          Signaling Flow-ID Label Capability and Flow-ID Readable Label Depth
                          Using IGP and BGP-LS
                       draft-xzc-lsr-mpls-flc-flrd-00

Abstract

   Flow-ID Label (FL) is used for MPLS flow identification and flow-
   based performance measurement with alternate marking method. The
   ability to process Flow-ID labels is called Flow-ID Label Capability
   (FLC), and the capability of reading the maximum label stack depth
   and performing FL-based performance measurement is called Flow-ID
   Readable Label Depth (FRLD). This document defines a mechanism to
   signal the FLC and the FRLD using IGP and BGP-LS.

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1. Introduction

As specified in [I-D.ietf-mpls-inband-pm-encapsulation], Flow-ID Label (FL) is used for MPLS flow identification and flow-based performance measurement with alternate marking method.

Flow-ID Label may appear multiple times in a label stack with variable depth, so both the Flow-ID Label Capability (FLC) and the Flow-ID Readable Label Depth (FRLD) are defined in [I-D.ietf-mpls-inband-pm-encapsulation].

Analogous to [I-D.ietf-isis-mpls-elc] and [I-D.ietf-ospf-mpls-elc], this document defines a mechanism to signal the FLC and the FRLD using IGP and BGP-LS, specifically, IGP includes IS-IS, OSPFv2 and OSPFv3.

1.1. Terminology

This memo makes use of the terms defined in [I-D.ietf-mpls-inband-pm-encapsulation] and [RFC8491].

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.

2. Advertising FLC Using IGP

   Even though FLC is a property of the node, in some cases it is
   advantageous to associate and advertise the FLC with a prefix, so FLC
   is advertised with a prefix in this document.

   If a router has multiple interfaces, the router MUST NOT announce FLC
   unless all of its interfaces are capable of processing FLs.

   If the router supports FLs on all of its interfaces, it SHOULD
   advertise the FLC with every local host prefix it advertises in IGP.

2.1. Advertising FLC Using IS-IS

   Next to the ELC Flag (E-flag) defined in Section 3 of
   [I-D.ietf-isis-mpls-elc], a new bit FLC Flag (F-flag) is defined,
   which is Bit 4 in the Prefix Attribute Flags [RFC7794], as shown in
   Figure 1.

```
            0 1 2 3 4 5 6 7...
           +-+-+-+-+-+-+-+-+...
           |X|R|N|E|F|     ...
           +-+-+-+-+-+-+-+-+...
```

                    Figure 1: Prefix Attribute Flags

   F-Flag: FLC Flag (Bit 4)

      Set for local host prefix of the originating node if it supports
      FLC on all interfaces.

   The FLC signaling MUST be preserved when a router propagates a prefix
   between ISIS levels [RFC5302].

2.2. Advertising FLC Using OSPFv2

   Next to the ELC Flag (E-flag) defined in Section 3.1 of
   [I-D.ietf-ospf-mpls-elc], a new bit FLC Flag (F-flag) is defined,
   which is Bit 3 in Flags field of OSPFv2 Extended Prefix TLV
   [RFC7684]:

      0x10 - F-Flag (FLC Flag): Set for local host prefix of the
      originating node if it supports FLC on all interfaces.

   The FLC signaling MUST be preserved when an OSPFv2 Area Border Router
   (ABR) distributes information between areas. To do so, an ABR MUST

originate an OSPFv2 Extended Prefix Opaque LSA [RFC7684] including
the received FLC setting.

2.3. Advertising FLC Using OSPFv3

Next to the ELC Flag (E-flag) defined in Section 3.2 of
[I-D.ietf-ospf-mpls-elc], a new bit FLC Flag (F-flag) is defined,
which is Bit 0 in OSPFv3 PrefixOptions field [RFC5340]:

   0x80 - F-Flag (FLC Flag): Set for local host prefix of the
   originating node if it supports FLC on all interfaces.

The FLC signaling MUST be preserved when an OSPFv3 Area Border Router
(ABR) distributes information between areas. The setting of the FLC
Flag in the Inter-Area-Prefix-LSA [RFC5340] or in the Inter-Area-
Prefix TLV [RFC8362], generated by an ABR, MUST be the same as the
value the FLC Flag associated with the prefix in the source area.

3. Advertising FRLD Using IGP

As requested by [RFC8491], IANA has created an IANA-managed registry
titled "IGP MSD-Types" to identify MSD-Types. A new MSD-Type, called
FRLD-MSD, is defined to advertise the FRLD of a given router. The
MSD-Type code 3 is requested to be assigned by IANA for FRLD-MSD.
The MSD-Value field is set to the FRLD in the range between 0 to 255.

If a router has multiple interfaces with different capabilities of
reading the maximum label stack depth, the router MUST advertise the
smallest value found across all of its interfaces.

For IS-IS, the FRLD is advertised in a Node MSD Sub-TLV [RFC8491]
using the FRLD-MSD type.

For OSPF including both OSPFv2 and OSPFv3, the FRLD is advertised in
a Node MSD TLV [RFC8476] using the FRLD-MSD type.

The absence of FRLD-MSD advertisements indicates only that the
advertising node does not support advertisement of this capability.

4. Signaling FLC and FRLD in BGP-LS

The IGP extensions defined in this document can be advertised via
BGP-LS (Distribution of Link-State and TE Information Using BGP)
[RFC7752] using existing BGP-LS TLVs.

The FLC is advertised using the Prefix Attribute Flags TLV as defined
in [I-D.ietf-idr-bgp-ls-segment-routing-ext].

The FRLD-MSD is advertised using the Node MSD TLV as defined in
[RFC8814].

5. Security Considerations

This document does not raise any additional security issues beyond
those of the specifications referred to in the list of normative
references.

6. IANA Considerations

This document requests the following allocations from IANA:

   - Bit 4 in the Bit Values for Prefix Attribute Flags Sub-TLV
   registry is requested to be assigned to the FLC Flag (F-Flag).

   - Flag 0x10 in the OSPFv2 Extended Prefix TLV Flags registry is
   requested to be assigned to the FLC Flag (F-Flag).

   - Bit 0x80 in the "OSPFv3 Prefix Options (8 bits)" registry is
   requested to be assigned to the FLC Flag (F-Flag).

   - Type 3 in the IGP MSD-Types registry is requested to be assigned
   to the FRLD-MSD.

7. Acknowledgements

TBA.

8. Normative References

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