Standard Representation Of Domain Sequence

draft-dhody-pce-pcep-domain-sequence-00

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Motivation for this work

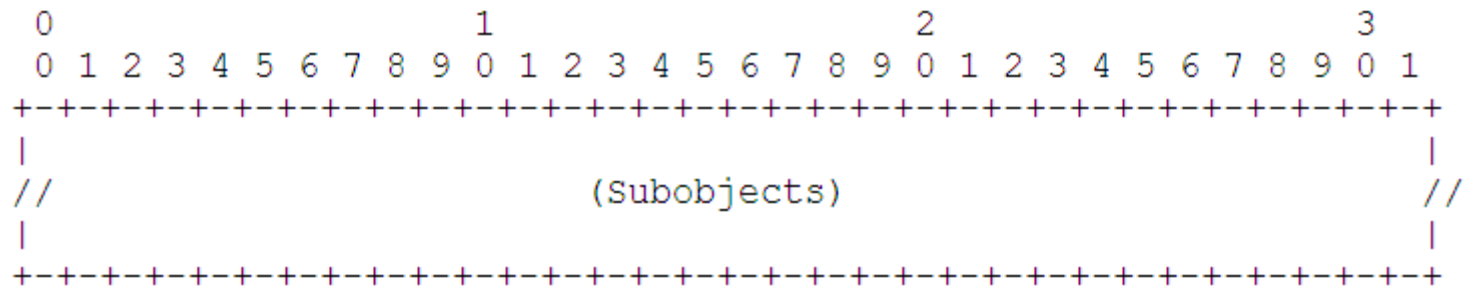
- RFC 5441 [BRPC] mentions-

> "The sequence of domains to be traversed is either administratively predetermined or discovered by some means that is outside of the scope of this document. The PCC MAY indicate the sequence of domains to be traversed using the Include Route Object (IRO) defined in [RFC5440] so that it is available to all PCEs."

- NO standards for the domain sequence representation, which will be an issue for the inter-op in the future when there are multiple implementation from different vendors.
- This document proposes a standard way to represent domain sequence for all inter-domain deployment scenarios
  - P2P [BRPC]
  - P2MP [Core Tree]
  - H-PCE
- Define Sub-Object for AREA in IRO/ERO

Standard Representation

The IRO (Include Route Object) is used to specify the domain sequence.
IRO Object-Class is 10.
IRO Object-Type is 1.



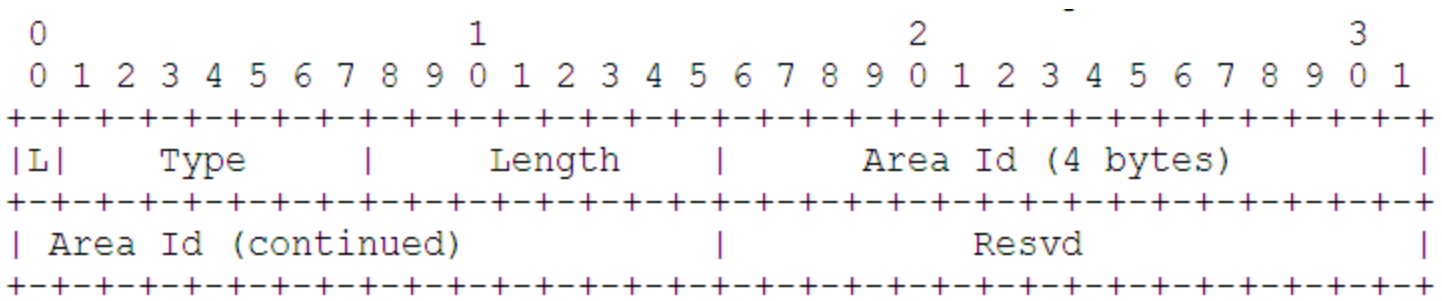
The following sub-object types are used.

