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Authors: Z. Li, *Huawei*; S. Zhuang, *Huawei*; K. Talaulikar, Ed., *Arrcus, Inc.*; S. Aldrin, *Google, Inc.*; J. Tantsura, *Microsoft*; G. Mirsky, *Ericsson*

RFC 9247
BGP - Link State (BGP-LS) Extensions for Seamless Bidirectional Forwarding Detection (S-BFD)

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 S-BFD Discriminators.

This document defines extensions to the BGP - Link State (BGP-LS) address family to carry the S-BFD Discriminators' information via BGP.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 7841.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc9247.

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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 the 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 (ASes) within an administrative domain.

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

2. Terminology

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

2.1. 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.

3. BGP-LS Extensions for S-BFD Discriminators

BGP-LS [RFC7752] specifies the Node Network Layer Reachability Information (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 are advertised as such.

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

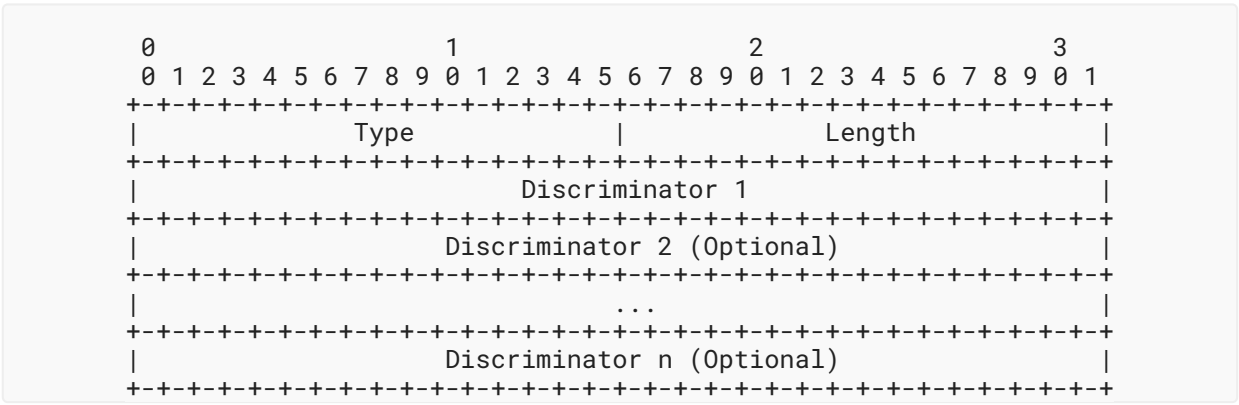

Figure 1: S-BFD Discriminators TLV

where:

Type: 1032

Length: variable. It **MUST** be a minimum of 4 octets, and it increments by 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 has permanently allocated the following code point in 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.

TLV Code Point	Description	Reference
1032	S-BFD Discriminators	This document

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 BGP-LS [RFC7752]. Procedures and protocol extensions defined in this document do not affect BGP protocol operations and management other than as discussed in "Manageability Considerations" (Section 6) of [RFC7752]. Specifically, the malformed NLRIs attribute tests in "Fault Management" (Section 6.2.2) of [RFC7752] now encompass 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 BGP-LS [RFC7752]. Procedures and protocol extensions defined in this document do not affect the BGP security model other than as discussed in "Security Considerations" (Section 8) of [RFC7752], i.e., 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 (see [RFC7883] and [RFC7884]). 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 [RFC7884]).

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. References

7.1. Normative References

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7.2. Informative References

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Authors' Addresses

Zhenbin Li
Huawei
Huawei Bld.
No.156 Beiqing Rd.
Beijing
100095
China
Email: lizhenbin@huawei.com

Shunwan Zhuang
Huawei
Huawei Bld.
No.156 Beiqing Rd.
Beijing
100095
China
Email: zhuangshunwan@huawei.com

Ketan Talaulikar (EDITOR)
Arrcus, Inc.
India
Email: ketant.ietf@gmail.com

Sam Aldrin
Google, Inc.
Email: aldrin.ietf@gmail.com

Jeff Tantsura
Microsoft
Email: jefftant.ietf@gmail.com

Greg Mirsky
Ericsson
Email: gregimirsky@gmail.com