Layer-3 Accessible EVPN Services

[draft-wang-bess-l3-accessible-evpn]

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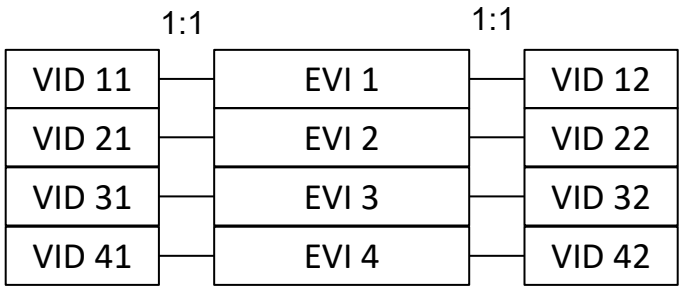
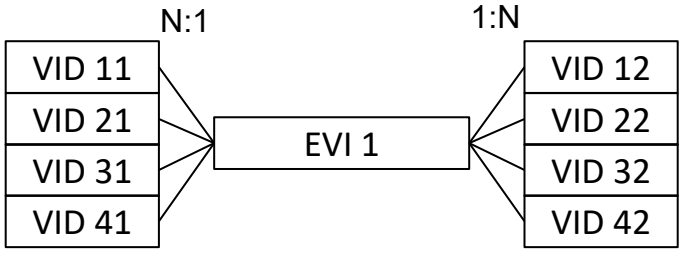
- Proposed Solutions
- Gap Analysis among L3 accessible EVPN with EVPN, EVPN-VPWS and EVPN-ETree.
- Further Action