Type	Sub-object
32	Autonomous system number
TBD	OSPF Area id
TBD	ISIS Area id

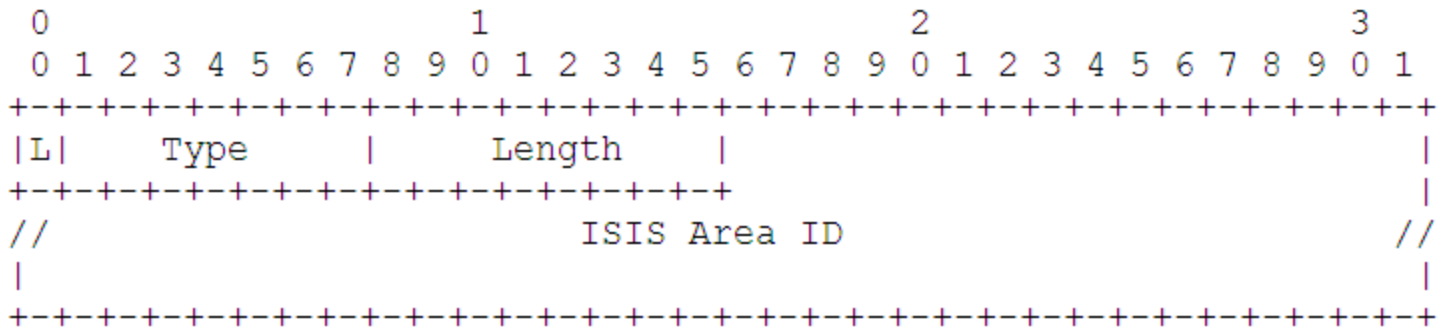
Since the length of Area-id is different for OSPF and ISIS, we propose different sub-objects.

Standard Representation

For OSPF, the area-id is a 32 bit number. The Subobject looks –



For ISIS, the area-id is of variable length and thus the length of the Subobject is variable. The Area-id is as described in ISIS by ISO standard.

