E-NNI registration protocol

Hayim Porat – Ethos Networks

Nurit Sprecher – NSN

Zehavit Alon - NSN

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Agenda

- Background
- Motivation
- Problem definition
- Suggested new standard

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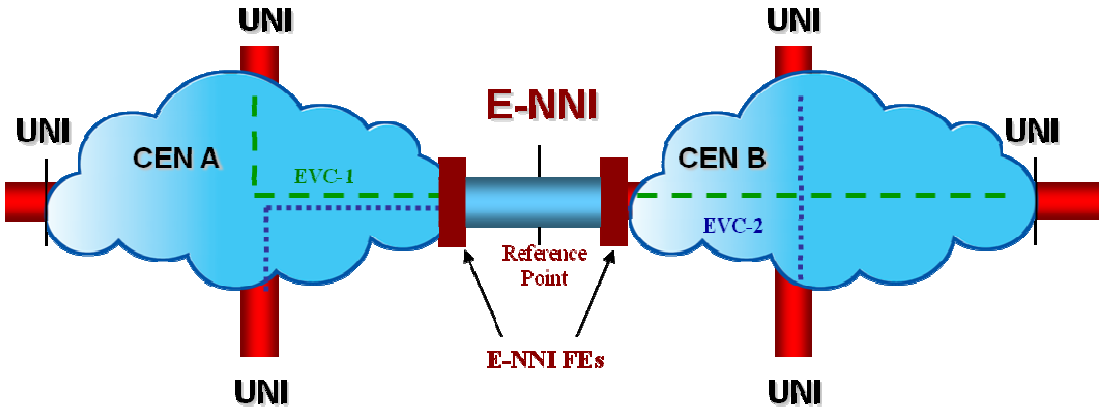
Background



- In order for two carriers (domains) to peer, there is a need for an external NNI.
- E-NNI is a reference point where two Service Providers meet in support of specified MEF Services.
- The E-NNI reference point is defined to exist between control domains

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Motivation

- Inter carrier (inter Domain) service provisioning automation is gaining place in carrier packet transport
- Ethos with NSN, BT,BGU & TKK are developing a solution for inter carrier Ethernet transport under the FP7 European research programs
- MEF had defined the E-NNI as a building block for inter carrier Ethernet transport (currently static and only S-VLAN)
- E-NNI registration must needs be supported at control plane in order to enable automatic /TE service provisioning

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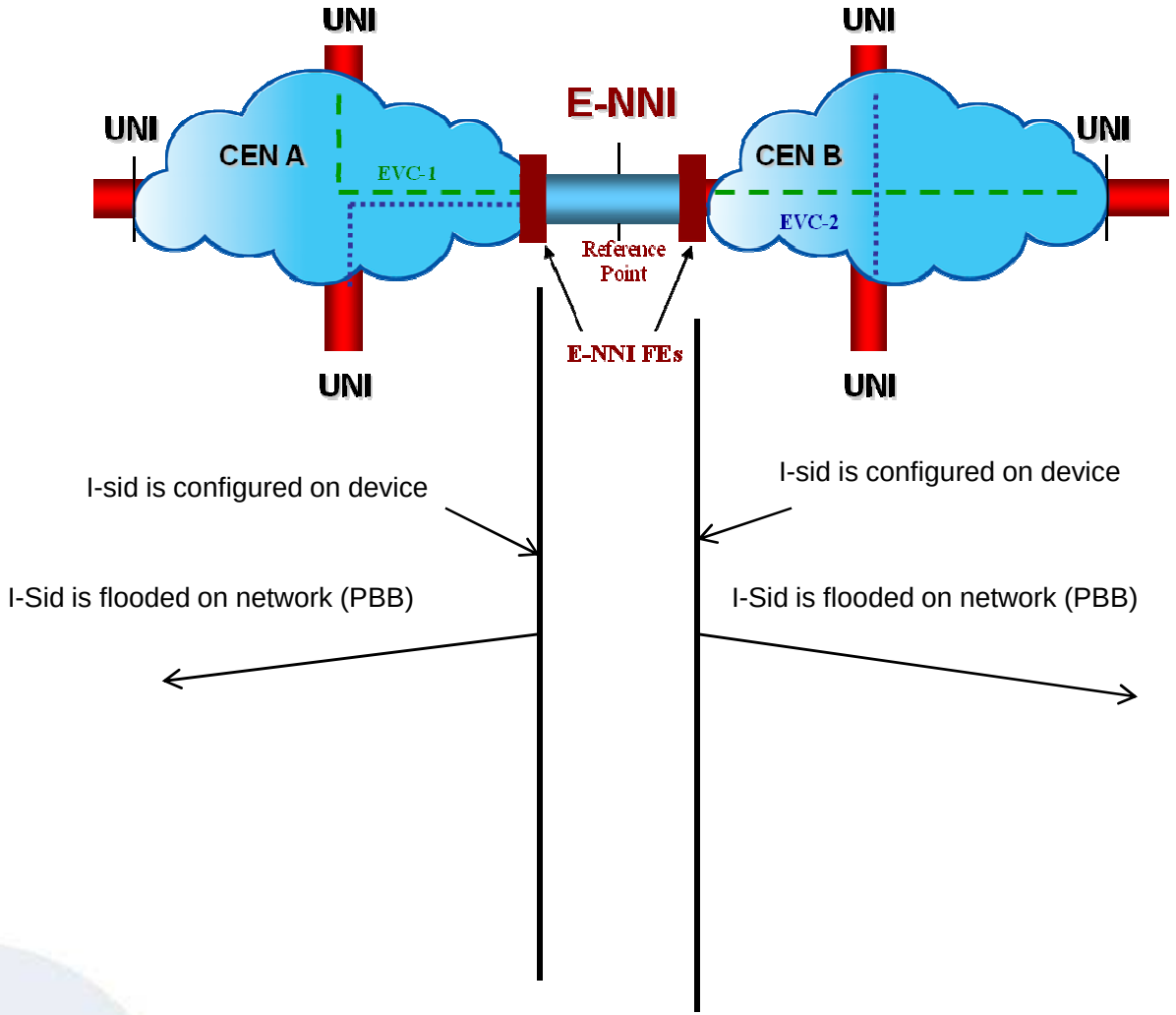
Current situation



