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BGP Link-State Extensions for Seamless BFD
draft-zhuang-idr-bgp-ls-sbfd-extensions-00

Abstract

[I-D.ietf-bfd-seamless-base] 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, OSPF and OSPFv3) have been extended to advertise the Seamless BFD (S-BFD) Discriminators.

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

Requirements Language

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 [RFC2119].

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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This Internet-Draft will expire on February 22, 2015.

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1. Introduction

[I-D.ietf-bfd-seamless-base] 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.

[I-D.ginsberg-isis-sbfd-discriminator] defines a mean of advertising one or more S-BFD Discriminators using the IS-IS Router Capability TLV. [I-D.bhatia-ospf-sbfd-discriminator] defines a new OSPF Router Information (RI) TLV that allows OSPF routers to flood the S-BFD discriminator values associated with a target network identifier. This mechanism is applicable to both OSPFv2 and OSPFv3.

The link-state routing protocols (IS-IS, OSPF and OSPFv3) have been extended to advertise the S-BFD Discriminators. But flooding based propagation of the S-BFD Discriminators using IGPs is limited by the

perimeter of the IGP domain. For advertising the S-BFD Discriminators which span across IGP domains (e.g. multiple ASes), the Border Gateway Protocol (BGP) is better suited as its propagation perimeter is not limited like the IGPs.

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

2. Terminology

This memo makes use of the terms defined in [I-D.ietf-bfd-seamless-base].

3. Problem and Requirement

Seamless MPLS [I-D.ietf-mpls-seamless-mpls] extends the core domain and integrates aggregation and access domains into a single MPLS domain. In a large network, the core and aggregation networks can be organized as different autonomous systems. Although the core and aggregation networks are segmented into different autonomous systems, but an E2E LSP will be created using hierarchical-labeled BGP LSPs based on iBGP-labeled unicast within each AS, and eBGP-labeled unicast to extend the LSP across AS boundaries. Meanwhile, the customer will see only two service-end points in the Seamless MPLS network. In order to detect the possible failure quickly and protect the network/trigger re-routing, BFD MAY be used for the Service Layer (e.g. for MPLS VPNs, PW) and the Transport Layer, so the need arises that the BFD session has to span across AS domain.

The link-state routing protocols (IS-IS, OSPF and OSPFv3) have been extended to advertise the S-BFD Discriminators. But flooding based propagation of the S-BFD Discriminators using IGPs is limited by the perimeter of the IGP domain. For advertising the S-BFD Discriminators which span across IGP domains (e.g. multiple ASes), the Border Gateway Protocol (BGP) is better suited as its propagation perimeter is not limited like the IGPs. This draft defines extensions requirement to the BGP Link-state address-family to carry the S-BFD Discriminators information via BGP.

4. BGP-LS Extensions for S-BFD Discriminators Exchanging

The BGP-LS NLRI can be a node NLRI, a link NLRI or a prefix NLRI. The corresponding BGP-LS attribute is a node attribute, a link attribute or a prefix attribute. BGP-LS [I-D.ietf-idr-ls-distribution] defines the TLVs that map link-state information to BGP-LS NLRI and BGP-LS attribute. This document adds additional BGP-LS attribute TLVs to encode the S-BFD Discriminators information.

[I-D.ginsberg-isis-sbfd-discriminator] defines the following TLVs to encode the S-BFD Discriminators information.

The ISIS Router CAPABILITY TLV as defined in [RFC4971] will be used to advertise S-BFD discriminators. A new Sub-TLV is defined as described below. S-BFD Discriminators Sub-TLV is formatted as specified in [RFC5305].

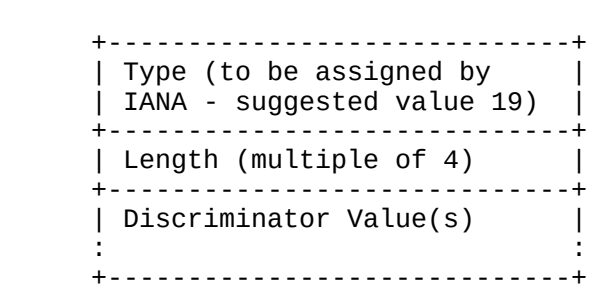


Figure 1: S-BFD Discriminators Sub-TLV

[I-D.bhatia-ospf-sbfd-discriminator] defines the following TLVs to encode the S-BFD Discriminators information. The format of the S-BFD Discriminator TLV is as follows:

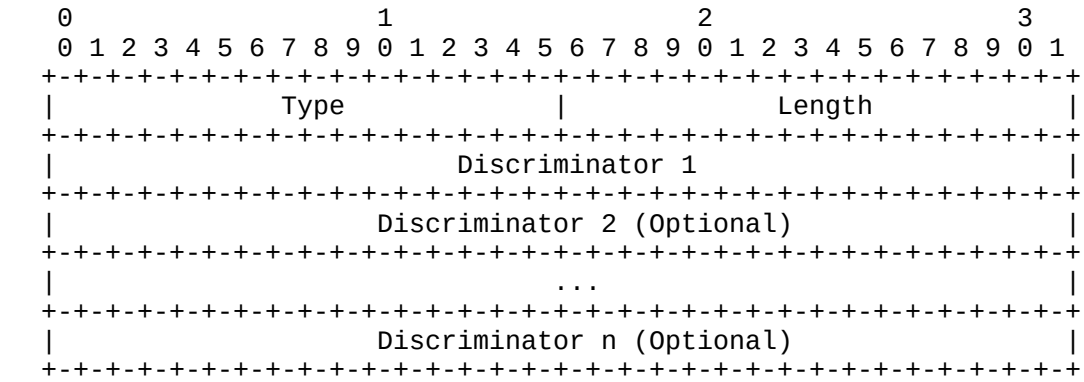


Figure 2: S-BFD Discriminators Sub-TLV

Type - S-BFD Discriminator TLV Type

Length - Total length of the discriminator (Value field) in octets, not including the optional padding. The Length is a multiple of 4 octets, and consequently specifies how many Discriminators are included in the TLV.

