PCEP-LS : Distribution of Link-State and TE Information via PCEP.

https://tools.ietf.org/html/draft-dhodylee-pce-pcep-ls-08
https://tools.ietf.org/html/draft-lee-pce-pcep-ls-optical-02

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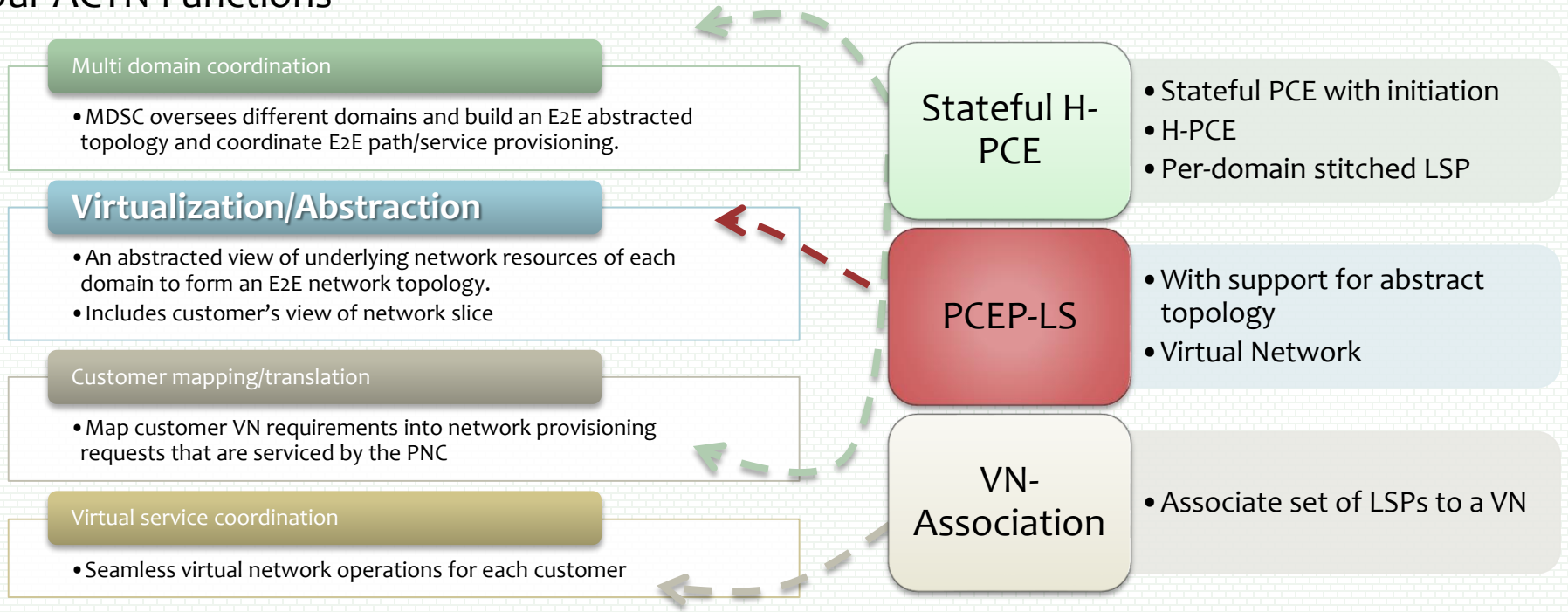
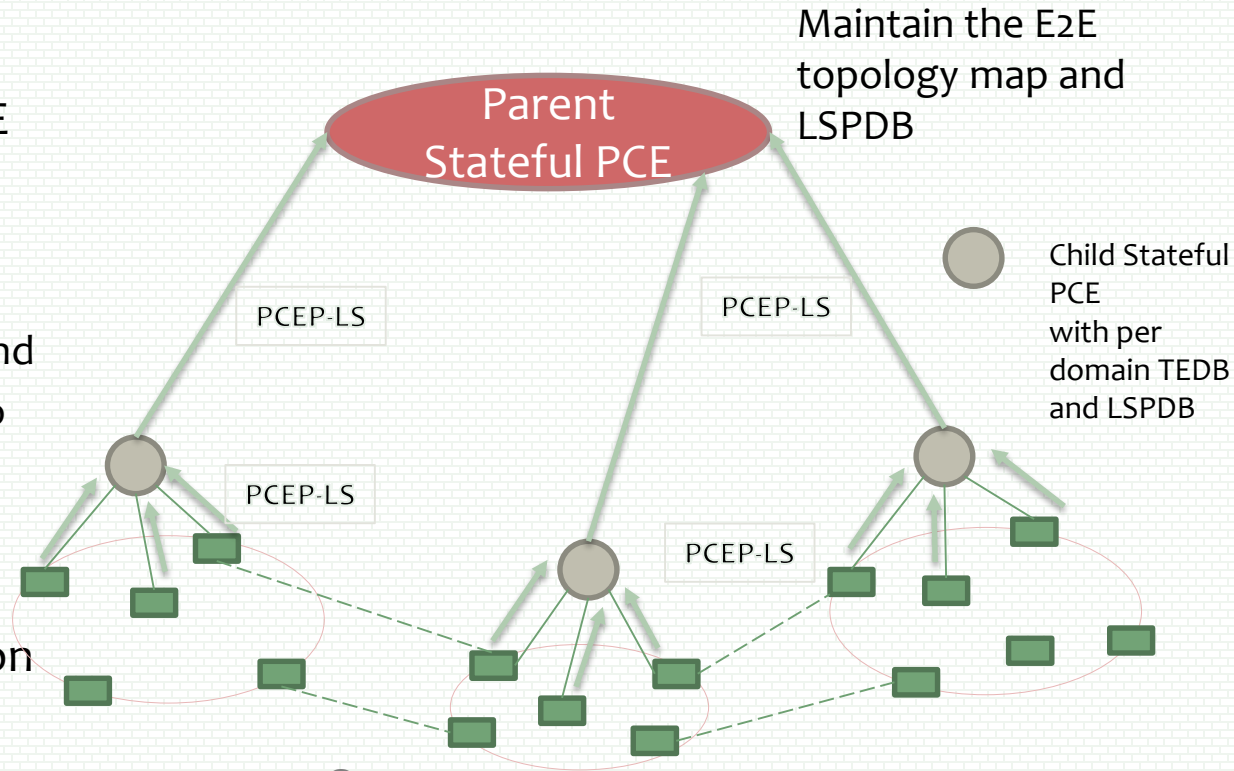
Architectural Context

