

Applicability of Generalized Multiprotocol Label Switching (GMPLS) User-Network Interface (UNI)

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draft-zhang-ccamp-gmpls-uni-app-04.txt

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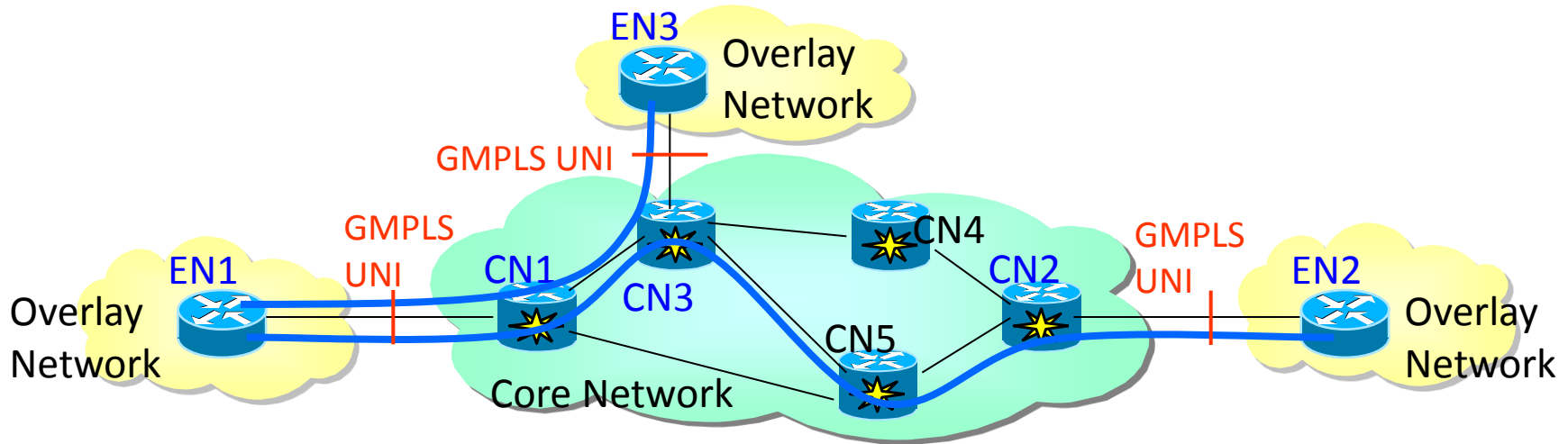
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Overview

- Objective of this draft:
 - Shows how GMPLS protocol and PCE can be used to automate or enable critical processes for use cases based on UNI
 - Points out some existing unresolved issues of GMPLS UNI and suggests the need of extensions to resolve the issues
- Objective of this presentation:
 - Briefly explain the use cases and the associated gap;
 - NO solution;

