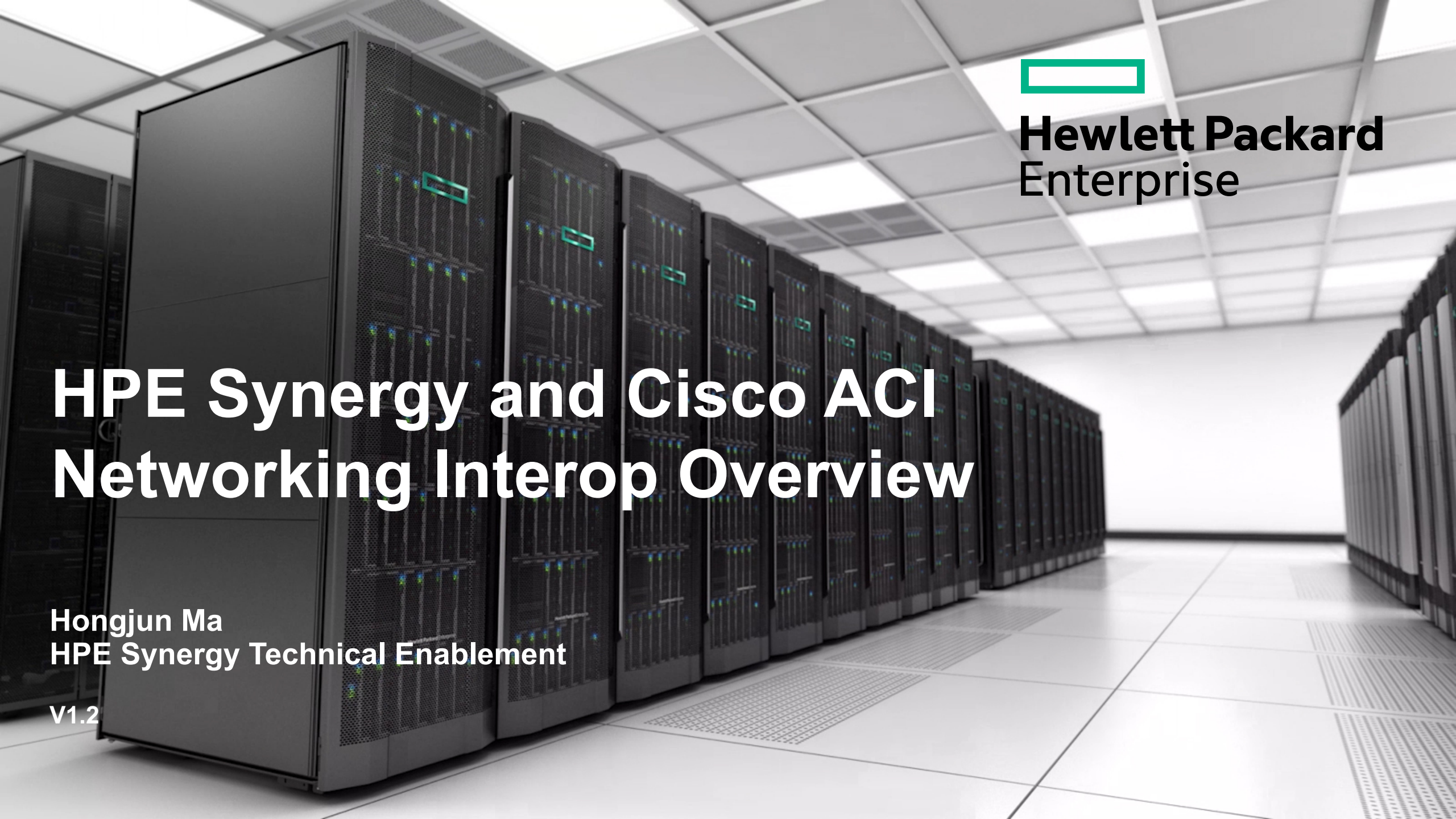

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HPE Synergy and Cisco ACI Networking Interop Overview

Hongjun Ma
HPE Synergy Technical Enablement

V1.2

Agenda

- Synergy Networking Overview
- Synergy Networking with Cisco ACI
- OneView 5.0 Synergy Networking Features

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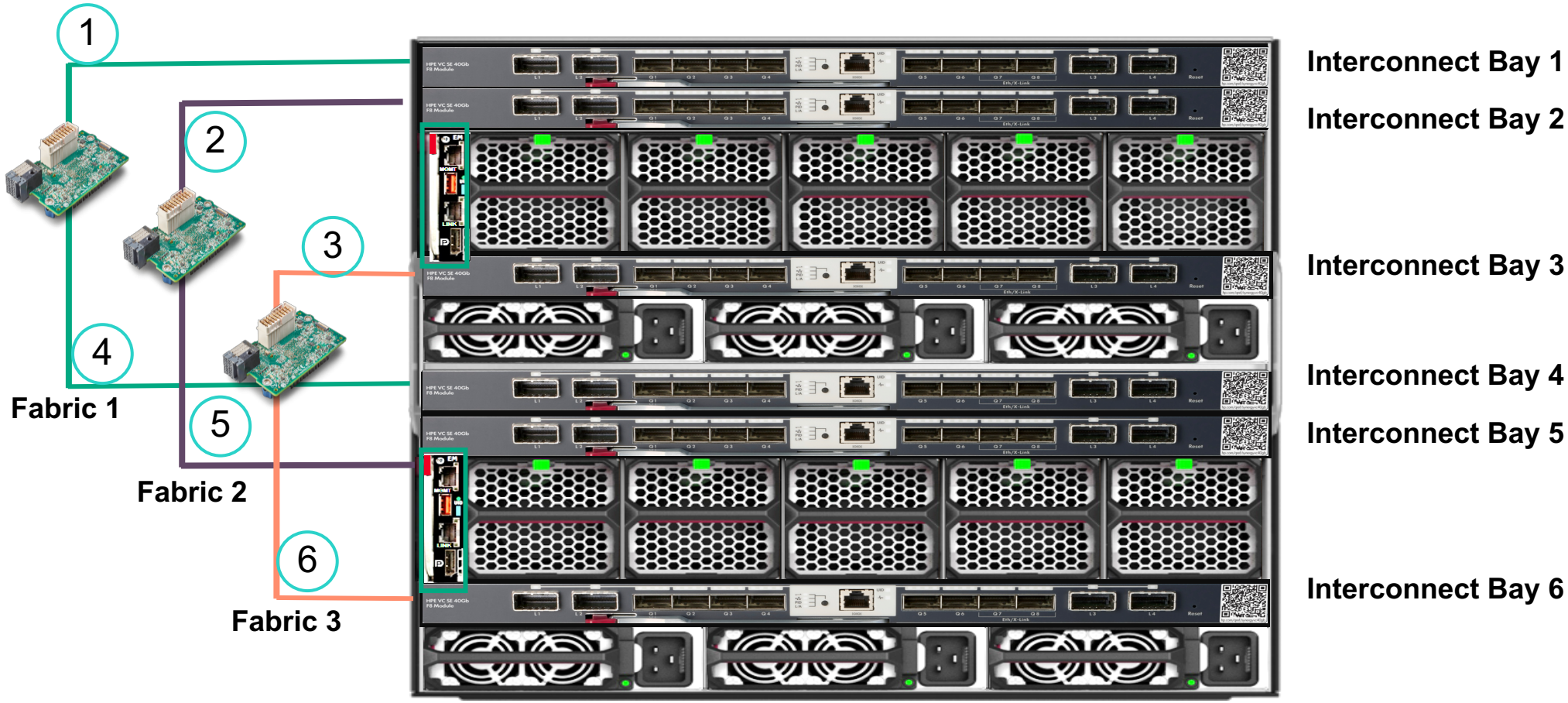
Synergy Networking Overview

