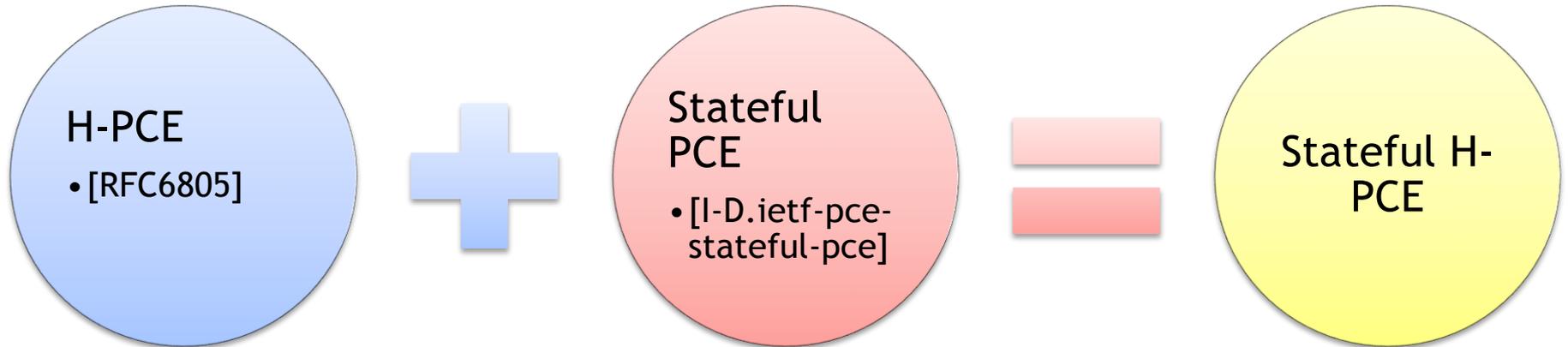


Hierarchical Stateful Path Computation Element (PCE)

draft-dhodylee-pce-stateful-hpce-00

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Hierarchical Stateful PCE



Hierarchical PCE architecture with Parent and Child PCE to compute inter-domain E2E paths

Uses network state (TED) and active paths (LSPDB) during path computation.