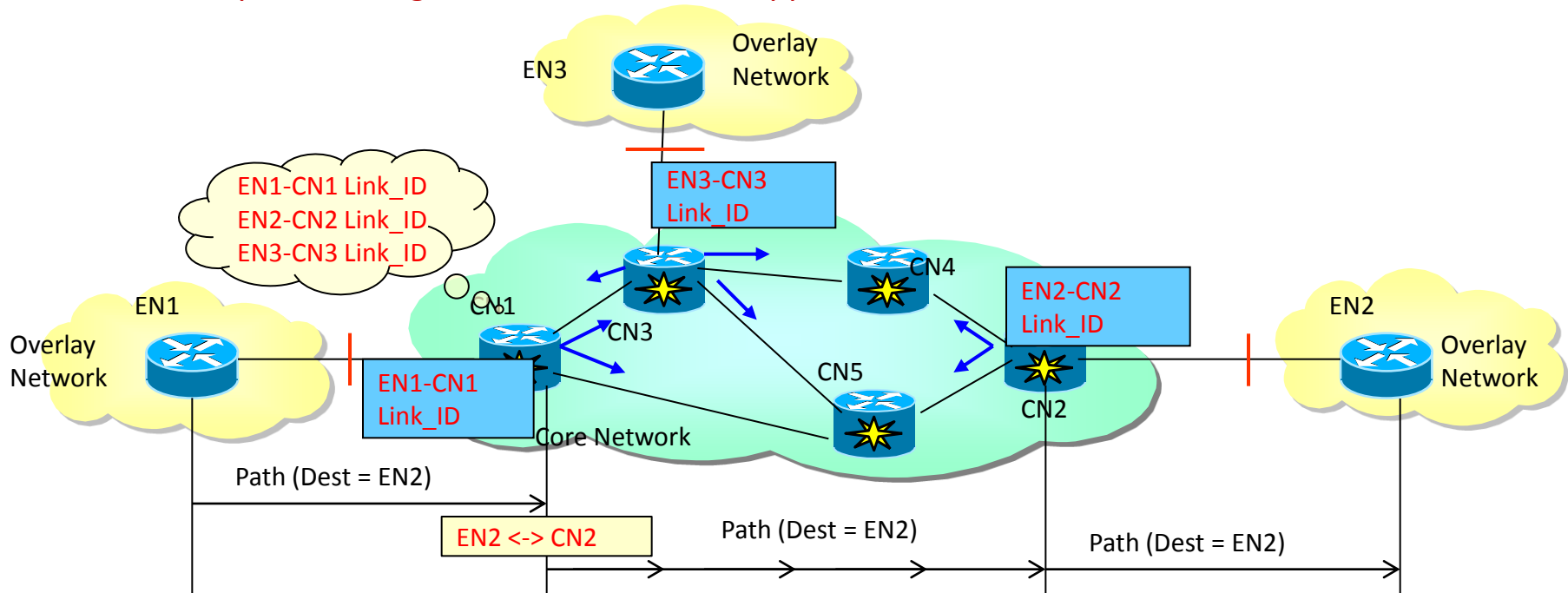
UNI Addressing



- Existing GMPLS UNI: ENs and their attached CNs **MUST** share the same address space
 - $\langle \text{EN1}, \text{CN1} \rangle, \langle \text{EN2}, \text{CN2} \rangle, \langle \text{EN3}, \text{CN3} \rangle$ MUST share the same address space
- Practical deployment: ENs and CNs may belong to different carriers and **may NOT** share the same address space
 - E.g., ENs use IPv4 while CNs use IPv6, or, CNs and ENs use overlapping address
- It may need to lift-up this address space restriction and introduce some process or mechanisms
 - e.g., address mapping
 - e.g., reuse the [session shuffling model](#) defined in L1VPN (see Slide 6)

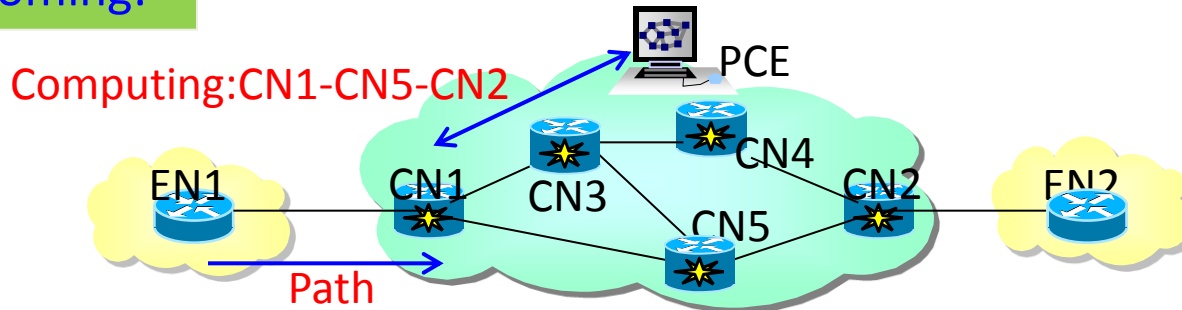
UNI TE Link Discovery

- When creating UNI connection, ingress CN is responsible to resolve who is the egress CN that the destination EN is attached
 - i.e., CNs should learn the information of all EN-CN relationship (e.g., by discovery or manual configuration)
- IGP needs to advertise the EN-CN relationship inside the core network
- L1VPN scenario: using L1VPN LSA [RFC5252] to advertise the CE-PE link
 - It's possible to generalize this LSA to support other UNI scenarios



