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# Signaling Entropy Label Capability and Entropy Readable Label-stack Depth Using OSPF
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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 and performing EL-based load-balancing, referred to as Entropy Readable Label Depth (ERLD), in the cases where stacked LSPs are used. This document defines a mechanisms to signal these two capabilities using OSPF and OSPFv3. These mechanisms are particularly useful in the environment where Segment Routing (SR) is used, where label advertisements are done via protocols like OSPF and OSPFv3.

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].

Table of Contents



## 1. Introduction

[RFC6790] describes a method to load balance Multiprotocol Label Switching (MPLS) traffic flows using Entropy Labels (EL). It also 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 OSPF [I-D.ietf-ospf-segment-routing-extensions]. In such scenario, the signaling mechanisms defined in [RFC6790] are inadequate. This draft

defines a mechanism to signal the ELC using OSPF. This mechanism is useful when the label advertisement is also done via OSPF.

In addition, in the cases where stacked LSPs are used for whatever reasons (e.g., SR-MPLS [I-D.ietf-spring-segment-routing-mpls]), it would be useful for ingress LSRs to know each intermediate LSR's capability of reading the maximum label stack depth and performing EL-based load-balancing. This capability, referred to as Entropy Readable Label Depth (ERLD) as defined in [I-D.ietf-mpls-spring-entropy-label] 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 [RFC7770].

## 3. Advertising ELC Using OSPF

Even though ELC is a property of the node, in some cases it is advantageous to associate and advertise the ELC with the prefix. In multi-area network, routers may not know the identity of the prefix originator in the remote area, or may not know the capabilities of such originator. Similarly in the multi domain network, the identity of the prefix originator and its capabilities may not be known to the ingress LSR.

If a router has multiple line cards, the router MUST NOT announce ELC unless all of its linecards are capable of processing ELs.

If the router support ELs on all of its line cards, it SHOULD advertise the ELC with every local host prefix it advertises in OSPF.

When an OSPF Area Border Router (ABR) advertises the prefix to the connected area based on the intra-area or inter-area prefix that is reachable in some other area, it MUST preserve the ELC signalling for such prefix.

When an OSPF Autonomous System Boundary Router (ASBR) redistributes the prefix from other instance of the OSPF or from some other protocol, it SHOULD preserve the ELC signalling for the prefix. Exact mechanism on how to exchange ELC between protocol instances on the ASBR is outside of the scope of this document and is implementation specific.

## 3.1. Advertising ELC Using OSPFv2

[RFC7684] defines the OSPFv2 Extended Prefix TLV to advertise additional attributes associated with the prefix. The OSPFv2 Extended Prefix TLV includes a one octet Flags field. A new bit in the Flags field is used to signal the ELC for the prefix:

0x20 - E-Flag (ELC Flag): Set by the advertising router to indicate that the prefix originator is capable of processing ELs

## 3.2. Advertising ELC Using OSPFv3

[RFC5340] defines the OSPFv3 PrefixOptions that is advertised along with the prefix. A new bit in the OSPFV3 PrefixOptions is used to signal the ELC for the prefix:

0x04 - E-Flag (ELC Flag): Set by the advertising router to indicate that the prefix originator is capable of processing ELs

## 4. Advertising ERLD Using OSPF

A new MSD-type of the Node MSD sub-TLV [I-D.ietf-isis-segment-routing-msd], called ERLD is defined to advertise the ERLD of a given router. The scope of the advertisement depends on the application.

Assignment of a MSD-Type for ERLD is defined in [I-D.ietf-isis-mpls-elc].

If a router has multiple linecards with different capabilities of reading the maximum label stack deepth, the router MUST advertise the smallest one.

## 5. Acknowledgements

The authors would like to thank Yimin Shen, George Swallow, Acee Lindem, Les Ginsberg, Ketan Talaulikar, Jeff Tantsura , Bruno Decraene and Carlos Pignataro for their valuable comments.

## 6. IANA Considerations

This document requests IANA to allocate one bit from the OSPFv2 Extended Prefix TLV Flags registry:

0x20 - E-Flag (ELC Flag)

This document requests IANA to allocate one bit from the OSPFv3 Prefix Options registry:

0x04 - E-Flag (ELC Flag)

## 7. Security Considerations

The security considerations as described in [RFC7770] is applicable to this document. This document does not introduce any new security risk.

## 8. References

### 8.1. Normative References

[I-D.ietf-isis-mpls-elc]
Xu, X., Kini, S., Sivabalan, S., Filsfils, C., and S. Litkowski, "Signaling Entropy Label Capability and Entropy Readable Label Depth Using IS-IS", draft-ietf-isis-mpls-elc-06 (work in progress), September 2018.

[I-D.ietf-isis-segment-routing-msd]
Tantsura, J., Chunduri, U., Aldrin, S., and L. Ginsberg, "Signaling MSD (Maximum SID Depth) using IS-IS", draft-ietf-isis-segment-routing-msd-19 (work in progress), October 2018.

[I-D.ietf-ospf-segment-routing-extensions]
Psenak, P., Previdi, S., Filsfils, C., Gredler, H., Shakir, R., Henderickx, W., and J. Tantsura, "OSPF Extensions for Segment Routing", draft-ietf-ospf-segment-routing-extensions-27 (work in progress), December 2018.

[I-D.ietf-spring-segment-routing-mpls]
Bashandy, A., Filsfils, C., Previdi, S., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing with MPLS data plane", draft-ietf-spring-segment-routing-mpls-22 (work in progress), May 2019.

[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>.

[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>.

[RFC5340] Coltun, R., Ferguson, D., Moy, J., and A. Lindem, "OSPF for IPv6", RFC 5340, DOI 10.17487/RFC5340, July 2008, <https://www.rfc-editor.org/info/rfc5340>.

[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>.

[RFC7684] Psenak, P., Gredler, H., Shakir, R., Henderickx, W., Tantsura, J., and A. Lindem, "OSPFv2 Prefix/Link Attribute Advertisement", RFC 7684, DOI 10.17487/RFC7684, November 2015, <https://www.rfc-editor.org/info/rfc7684>.

[RFC7770] Lindem, A., Ed., Shen, N., Vasseur, JP., Aggarwal, R., and S. Shaffer, "Extensions to OSPF for Advertising Optional Router Capabilities", RFC 7770, DOI 10.17487/RFC7770, February 2016, <https://www.rfc-editor.org/info/rfc7770>.

## 8.2. Informative References

[I-D.ietf-mpls-spring-entropy-label] Kini, S., Kompella, K., Sivabalan, S., Litkowski, S., Shakir, R., and J. Tantsura, "Entropy label for SPRING tunnels", draft-ietf-mpls-spring-entropy-label-12 (work in progress), July 2018.

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