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IGP extensions for Advertising Offset for Flex-Algorithm
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Abstract

This document describes the IGP extensions to provide predictable Adjacency-per Flex-Algorithm [FLEXALGO] in segment routing.

We propose some methods to allow the advertisement of additional TLV in IGP the Flex-Algorithm specific Adjacency-SIDs could be automatically derived.

With the proposed method, the size of advertisement on per node per link has greatly reduced. Each participating router would derive the required labels automatically.

Extensions for offset to derive Flex-Algorithm Prefix-SID is also included in this document.

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[1.](#) Introduction

The draft proposes methods for routers to announce Flex-Algorithm specific Adjacency-SID with minimal advertisement in IGP. When the other routers need a specific path (aka SR-TE) or TI-LFA path, the Flex-Algorithm specific Adjacency-SID should be taken into the path label construction.

Hence, the top most label, either node or link related, in a SR policy stack should be used to identify a certain Flex-Algo with full identification.

[2.](#) Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

interpreted as described in [RFC 2119](#) [[RFC2119](#)].

In this document, these words will appear with that interpretation only when CAPS. Lower case uses of these words are not to be interpreted as carrying significance described in [RFC 2119](#).

3. ISIS extension

With reference to [RFC8667](#), the information could be advertised in SR-Capability sub-TLV in [Section 3](#).

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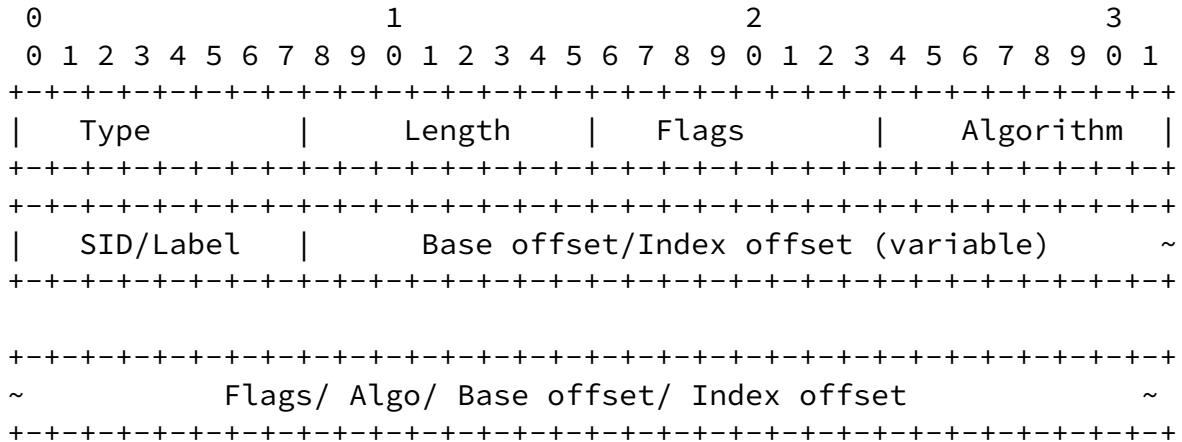
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3.1. Algorithm Offset for Adj-SID

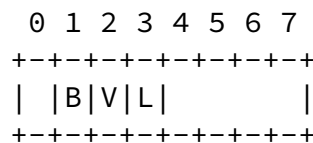


where:

Type: TDB

Length: variable; multiple advertisements

Flags: 1 octet field of the following flags:




```

+++++
|      SID/Label Base Offset/Index Offset (variable)      ~
+++++
~      Flags/ Algo/NB Sys-ID/ SID/Label/Index Offset (variable)  ~
+++++

```

where:

Type: TDB

Length: variable; multiple advertisements

Flags: 1 octet field of the following flags:

```

  0 1 2 3 4 5 6 7
+++++
| |B|V|L|      |
+++++

```

where:

B-Flag: Backup Flag. If set, the Adj-SID is eligible for protection (e.g., using IP Fast Reroute (IPFRR) or MPLS Fast Reroute (MPLS-FRR)) as described in [\[RFC8402\]](#).

V-Flag: Value Flag. If set, then it carries a label value. If not set, it is an index value.

L-Flag: Local Flag. Always set to 1

Algorithm: 1 octet. Same as [Section 5.1](#)

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Neighbor System-ID: IS-IS System-ID of length "ID Length" as defined in [\[IS010589\]](#).

