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**PCE auxiliary connections**  
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Abstract

This document provides a method to establish auxiliary connections between PCE and PCC to improve the reliability of the connection of PCE and PCC. The real-time sample data and some state report flow are suggestion to transport by take use of the auxiliary connection.

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## [1.](#) Introduction

The Path Computation Element Protocol (PCEP) defined in [\[RFC5440\]](#) 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 is a recommendation south-bound interface protocol, and PCE acts as a controller, and PCCs are the SDN switch being managed by PCE. The PCC should report the link state and flow statistics in the SDN environment. The data going through the PCEP channel may be very huge. The PCEP session and the TCP connection may be occupied by the flow sample and be congested for the PCEP packet. So it is important to improve the reliability of the PCE and the connection between PCE and PCC.

This document provides to establish auxiliary connections between PCE and PCC to improve the reliability of the connection of PCE and PCC. The real-time sample data and some state report flow are suggestion to transport by take use of the auxiliary connection. And the original connection (we name it main connection) are used to transport the PCEP protocol message (such as PCE PCReq message, PCRep message, PCRpt message, PCUpd message, PCInitiate message, etc.)([\[RFC5440\]](#), [\[I-D.ietf-pce-stateful-pce\]](#), [\[I-D.ietf-pce-pce-initiated-lsp\]](#)).



## **2. Conventions Used in This Document**

### **2.1. 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](#)].

### **2.2. Terminology**

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

The following terms are defined in this document:

Main connection: The PCEP session between PCE and PCC peer. It is defined in [[RFC5440](#)]. It is renamed as main connection in this document.

Auxiliary connection: the addition connection session beyond the main connection. It is used to improve the reliability of main connection.

## **3. New Functions to Support auxiliary connections**

A new function is required in PCEP to support auxiliary connections. A function can be initiated either from a PCC towards a PCE (C-E) or from a PCE towards a PCC (E-C). The new function is:

Capability advertisement (E-C, C-E): both the PCC and the PCE must announce during PCEP session establishment that they support auxiliary connection defined in this document.