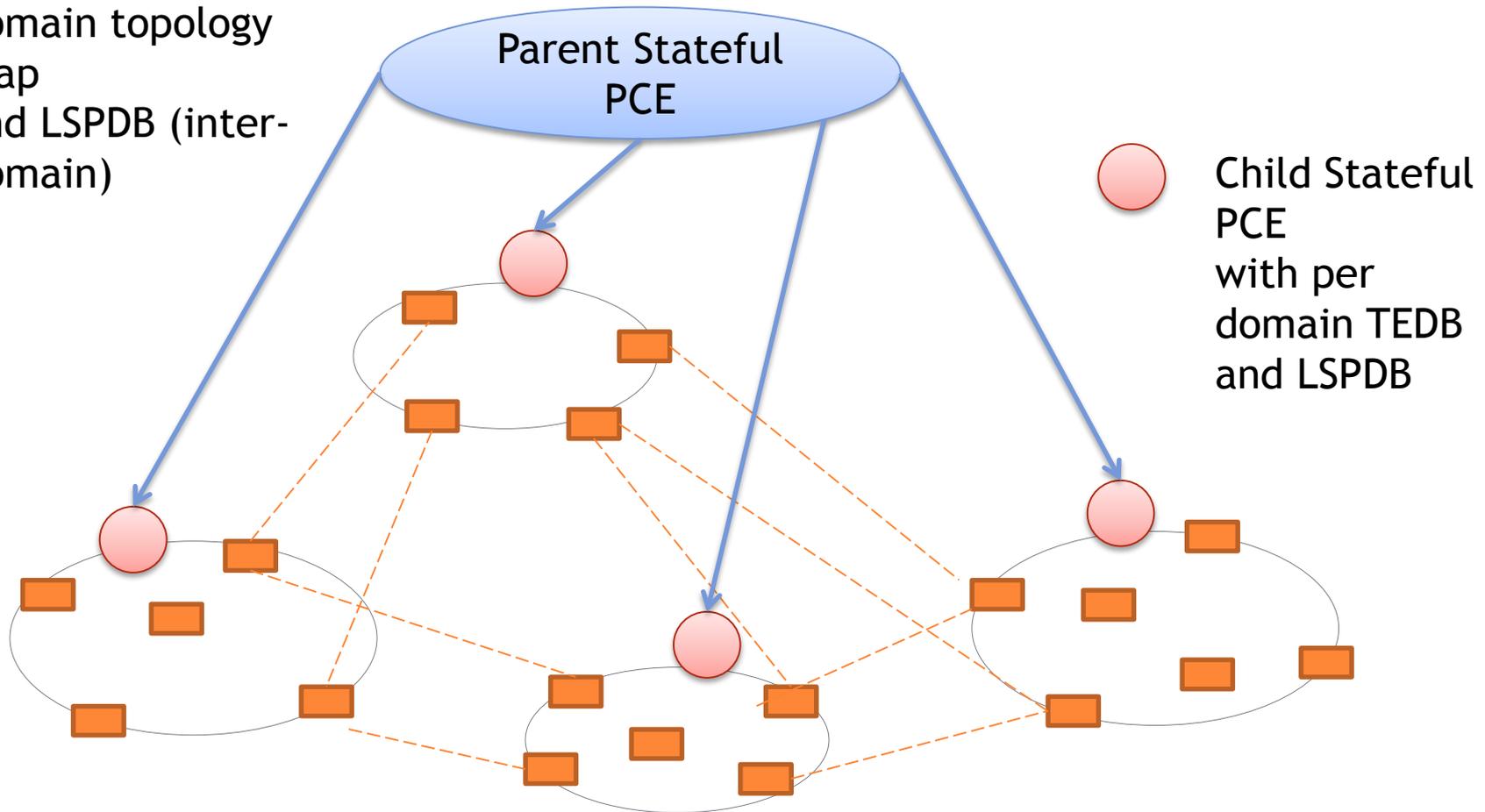
Delegation

PCE-Initiated

Combining the two capability for multi-domain, multi-layer scenario.

Hierarchical Stateful PCE

Maintain the domain topology map and LSPDB (inter-domain)



Stateful PCE in recursive mode...

Update to Stateful PCE

PCRpt message (Child PCE to Parent PCE)

- LSP State report
 - Child PCE sends LSP state reports to Parent PCE as well
- State Synchronization
 - Child PCE synchronizes state after session up with parent PCE
- LSP Delegation
 - Child PCE can further delegate control to Parent PCE

PCUpd Message (Parent PCE to Child PCE)

- Parent PCE requests modification of attributes on a Child PCE's TE LSP

PCInitiate Message (Parent PCE to Child PCE)

- Parent PCE request initiation of an LSP through the child PCE

Passive Stateful Operations

H-PCE procedures to compute end to end path.

PCC signals the path, it reports the status of the LSP to its domain PCE (child PCE).

Child PCE further propagates the status to the parent PCE via PCRpt message.

A local policy at C-PCE MAY dictate which LSPs to be reported to the P-PCE.

State Synchronization between child & Parent PCE.

Same as RFC6805 and stateful PCE

Active Stateful Operations

LSP Delegation

- PCC grants right to a PCE to update LSP parameters
- **Child PCE may further delegate to Parent PCE**
 - Based on local policy
- PCRpt message

Path Computation

- Parent PCE use the same procedure as RFC6805
- **Both Parent and Child PCE can refer to LSPDB**

LSP Updation

- **Parent PCE update the LSP parameters for delegated LSP.**
- Child PCE further propagates to the PCC.
- PCUpd message

LSP Status

- PCC report the status of LSP to the child PCE.
- Child PCE further propagates to Parent PCE

PCE Initiation Operation

[I-D.ietf-pce-pce-initiated-lsp] describes the setup, maintenance and teardown of LSPs, without the need for local configuration on the PCC.

- Thus allowing for a dynamic network that is centrally controlled and deployed.

In case of inter-domain LSP in Hierarchical PCE architecture, the initiation operations can be carried out at the Parent PCE.

- Parent PCE can send the PCInitiate message to the Child PCE (the Ingress domain PCE); the PCE further propagates the initiate request to the PCC to setup E2E LSP.

Per Domain Stitched LSP

The hierarchical PCE architecture as per [RFC6805] is primarily used for E2E LSP.

