Inter-Domain Routing
Internet-Draft
Intended status: Standards Track
Expires: October 13, 2022

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April 11, 2022

BGP Link-State Extensions for Seamless BFD
draft-ietf-idr-bgp-ls-sbfd-extensions-07

Abstract

Seamless Bidirectional Forwarding Detection (S-BFD) defines a simplified mechanism to use Bidirectional Forwarding Detection (BFD) with large portions of negotiation aspects eliminated, thus providing benefits such as quick provisioning as well as improved control and flexibility to network nodes initiating the path monitoring. The link-state routing protocols (IS-IS and OSPF) have been extended to advertise the Seamless BFD (S-BFD) Discriminators.

This document defines extensions to the BGP Link-state address-family to carry the S-BFD Discriminators' information via BGP.

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1. Introduction

Seamless Bidirectional Forwarding Detection (S-BFD) [RFC7880] defines a simplified mechanism to use Bidirectional Forwarding Detection (BFD) [RFC5880] with large portions of negotiation aspects eliminated, thus providing benefits such as quick provisioning as well as improved control and flexibility to network nodes initiating the path monitoring.

For monitoring of a service path end-to-end via S-BFD, the headend node (i.e. Initiator) needs to know the S-BFD Discriminator of the destination/tail-end node (i.e. Responder) of that service. The link-state routing protocols (IS-IS [RFC7883] and OSPF [RFC7884]) have been extended to advertise the S-BFD Discriminators. With this, an Initiator can learn the S-BFD discriminator for all Responders within its IGP area/level, or optionally within the domain. With networks being divided into multiple IGP domains for scaling and

operational considerations, the service endpoints that require end to end S-BFD monitoring often span across IGP domains.

BGP Link-State (BGP-LS) [RFC7752] enables the collection and distribution of IGP link-state topology information via BGP sessions across IGP areas/levels and domains. The S-BFD discriminator(s) of a node can thus be distributed along with the topology information via BGP-LS across IGP domains and even across multiple Autonomous Systems (AS) within an administrative domain.

This document defines extensions to BGP-LS for carrying the S-BFD Discriminators information.

1.1. Requirements Language

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. Terminology

This memo makes use of the terms defined in [RFC7880].

3. BGP-LS Extensions for S-BFD Discriminator

The BGP-LS [RFC7752] specifies the Node NLRI for the advertisement of nodes and their attributes using the BGP-LS Attribute. The S-BFD discriminators of a node are considered a node-level attribute and advertised as such.

This document defines a new BGP-LS Attribute TLV called the S-BFD Discriminators TLV and its format is as follows:

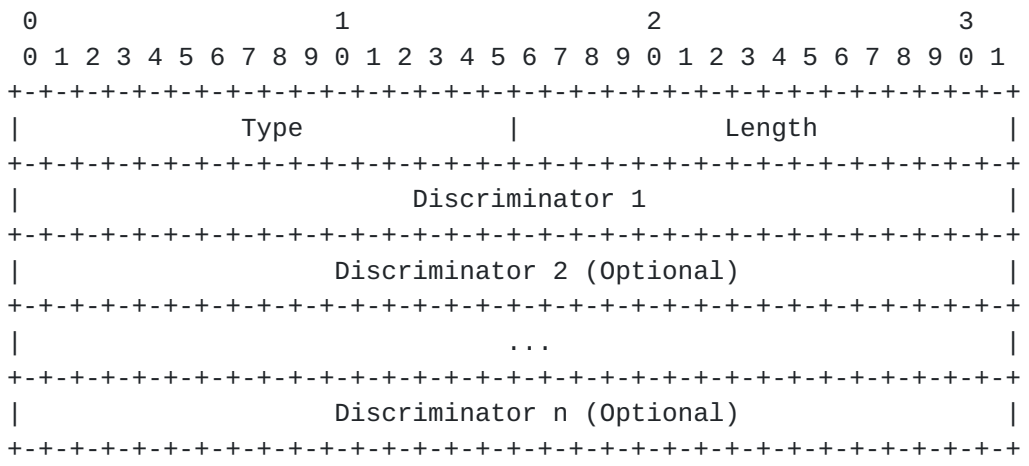

Figure 1: S-BFD Discriminators TLV

where:

- Type: 1032 (early allocation by IANA)
- Length: variable. It MUST be a minimum of 4 octets and increments of 4 octets for each additional discriminator.
- Discriminator n: 4 octets each, carrying an S-BFD local discriminator value of the node. At least one discriminator MUST be included in the TLV.

The S-BFD Discriminators TLV can be added to the BGP-LS Attribute associated with the Node NLRI that originates the corresponding underlying IGP TLV/sub-TLV as described below. This information is derived from the protocol specific advertisements as follows:

- IS-IS, as defined by the S-BFD Discriminators sub-TLV in [RFC7883].
- OSPFv2/OSPFv3, as defined by the S-BFD Discriminator TLV in [RFC7884].

4. IANA Considerations

IANA is requested to permanently allocate the following code-point from the "BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs" registry. The column "IS-IS TLV/Sub-TLV" defined in the registry does not require any value and should be left empty.

Code Point	Description	Length
1032	S-BFD Discriminators TLV	variable

Table 1: S-BFD Discriminators TLV Code-Point Allocation

5. Manageability Considerations

The new protocol extensions introduced in this document augment the existing IGP topology information that was distributed via [RFC7752]. Procedures and protocol extensions defined in this document do not affect the BGP protocol operations and management other than as discussed in the Manageability Considerations section of [RFC7752]. Specifically, the malformed NLRIs attribute tests in the Fault Management section of [RFC7752] now encompasses the new TLV for the BGP-LS NLRI in this document.

6. Security Considerations

The new protocol extensions introduced in this document augment the existing IGP topology information that can be distributed via [RFC7752]. Procedures and protocol extensions defined in this document do not affect the BGP security model other than as discussed in the Security Considerations section of [RFC7752]. More specifically, the aspects related to limiting the nodes and consumers with which the topology information is shared via BGP-LS to trusted entities within an administrative domain.

The TLV introduced in this document is used to propagate IGP defined information ([RFC7883] and [RFC7883]). The TLV represents information used to set up S-BFD sessions. The IGP instances originating this information are assumed to support any required security and authentication mechanisms (as described in [RFC7883] and [RFC7883]) to prevent any security issues when propagating the information into BGP-LS.

Advertising the S-BFD Discriminators via BGP-LS makes it possible for attackers to initiate S-BFD sessions using the advertised information. The vulnerabilities this poses and how to mitigate them are discussed in [RFC7880].

7. Acknowledgements

The authors would like to thank Nan Wu for his contributions to this work and Gunter Van De Velde for his review. The authors would also like to thank Jeff Haas for his shepherd review and Alvaro Retana for his AD review of this document.

8. References

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