Layer-2 Accessible Interfaces for EVPN Service



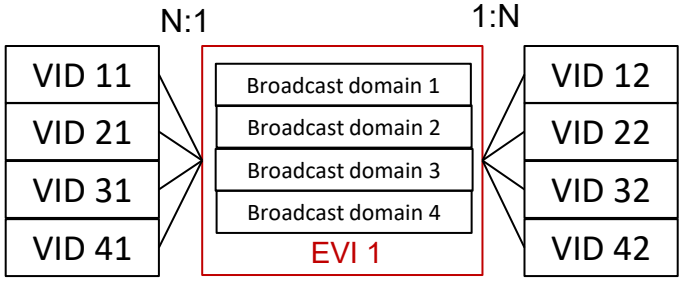
VLAN-Based Service Interface

- 1:1 mapping between VID and EVI
- Each EVI has a single broadcast domain



VLAN-Bundle Service Interface

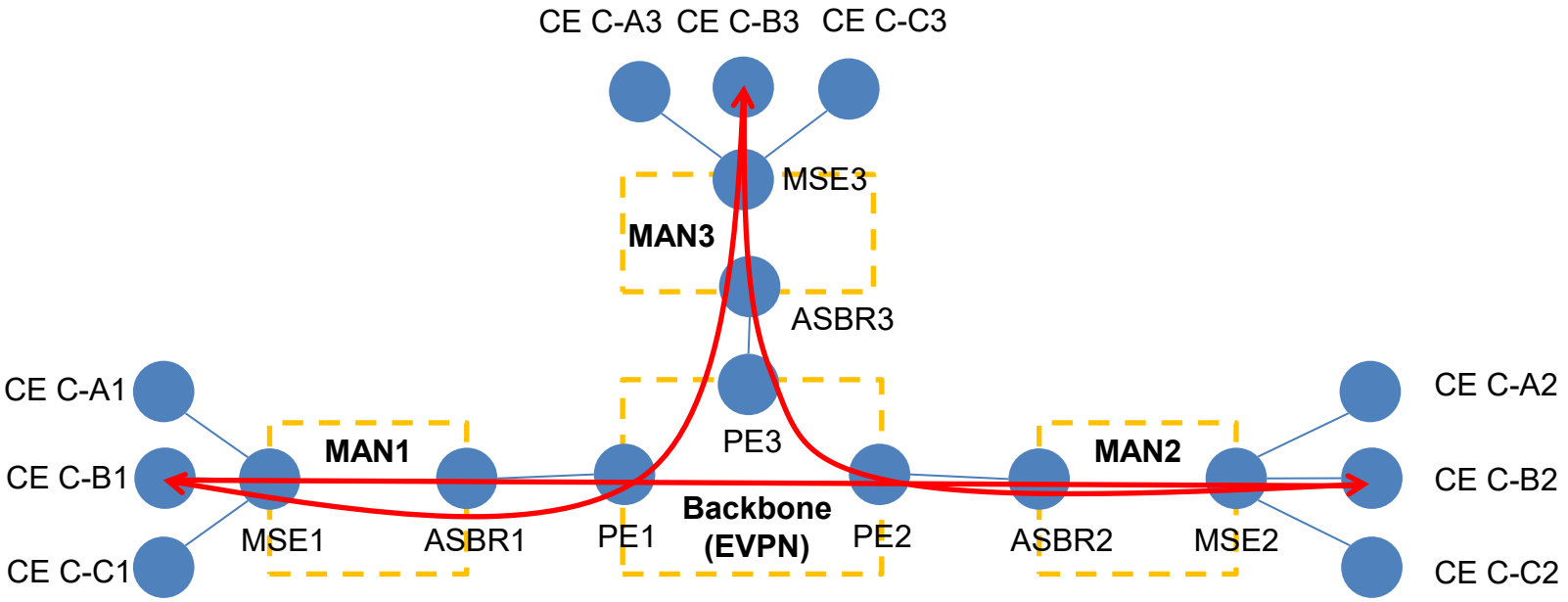
- N:1 mapping between VID and EVI
- Each EVI has a single broadcast domain
- MAC address MUST be unique



VLAN-Aware Bundle Service Interface

- N:1 mapping between VID and EVI
- Each EVI has multiple broadcast domains
- MAC address can overlap
- 1:1 mapping between VID and Broadcast domain

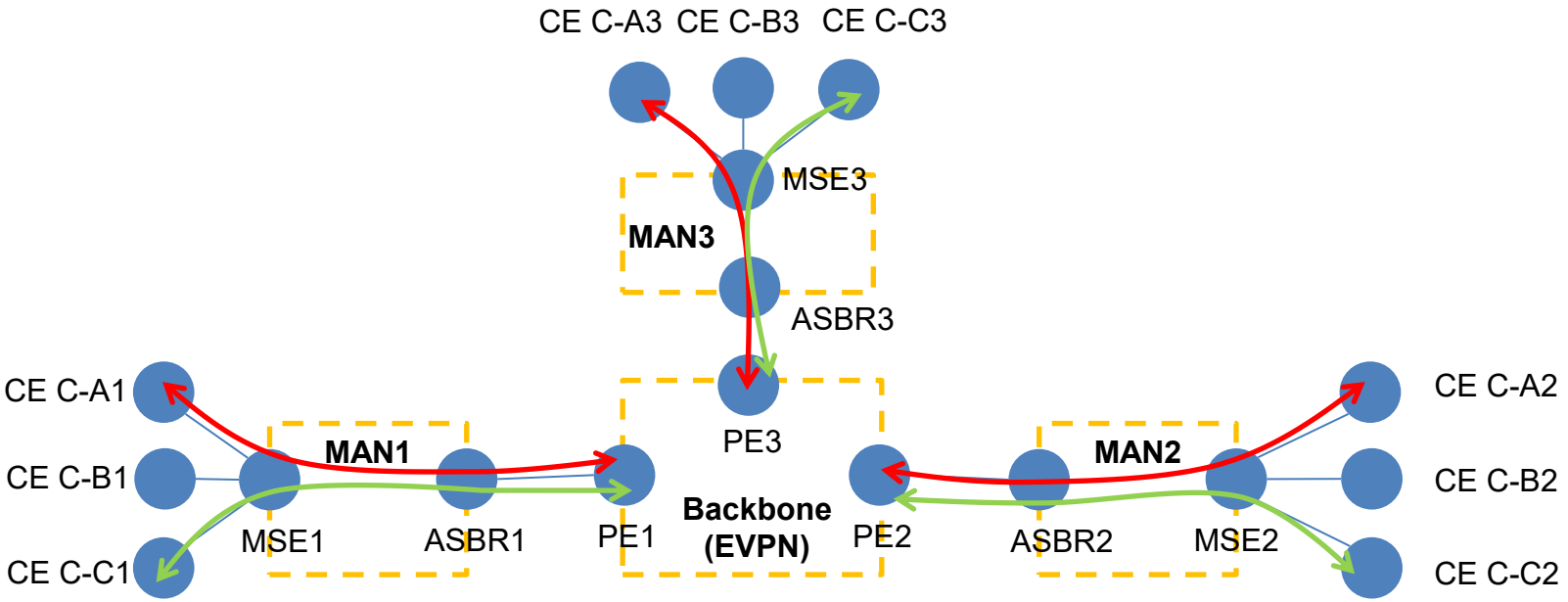
Requirements for Layer-3 Accessible EVPN Service