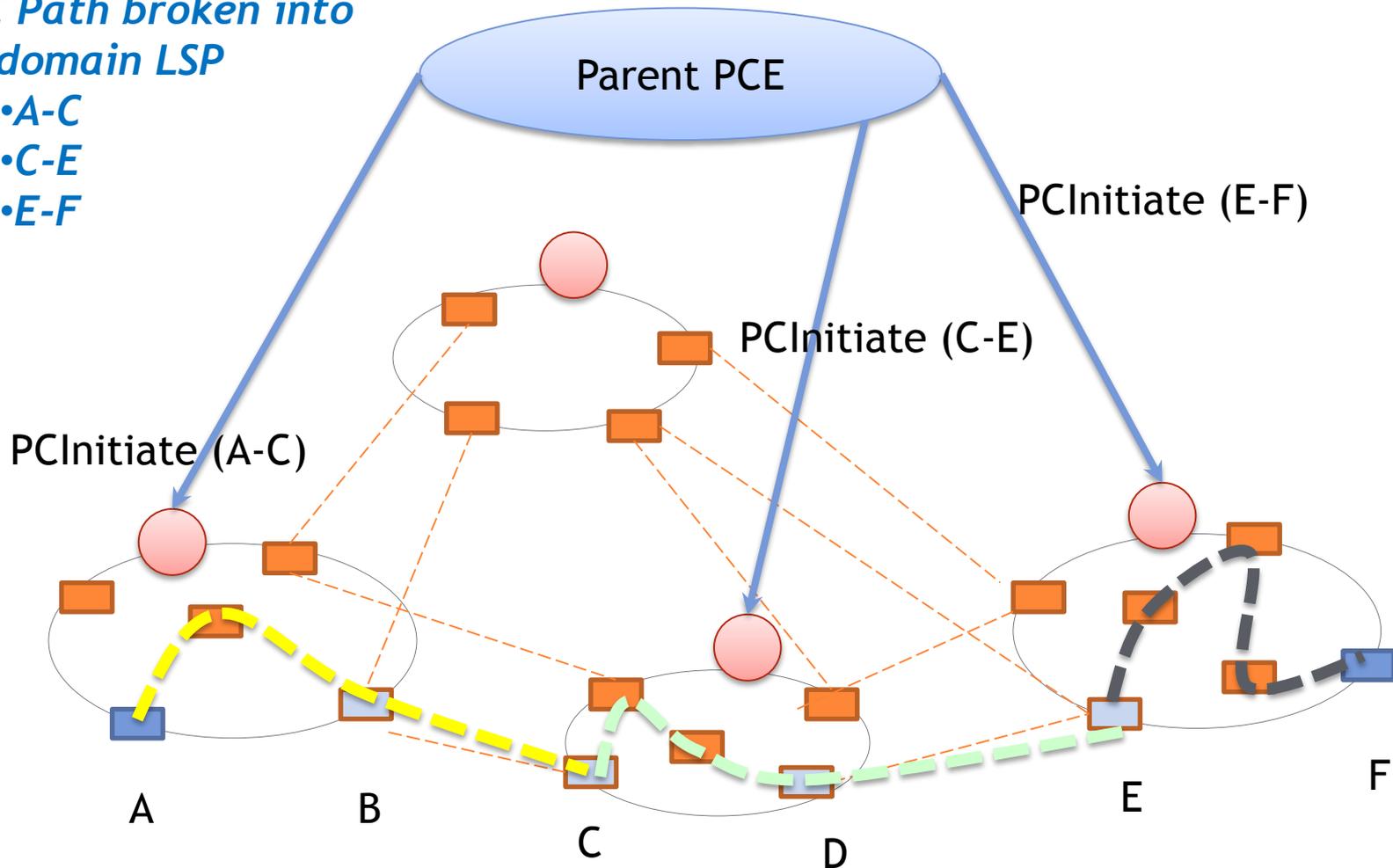
With PCE-Initiated capability, another mode of operation is possible, *where multiple intra-domain LSP are initiated in each domain which are further stitched to form an E2E LSP.*

- The Parent PCE sends PCInitiate message to each Child PCE separately to initiate individual LSP segments along the domain path.

