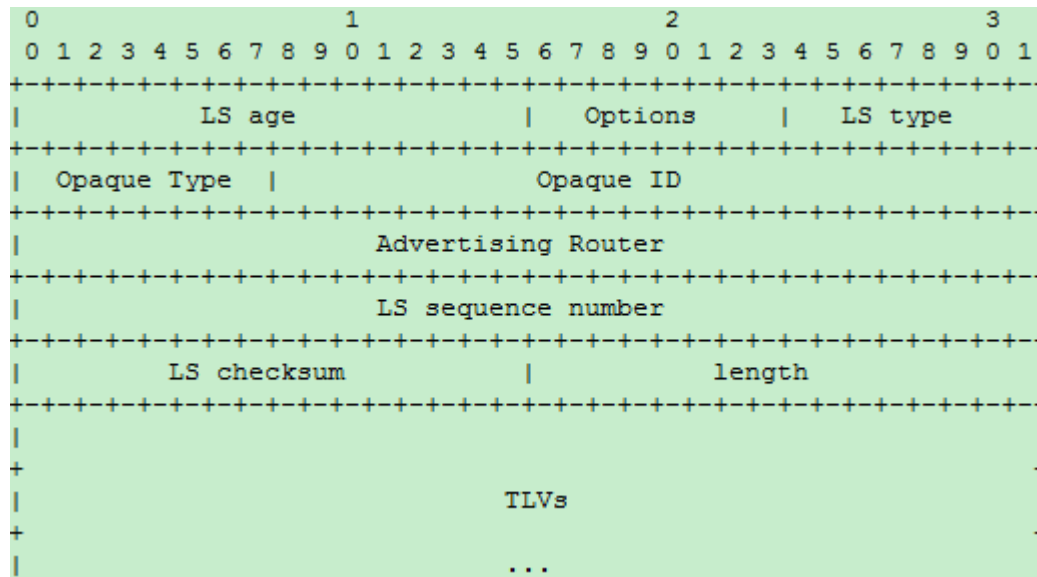
Figure 4: FlowSpec Opaque LSA

◆ Opaque type: OSPF FlowSpec Opaque LSA (Type Code: TBD1)

OSPF Extensions for FlowSpec Info ------ OSPFv3

This document defines a new OSPFv3 flow specification LSA encoding format that can be used to distribute traffic flow specifications. This new OSPFv3 FlowSpec LSA is extended based on [RFC5340].
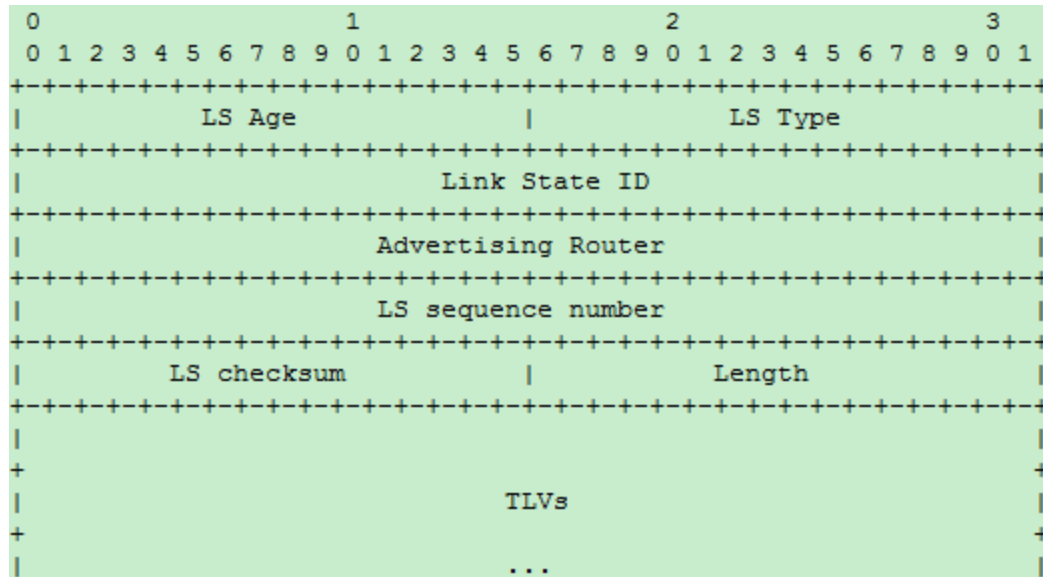
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            LS Age              |           LS Type             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         Link State ID                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Advertising Router                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       LS sequence number                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         LS checksum           |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                                                               +
|                             TLVs                              |
+                                                               +
|                             ...                               |
```

Figure 5: OSPFv3 FlowSpec LSA

◆ LSA Function Code: FlowSpec LSA (Type Code: TBD2)

OSPF Extensions for FlowSpec Info

The FlowSpec Opaque LSA carries one or more FlowSpec Filters TLVs and corresponding FlowSpec Action TLVs.