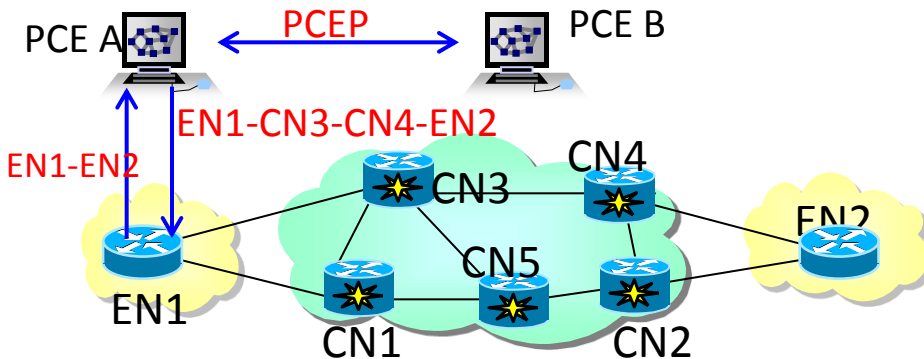
UNI Path Computation

Single-homing:

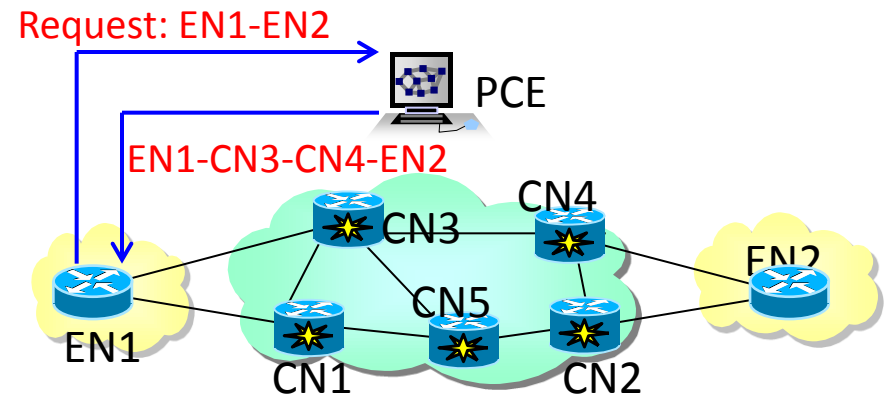


- CN1 or PCE computes the path segment inside the core network
- No need to select source UNI link because of single-homing

Multi-homing:



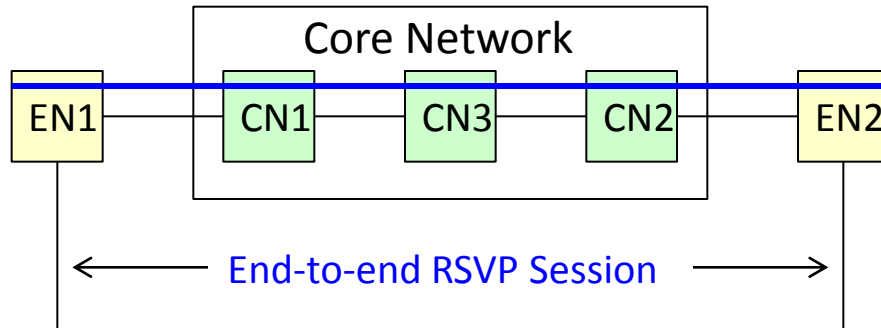
- PCE A for the overlay network
- PCE B for the core network
- Inter-PCE communication needed



- PCE is aware of ENs and is visible to ENs
- PCE computes the E2E optimal path (by selecting the source UNI TE link)

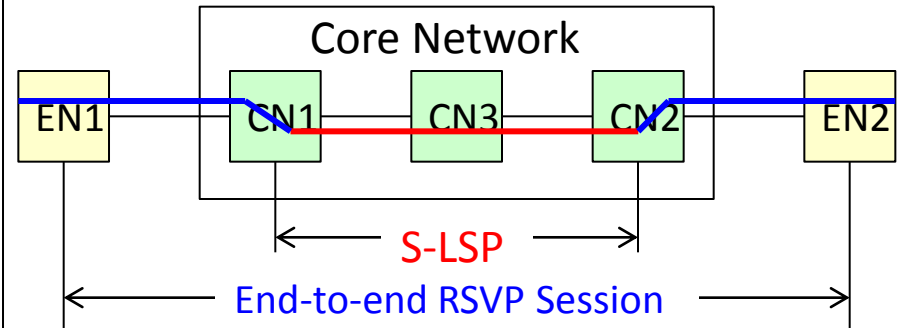
UNI Conn. Provisioning Models

Flat model [RFC3473]