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Problem definition

- PBB-TE does not supports PBBN peering
- There is I interface definition for PBB but registration of unknown I-tag on the peered E-NNI port is not defined
- In addition B-tag translation at E-NNI may be required to limit B-SA MAC learning between two domains
- PBB-TE must rely on external agent to be configured. The inter-carrier case raises problems with:
  - NMS connectivity between two carriers
  - Authority over ports configurations
  - Configuration synchronization

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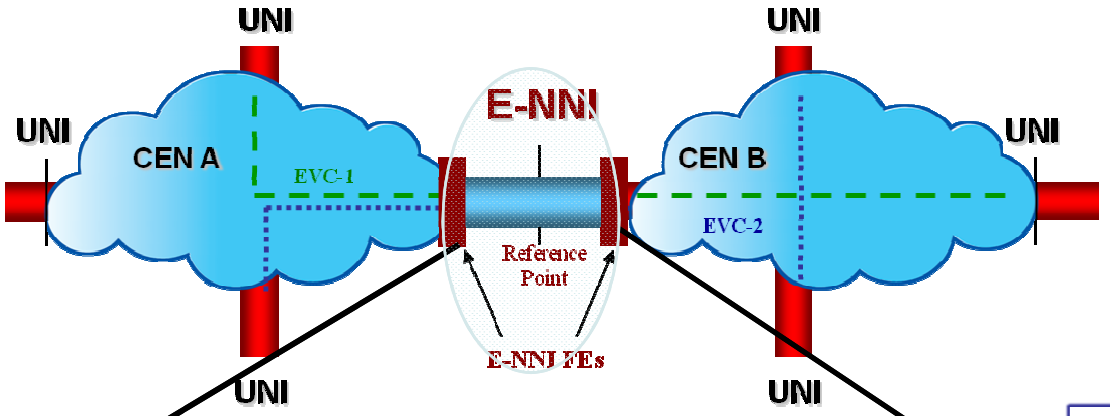
Suggested solution



Independent PBB / PB domain

Advertize capabilities

Advertize capabilities

I-sid is configured on device

Advertize new configuration with I-sid'

Invoke external agent

Get authorization and configuration

Confirm configuration

I-sid is flooded on network (PBB)

I-sid'' is flooded on network (PBB)

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Suggested solution

- Add multi domain and E-NNI interface definitions to PBB-TE
- Add to E-NNI functionality the following capabilities:
  - Discovery and advertizing of E-NNI functionality and configuration
  - Automatic I tag (S-VLAN) registration / stitching/ translation mechanisms within the data plane. (extend I/S interface functionality to include B-TAG) by invoking external agent for unknown I-tag at E-NNI
  - Optionally add B-SA translation at E-NNI to limit scope of B-SA MAC