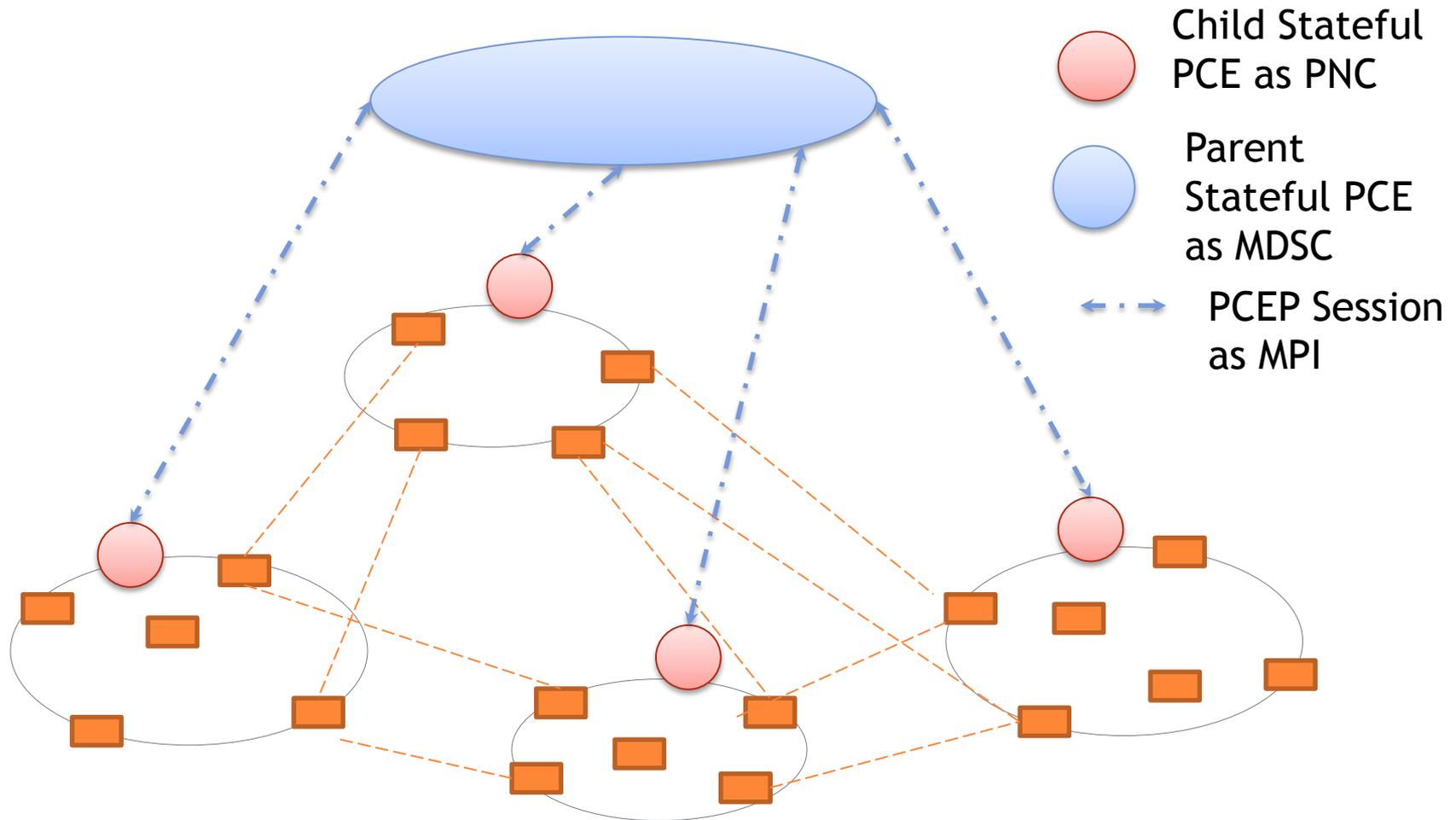
Per Domain Stitched LSP

- Ingress - A
- Egress - F
- *E2E Path broken into per domain LSP*
 - A-C
 - C-E
 - E-F

