

Network Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: January 26, 2019

X. Xu  
Alibaba Inc  
S. Kini  
  
S. Sivabalan  
C. Filsfils  
Cisco  
S. Litkowski  
Orange  
July 25, 2018

**Signaling Entropy Label Capability and Entropy Readable Label Depth  
Using IS-IS  
draft-ietf-isis-mpls-elc-04**

**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 IS-IS. These mechanisms are useful when the label advertisement is also done via IS-IS.

**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 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 January 26, 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>	Advertising ELC Using IS-IS . . . . .	<a href="#">3</a>
<a href="#">4.</a>	Advertising ERLD Using IS-IS . . . . .	<a href="#">3</a>
<a href="#">5.</a>	Acknowledgements . . . . .	<a href="#">4</a>
<a href="#">6.</a>	IANA Considerations . . . . .	<a href="#">4</a>
<a href="#">7.</a>	Security Considerations . . . . .	<a href="#">4</a>
<a href="#">8.</a>	References . . . . .	<a href="#">4</a>
<a href="#">8.1.</a>	Normative References . . . . .	<a href="#">4</a>
<a href="#">8.2.</a>	Informative References . . . . .	<a href="#">5</a>
	Authors' Addresses . . . . .	<a href="#">5</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 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., 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 [\[RFC4971\]](#).

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](#) [\[RFC2119\]](#).

## 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. If a router has multiple linecards, the router MUST NOT advertise the ELC unless all of the linecards are capable of processing ELs.

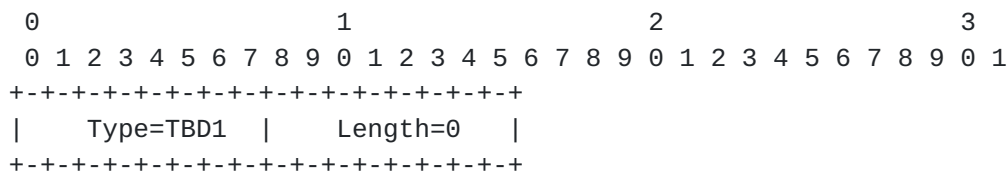


Figure 1: ELC sub-TLV Format

## 4. Advertising ERLD Using IS-IS

A new MSD-type of the IS-IS Node MSD sub-TLV [\[I-D.ietf-isis-segment-routing-msd\]](#), called ERLD is defined to advertise the ERLD of a given router. As shown in Figure 2, it is formatted as described in [\[I-D.ietf-isis-segment-routing-msd\]](#) with a new MSD-Type code to be assigned by IANA (the type code of 2 is desired) and the Value field is set to the ERLD in the range between 0 to 255. The scope of the advertisement depends on the application. If a router has multiple linecards with different capabilities of reading the maximum label stack depth, the router MUST advertise the smallest one.



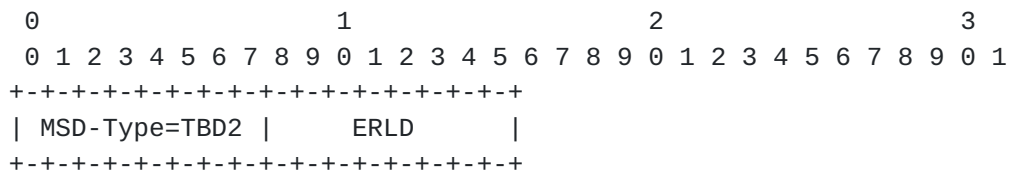


Figure 2: ERLD MSD-Type Format

## 5. Acknowledgements

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

## 6. IANA Considerations

IANA is requested to allocate one sub-TLV type of the IS-IS Router Capability TLV for ELC and a MSD type (the type code of 2 is desired) from the "IGP MSD Types" registry for ERLD.

## 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

- [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-19](#) (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-13](#) (work in progress), July 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>>.
- [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>>.
- [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>>.

## **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.

### Authors' Addresses

Xiaohu Xu  
Alibaba Inc

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