Inter carrier provisioning

Technical background

Based on the ETNA project that is funded by the FP7

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Inter Domain Transport Network

- Inter Domain Transport Network is an architecture for automatic inter domain provisioning of transport services
- ETNA emphasizes and analyses the case of Inter Carrier, i.e. different domains operated by different carriers
- The goal was proposing efficient and low cost pan-European and even world wide transport services
- Automatic inter carrier provisioning will shorten the provisioning period dramatically compare to today manual provisioning that lasts days or even weeks
- OPEX reduction is a significant goal of this architecture
- The ETNA Inter domain transport concept works for any domain technology like IEEE based transport (PBB, PBB-TE), MPLS, MPLS-TP etc., this concept considers the fact that the pan European transport is composed of several transport technologies operated by different carriers..

Business Aspects in Inter Carrier Transport

- Form the business perspective, WP2 analyzed the peering models, which were considered as the major architecture influencing element

- The peering models for inter carrier transport are:
  1. **Adjacent Peering:** In adjacent peering, carrier has business partnership only with its adjacent carriers
  2. **Alliance Peering:** In alliance peering, inter carrier service can be setup between carriers that are members in the alliance. The business partnership is between all the members (including carriers that are not adjacent)
  3. **Hybrid peering:** Hybrid peering is a combination between Adjacent Peering and Alliance Peering
  4. **Ethernet Exchange peering:** Similar to a VOIP peering point or an IP exchange, this would be a place where carrier networks intersect, and where Ethernet services could be handed off from one operator to another.
  5. **Neutral Exchange Peering:** the Neutral Exchange is a central market place for transport services, each carrier publishes its offers and prices in the exchange, and the retail provider can choose and buy the appropriate services

Security Aspects in Inter Carrier Transport

- Inter Carrier Transport has security challenges
  - **Customer-Provider**
    - The initiator side: the customer access the provider portal via secured access like TSL (Transport Layer Security) , SSL (Secure Socket Layer), IPSec. ETNA does not have specific requirements
    - The destination side: the destination side generates a certificate to approve the call, ETNA describes the certificate generation in the set up process
  - **Template Exchange**
    - The providers use secured DCN network with optionally IPSec
  - **Signaling process**
    - Inter carrier signaling requires authentication of the initiator (who should pay for the service)
    - This issue is also discussed regarding to Inter-Domain MPLS and GMPLS, There is work starting in the IETF to define improved authentication including automated key management for RSVP. The outcome can be used also for Inter Carrier Transport

End-to-end Ethernet Transport overview

- End-to-End Ethernet based transport network architecture by the combination of Ethernet-based domain and Inter Domain Transport
- The main objectives of the Ethernet-based domain are:
  - Large scale Ethernet Domain
  - Compatibility by keeping the host interface as well as the entire MAC concept unchanged
  - Supports additional bridging functions:
    - Device and transport mobility
    - Manageability
    - Traffic engineering
    - QoS
    - Protection
    - Efficient forwarding and routing mechanisms