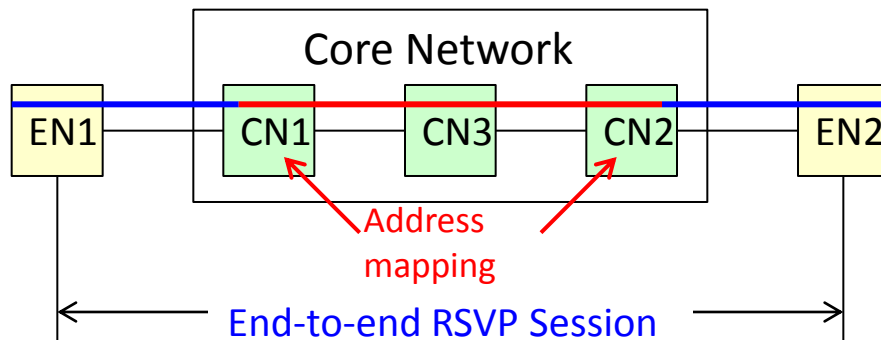
- Single end-to-end session through ENs and CNs
- Similar to intra domain path provisioning

Stitching model [RFC5150]



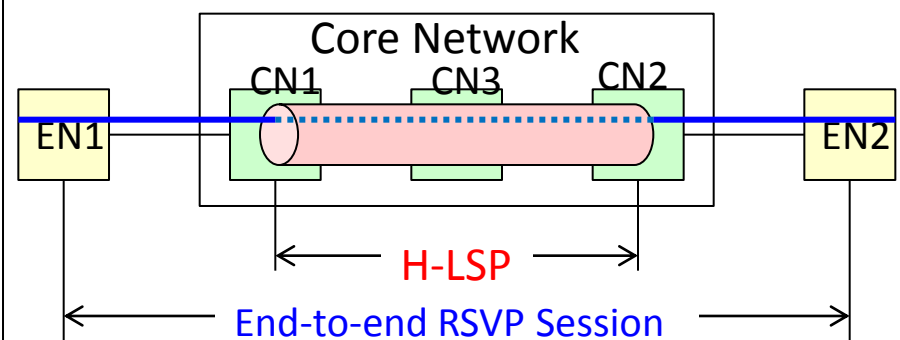
- S-LSP is pre-provisioned
- Stitch the UNI connection to the created S-LSP

Session Shuffling model [RFC5251]



- **Address mapping at ingress/egress CNs**, which changes the session identifiers
 - End-to-end session: source / dest = EN1 / EN2
 - Core session: source / dest = CN1 / CN2

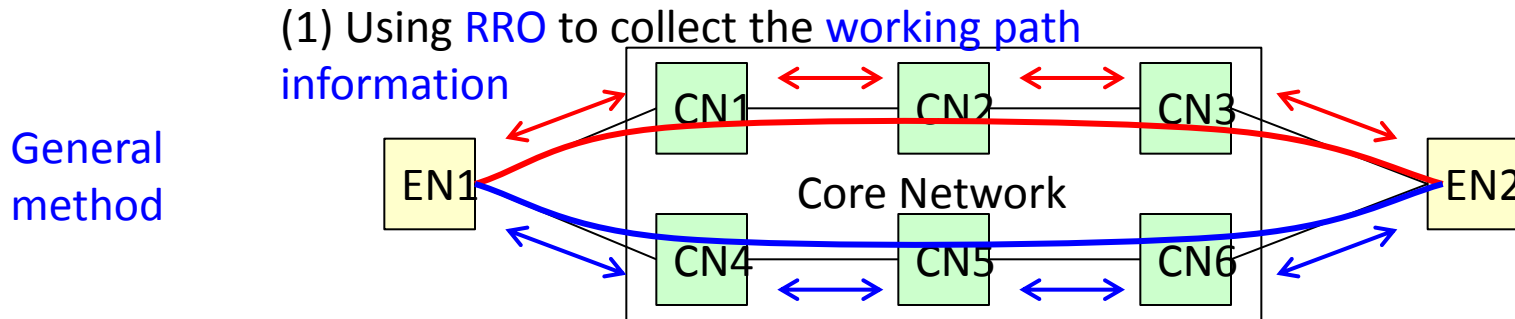
Hierarchical model [RFC6107][4206]



