ACTN – Abstraction and Control of TE networks

- A set of virtual network operations to orchestrate, manage and control of multi-domain heterogeneous TE networks.
- Three tier controller hierarchy
  - Customer Network Controller (CNC)
  - Multi Domain Service Coordinator (MDSC)
  - Physical Network Controller (PNC)
- Four functions in ACTN
  - Multi domain coordination
  - Virtualization/Abstraction
  - Customer mapping
  - Virtual service coordination
- TEAS
  - draft-ietf-teas-actn-requirements
  - draft-ietf-teas-actn-framework
# PCE Applicability for ACTN

## ACTN
- MDSC-PNC
- Hierarchy of Controllers
- Tunnel instantiation by the controllers
- MDSC Multi-domain Coordination

## PCE/PCEP Architecture
- Parent PCE – Child PCE
- H-PCE
- PCInitiated Message by PCE
- Stateful H-PCE
Stateful H-PCE


- Hierarchy of stateful PCEs
- Stateful PCEP messages and procedures between child and parent PCE – active and passive!
  - Parent PCE maintain domain topology and inter-domain LSPDB
- Initiation of multi-domain E2E LSP at Parent PCE

- Initiation of per-domain LSP by each child PCE, stitched.
ACTN with PCE (& PCEP)

Step 1 – Build topology at MDSC

- Use PCEP LSRpt message to build domain topology
- Include border nodes and inter-domain links
- Can also have abstracted information from within the domain
- Based on network events, change in topology is reported to MDSC.
Step 2 – VN Instantiation

- VN Instantiation will include constraints and optimization criteria
- E2E Path computation for \{A-F\} and \{A-I\}
  - **Step 2.1 Per-domain paths**
    - \{A-F\} = \{A-B, C-D, E-F\}
    - \{A-I\} = \{A-G, H-I\}
  - PCE Initiate message to initiate per-domain path.
Step 2.2 – Per-domain report

- Each child PCE reports the status of per-domain LSP via PCRpt message
- E2E LSP is up when all per-domain LSP along the path are up.
  - \{A-F\} = \{A-B, C-D, E-F\}
  - \{A-I\} = \{A-G, H-I\}
- Any change in status of per-domain LSP is sent to parent PCE.
ACTN with PCE (& PCEP)

Step 3 – VN Modify

- VN parameters can be modified, such as change in bandwidth
- After re-computation, the per-domain path may need to be updated.
- There might also be a case that existing per-domain path needs to be deleted and a new per-domain path needs to be created between different set of border nodes.
ACTN with PCE (& PCEP)

**Step 4 – VN Delete**

- Customer may request VN to be deleted
- For each E2E path
  - Each per-domain LSP
    - Needs to be deleted
    - PCInitiate with R flag
Summary

• This document is useful to understand how PCE and various extensions to PCEP comes together for ACTN.
• ACTN Framework is now in RFC Requested Stage.
• This document is stable and ready for WG LC.
Thanks!