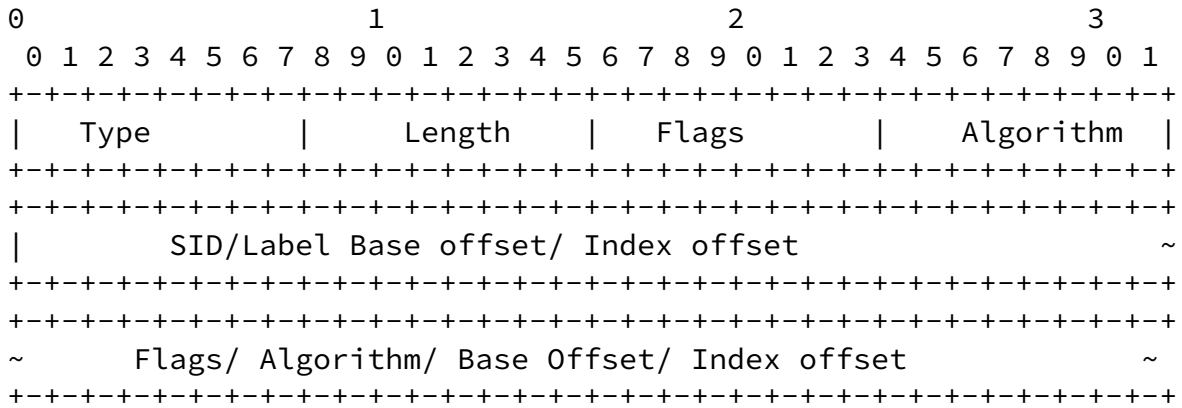
Base Offset: 3 octets. Same as [Section 5.1](#)

Index Offset: 4 octets. Same as [Section 5.1](#)

3.3. Algorithm Offset for Prefix SID

Prefix-SID for Algorithm could also be generated by adding an index offset v a base offset for label.

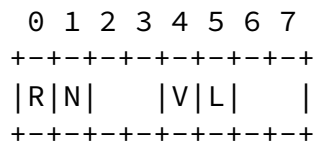
This advertisement is an sub-TLV in [RFC8667 Section 2](#).



Type: TDB

Length: variable

Flags: 1 octet field of the following flags:



where:

R-Flag: Re-advertisement Flag. If set, then the prefix to which this Prefix-SID is attached has been propagated by the router from either another level (i.e., from Level-1 to Level-2 or the opposite) or redistribution (e.g., from another protocol).

N-Flag: Node-SID Flag. If set, then the Prefix-SID refers to the router identified by the prefix. Typically, the N-Flag is set on Prefix-SIDs that are attached to a router loopback address. The

N-Flag is set when the Prefix-SID is a Node-SID as described in [[RFC8402](#)].

V-Flag: Value Flag. If set, then it carries a label value. If not set, it is an index value.

L-Flag: Local Flag. Always set to 0

Algorithm: 1 octet
Flex-Algo value is between 128 and 255

Base offset: 3 octets
Label base for Prefix-SIDs for given Algorithm
The derived Prefix-SID is the sum of the base Offset and the Algo 0 label

Index Offset: 4 octets
Index offset counting from Algo 0
The new label for Prefix is sum of (SRGB base + index + index offset)

The format of Base offset and Index Offset is the same as [RFC8667](#). The choice advertising Base Offset or Index Offset MUST match the advertisement of original Prefix-SID method from the same router.

[4. Compatibility](#)

For nodes that do not support Algorithm Offset for Adj-SID extension, the label stack could use normal Adj-SID, providing that the node still supports Flex-Prefix SID.

For TI-LFA, there would be two modes of operation - loose or strict. For strict mode, all Adj-SID involved in TI-LFA candidate path must be derived with offset method.

For loose mode, Adj-SID in the TI-LFA candidate path could be a mix of Adj-SID with and without offset. This allows backward compatibility with routers which support Flex-Algo.

[5. OSPF extension](#)

TBD

6. Security Consideration

TBD

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7. References

7.1. Normative References

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- [RFC8667] Previdi, S., Ed., Ginsberg, L., Ed., Filsfils, C., Bashandy, A., Gredler, H., and B. Decraene, "IS-IS Extensions for Segment Routing", [RFC 8667](#), DOI 10.17487/RFC8667, December 2019, <<https://www.rfc-editor.org/info/rfc8667>>.
- [TI-LFA] Litkowski, S., Bashandy, A., Filsfils, C., Francois, P., Decraene, B., and D. Voyer, "Topology Independent Fast Reroute using Segment Routing", <<https://datatracker.ietf.org/doc/html/draft-ietf-rtgwg-segment-routing-ti-lfa>>
- [FLEXAGLO] S. Hegde, P. Psenak and etc, IGP Flexible Algorithm <https://datatracker.ietf.org/doc/draft-ietf-lsr-flex-algo>
- [ISO10589] International Organization for Standardization, "Information technology -- Telecommunications and information exchange between systems -- Intermediate system to Intermediate system intra-domain routing information exchange protocol for use in conjunction with the protocol for providing the connectionless-mode network service (ISO 8473)", ISO/IEC 10589:2002, Second Edition, November 2002.

8. Acknowledgments

The following people have contributed to this document:
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