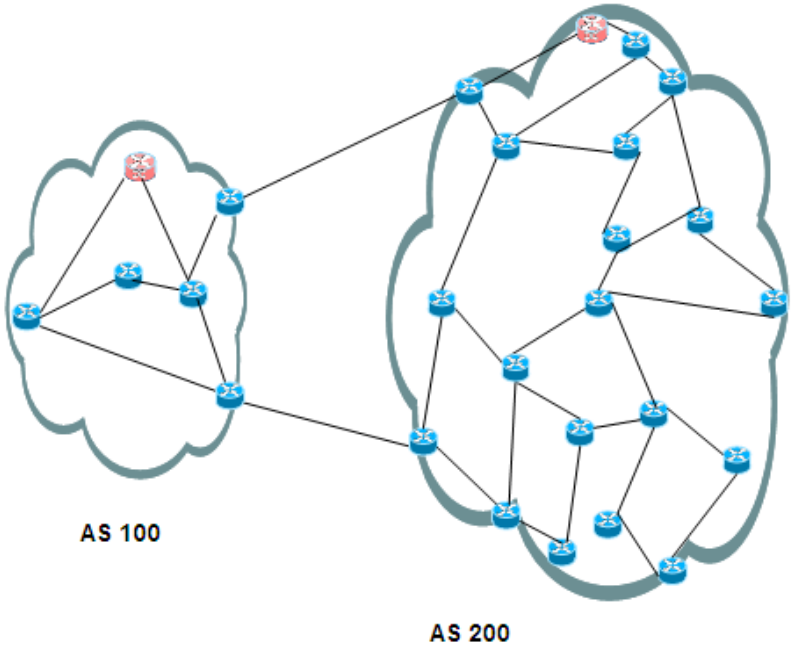


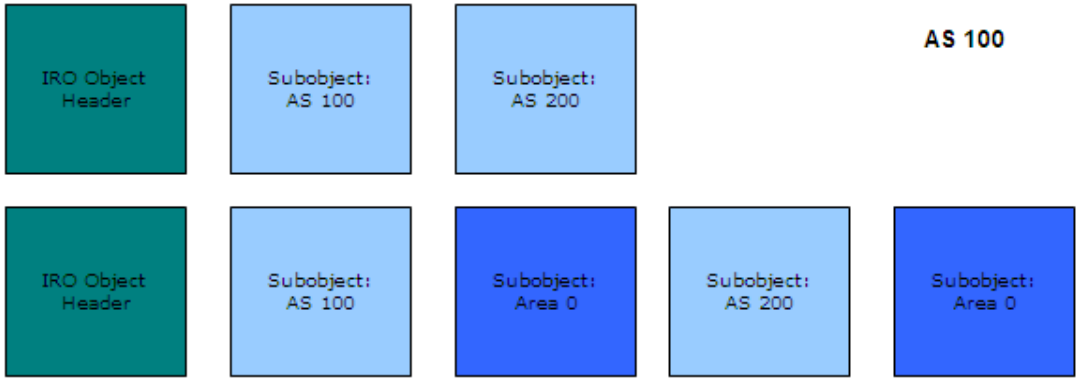
Deployment Scenario

Only AS

Each AS to be made of a single area.

Domain Sequence can be represented by only AS, Area is optional.



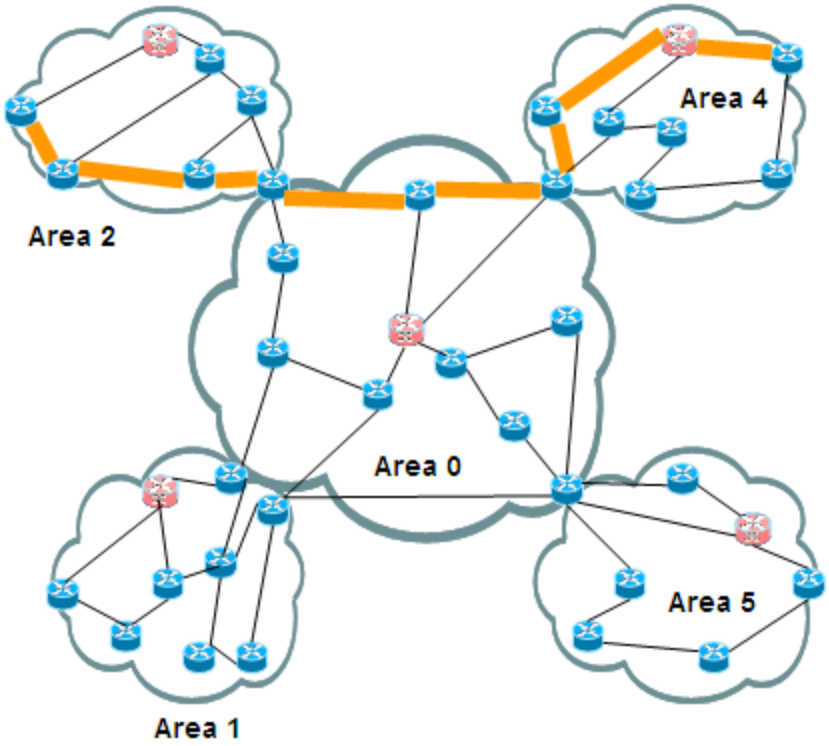


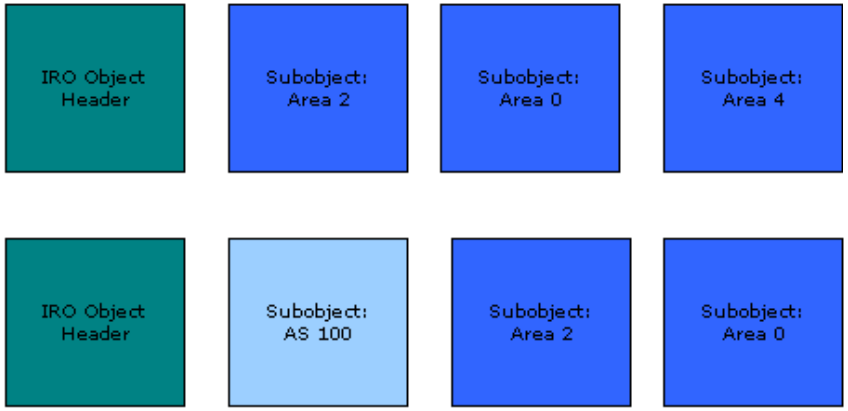
Deployment Scenario

Only Area

All Area within a single AS

Domain Sequence can be represented by only Area, AS is optional.