Child PCE



Applicability to ACTN



Next Steps

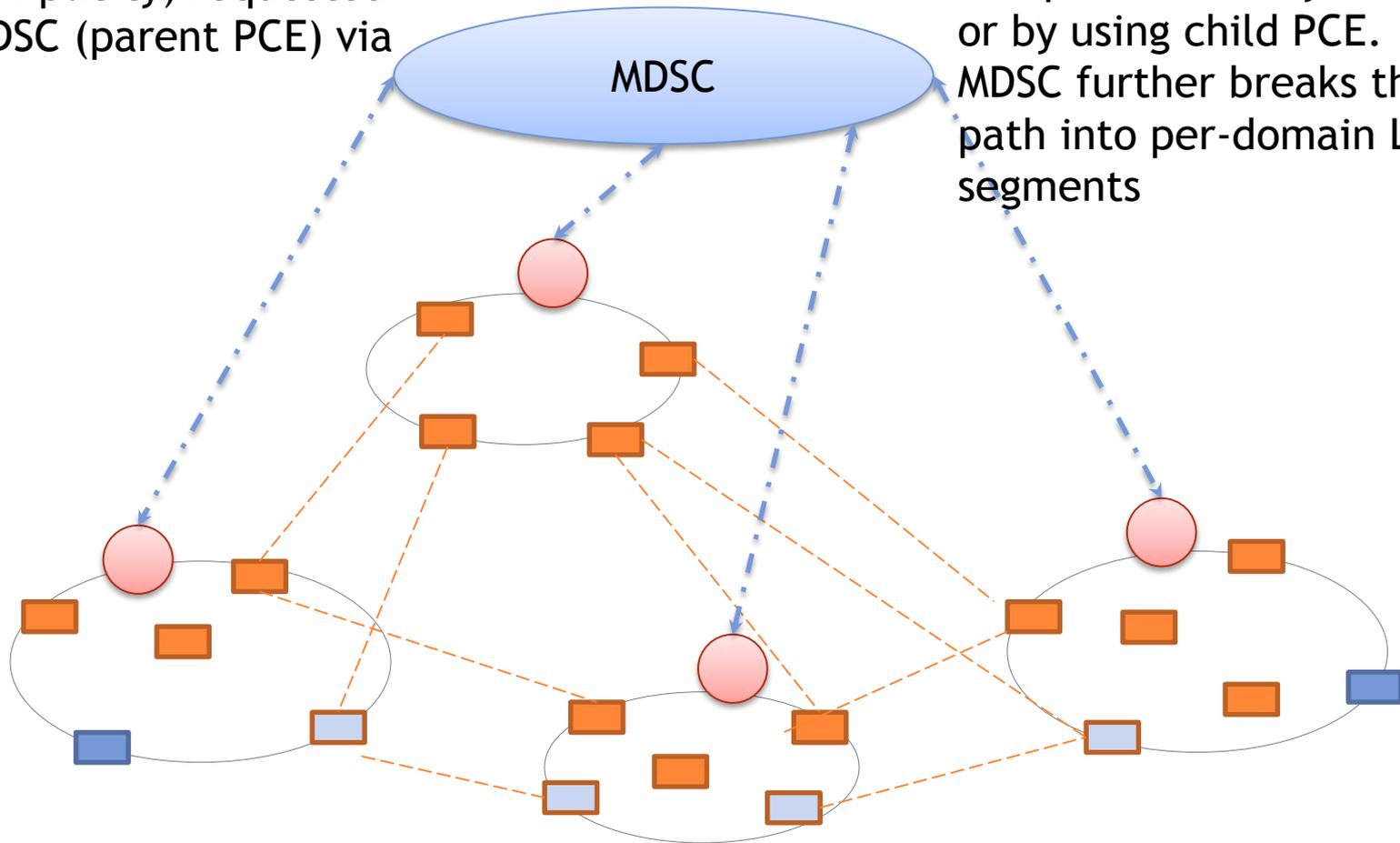
- Feedback from WG
 - Is this useful?
 - Is the mechanism correct?
 - PCEP architecture
 - Stateful PCE
 - H-PCE
 - Applicability of PCEP as an interface in ACTN?
- Thanks!