Value - S-BFD network target discriminator value or values.

Routers that do not recognize the S-BFD Discriminator TLV Type MUST ignore the TLV. S-BFD discriminator is associated with the BFD Target Identifier type, which allows de-multiplexing to a specific task or service.

These TLVs are mapped to BGP-LS attribute TLVs in the following way. The new information in the Link-State NLRIs and attributes is encoded in Type/Length/Value triplets.

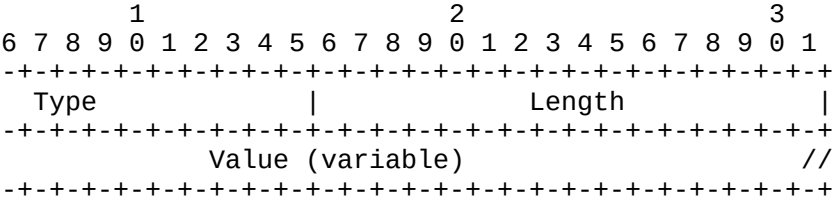


Figure 3: BGP-LS TLV format

The 2 octet Type field values are defined in Table 1. The next 2 octet Length field encodes length of the rest of the TLV. The Value portion of the TLV is variable and is equal to the corresponding Value portion of the TLV defined in [I-D.ginsberg-isis-sbfd-discriminator] and [I-D.bhatia-ospf-sbfd-discriminator].

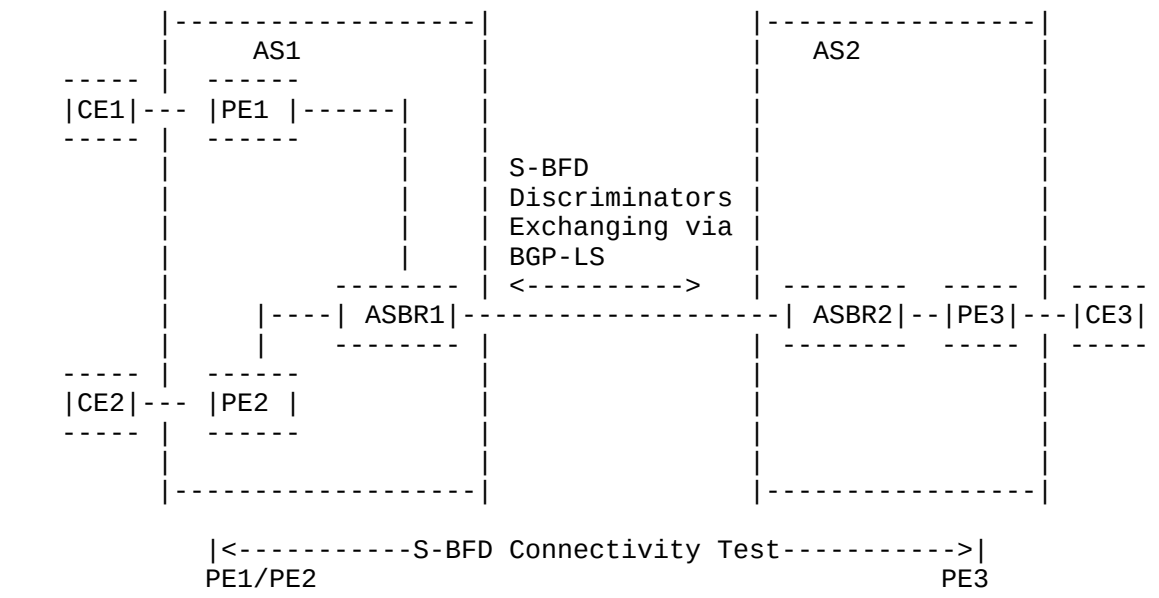
The following 'Node Attribute' TLVs are defined:

TLV Code Point	Description	Length	ISIS/OSPF TLV/Sub-TLV
TBD	S-BFD Discriminators	variable	TBD
...	...	...	...

Table 1: Node Attribute TLVs

5. Operation

In an inter-as VPN network as follows, ASBR1 and ASBR2 establish a BGP-LS session for exchanging S-BFD Discriminators information.



Step 1: ASBR1 learns all the S-BFD Discriminators information within AS1 by the mean defines in [I-D.ginsberg-isis-sbfd-discriminator] or [I-D.bhatia-ospf-sbfd-discriminator].

Step 2: ASBR1 sends AS1's S-BFD Discriminators information to AS2's ASBR2 via the BGP-LS session.

Step 3: ASBR2 injects the AS1's S-BFD Discriminators information receiving from ASBR1 into IGP (IS-IS or OSPF or OSPFv3), then flood them within the domain of the AS2 via IGP, So the nodes of AS2 can learn all the S-BFD Discriminators information originating from AS1.

Likewise, the nodes of AS1 can learn all the S-BFD Discriminators information originating from AS2.

At this point, we can use S-BFD Procedures defines in [I-D.ietf-bfd-seamless-base] between the PEs which belong to different AS.

6. IANA Considerations

TBD.

7. Security Considerations

This document does not introduce any new security risk.

8. Acknowledgements

The authors would like to thank Nan Wu for his contributions to this work.

9. References

9.1. Normative References

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