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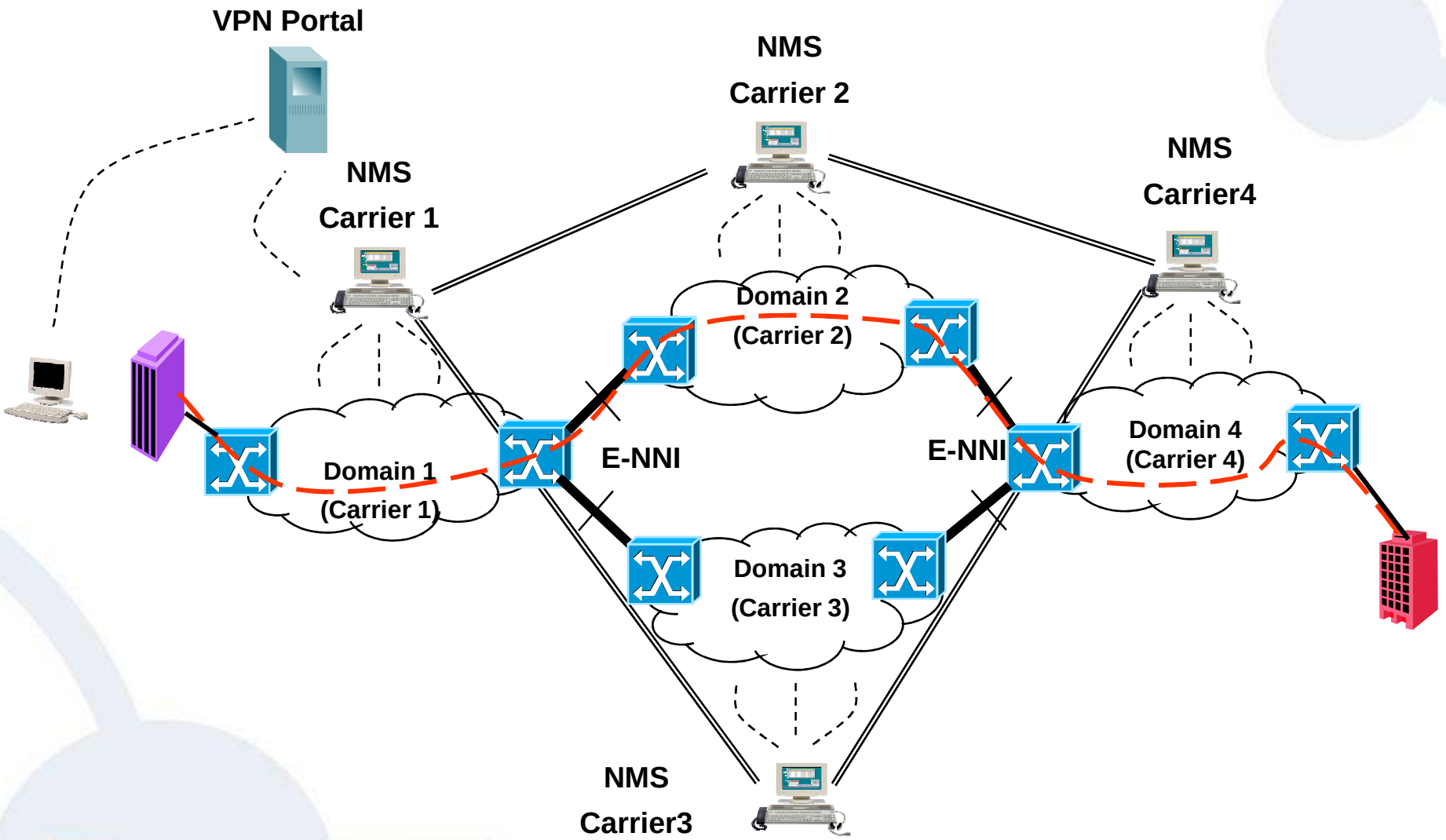
Inter Domain Transport Network Diagram



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Inter Domain Transport Architecture Planes

Management Plane

- Inter Domain Topology discovery (How the domains are connected each other)
- Template publishing (i.e. service offering)
- Calculating the Domain Chain according to the templates (Domain Chain describes the reachability to the far end network provider)