Four ACTN Functions



Stateful H-PCE Context

- PCEP-LS allow recursive update of TE and Link State information
  - from Device to Domain Child PCE and
  - from Domain PCE to Parent PCE.
- Only incremental updates/changes
- Support for abstraction



Key Features of PCEP-LS

Capability to report the link-state and TE information

- Local and remote information
- Support for synchronization

Incremental Update in link-state and TE information with encoding of only the fields that are impacted.

(Fast Convergence)

Mechanism to link information learned via IGP and BGP-LS

Support Optical Network TE information

LSRpt Message

PCC MUST report any changes in the link-state (and TE) information to the PCE by sending a LS Report carried on a LSRpt message to the PCE.

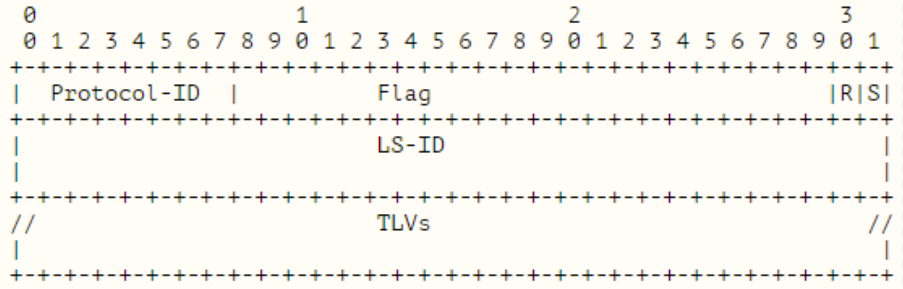
Each node and Link would be uniquely identified by a PCEP LS identifier (LS-ID). - remains constant for the lifetime of a PCEP session

The LS reports may carry local as well as remote link-state (and TE) information

The format of the LSRpt message is as follows:

```
<LSRpt Message> ::= <Common Header>
                    <ls-report-list>
Where:

<ls-report-list> ::= <LS>[<ls-report-list>]
```



TLV & Sub-TLV

- Routing Universe TLV
- Local and Remote Node Descriptor TLV
- Link Descriptor TLV
- Prefix Descriptor TLV
- Node Attributes TLV
- Link Attributes TLV
- Optical Node Attributes TLV
- Optical Link Attributes TLV

Implementation Report

Hierarchical Transport PCE controllers

- The PCEP-LS has been implemented as part of IETF97 Hackathon and Bits-N-Bites demonstration. The use-case demonstrated was DCI use- case of ACTN architecture in which to show the following scenarios: - connectivity services on the ACTN based recursive hierarchical SDN/PCE platform that has the three tier level SDN controllers (two-tier level MDSC and PNC) on the top of the PTN systems managed by EMS.
- Integration test of two tier-level MDSC: The SBI of the low level MDSC is the YANG based Korean national standards and the one of the high level MDSC the **PCEP-LS** based ACTN protocols. - Performance test of three types of SDN controller based recovery schemes including protection, reactive and proactive restoration. **PCEP-LS protocol was used to demonstrate quick report of failed network components.**

ONOS-based Controller (MDSC and PNC) Huawei (PNC, MDSC) and SKT (MDSC) implemented PCEP-LS during Hackathon and IETF97 Bits-N-Bites demonstration.

- The demonstration was ONOS-based ACTN architecture in which to show the following capabilities: Both packet PNC and optical PNC (with **optical PCEP-LS extension**) implemented **PCEP-LS on its SBI and well as its NBI** (towards MDSC). SKT orchestrator (acting as MDSC) also supported PCEP-LS (as well as RestConf) towards packet and optical PNCs on its SBI. Further description can be found at <ONOS-PCEP> and the code at <ONOS-PCEP-GITHUB>.

CTTC experimental Stateful PCE controller:

- We have detailed the implementation of the ACTN architecture in terms of hierarchical active stateful PCEs, using **PCEP-LS extensions for (aggregated) topology management**, and how per-client controllers are instantiated on-demand, to control allocated slices. Reference: Experimental Validation of the ACTN architecture for flexi-grid optical networks using Active Stateful Hierarchical PCEs. ICTON 2017.

Summary & Next Steps

- PCEP-LS completes ACTN Applicability to PCE and Stateful H-PCE implementation to support TE and Link State Information Updates.
- A number of implementations have been reported to date.
- Comments handled from Ramon.
- Ask for WG adoption!

Thanks!