Synergy Fabric Layout

Synergy supports three redundant fabrics



Rear view of Synergy frame

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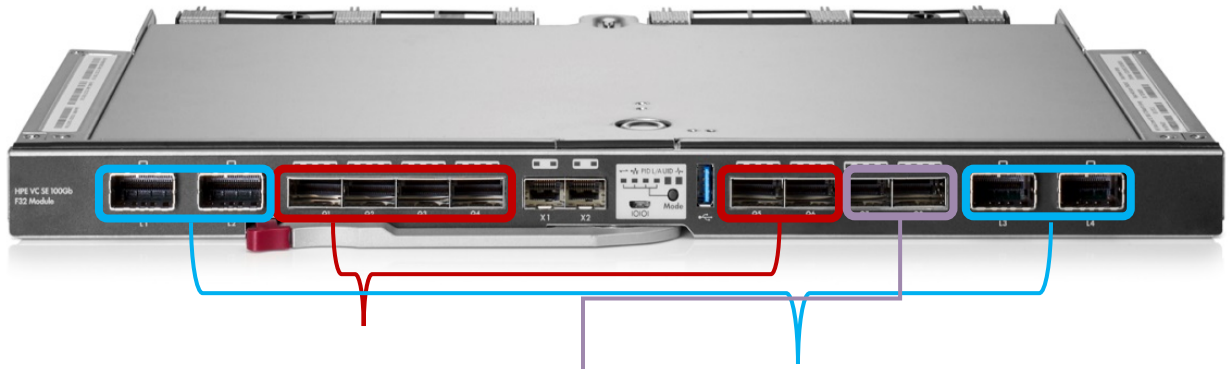
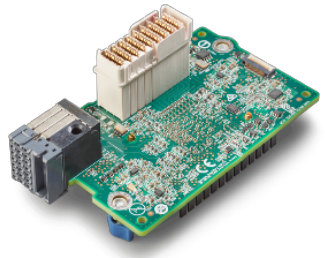
Synergy Virtual Connect SE 100Gb F32 Module

12x 25/50Gb to Internal Compute Modules

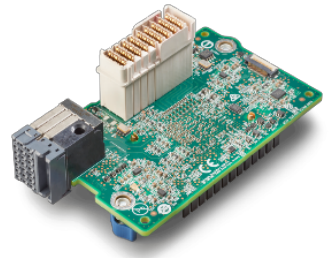


- **6x 100Gb uplink ports**
  - Q1-Q6: 100/40Gb, 4x 10Gb or 4x25Gb Eth/FCoE
  - 4x 8/16/32Gb FC
- **2x 100Gb cluster ports**
  - Q7-Q8: 100Gb ICM cluster ports
- **4x 300Gb Interconnect Link ports**
  - AOC ICM cables (3m, 7m and 15m)
  - DAC cables (1.1m, 1.6m and 2.1m)

- High performance, low latency
  - 6.40 Tbps switching capacity
  - 300 ns sec for port to port latency
- Converged and resilient fabrics
  - Ethernet, FCoE, FC, RDMA and iSCSI
  - M-LAG for resilient fabric
- Multi-frame composable
- Paired with full-featured currently shipping and new adapters