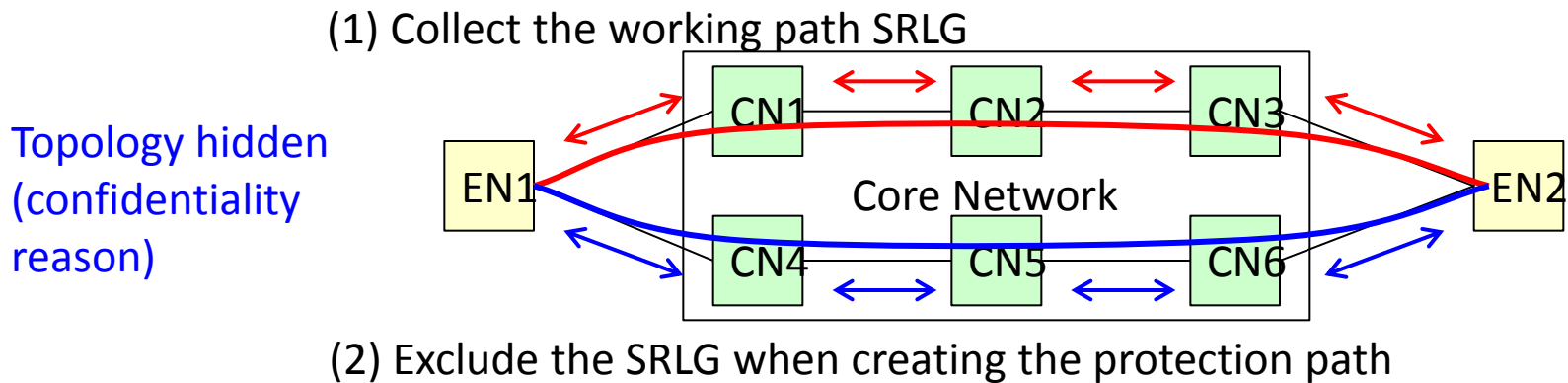
- The end-to-end UNI connection is nested into the H-LSP (tunnel)
- H-LSP can pre-provisioned or be triggered by the UNI signaling

End-to-end UNI Path Recovery

Key point: diversity between working and protection path

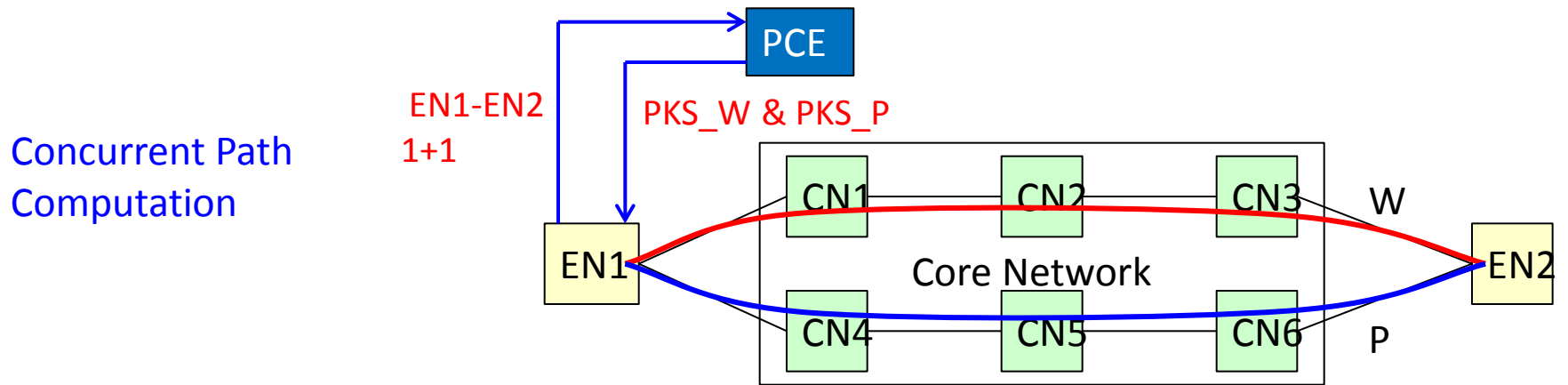
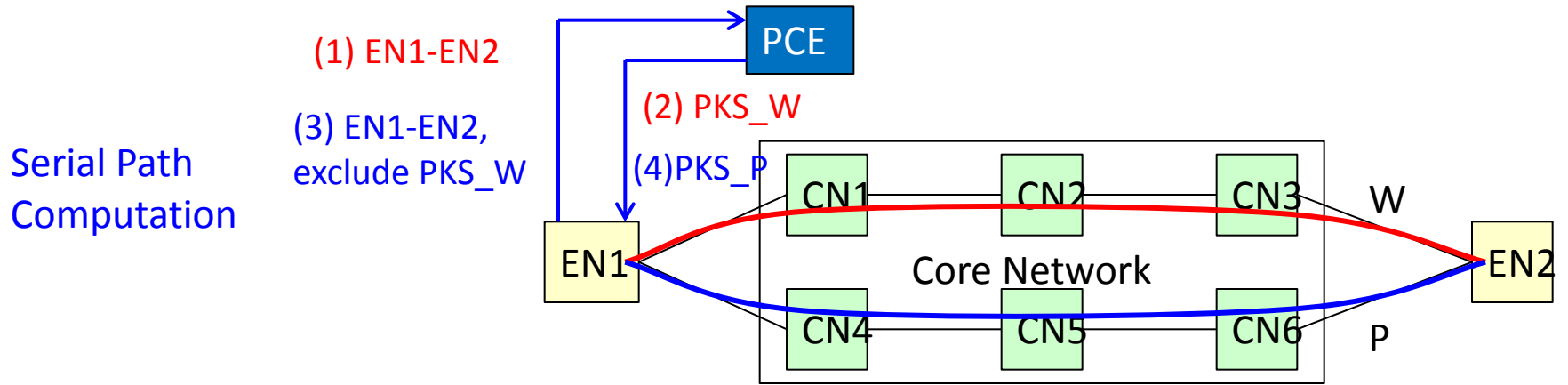