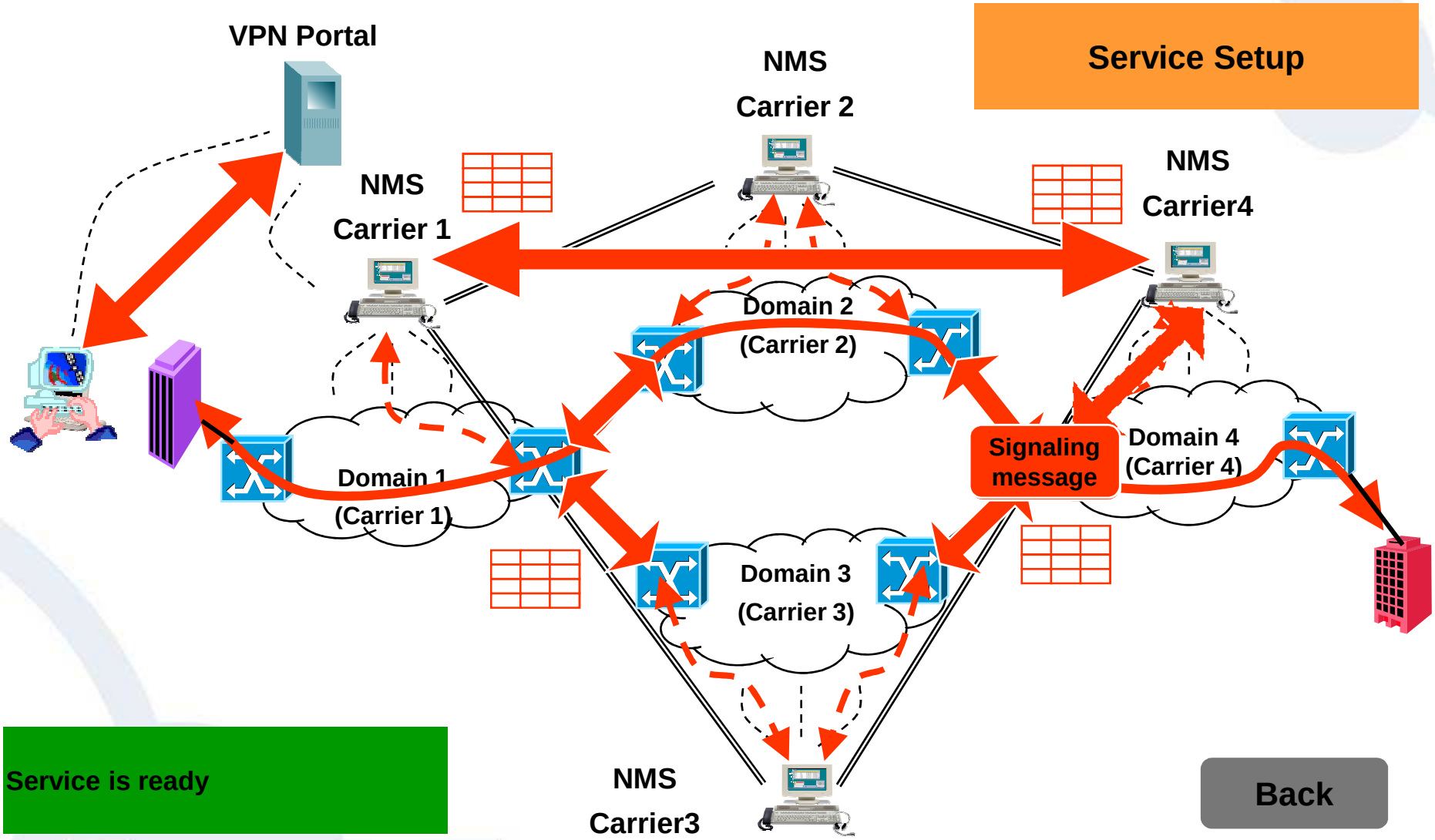
Control Plane

- Neighbor discovery (by ETNA E-NNI control protocol)
- Path setup/teardown by inter domain and intra domain signaling
- OAM