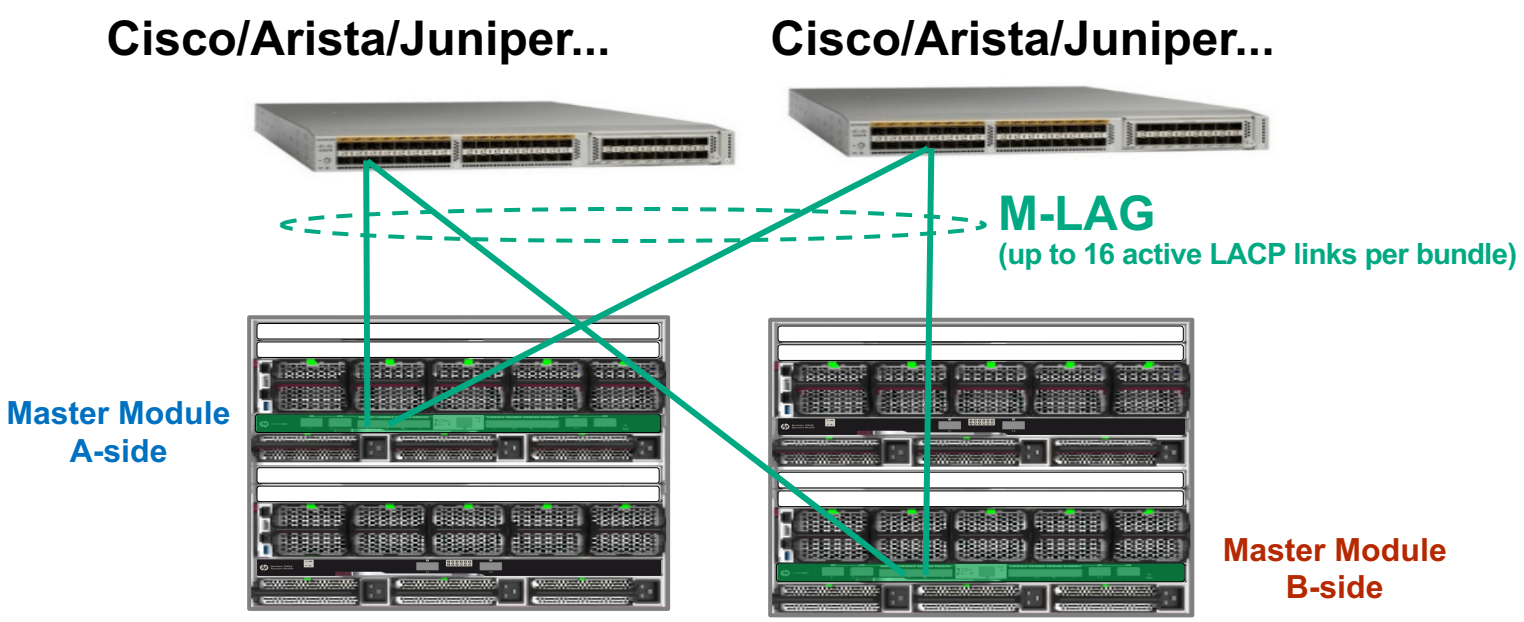
4820C @ 25 Gb/s



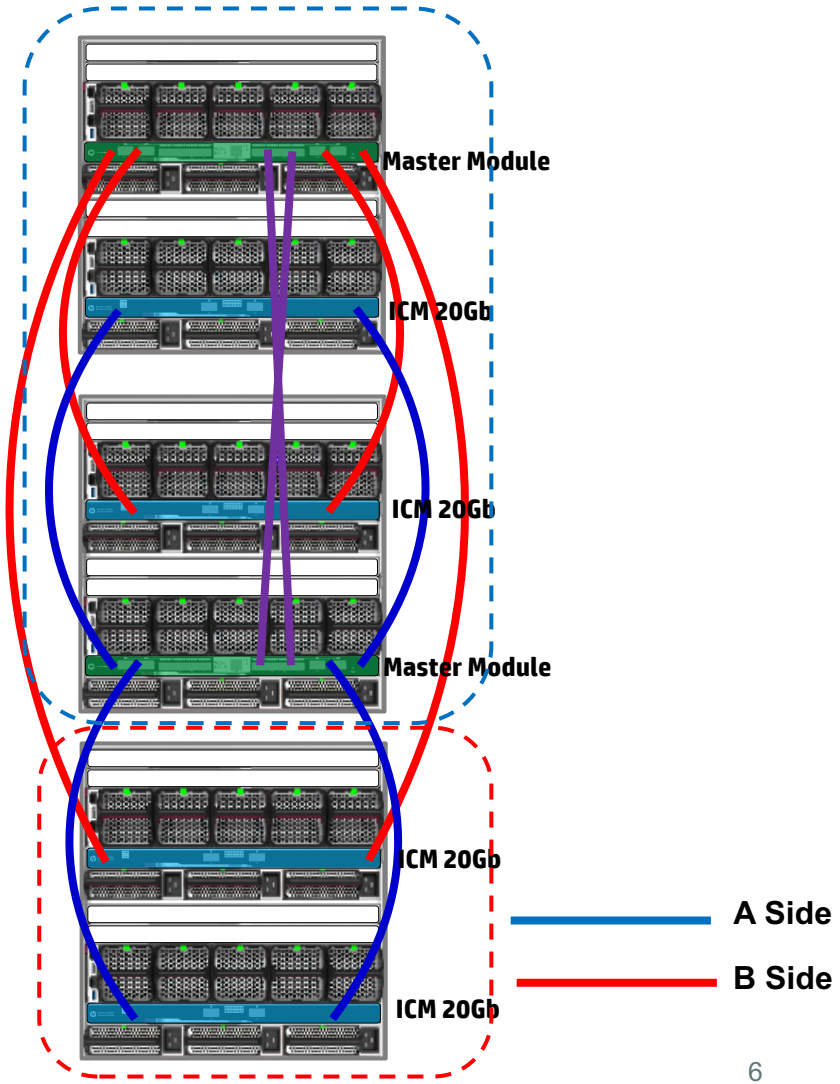
6820C @ 25/50 Gb/s

Multi-Module Link Aggregation For Resilient Fabric

Synergy Network Uplink Topology



