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**LSP Object Flag Extension of Stateful PCE**  
**draft-xiong-pce-lsp-flag-03**

Abstract

[RFC 8231](#) describes a set of extensions to Path Computation Element Communication Protocol (PCEP) to enable stateful control of MPLS-TE and GMPLS Label Switched Paths (LSPs) via PCEP. One of the extensions is the LSP object which includes a Flag field of the length of 12 bits. However, 11 bits of the Flag field have already been assigned in [RFC 8231](#), [RFC 8281](#) and [RFC 8623](#).

This document proposes to define a new LSP-EXTENDED-FLAG TLV for the LSP object for an extended flag field.

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## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Conventions used in this document . . . . .	<a href="#">3</a>
<a href="#">2.1.</a>	Terminology . . . . .	<a href="#">3</a>
<a href="#">2.2.</a>	Requirements Language . . . . .	<a href="#">3</a>
<a href="#">3.</a>	PCEP Extension . . . . .	<a href="#">3</a>
<a href="#">3.1.</a>	The LSP-EXTENDED-FLAG TLV . . . . .	<a href="#">3</a>
<a href="#">3.2.</a>	Processing . . . . .	<a href="#">4</a>
<a href="#">4.</a>	Backward Compatibility . . . . .	<a href="#">4</a>
<a href="#">5.</a>	IANA Considerations . . . . .	<a href="#">4</a>
<a href="#">5.1.</a>	LSP Object . . . . .	<a href="#">4</a>
<a href="#">5.1.1.</a>	PCEP TLV Type Indicators . . . . .	<a href="#">4</a>
<a href="#">5.1.2.</a>	LSP Extended Flags Field . . . . .	<a href="#">4</a>
<a href="#">6.</a>	Security Considerations . . . . .	<a href="#">5</a>
<a href="#">7.</a>	Acknowledgements . . . . .	<a href="#">5</a>
<a href="#">8.</a>	Contributors . . . . .	<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>
	Author's Address . . . . .	<a href="#">6</a>

## [1.](#) Introduction

[RFC5440] describes the Path Computation Element Protocol (PCEP) which is used between a Path Computation Element (PCE) and a Path Computation Client (PCC) (or other PCE) to enable computation of Multi-protocol Label Switching (MPLS) for Traffic Engineering Label Switched Path (TE LSP).

PCEP Extensions for the Stateful PCE Model [[RFC8231](#)] describes a set of extensions to PCEP to enable active control of MPLS-TE and Generalized MPLS (GMPLS) tunnels. One of the extensions is the LSP object which contains a flag field; bits in the flag field are used to indicate delegation, synchronization, removal, etc.

As defined in [[RFC8231](#)], the length of the flag field is 12 bits and the value from bit 5 to bit 11 is used for operational, administrative, remove, synchronize and delegate bits respectively. The bit value 4 is assigned in [[RFC8281](#)] for create for PCE-Initiated LSPs. The bits from 1 to 3 is assigned in [[RFC8623](#)] for Explicit Route Object (ERO)-compression, fragmentation and Point-to-Multipoint (P2MP) respectively. Almost all bits of the Flag field has been

Xiong

Expires August 5, 2021

[Page 2]

assigned already. Thus, it is required to extend the flag field for the LSP Object for future use.

This document proposes to define a new LSP-EXTENDED-FLAG TLV for an extended flag field in the LSP object.

## 2. Conventions used in this document

### 2.1. Terminology

The terminology is defined as [RFC5440] and [RFC8231].

### 2.2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 3. PCEP Extension

The LSP Object is defined in Section 7.3 of [RFC8231]. This document proposes to define a new LSP-EXTENDED-FLAG TLV for an extended flag field in the LSP object.

### 3.1. The LSP-EXTENDED-FLAG TLV

The format of the LSP-EXTENDED-FLAG TLV is as shown in the Figure 1.