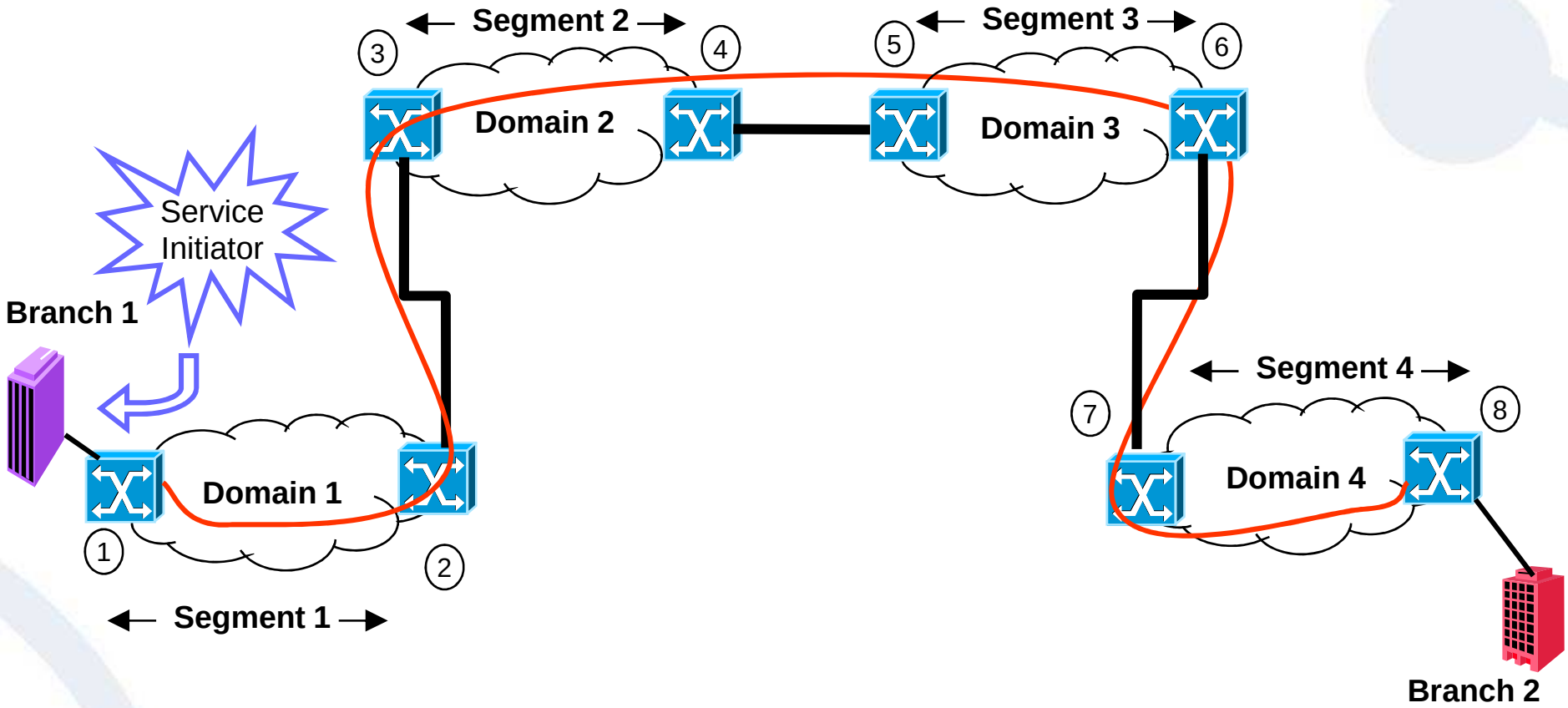
Data Plane

- Inter domain data exchange over E-NNI (with ETNA extensions)
- Intra domain: according to the domain technology

Inter Carrier Transport Process
Overview Animation



Adjacent /Alliance Peering



Note: **Each domain operated by different carrier**

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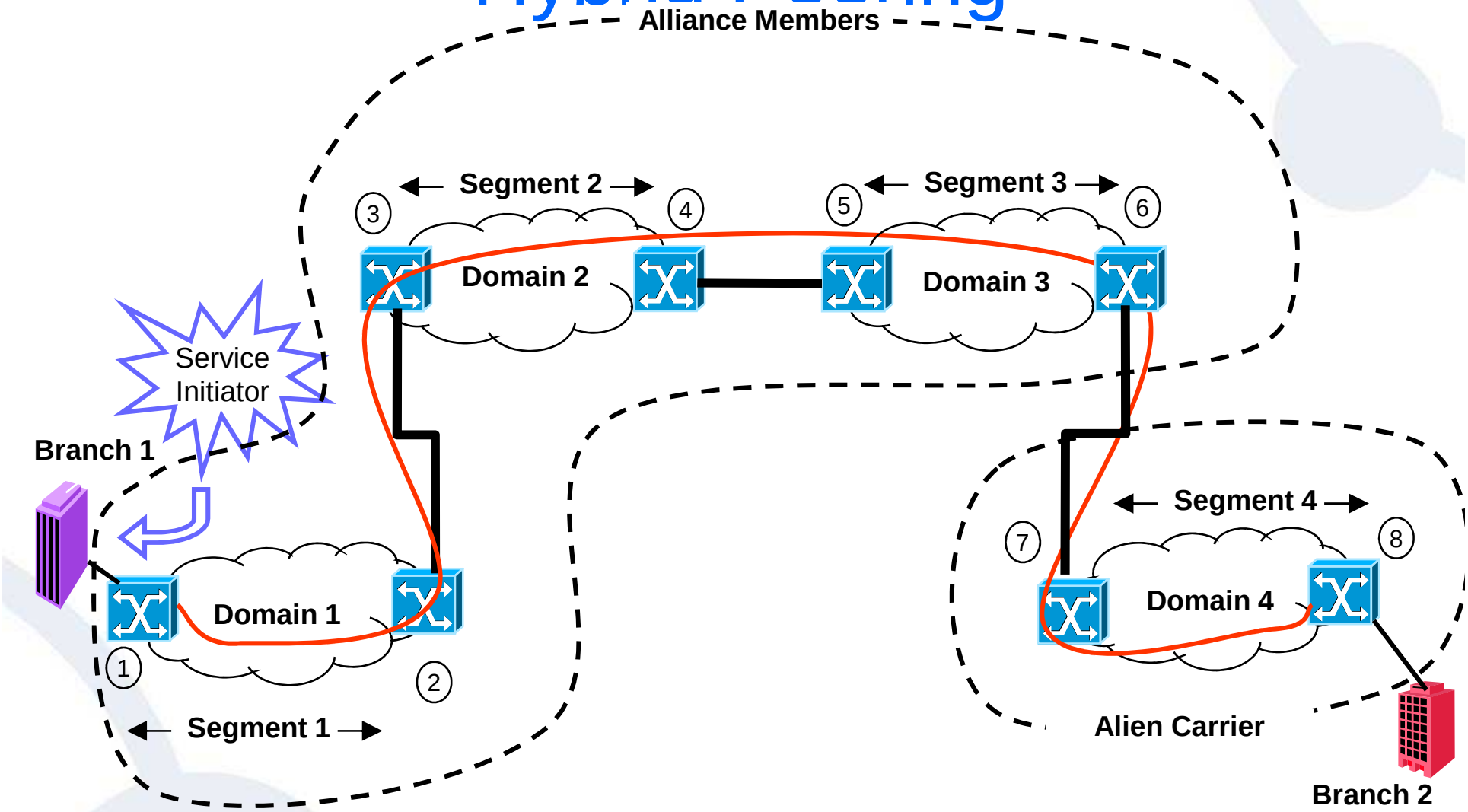
Hybrid Peering