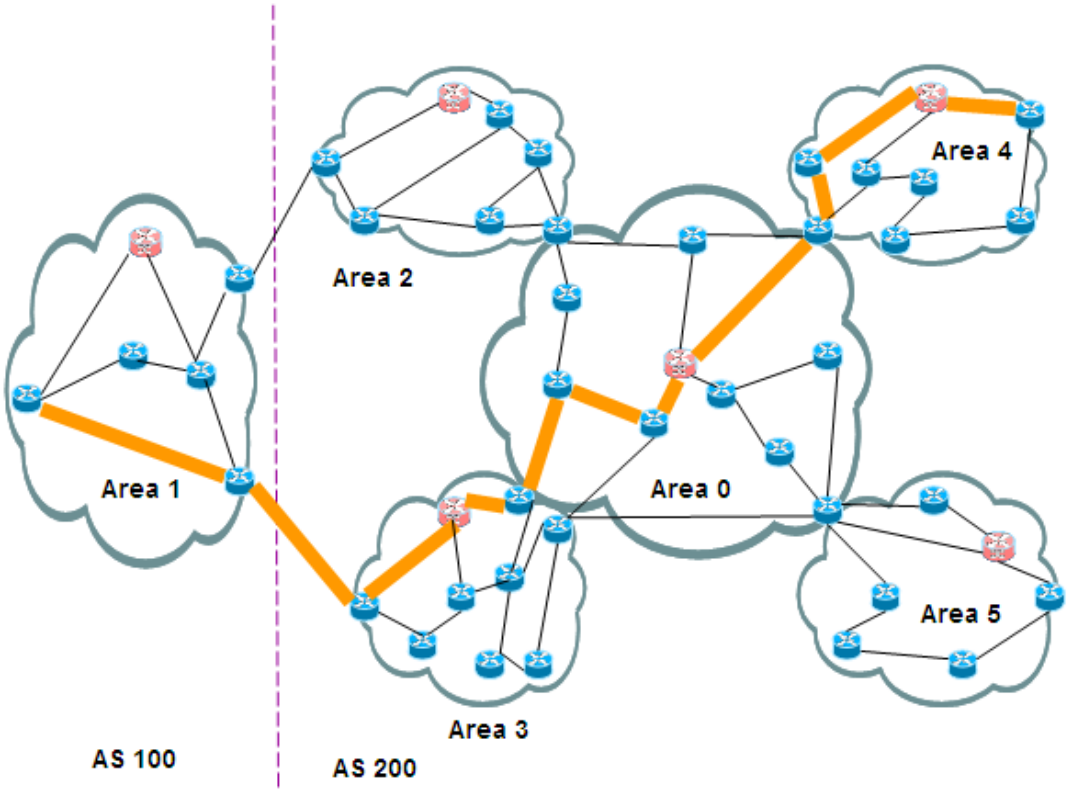


Deployment Scenario

Mix of AS & Area

In inter-AS case where an AS is further made up of multiple areas.

Both AS number and area should be a part of domain sequence.



Deployment Scenario

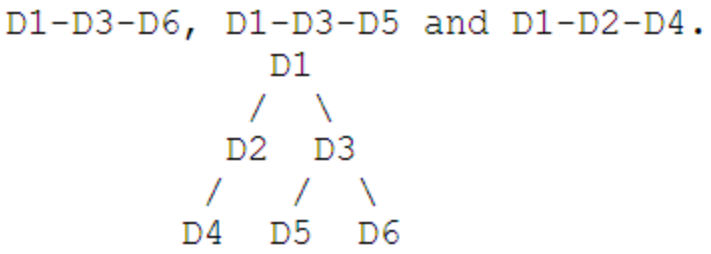
PCE serving multiple domains

A single PCE maybe responsible for multiple domains [ABR].

Domain sequence should have no impact on this. PCE which can support 2 adjacent domains can internally handle this situation without any impact on the neighboring domains.