Synergy Interconnect Topology Across Frames



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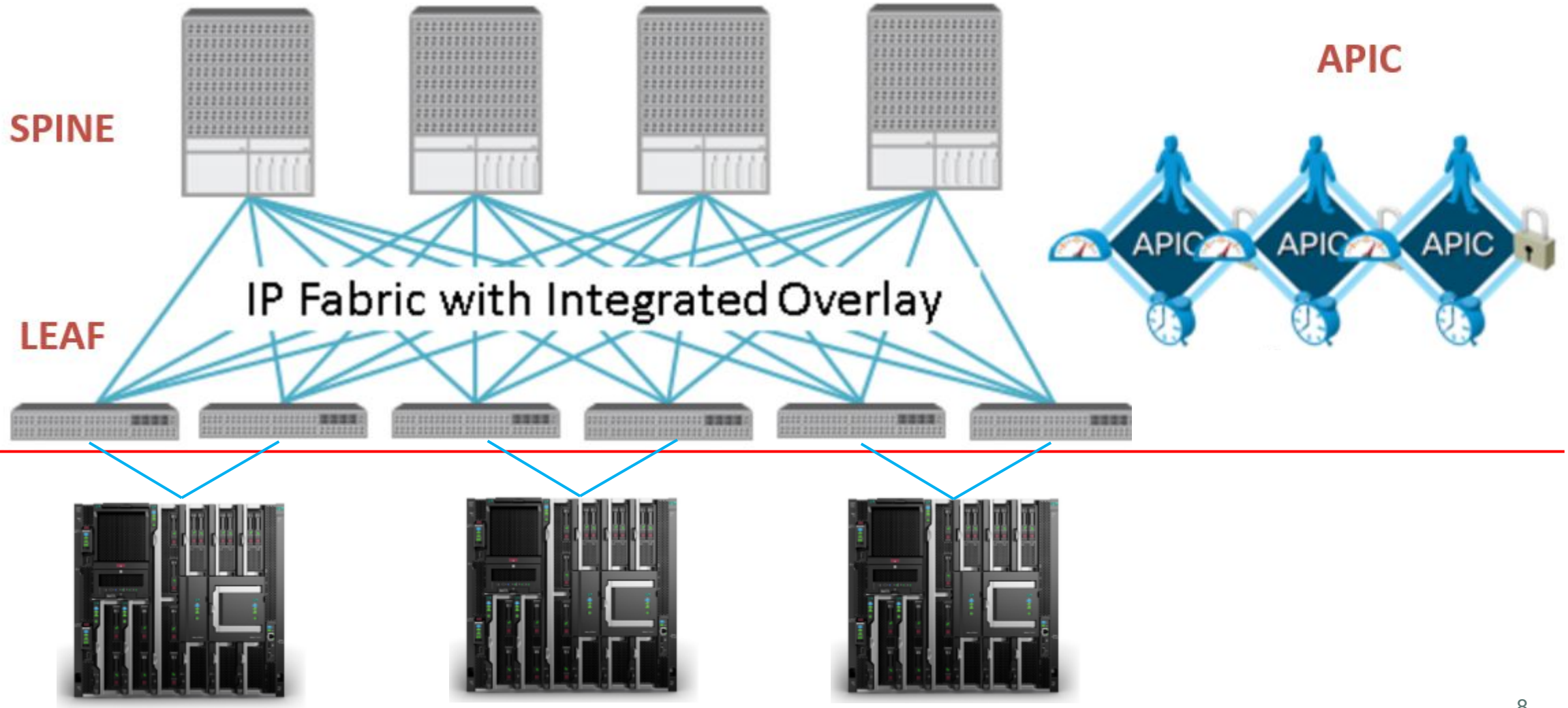
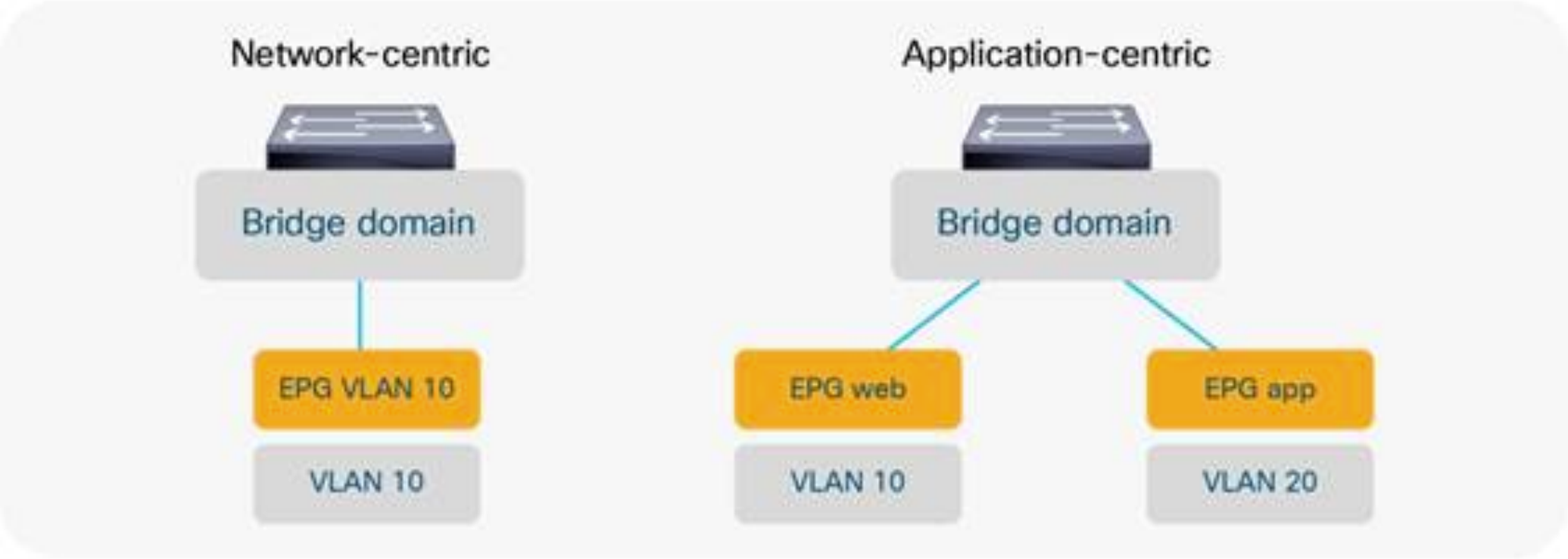
Synergy Networking with Cisco ACI

