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PCEP Extensions for establishing relationships between sets of LSPs
draft-minei-pce-association-group-00

Abstract

This document introduces a generic mechanism to create a grouping of LSPs in the context of stateful PCE. This grouping can then be used to define associations between sets of LSPs or between a set of LSPs and a set of attributes (such as configuration parameters or behaviors), and is equally applicable to the active and passive modes of stateful PCE.

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 [RFC2119].

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on December 29, 2014.

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1. Introduction

[RFC5440] describes the Path Computation Element Protocol PCEP. PCEP enables the communication between a Path Computation Client (PCC) and a Path Control Element (PCE), or between PCE and PCE, for the purpose of computation of Multiprotocol Label Switching (MPLS) for Traffic Engineering Label Switched Path (TE LSP) characteristics.

Stateful pce [I-D.ietf-pce-stateful-pce] specifies a set of extensions to PCEP to enable stateful control of TE LSPs between and across PCEP sessions in compliance with [RFC4657] and focuses on a model where LSPs are configured on the PCC and control over them is delegated to the PCE. The model of operation where LSPs are initiated from the PCE is described in [I-D.ietf-pce-pce-initiated-lsp].

This document introduces a generic mechanism to create a grouping of LSPs. This grouping can then be used to define associations between sets of LSPs or between a set of LSPs and a set of attributes (such as configuration parameters or behaviors), and is equally applicable to the active and passive modes of stateful PCE.

2. Terminology

This document uses the following terms defined in [RFC5440]: PCC, PCE, PCEP Peer.

3. Architectural Overview

3.1. Motivation

Stateful PCE provides the ability to update existing LSPs and to instantiate new ones. To enable support for PCE-controlled make-before-break and for protection, there is a need to define associations between LSPs. For example, the association between the original and the reoptimized path in the make-before break scenario, or between the working and protection path in end-to-end protection. Another use for LSP grouping is for applying a common set of configuration parameters or behaviors to a set of LSPs. Rather than creating separate mechanisms for each use case, this draft defines a generic one.

3.2. Operation overview

LSPs are associated with other LSPs with which they interact by adding them to a common association group. Association groups as defined in this document are locally meaningful at the LSP head-end, and can only be applied to LSPs originating at that head end. Thus, the association identifiers are unique at each head end, but not necessarily across the network, and are owned and managed by the head end.

Multiple types of groups can exist, each with their own identifiers space. The definition of the different association types and their behaviors is outside the scope of this document. The establishment and removal of the association relationship can be done on a per LSP basis. There is support for removal of all LSPs from an association as well. An LSP may join multiple association groups, of different or of the same type.

4. LSP association groups

Association groups are owned by the PCC, but the PCE may request creation of an association group (for example before instantiating LSPs that belong to that group). Membership in an association group can be initiated by either the PCE or the PCC. Association groups and their memberships are defined using the Association object.

The Association Object is an optional object in the PCupd, PCRpt and PCinit messages.

The format of the Association object is shown Figure 1:

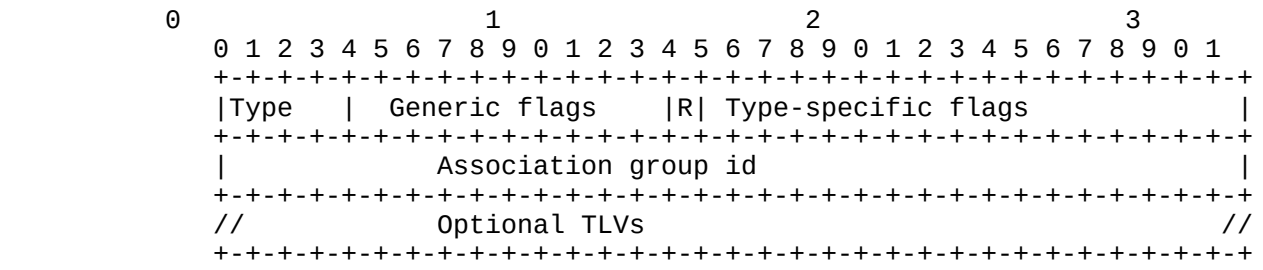

Figure 1: The Association Object format

Type - the association type (for example protection or make-before-break). The association type will be defined in separate documents.

Generic flags - flags for the association object. A single one is defined, the R flag indicating removal from the association group.

Type-specific flags - specific to the association type, will be defined at the time of the association type.

Association group id - identifier of the association group. The values 0 and 0xffffffff are reserved. Value 0 is used when the PCE requests allocation of an association group. Value 0xffffffff indicates all association groups.

5. Using the LSP association group

Membership in an association group is reported in PCRpt messages by including the association object along with the LSP object. Removal of the LSP from the association group on the PCC (for example through configuration) is reported by including the association object with the R flag set. When an LSP belongs to multiple association groups,

multiple association objects are included in the PCRpt, one for each association the LSP belongs to. A PCE can associate an LSP that was delegated to it (the candidate LSP) with an existing association group, by sending a PCUpd for the candidate LSP, including the Association Object for the association group. Error handling for this operation will be defined in a future version of this draft.

An association group can be created locally at the PCC (for example through configuration) or it can be requested by the PCE. A PCE may request the creation of an association group by sending a PCUpd message with the reserved value 0. In response to this request, the PCC will allocate an association group id and report it in the PCRpt message. Error handling will be defined in a future version of this draft. Note that this operation includes creation of the group and association of one LSP with this group. Requesting the creation of an association group before the LSP exists will be handled in a future version of this draft.

6. IANA considerations

This document defines the following new PCEP Object-classes and Object-values:

Object-Class Value	Name	Reference
TBD	Association Object-Type 1	This document

This document requests that a registry is created to manage the Flags field of the Association object. New values are to be assigned by Standards Action [RFC5226].

7. Security Considerations

The security considerations described in [I-D.ietf-pce-stateful-pce] apply to the extensions described in this document. Additional considerations related to a malicious PCE are introduced, as the PCE may now create additional state on the PCC through the creation of association groups.

8. Acknowledgements

We would like to thank Yuji Kamite and Joshua George for their contributions to this document.

9. References

9.1. Normative References

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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

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9.2. Informative References

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