- Backbone is EVPN domain, and MAN1-3 are Layer-3 network.
- Customer C has different branches that located in sites under different MANs(Metro Area Network).
- Customer C buys the EVPN service within the backbone from the service provider.
- Customer C wants its branches in different sites(C-A1/C-A2/C-A3) communicates in layer 2 mode, and keep the traffic isolation among different branches(C-A, C-B, C-C).

- If MAN is a layer-2 network, we can utilize the Layer-2 accessible EVPN service
- Currently, MAN is a layer-3 network, and there is no user's VLAN information that can be used to isolate the traffic of its different divisions. We must find other ways to meet the customer's requirements.

Solution for Layer-3 Accessible EVPN Service



- We connect the sites under the MAN to the Backbone EVPN, via one pseudo wire(for example, VxLAN) to transport the Ethernet frame to the PE of the Backbone EVPN.
- The identification of pseudo wire(LSI, Logical Session Identifier) can be used to differentiate the traffic from customer's different branches.
- This scenario may involve the following situations:
  - point-to-point communication (e.g. the communication between C-A1 and C-A2.)
  - point-to-multipoint communication (e.g. C-A1 needs to communicate with both C-A2 and C-A3 simultaneously.)
  - multipoint-to-multipoint communication (e.g. mutual communication among the three C-As in the Figure.)

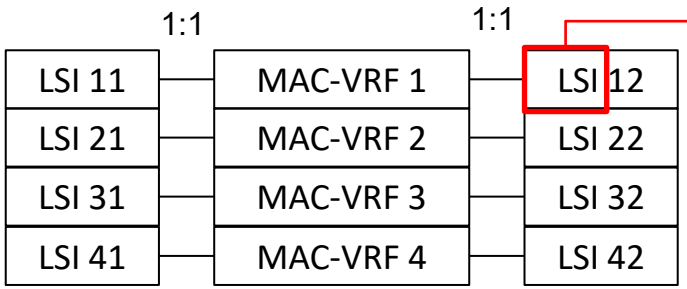
Gap analysis

- **L3 Accessible EVPN vs EVPN**
  - L3 Accessible EVPN is designed for scenarios where **CE-PE needs to cross a Layer-3 network**.
  - EVPN is designed for scenarios where customers directly access the provider's PE **through Layer-2 links**.

- **L3 Accessible EVPN vs EVPN-VPWS**
  - EVPN-VPWS provides **point-to-point** Layer-2 dedicated line connections by advertising Ethernet A-D routes through BGP, without handling traffic isolation for multiple customers on the same PE.
  - L3 Accessible EVPN focuses on traffic isolation for **multipoint-to-multipoint** customers accessing the same PE through a Layer-3 network, achieving logical isolation of different customers' Layer-2 traffic via LSI/MAC-VRF mapping.

- **L3 Accessible EVPN vs EVPN-Etree**
  - EVPN-ETree supports **point-to-multipoint** tree-shaped topologies, optimizing traffic forwarding to reduce duplicate traffic.
  - L3 Accessible EVPN aims at isolating traffic for **multipoint-to-multipoint** connections in Layer-3 network, dividing logical planes through LSI and MAC-VRF mapping to prevent intercommunication of different customers' traffic.

