

OSPF Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: March 29, 2019

X. Xu  
Alibaba Inc  
S. Kini

S. Sivabalan  
C. Filsfils  
Cisco  
S. Litkowski  
Orange  
September 25, 2018

Signaling Entropy Label Capability and Entropy Readable Label-stack  
Depth Using OSPF  
draft-ietf-ospf-mpls-elc-07

## 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 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 OSPF. In addition, this document introduces the Non-IGP Functional Capabilities TLV for advertising OSPF router's actual non-IGP functional capabilities. ELC is one of such non-IGP functional capabilities.

## 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](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute

Internet-Draft

Signalling ELC and ERLD using OSPF

September 2018

working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 29, 2019.

## Copyright Notice

Copyright (c) 2018 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Terminology . . . . .	<a href="#">3</a>
<a href="#">3.</a>	Non-OSPF Functional Capabilities TLV . . . . .	<a href="#">3</a>
<a href="#">4.</a>	Advertising ELC Using OSPF . . . . .	<a href="#">4</a>
<a href="#">5.</a>	Advertising ERLD Using OSPF . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">7.</a>	IANA Considerations . . . . .	<a href="#">5</a>
<a href="#">8.</a>	Security Considerations . . . . .	<a href="#">5</a>
<a href="#">9.</a>	References . . . . .	<a href="#">5</a>
<a href="#">9.1.</a>	Normative References . . . . .	<a href="#">5</a>
<a href="#">9.2.</a>	Informative References . . . . .	<a href="#">6</a>
	Authors' Addresses . . . . .	<a href="#">6</a>

## [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 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 [[RFC6790](#)] 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.](#) Non-OSPF Functional Capabilities TLV

This document defines the Router Non-IGP Functional Capabilities TLV with TLV type code of TBD1 within the body of the OSPF Router Information LSA. An OSPF router advertising an OSPF RI LSA MAY include the Router Non-IGP Functional Capabilities TLV. If included, it MUST be included in the first instance of the LSA. Additionally, the TLV MUST reflect the advertising OSPF router's actual non-IGP functional capabilities in the flooding scope of the containing OSPF RI LSA.

The format of the Router Non-OSPF Functional Capabilities TLV is as follows:

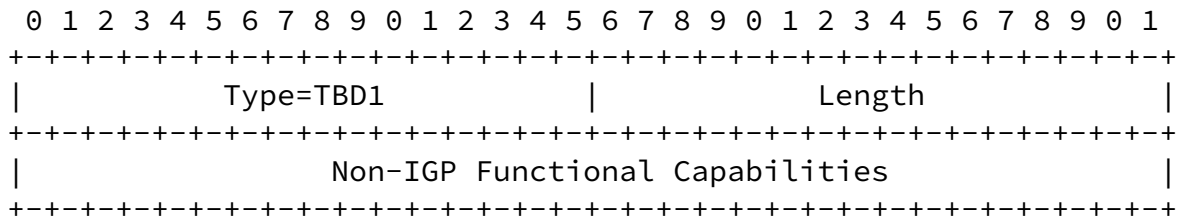


Figure 1: Non-OSPF Functional Capabilities TLV Format

Type: TBD1.

Length: Indicates the length of the value portion in octets and will be a multiple of 4 octets dependent on the number of

capabilities advertised. Initially, the length will be 4, denoting 4 octets of Non-IGP Functional Capabilities Bits as defined in [[I-D.ietf-isis-mpls-elc](#)].

Value: contains the Non-IGP Functional Capabilities Bits as defined in [[I-D.ietf-isis-mpls-elc](#)].

The Non-IGP Functional Capabilities TLV MAY be followed by optional TLVs that further specify a non-OSPF functional capability. In contrast to the OSPF Router Functional Capabilities TLV, the non-OSPF functional capabilities advertised in this TLV have no impact on the OSPF protocol operation. The specifications for non-IGP functional capabilities advertised in this TLV MUST describe protocol behavior and address backwards compatibility.

#### 4. Advertising ELC Using OSPF

One bit of the Non-IGP Functional Capability Bits for is used to indicate the ELC.

Assignment of a Non-IGP Functional Capability Bit for the ELC is defined in [[I-D.ietf-isis-mpls-elc](#)].

If a router has multiple line cards, the router MUST NOT announce the ELC [[RFC6790](#)] unless all of its linecards are capable of processing ELs.

How to apply the ELC advertisement to the inter-area, inter-AS and inter-protocol scenarios is outside the scope of this document.

## [5.](#) 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 depth, the router MUST advertise the smallest one.

Xu, et al.

Expires March 29, 2019

[Page 4]

---

Internet-Draft

Signalling ELC and ERLD using OSPF

September 2018

## [6.](#) 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.

## [7.](#) IANA Considerations

This document requests IANA to allocate one TLV type from the OSPF RI TLVs registry for the Non-IGP Functional CapabilitiesTLV.

## [8.](#) Security Considerations

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

## [9.](#) References

### [9.1.](#) 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-05](#) (work in progress), July 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-16](#) (work in progress), September 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-25](#) (work in progress), April 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-14](#) (work in progress), June 2018.

[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>>.

[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>>.

[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>>.

## [9.2.](#) 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.

### Authors' Addresses

Xiaohu Xu  
Alibaba Inc

Email: [xiaohu.xxh@alibaba-inc.com](mailto:xiaohu.xxh@alibaba-inc.com)

Sriganesh Kini

Email: [sriganeshkini@gmail.com](mailto:sriganeshkini@gmail.com)

Siva Sivabalan  
Cisco

Email: [msiva@cisco.com](mailto:msiva@cisco.com)

Clarence Filsfils  
Cisco

Email: [cfilsfil@cisco.com](mailto:cfilsfil@cisco.com)

Stephane Litkowski  
Orange

Email: [stephane.litkowski@orange.com](mailto:stephane.litkowski@orange.com)