Note: **Each domain operated by different carrier**

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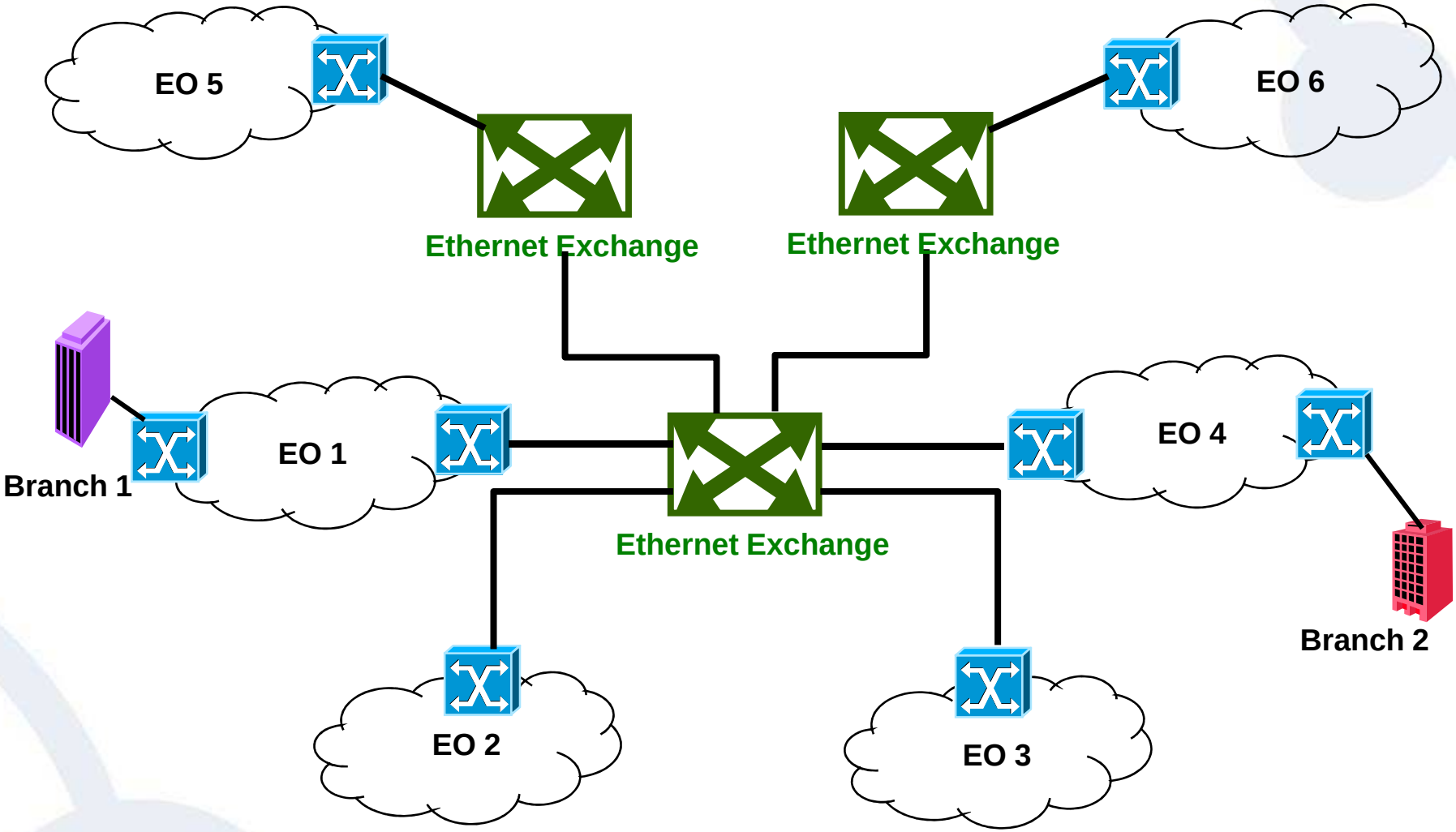
Ethernet Exchange



