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**Signaling Entropy Label Capability and Entropy Readable Label Depth  
Using IS-IS  
draft-ietf-isis-mpls-elc-05**

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

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## 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-IGP Functional Capabilities Sub-TLV . . . . .	<a href="#">3</a>
<a href="#">4.</a>	Advertising ELC Using IS-IS . . . . .	<a href="#">4</a>
<a href="#">5.</a>	Advertising ERLD Using IS-IS . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Acknowledgements . . . . .	<a href="#">4</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 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. Non-IGP Functional Capabilities Sub-TLV

This document defines the Non-IGP Functional Capabilities Sub-TLV with Sub-TLV type of TBD1 within the body of the IS-IS Router Capability TLV. An IS-IS router advertising an IS-IS Router Capability TLV MAY include the Non-IGP Functional Capabilities Sub-TLV. The Sub-TLV MUST reflect the advertising IS-IS router's actual non-IGP functional capabilities in the flooding scope of the containing Router Capability TLV.

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

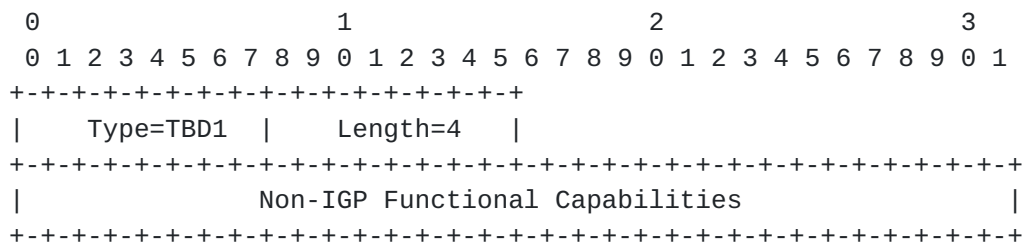


Figure 1: Non-IGP Functional Capabilities Sub-TLV Format

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 capability bits.



Value: A variable-length sequence of capability bits rounded to a multiple of 4 octets padded with undefined bits. Initially, there are 4 octets of capability bits. Bits are numbered left to right starting with the most significant bit being bit 0.

The Non-IGP Functional Capabilities Sub-TLV MAY be followed by optional Sub-TLVs that further specify a non-IGP functional capability. The specifications for non-IGP functional capabilities advertised in this Sub-TLV MUST describe protocol behavior and address backwards compatibility.

#### 4. Advertising ELC Using IS-IS

One bit of the Non-IGP Functional Capability Bits (Bit 0 is desired) is to be assigned by the IANA for the ELC [RFC6790]. 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.

#### 5. Advertising ERLD Using IS-IS

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. 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.

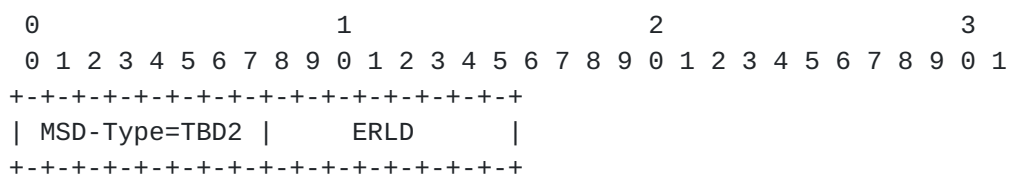


Figure 2: ERLD MSD-Type Format

#### 6. 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.



## 7. IANA Considerations

This document requests IANA to allocate one sub-TLV type of the Router Capability TLV registry for the Non-IGP Functional Capabilities Sub-TLV. Furthermore, this document requests IANA to create a subregistry for "Non-IGP Functional Capability Bits" within the "Interior Gateway Protocol (IGP) Parameters" registry. This subregistry is comprised of the fields Bit Number, Capability Name, and Reference. Initially, one bit is requested to be assigned for the ELC. The registration procedure is "Expert Review" as defined in [RFC8126]. The following values are defined by this document:

Bit No.	Capability Name	Reference
-----	-----	-----
0	ELC	This document
1-31	Unassigned	This document

Figure 3: Non-IGP Functional Capability Bits Registry

IANA is requested to allocate a MSD type (the type code of 2 is desired) from the "IGP MSD Types" registry for ERLD.

## 8. Security Considerations

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

## 9. References

### 9.1. Normative References

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## **9.2. Informative References**

[I-D.ietf-mpls-spring-entropy-label]

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