(1) Applicability of Stateful PCE
(2) PCEP Extensions for Stateful PCE
Usage in GMPLS Networks

PCE WG, IETF 84th, Vancouver, BC, Canada

draft-zhang-pce-stateful-pce-app-01.txt
draft-zhang-pce-pcep-stateful-pce-gmpls-00.txt

Fatai Zhang (zhangfatai@huawei.com)
Xian Zhang (zhang.xian@huawei.com)
Young Lee (leeyong@huawei.com)
Ramon Casellas (ramon.casellas@cttc.es)
Oscar Gonzalez de Dios (ogondio@tid.es)
Dhruv Dhody (dhruv.dhody@huawei.com)
Outline

• Stateful PCE applicability update
• PCEP extensions for stateful PCE usage in GMPLS networks
• Summary and next step
Stateful PCE Applicability

Main Objective:

(1) Presenting generic considerations for stateful PCE architecture based on RFC4655;

(2) Exhibiting the superiority of stateful PCE through the following typical scenarios:
   - Impairment-aware RWA in WSON networks
   - Recovery (Protection & Restoration)
   - Time-based Scheduling
   - SRLG Diversity
   - Defragmentation in flexible grid networks
   - Maintenance of Virtual Network Topology
   - GCO (Incremental)
   - P2MP Application
From Version 00 to 01

**Major Updates:**

1. Linked this document with relevant drafts that cover PCEP extensions;
   - `draft-ietf-pce-stateful-pce`
   - `draft-zhang-pce-pcep-stateful-pce-gmpls`
2. Added a section talking about the usage of under construction LSP information;
   - `LSP-DB stores two types of LSP info.: (a) established LSPs; (2) yet-to-be established LSPs;`
3. Added contents for security and manageability sections;
4. Editorial updates;
PCEP Extensions for Stateful PCE Usage in GMPLS Networks

◆ Motivation

Gaps identified between what PCEP extensions are needed with the WG (draft-ietf-pce-stateful-pce) according to the appl. draft (draft-zhang-pce-stateful-pce-app)

◆ Overview of PCEP Extensions

  o LSP capability advertisement and negotiation;
  
  o LSP state synchronization;
  
  o LSP delegation;
  
  o PCEP simplification;
  
  o Application-specific extension;
PCEP Extensions for Stateful PCE
Usage in GMPLS Networks

◆ LSP capability advertisement and negotiation (essential)

Negotiation: during PCEP session establishment process
Advertisement: through routing protocol(s)

multi-layer: Layer-specific capability advertisement => **LayerCapability TLV**

(note: carried in OPEN msg)
PCEP Extensions for Stateful PCE Usage in GMPLS Networks

◆ LSP State Synchronization (essential)

GMPLS LSP characteristics should be considered:

○ <GENERALIZED BANDWIDTH>
○ <PROTECTION ATTRIBUTE>
○ Extended Objects to support the inclusion of the label sub-object
  - <RP>, <IRO>, <XRO>

◆ LSP Delegation

Q1: Should it be part of RFC5394 (Policy-enabled PCE FRWK)?

Q2: Typical usage?

Q3: A LSP spanning across multiple domains? How to maintain the per LSP mode?
PCEP Extensions for Stateful PCE Usage in GMPLS Networks

◆ PCEP Simplification

PCReq/PCRep: Detailed LSP Info.
- e.g. for diversified path comp. or optimization

PCReq/PCRep: Only LSP identifiers (e.g. the 4-tuple)
- Simplified!

Stateless PCE

Stateful PCE
PCEP Extensions for Stateful PCE Usage in GMPLS Networks

◆ Application-specific Extension

**Time-based scheduling:**

(1) Internal to PCE:
Scheduled LSP info.;

(2) PCEP extension: LSP starting time and LSP holding time =>
A new object (Service-Time)

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PCEP Extensions for Stateful PCE Usage in GMPLS Networks

◆ Application-specific Extension

RWA in impairment-aware WSON networks:

Requirement: should not impact existing LSPs while establishing new LSPs

Extension needed: Impairment related information, e.g. Power, OSNR, PMD, etc.

- Extension to the METRIC object to include the requirement relating to these impairment parameters
Summary & Next Step

- Welcome feedback from the meeting or mailing list and further revision

- Suggestion for moving forward: requirement/applicability first, then specific PCEP extensions

  ⇒ **Requirement**: merge relevant contents from existing two drafts
  
  -(1) part of *draft-ietf-pce-stateful-pce*
  
  -(2) *draft-zhang-pce-stateful-pce-app*

  ⇒ one PCEP extensions draft

  - (1) part of *draft-ietf-pce-stateful-pce*
  
  - (2) *draft-zhang-pce-pcep-stateful-pce-gmpls*