## **4. Overview of Protocol Extensions**

### **4.1. Auxiliary-Connections-Capability-TLV**



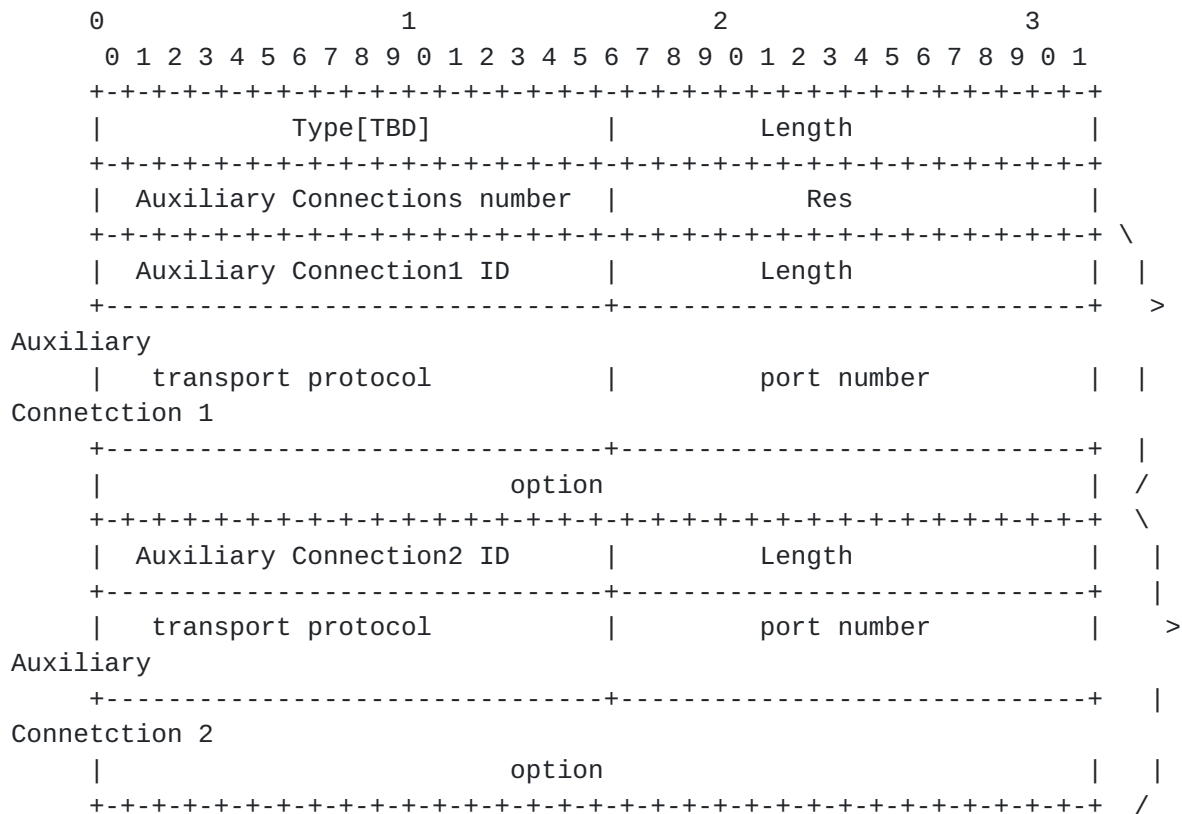


Figure 1 Auxiliary-Connections-Capability-TLV

- o Type:
- o Length: the whole length of TLV
- o Auxiliary Connections number: the record number of auxiliary connections.
- o Res: reserve for future use.
- o Auxiliary Connection ID: the identifier of the auxiliary connection.
- o Length:the length for the auxiliary connection.
- o transport protocol: the transport protocol for the auxiliary connection. The value is as following:
- o TCP 1;
- o UDP 2;
- o TLS 3;
- o DTLS 4;

- o port number: port number used for the transport protocol in the auxiliary connection.

- o Option: Optional data. The extra optional data is filled in the field. For example, if the transport protocol is TLS, the secret key is filled in the field.

#### **4.2. Capability Advertisement**

During PCEP Initialization Phase, PCEP Speakers (PCE or PCC) advertise their support auxiliary connections. A PCEP Speaker includes the "Auxiliary-Connections-Capability" TLV, described in [Section 5.1](#), in the OPEN Object to advertise its support for auxiliary connections. The Auxiliary Connections Capability TLV includes the auxiliary connection parameters.

The presence of the auxiliary connection Capability TLV in PCC's OPEN Object indicates that the PCC is willing to establish auxiliary connection with PCE.

The presence of the auxiliary connection Capability TLV in PCE's OPEN message indicates that the PCE is willing to establish auxiliary connection with PCC.

#### **4.3. Initialization Phase**

The PCE peer must not initiate auxiliary connection before having completed the connection setup over the main connection; it must setup and maintain auxiliary connections with the PCE peer only while the corresponding main connection is alive. The connection setup for auxiliary connections is the same as for the main connection. The procedure of auxiliary connection is as following:

PCC sends OPEN message to initiate the main connection. The auxiliary connections capability is filled in the OPEN object and carried in the OPEN message.

PCE sends OPEN message to PCC carrying the auxiliary connections capability in the OPEN message too.

After receiving the OPEN message from PCE, PCC establishes PCEP session, and sends the keepalive message to enable the keepalive mechanism. The keepalive message is transported relying on the main connection. If one end of the main connection session receives no message before the DeadTimer expires, it declares the session dead.

Once the main connection session and the transport connection for the auxiliary connection are established, the PCC and PCE initiate the auxiliary connections PCEP session establishment.





After receiving the OPEN message from the PCEP peer, the other PCEP peer establishes PCEP session, and sends the keepalive message to enable the keepalive mechanism. The keepalive message is transported relying on the auxiliary connection. If one end of the auxiliary connection session receives no message before the DeadTimer expires, it declares the session dead and close the auxiliary connection. If the PCEP peer notices that the main connection session is dead, the auxiliary connection will be closed.

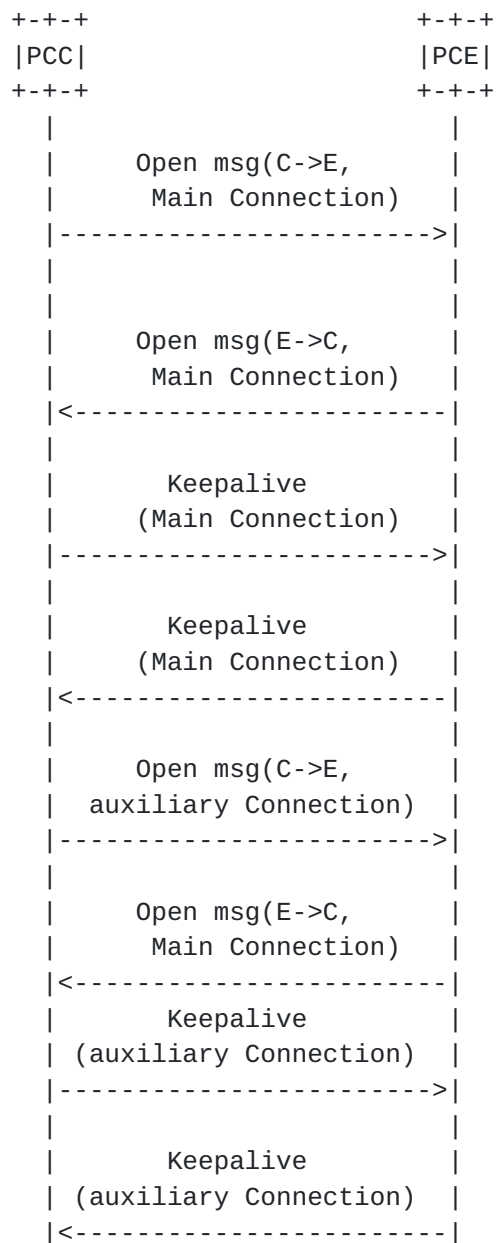


Figure 2 Initialization Phase



#### 4.4. Termination of the Auxiliary Connections PCEP Session

The termination of the auxiliary connections PCEP session could be triggered by the close of main connection or the auxiliary connection's PCEP peer itself.

