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Yao. Liu
Shaofu. Peng
ZTE Corp.

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BGP Extension for SR-MPLS Entropy Label Position
draft-zhou-idr-bgp-srmpls-elp-01

Abstract

This document proposed an extension for BGP to configure the entropy label position for SR-MPLS networks.

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, 2021.

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1. Introduction

Entropy Label(EL) [RFC6790]is a technology that can be used for load-balancing in Segment Routing (SR) MPLS.

[RFC8662] proposes to use entropy labels for SR-MPLS networks and mutiple < ELI, EL> pairs SHOULD be inserted in the SR-MPLS label stack. The ingress node may decide the number and position of the ELI/ELs which need to be inserted into the label stack, that is termed as ELP (Entropy Label Position). In some cases, the controller is used to perform the TE path computation for intra or inter-domain scenarios, thus it is also the responsibility of the controller to calculate ELP and inform it to the headend of the SR-TE path.

[I-D.ietf-idr-segment-routing-te-policy] defines the specific process of how the controller in the SR network passes the path calculation result of the SR-TE policy to the headend of the network through BGP.

In this document, the ELP information is transmitted by extending the flags of Segment List Sub-TLV in the BGP.

2. Entropy Labels in SR-MPLS Scenario with a Controller

[RFC8662] proposes to use entropy labels for SR-MPLS networks. The Entropy Readable Label Depth (ERLD) is defined as the number of labels which means that the router will perform load-balancing using the ELI/EL. An appropriate algorithm should consider the following criteria:

- a limited number of < ELI, EL> pairs SHOULD be inserted in the SR-MPLS label stack;
- the inserted positions SHOULD be whithin the ERLD of a maximize number of transit LSRs;
- a minimum number of < ELI, EL> pairs SHOULD be inserted while satisfying the above criteria.

As shown in Figure 1 , in SR-MPLS inter-domain scenario, the controller may perform the computation of the end-to-end path as well as the the Entropy Label Position (ELP) including the number and the position of the ELI/ELs. The controller has the capability to get the ERLD information of all nodes in inter-domain scenarios.

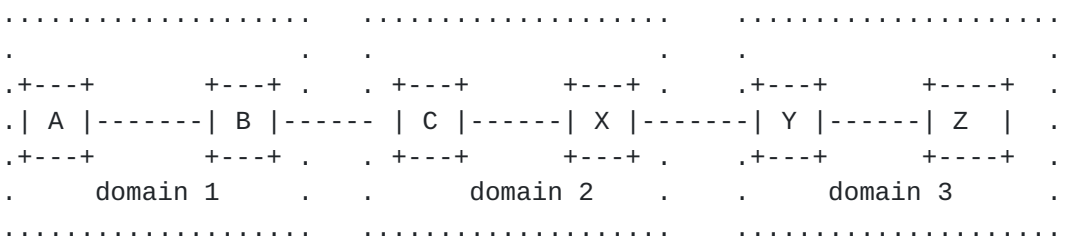
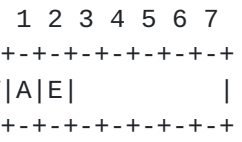


Figure 1: Entropy Labels in SR-MPLS Inter-Domain Scenario

3. BGP Extensions

The Segment Flags is defined in Section 2.4.3.2.12 of [I-D.ietf-idr-segment-routing-te-policy].



E-Flag: This flag indicates that presence of < ELI, EL> label pairs are inserted after this segment. It is applicable to all SR-MPLS Segment Types.

4. Operations

Supposed the head end had received a SR-TE path from the controller with multiple Segment List Sub-TLVs, for example, <S1, S2, S3, S4, S5, S6>, especially S3 and S6 with E-flag. It indicates that two < ELI, EL> pairs SHOULD be inserted into the label stack of the SR-TE forwarding entry, respectively after the Label for S3 and Label for S6. With EL information, the label stack for SR-MPLS would be <label1, label2, label3, ELI, EL, label4, label5, label6, ELI, EL>.

Note that the value of EL is supplemented by headend, according to load-balancing function of the appropriate keys extracted from a given packet.

5. IANA Considerations

This document requests bit 2 for Entropy Label Flag.

Bit	Description	Reference
2	Entropy Label Position Flag(E-Flag)	This document

6. Normative References

[I-D.ietf-idr-segment-routing-te-policy]
Previdi, S., Filsfils, C., Talaulikar, K., Mattes, P., Rosen, E., Jain, D., and S. Lin, "Advertising Segment Routing Policies in BGP", draft-ietf-idr-segment-routing-te-policy-09 (work in progress), May 2020.

[RFC6790] Kompella, K., Drake, J., Amante, S., Henderickx, W., and L. Yong, "The Use of Entropy Labels in MPLS Forwarding", RFC 6790, DOI 10.17487/RFC6790, November 2012, <https://www.rfc-editor.org/info/rfc6790>.

[RFC8662] Kini, S., Kompella, K., Sivabalan, S., Litkowski, S., Shakir, R., and J. Tantsura, "Entropy Label for Source Packet Routing in Networking (SPRING) Tunnels", RFC 8662, DOI 10.17487/RFC8662, December 2019, <https://www.rfc-editor.org/info/rfc8662>.

Authors' Addresses

Liu Yao
ZTE Corp.

Email: liu.yao71@zte.com.cn

Peng Shaofu
ZTE Corp.

Email: peng.shaofu@zte.com.cn