(2) Using XRO to exclude the working path when creating the protection path



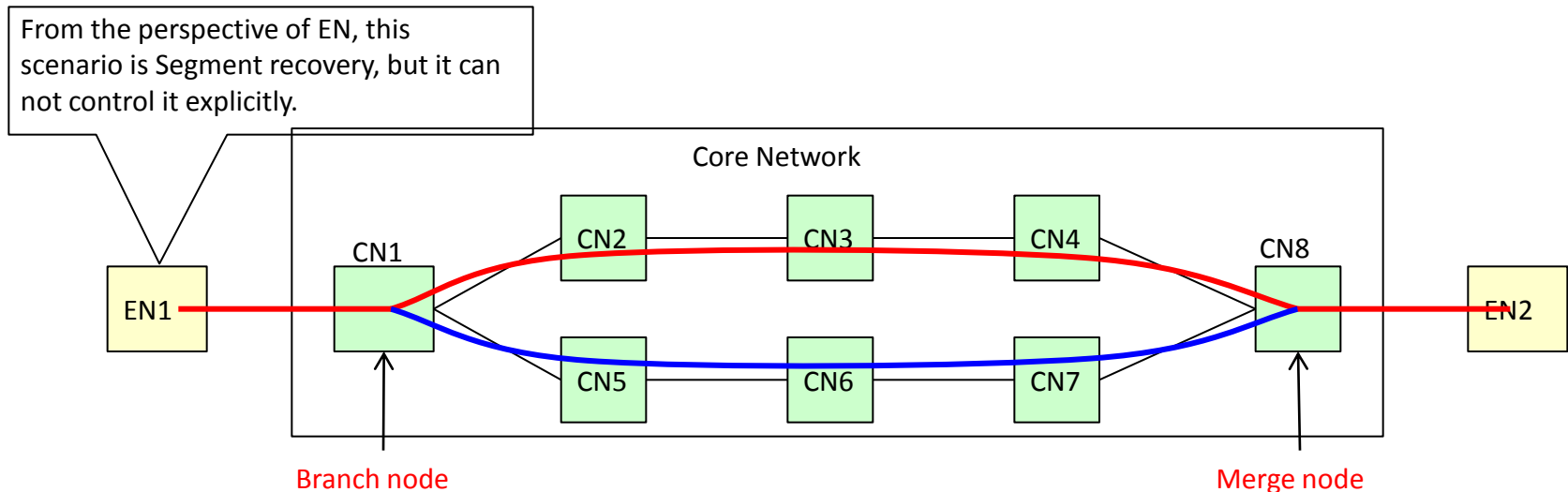
End-to-end UNI Path Recovery

- In the case that PCE is involved:
 - Path Key can be used for confidentiality consideration