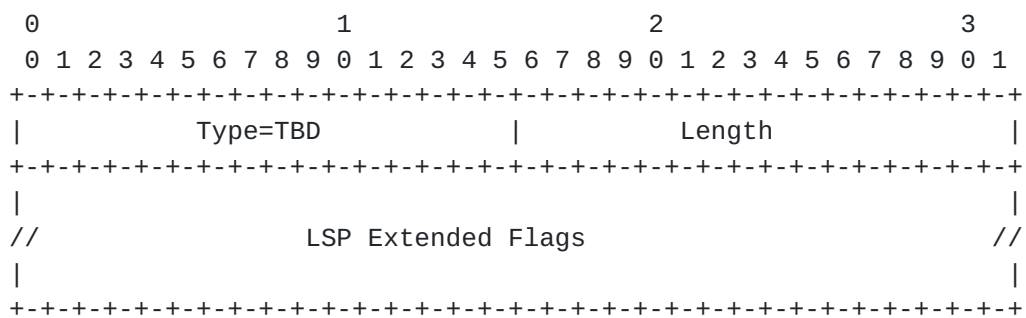


Figure 1: LSP-EXTENDED-FLAG TLV Format

Type (16 bits): the value is TBD1 by IANA.

Length (16 bits): multiple of 4 octets.



LSP Extended Flags: this contains an array of units of 32-bit flags numbered from the most significant as bit zero, where each bit represents one LSP operation, feature, or state. Currently no bits are assigned. Unassigned bits MUST be set to zero on transmission and MUST be ignored on receipt.

### **3.2. Processing**

The LSP Extended Flags field is an array of units of 32 flags and to be allocated starting from the most significant bit. No bits are currently assigned in this document and the bits of the LSP Extended Flags field will be assigned by future documents.

## **4. Backward Compatibility**

The LSP-EXTENDED-FLAG TLV defined in this document does not introduce any interoperability issues.

A router that does not understand or support the LSP-EXTENDED-FLAG TLV will silently ignore the TLV as per [\[RFC5440\]](#). It is expected that future document that define bits in the LSP-EXTENDED-FLAG TLV would also define the error case handling required for missing LSP-EXTENDED-FLAG TLV.

## **5. IANA Considerations**

### **5.1. LSP Object**

#### **5.1.1. PCEP TLV Type Indicators**

IANA is requested to allocate the following TLV Type Indicator value within the "PCEP TLV Type Indicators" subregistry of the "Path Computation Element Protocol (PCEP) Numbers" registry:

Value	Description	Reference
TBD1	LSP-EXTENDED-FLAG	[This document]

#### **5.1.2. LSP Extended Flags Field**

IANA is requested to create a new subregistry called "LSP-EXTENDED-FLAG TLV Flag Field", within the "Path Computation Element Protocol (PCEP) Numbers" registry to manage the LSP Extended Flags field of the LSP-EXTENDED-FLAG TLV. New values are assigned by Standards Action [\[RFC8126\]](#). Each bit should be tracked with the following qualities:

- o Bit number (counting from bit 0 as the most significant bit)

Xiong

Expires August 5, 2021

[Page 4]

- o Capability description
- o Defining RFC

No values are currently defined.

## **6. Security Considerations**

For LSP Object processing security considerations, see [[RFC8231](#)].

No additional security issues are raised in this document beyond those that exist in the referenced documents.

## **7. Acknowledgements**

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## **8. Contributors**

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## **9. References**

### **9.1. Normative References**

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- [RFC5440] Vasseur, JP., Ed. and JL. Le Roux, Ed., "Path Computation Element (PCE) Communication Protocol (PCEP)", [RFC 5440](#), DOI 10.17487/RFC5440, March 2009, <<https://www.rfc-editor.org/info/rfc5440>>.
- [RFC8126] Cotton, M., Leiba, B., and T. Narten, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 8126](#), DOI 10.17487/RFC8126, June 2017, <<https://www.rfc-editor.org/info/rfc8126>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.





[RFC8231] Crabbe, E., Minei, I., Medved, J., and R. Varga, "Path Computation Element Communication Protocol (PCEP) Extensions for Stateful PCE", [RFC 8231](#), DOI 10.17487/RFC8231, September 2017, <<https://www.rfc-editor.org/info/rfc8231>>.

## **9.2. Informative References**

[RFC8281] Crabbe, E., Minei, I., Sivabalan, S., and R. Varga, "Path Computation Element Communication Protocol (PCEP) Extensions for PCE-Initiated LSP Setup in a Stateful PCE Model", [RFC 8281](#), DOI 10.17487/RFC8281, December 2017, <<https://www.rfc-editor.org/info/rfc8281>>.

[RFC8623] Palle, U., Dhody, D., Tanaka, Y., and V. Beeram, "Stateful Path Computation Element (PCE) Protocol Extensions for Usage with Point-to-Multipoint TE Label Switched Paths (LSPs)", [RFC 8623](#), DOI 10.17487/RFC8623, June 2019, <<https://www.rfc-editor.org/info/rfc8623>>.

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