P2MP

In case of P2MP the path domain tree is nothing but a series of Domain-Seq

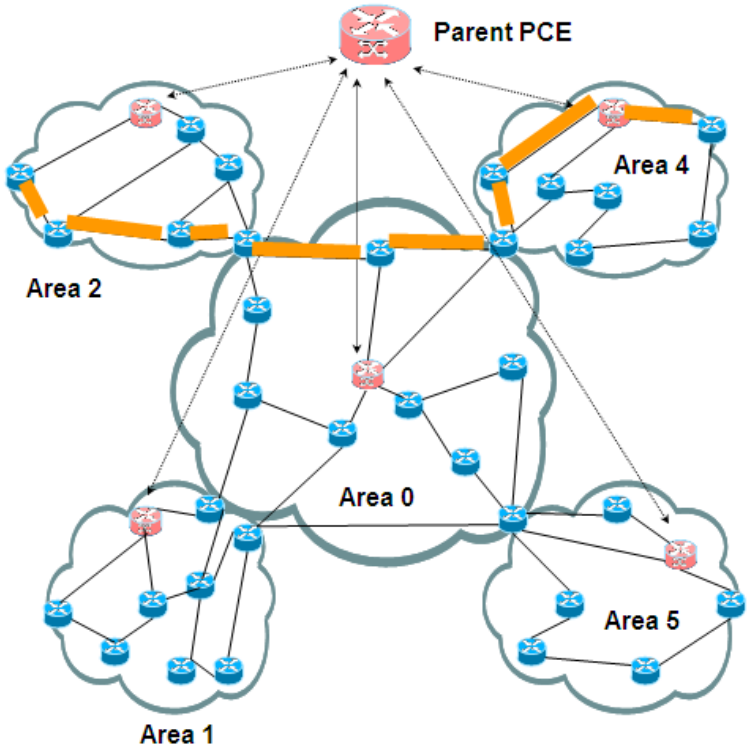


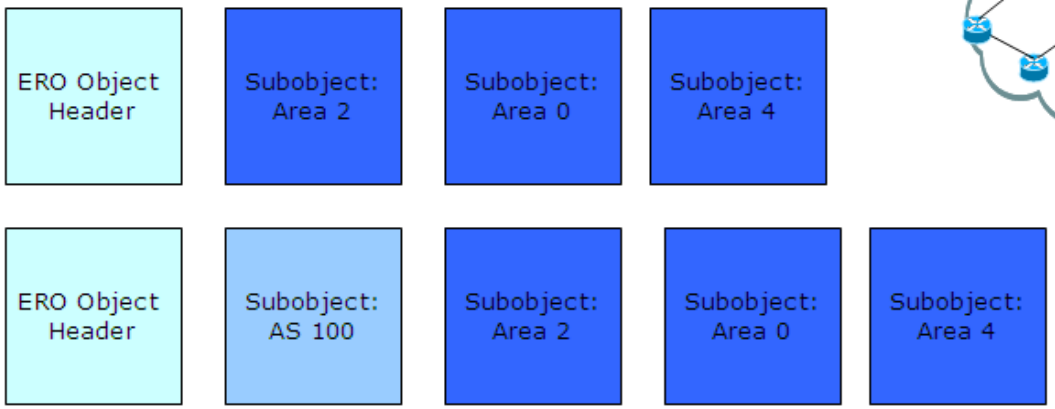
Deployment Scenario

HPCE

In HPCE implementation PCE (1) can request the parent PCE to determine the domain path and return in the PCRep in form of ERO.

The Subobject would be AS and Area (OSPF/ISIS).





Deployment Scenario

Domain Seq v/s PCE Sequence : Advantage of use Domain Seq

1) All PCE must be aware of all other PCEs in all domain for PCE-Sequence. There is no clear method for this. In domain-sequence PCE should be aware of the domains and not all the PCEs serving the domain. PCE needs to be aware of the neighboring PCEs as done by discovery protocols.

2) There maybe multiple PCE in a domain, the selection of PCE shouldn't be made at the PCC/PCE(1). This decision is made only at the neighboring PCE which is completely aware of states of PCE via notification messages.

3) Domain sequence would be compatible to P2P inter-domain BRPC method as described in RFC 5441.

Next Steps

- Any other deployment scenario.
- Analyze if multiple IGP configured on PCE, how it impacts domain-sequence.

Questions & Comments?

Thanks!