UNI Segment Recovery

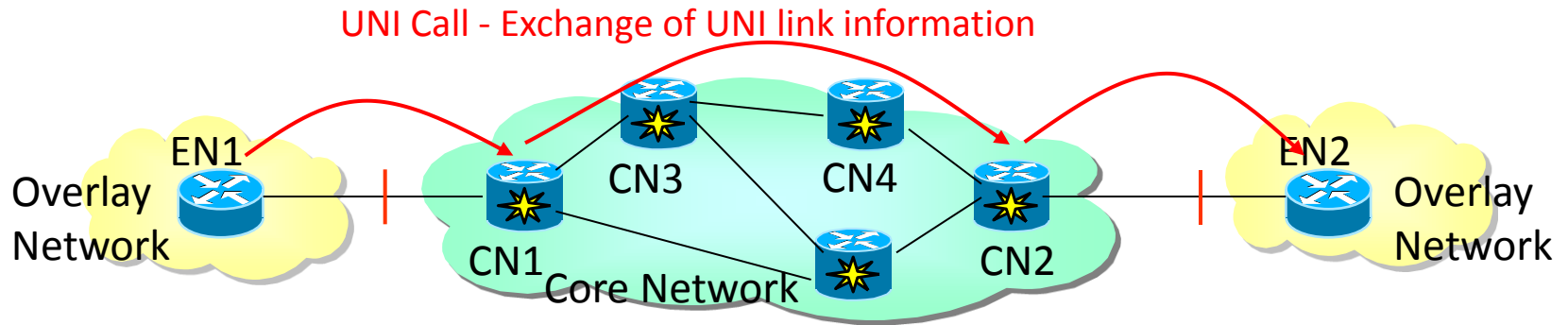
- [\[RFC4873\]](#) provides the segment recovery
 - Use SERO to indicate the recovery segment between the branch node and the merge node
- But in UNI cases, the source EN may not know which CN the destination EN is attached to
 - Therefore, source EN cannot control the segment recovery explicitly (i.e., it can not fill the address of merge node into the SERO)



UNI Call

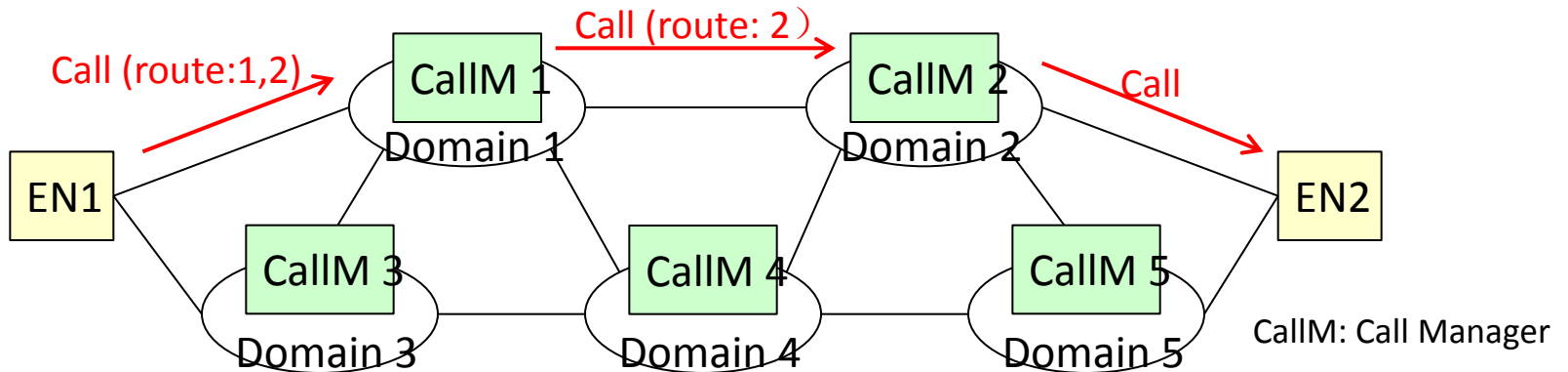
- Exchanging of UNI link information [RFC4974]:

