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Signaling Entropy Label Capability and Readable Label-stack Depth Using IS-IS

draft-ietf-isis-mpls-elc-03

Abstract

Multiprotocol Label Switching (MPLS) has defined a mechanism to load balance traffic flows using Entropy Labels (EL). An ingress Label Switching Router (LSR) cannot insert ELs for packets going into a given tunnel unless an egress LSR has indicated via signaling that it has the capability of processing ELs, referred to as Entropy Label Capability (ELC), on that tunnel. In addition, it would be useful for ingress LSRs to know each LSR's capability of reading the maximum label stack depth, referred to as Readable Label-stack Depth (RLD), in the cases where stacked LSPs are used for whatever reasons. This document defines mechanisms to signal these two capabilities using OSPF. These mechanisms are useful when the label advertisement is also done via IS-IS.

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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1. Introduction

[RFC6790] describes a method to load balance Multiprotocol Label Switching (MPLS) traffic flows using Entropy Labels (EL). [RFC6790] introduces the concept of Entropy Label Capability (ELC) and defines the signalings of this capability via MPLS signaling protocols. Recently, mechanisms are being defined to signal labels via link-state Interior Gateway Protocols (IGP) such as IS-IS [I-D.ietf-isis-segment-routing-extensions]. In such scenario, the signaling mechanisms defined in [RFC6790] are inadequate. This draft defines a mechanism to signal the ELC [RFC6790] using IS-IS. This mechanism is useful when the label advertisement is also done via IS-

IS. In addition, in the cases where stacked LSPs are used for whatever reasons (e.g., SPRING-MPLS [I-D.ietf-spring-segment-routing-mpls]), it would be useful for ingress LSRs to know each LSR's capability of reading the maximum label stack depth. This capability, referred to as Readable Label-stack Depth (RLD) may be used by ingress LSRs to determine whether it's necessary to insert an EL for a given LSP of the stacked LSP tunnel in the case where there has already been at least one EL in the label stack [I-D.ietf-mpls-spring-entropy-label].

2. Terminology

This memo makes use of the terms defined in [RFC6790] and [RFC4971].

3. Advertising ELC Using IS-IS

The IS-IS Router CAPABILITY TLV as defined in [RFC4971] is used by IS-IS routers to announce their capabilities. A new sub-TLV of this TLV, called ELC sub-TLV is defined to advertise the capability of the router to process the ELs. As shown in Figure 1, it is formatted as described in [RFC5305] with a Type code to be assigned by IANA and a Length of zero. The scope of the advertisement depends on the application but it is RECOMMENDED that it SHOULD be domain-wide. If a router has multiple linecards, the router MUST NOT advertise the ELC unless all of the linecards are capable of processing ELs.

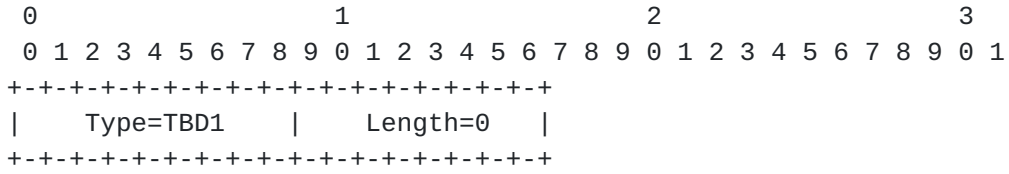

Figure 1: ELC sub-TLV Format

4. Advertising RLD Using IS-IS

A new sub-TLV of the IS-IS Router CAPABILITY TLV, called RLD sub-TLV is defined to advertise the capability of the router to read the maximum label stack depth. As shown in Figure 2, it is formatted as described in [RFC5305] with a Type code to be assigned by IANA and a Length of one. The Value field is set to the maximum readable label stack deepth in the range between 1 to 255. The scope of the advertisement depends on the application but it is RECOMMENDED that it SHOULD be domain-wide. If a router has multiple linecards with different capabilities of reading the maximum label stack deepth, the router MUST advertise the smallest one in the RLDC sub-TLV.

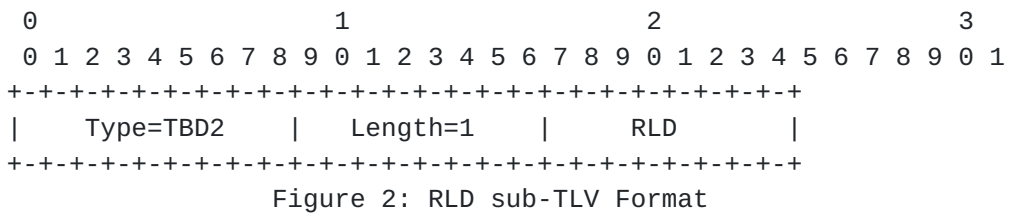

Figure 2: RLD sub-TLV Format

5. Acknowledgements

The authors would like to thank Yimin Shen, George Swallow, Acee Lindem and Carlos Pignataro for their valuable comments.

6. IANA Considerations

This memo includes a request to IANA to allocate two sub-TLV types within the IS-IS Router Capability TLV.

7. Security Considerations

The security considerations as described in [RFC4971] is applicable to this document. This document does not introduce any new security risk.

8. References

8.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC4971] Vasseur, JP., Ed., Shen, N., Ed., and R. Aggarwal, Ed., "Intermediate System to Intermediate System (IS-IS) Extensions for Advertising Router Information", RFC 4971, DOI 10.17487/RFC4971, July 2007, <https://www.rfc-editor.org/info/rfc4971>.

8.2. Informative References

[I-D.ietf-isis-segment-routing-extensions] Previdi, S., Ginsberg, L., Filsfils, C., Bashandy, A., Gredler, H., Litkowski, S., Decraene, B., and J. Tantsura, "IS-IS Extensions for Segment Routing", draft-ietf-isis-segment-routing-extensions-15 (work in progress), December 2017.

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Kini, S., Kompella, K., Sivabalan, S., Litkowski, S., Shakir, R., and J. Tantsura, "Entropy label for SPRING tunnels", draft-ietf-mpls-spring-entropy-label-07 (work in progress), October 2017.

[I-D.ietf-spring-segment-routing-mpls]
Filsfils, C., Previdi, S., Bashandy, A., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing with MPLS data plane", draft-ietf-spring-segment-routing-mpls-11 (work in progress), October 2017.

[RFC5305] Li, T. and H. Smit, "IS-IS Extensions for Traffic Engineering", RFC 5305, DOI 10.17487/RFC5305, October 2008, <https://www.rfc-editor.org/info/rfc5305>.

[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>.

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