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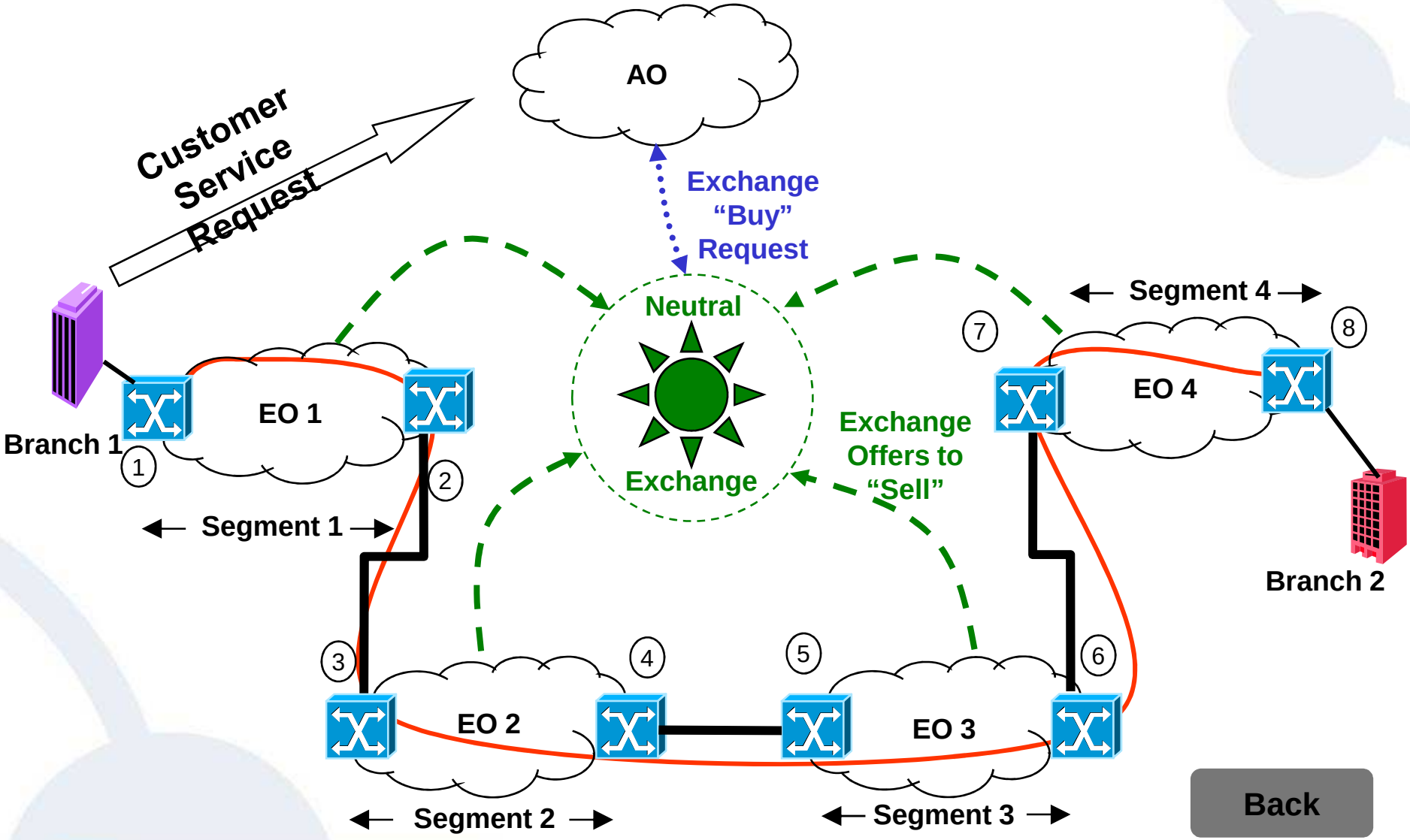
Neutral Exchange Peering



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