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Signaling Flow-ID Label Capability and Flow-ID Readable Label Depth Using IGP and BGP-LS
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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.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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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 [RFC9088] and [RFC9089], 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 [RFC9088], a new bit FLC Flag (F-flag) is defined, which is Bit 4 in the Prefix Attribute Flags [RFC7794], as shown in Figure 1.

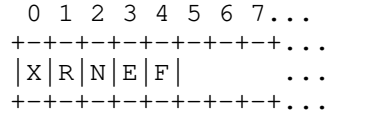

Figure 1: Prefix Attribute Flags

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 [RFC9089], 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 [RFC9089], 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 [RFC9085].

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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