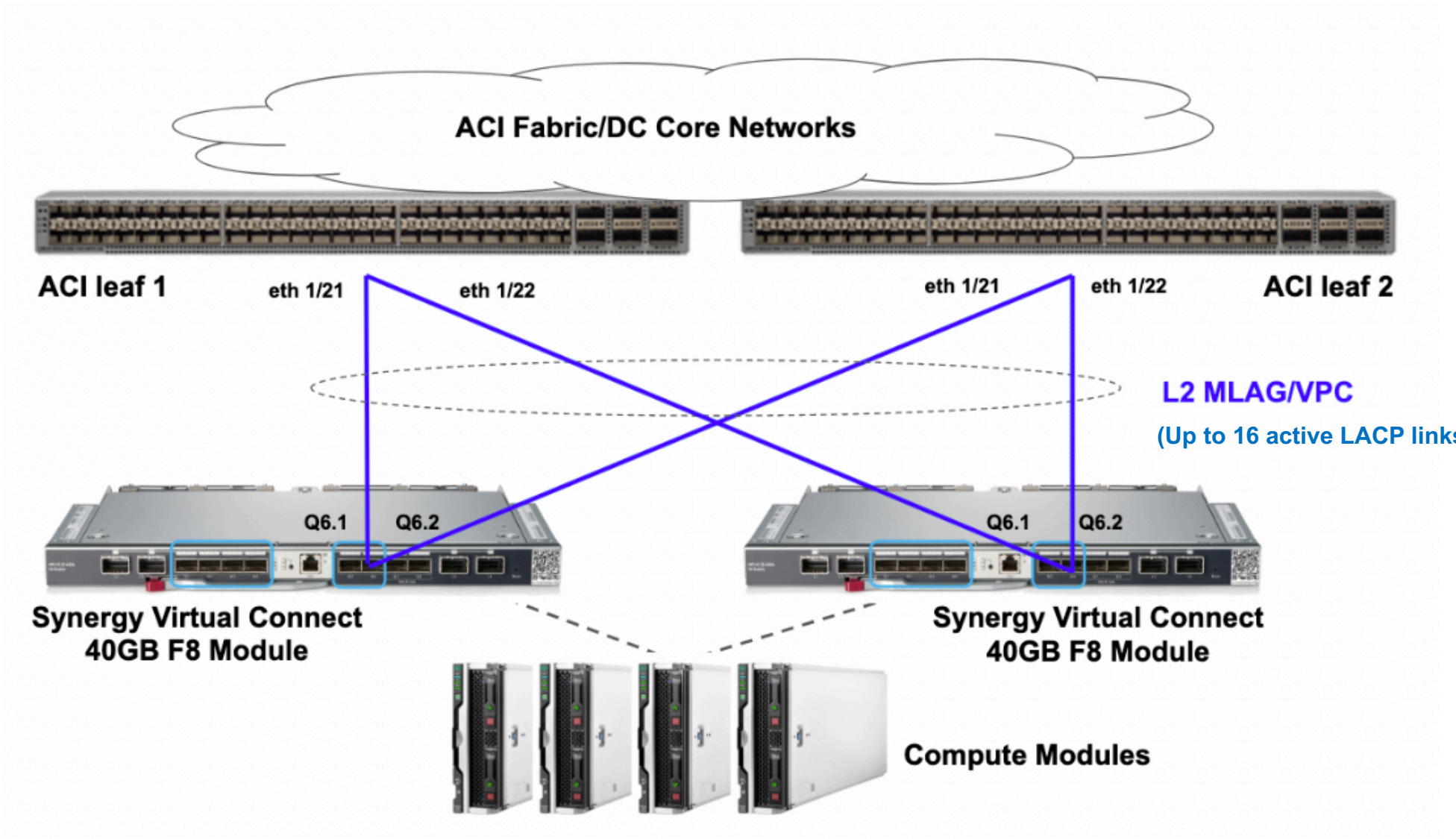
Cisco Application Centric Infrastructure



Cisco ACI Endpoint Connectivity



Synergy and Cisco ACI Sample Topology



Synergy Uplink Ports to Cisco ACI

6 x 100Gb QSFP28 uplink ports

Eth/FCOE: 100Gb, 40Gb, 4x25Gb or 4x10Gb

FC: 4x32/16/8Gb

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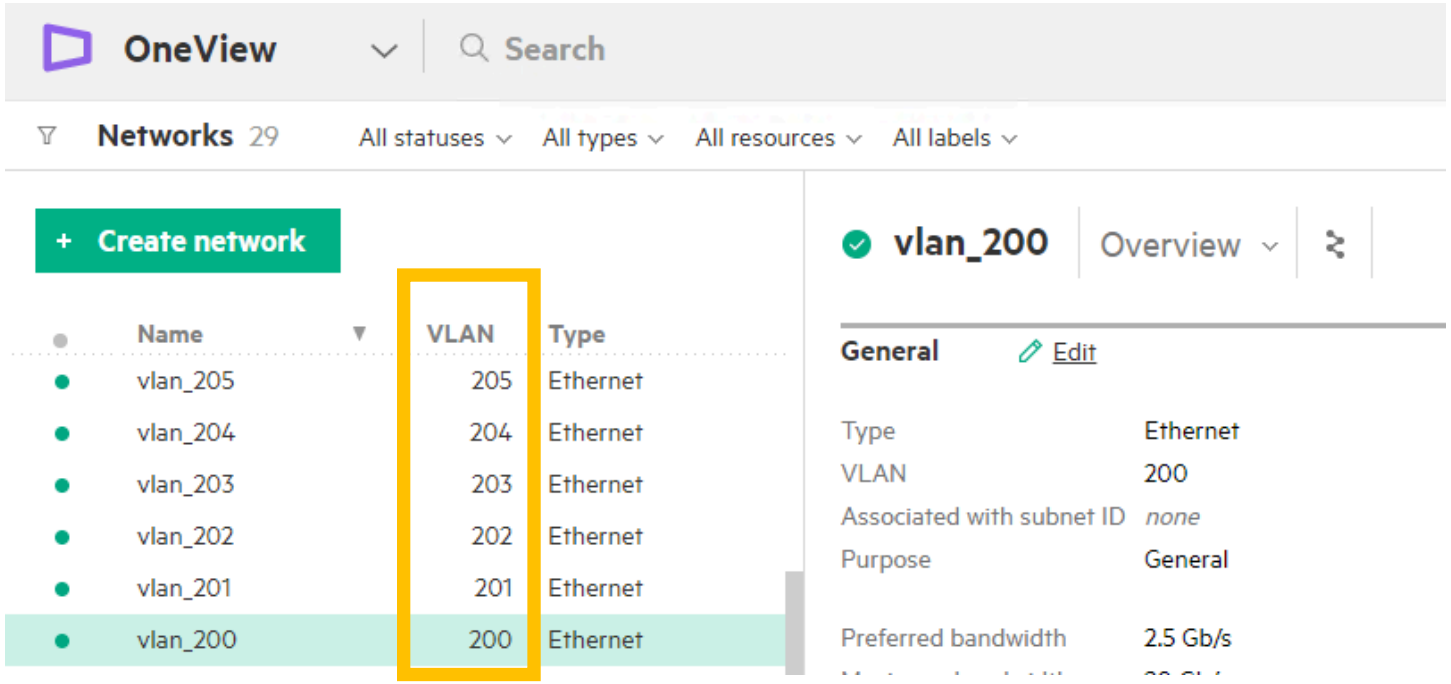
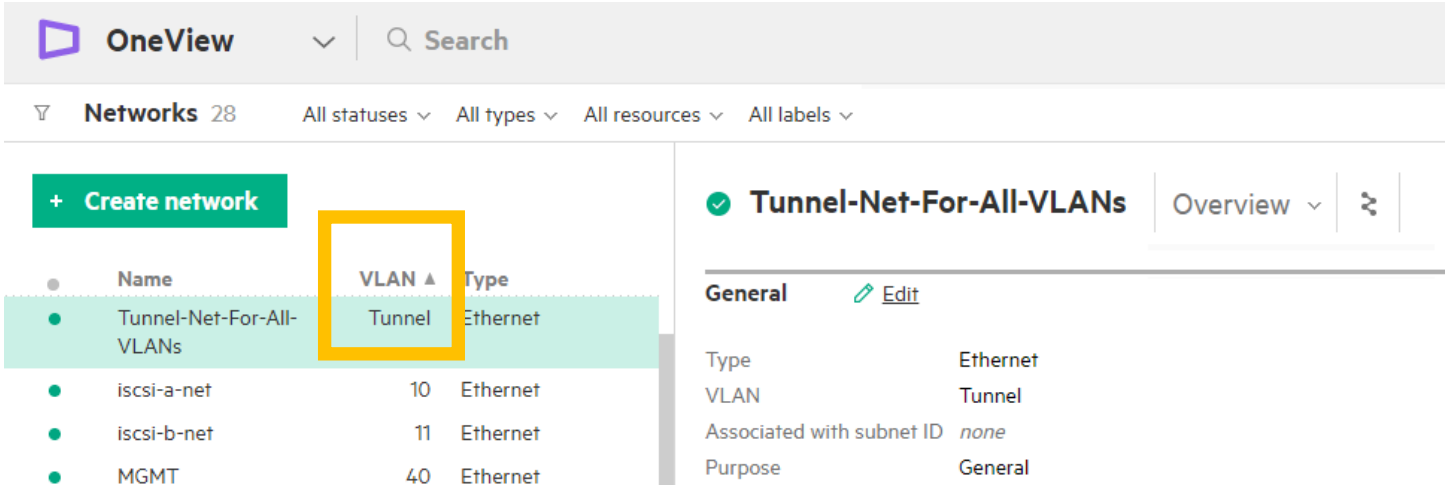
Synergy Network Configuration (Tagged or Tunnel)