```
 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              |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Filters (variable)                      |
+                                                               +
|                             ...                               |
```
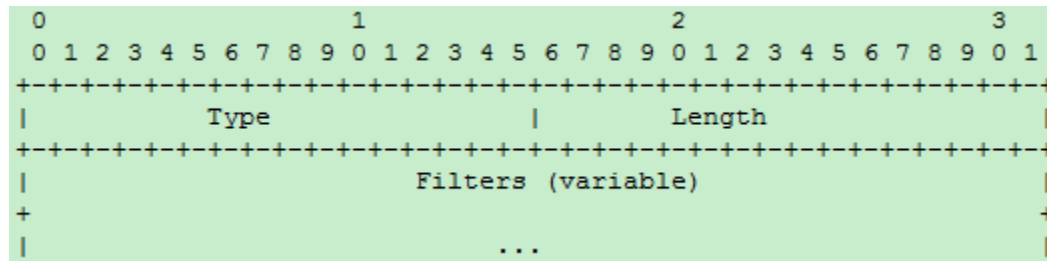
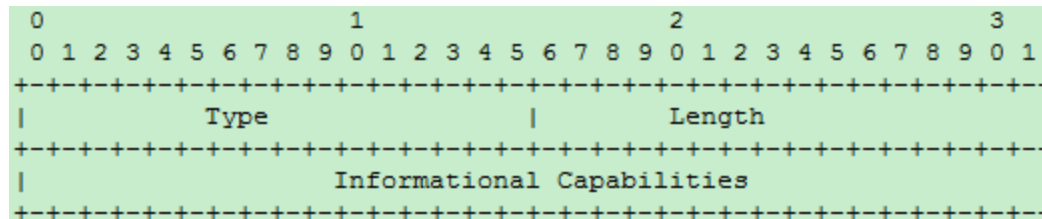Figure 6: OSPF FlowSpec Filters TLV

- ◆ Type: the TLV type (Type Code: TBD3)
- ◆ Filters: the same as "flow-spec NLRI value" defined in [RFC5575].

Table 1: Traffic Filtering Actions in [RFC5575]

```
+-------+----------------+-------------------------+
| type  | FlowSpec Action | encoding               |
+-------+----------------+-------------------------+
| 0x8006| traffic-rate   | 2-byte as#, 4-byte float|
|       |                |                         |
| 0x8007| traffic-action | bitmask                 |
|       |                |                         |
| 0x8008| redirect       | 6-byte Route Target     |
|       |                |                         |
| 0x8009| traffic-marking| DSCP value              |
+-------+----------------+-------------------------+
```

OSPF Extensions for FlowSpec Info

OSPF routers may use Router Information (RI) LSA [RFC4970] for OSPF features advertisement and discovery. The FlowSpec info requires an additional capability for the OSPF router.

```
 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               |           Length              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Informational Capabilities                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
Bit             Capabilities
-------------------------------
6 (TBD3)        OSPF FlowSpec
7-31            Unassigned (Standards Action)
```

OSPF Extensions for FlowSpec Info

When FlowSpec info is from the BGP protocol, it needs to be imported to the IGP protocol. This extended community is used to specify a particular action, i.e. importing the FlowSpec info to the IGP protocol.

```
+--------+--------------------+--------------------+
| type   | extended community | encoding           |
+--------+--------------------+--------------------+
| TBD4   | import-policy      | IGP target         |
+--------+--------------------+--------------------+
```

```
 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 (TBD4, import-policy) |    Protocol   |   Reserved    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                             Metric                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Next Step

◆ AS the flow information is domain wide, we need to describe the flooding problem.

Thanks!