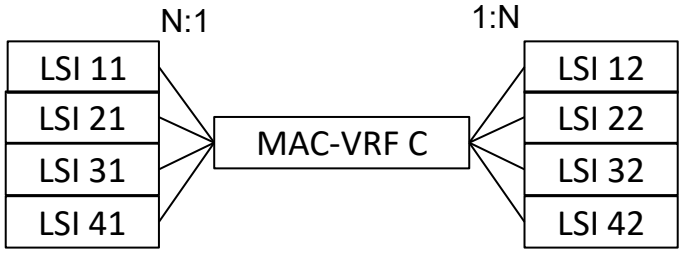
Layer-3 Accessible Interfaces for EVPN Services



LSI-Based Service Interface

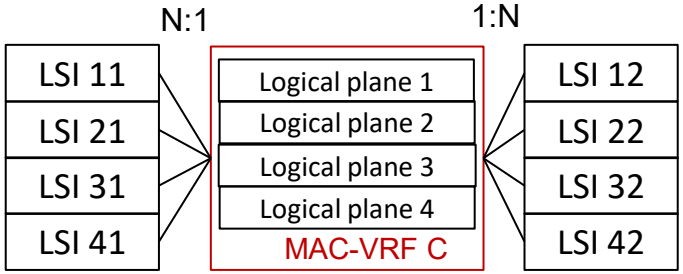
LSI: Logical Session Identifier, for example VNI.

- 1:1 mapping between LSI and MAC-VRF
- Each MAC-VRF has a single broadcast domain



LSI-Bundle Service Interface

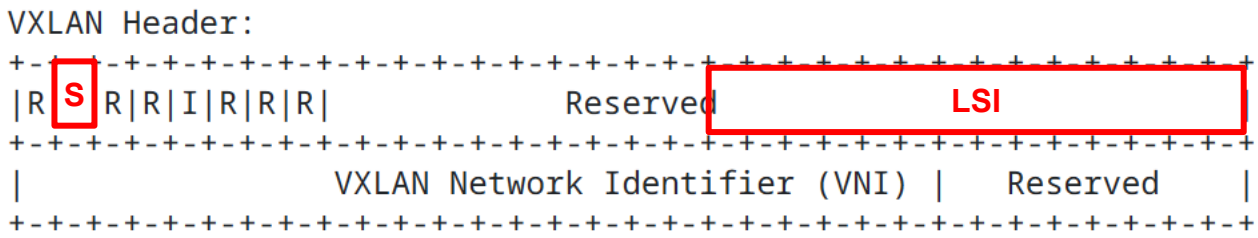
- N:1 mapping between LSI and MAC-VRF
- Each MAC-VRF has a single broadcast domain
- MAC address MUST be unique



LSI-Aware Bundle Service Interface

- N:1 mapping between LSI and MAC-VRF
- Each MAC-VRF has multiple broadcast domain
- MAC address can overlap
- 1:1 mapping between LSI and broadcast domain

Forwarding Plane Extension for LSI-Aware Bundle Service



The extensions to VxLAN header(Based on RFC 7348)

- For LSI-Aware Bundle Service, if the customer want to differentiate the traffic from its different branches, there should be indicator(LSI) within the VxLAN header.
- We define one flag “S” from the reserved bits of the current VxLAN header, to indicate the last 16 bits of first 4-bytes indicates the value of “LSI”.

Control Plane Extensions for LSI-Aware Bundle Service

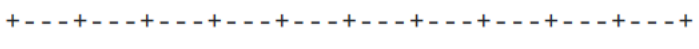


Figure 5: The format of new ESI type

Where:

* T (1 octet): specify the ESI Type. The recommended value is 0x06.

* CE Identifier (3 octets): the route ID/IPv4 address of CE.

* LSI (2 octets): the LSI information.

Control Plane Extensions for LSI-Aware Bundle Service

- We propose to define one new type of ESI(Ethernet Segment Identifier) to transfer the LSI information, that associated with the destination MAC address advertisements.

Further Action

- More comments are welcome.
- Request WG Adoption Call.

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