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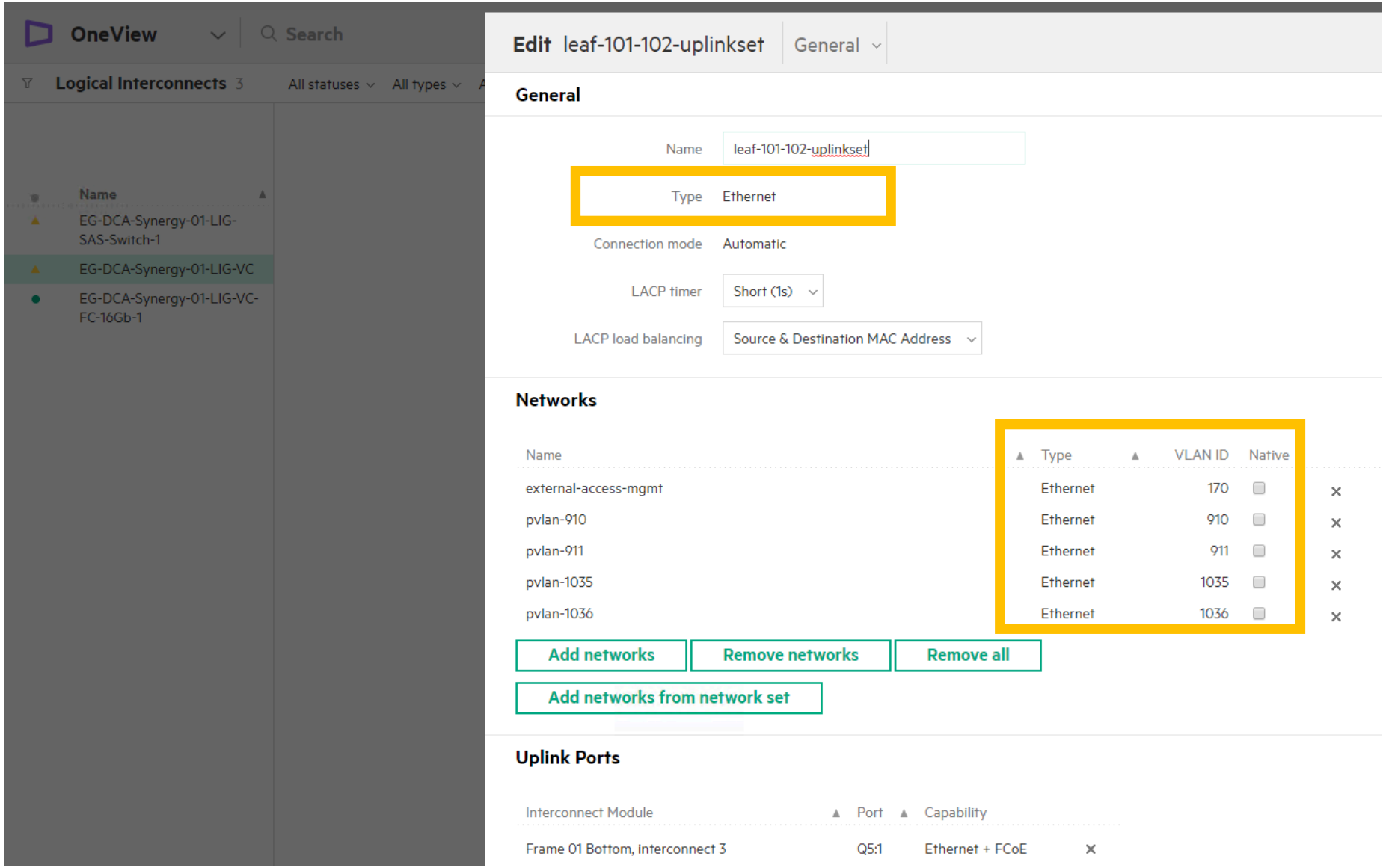
Synergy Uplink Configuration with Tagged Networks