If PCC desires to close the main connection, PCC sends the close message to PCE. When PCE receives the close message, it closes all the auxiliary connections with the PCC firstly, then clears all the states related to pending requests previously sent to the PCC and closes the main connection. The procedure is described in figure 2.

Similarly, if the PCE desires to close the main connection, The PCC close all the auxiliary connections with the PCE firstly, then clears all the states related to pending requests previously sent to the PCE and closes the main connection.

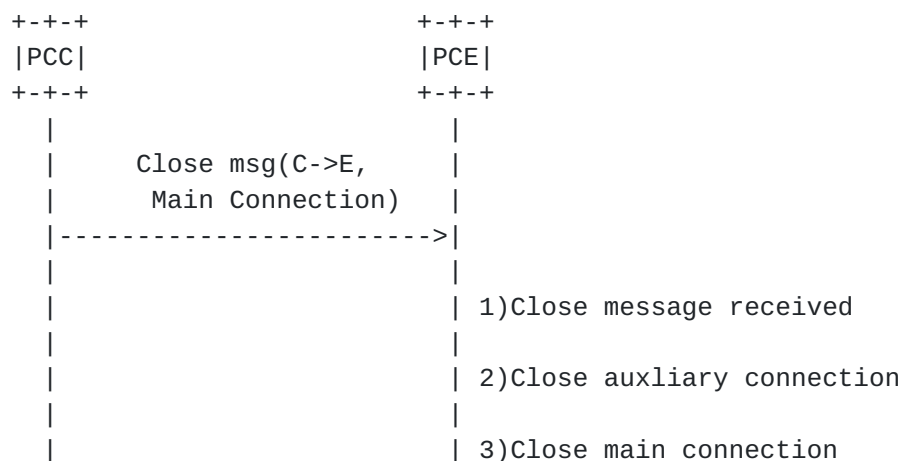


Figure 3 Close Main Connection

When one of the PCEP peers desires to terminate an auxiliary connection PCEP session, it first sends a PCEP Close message based on the auxiliary connection and then closes the TCP connection.

If the PCEP session is terminated by the PCE, the PCC clears all the states related to auxiliary connection pending requests previously sent to the PCE.

Similarly, if the PCC terminates a PCEP session, the PCE clears all auxiliary connection pending path computation requests sent by the PCC in question as well as the related states. Figure 3 shows the procedure.



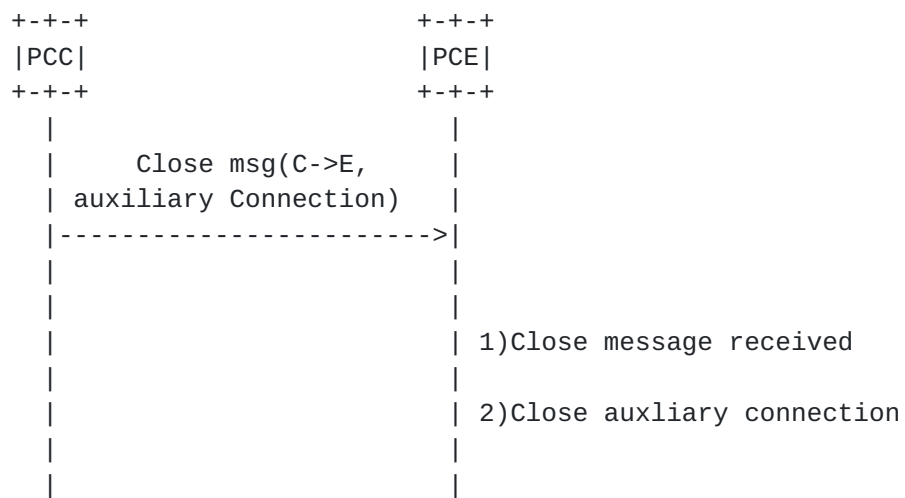


Figure 4 Close Auxliary Connection

## 5. Security Considerations

TBD

## 6. IANA Considerations

There is no need additional IANA allocation for this document.

## 7. Acknowledgements

TBD.

## 8. Informative References

- [I-D.ietf-pce-pce-initiated-lsp]  
 Crabbe, E., Minei, I., Sivabalan, S., and R. Varga, "PCEP Extensions for PCE-initiated LSP Setup in a Stateful PCE Model", [draft-ietf-pce-pce-initiated-lsp-07](#) (work in progress), July 2016.
- [I-D.ietf-pce-stateful-pce]  
 Crabbe, E., Minei, I., Medved, J., and R. Varga, "PCEP Extensions for Stateful PCE", [draft-ietf-pce-stateful-pce-18](#) (work in progress), December 2016.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<http://www.rfc-editor.org/info/rfc2119>>.



[RFC5440] Vasseur, JP., Ed. and JL. Le Roux, Ed., "Path Computation Element (PCE) Communication Protocol (PCEP)", [RFC 5440](#), DOI 10.17487/RFC5440, March 2009, <<http://www.rfc-editor.org/info/rfc5440>>.

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