BACKUP SLIDES

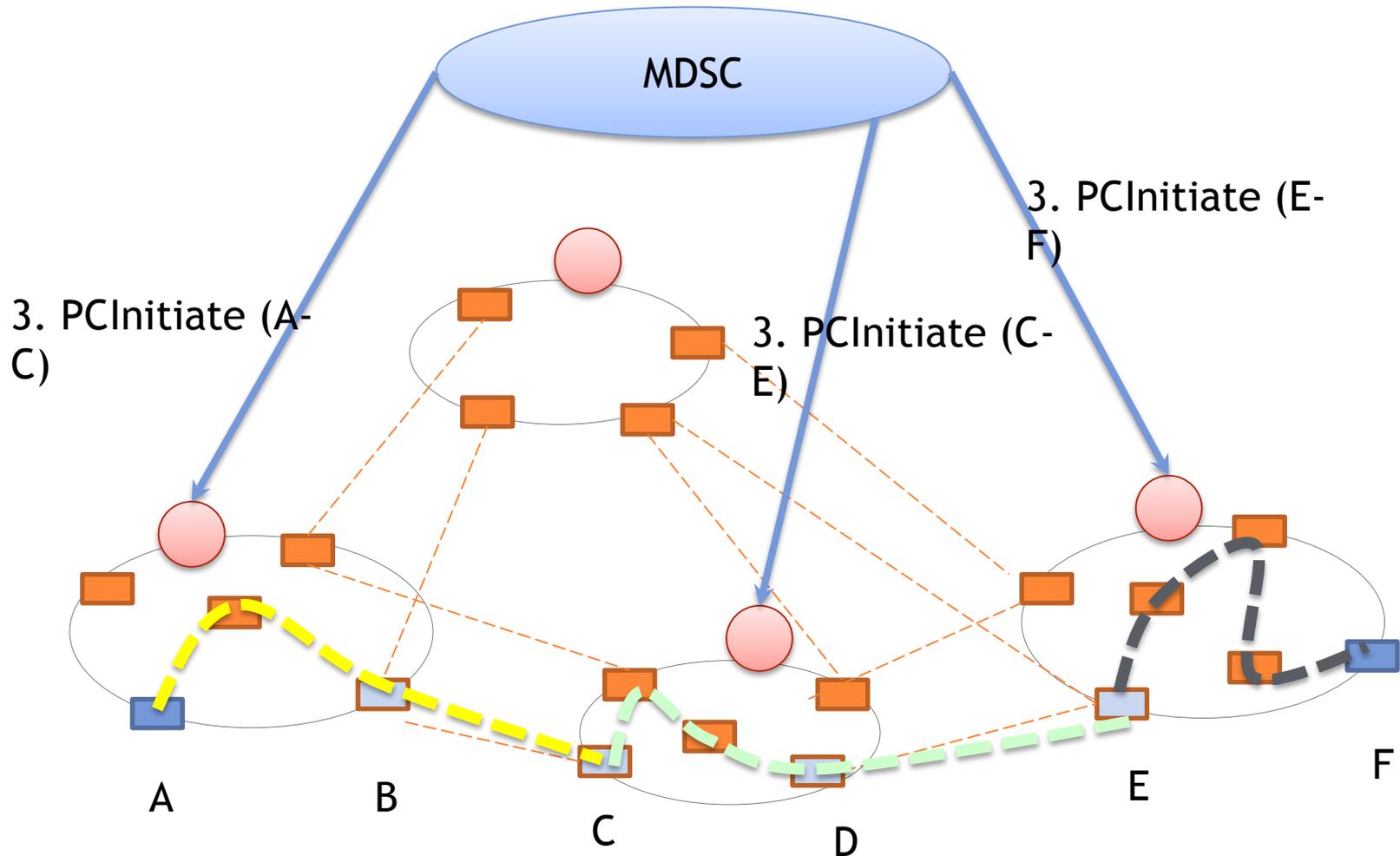
Applicability to ACTN

1. VN (assume 2 endpoints for simplicity) requested at MDSC (parent PCE) via CNC

2. MDSC computes end to end path either by itself or by using child PCE. MDSC further breaks the path into per-domain LSP segments



Applicability to ACTN



Applicability to ACTN

5. Once parent PCE receives up state from each LSP segment, it should stitch per-domain LSP

4. PCRpt (E-F)

4. PCRpt (A-C)

4. PCRpt (C-E)