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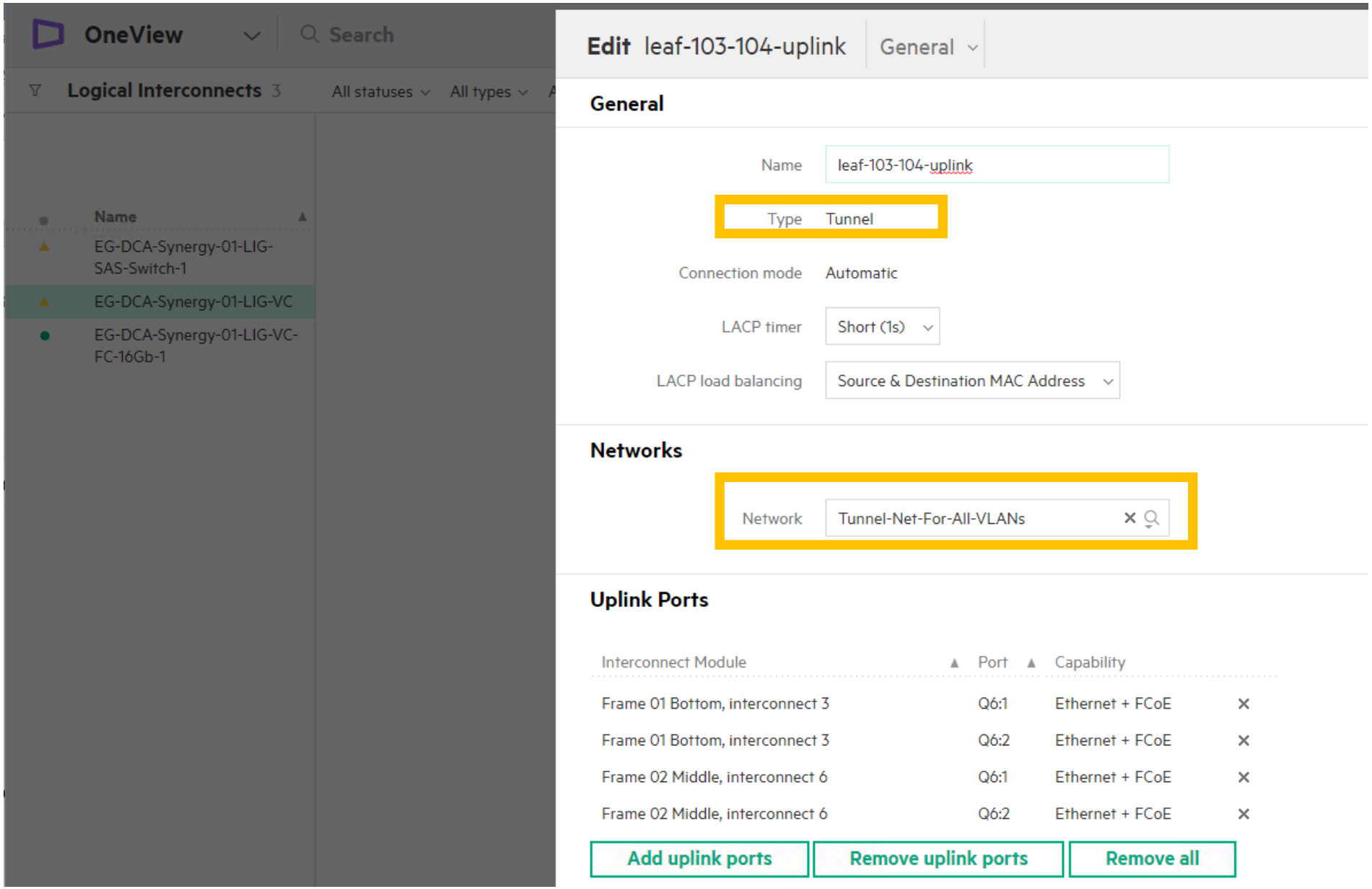
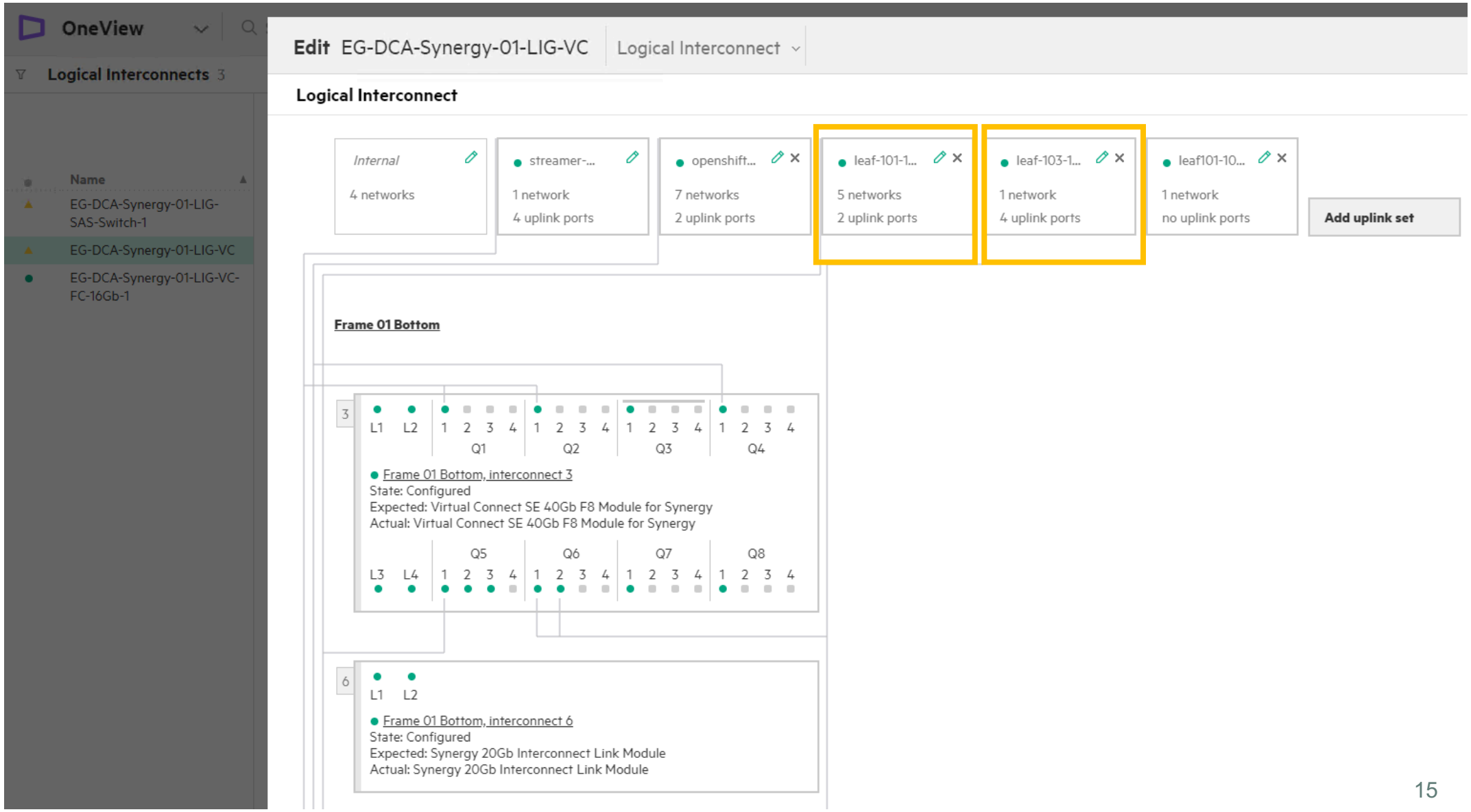
Synergy Uplink Configuration with Tunnel Networks