- Information of destination UNI link is not advertised to the source EN. Therefore, Call is needed



- Multi-domain Scenarios:

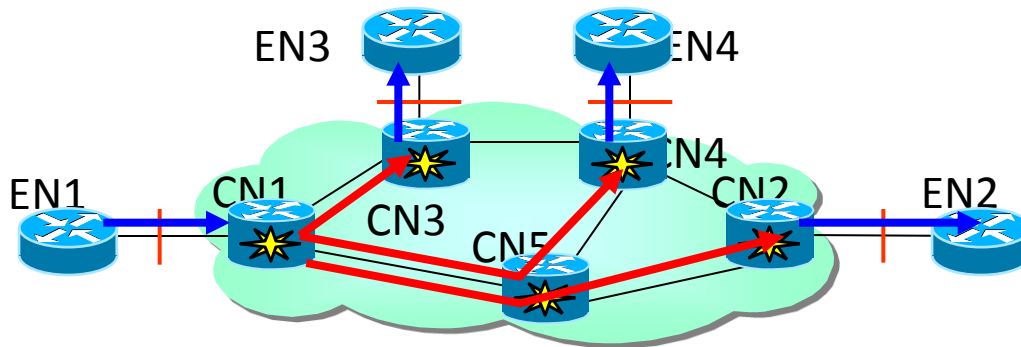
- Commercial and policy motivations play an important role in selecting Call route
- Explicit of Call control is required



UNI Multicast

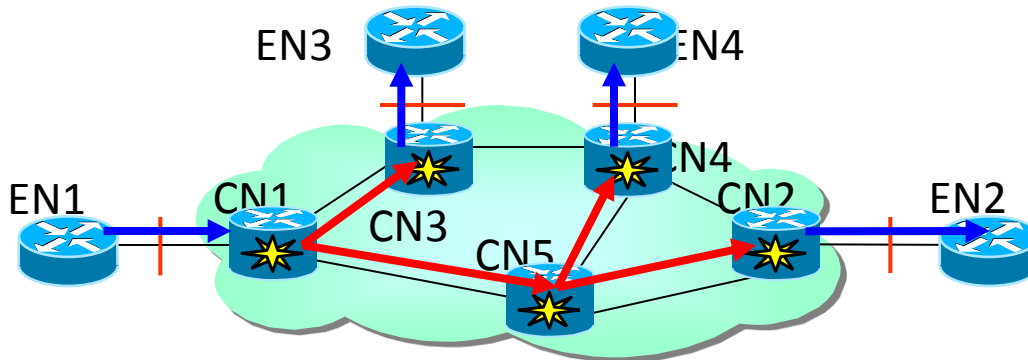
- There is a requirement to transport signals from one EN to multiple ENs
- If UNI P2MP connection is supported, bandwidth resource is saved
- Requirements: **UNI support the P2MP signaling**

Case 1: client layer multicast (saving UNI resource)



E.g., packet over TDM network, and CN1 has the packet multicast capability

Case 2: server layer multicast (saving UNI & core network resource)



E.g., all the nodes involved can support multicast capability

Gap Analysis Summary

Issue/Use Case		Ext. needed?	Supported already? If so, which draft/RFC?
1	UNI Addressing	NO	Needs adding explanatory texts
2	Auto Discovery	YES	Option 1: Generalizing RFC5252 (OSPF-based) Option 2: Generalizing RFC5195 (BGP-based)
3	Path Computation	YES	Multi-homing with single PCE in server layer: the PCE needs to be visible to ENs PCE needs to be aware of UNI TE info. (UC2)
4*	Additional Parameters over UNI	YES	Information collection drafts; Constraints drafts;
5	Provisioning Models	NO	RFC5251, RFC5150, RFC6107 Needs adding explanatory texts
6	E2E Recovery	YES	Serial provisioning: SRLG-collect; path info. in XRO etc.
	Segment Recovery	NO	RFC4873; Needs adding explanatory texts
7	Controlling Call Route	YES	Carry Call Route info. during Call procedure
8	UNI Multicasting	YES	Signaling convey the multicast information

*no expanded explanation provided in this presentation

Next Steps

– Keep alignment with:

- draft-farrel-interconnected-te-info-exchange
- draft-ceccadedios-ccamp-overlay-use-cases

– WG adoption?