Synergy Uplink Configuration Overview



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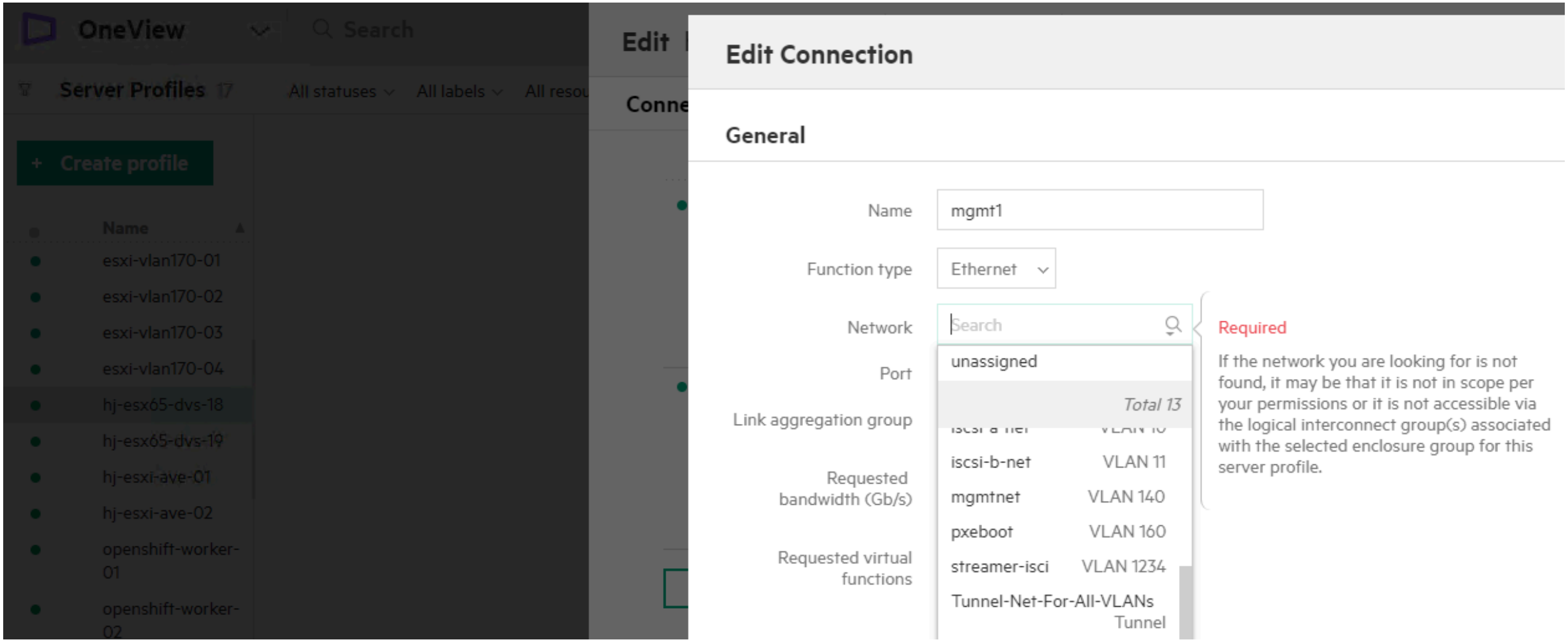
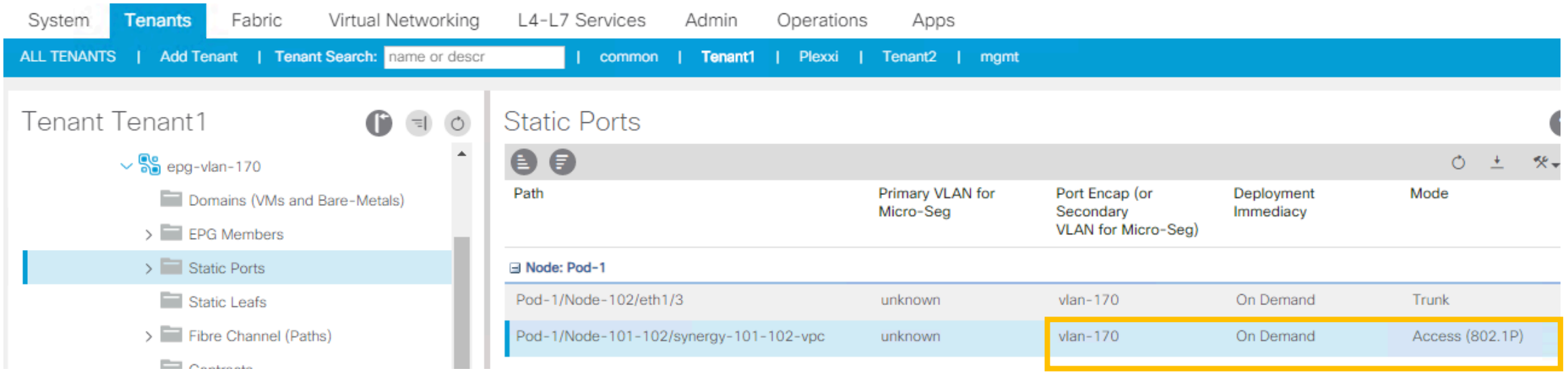
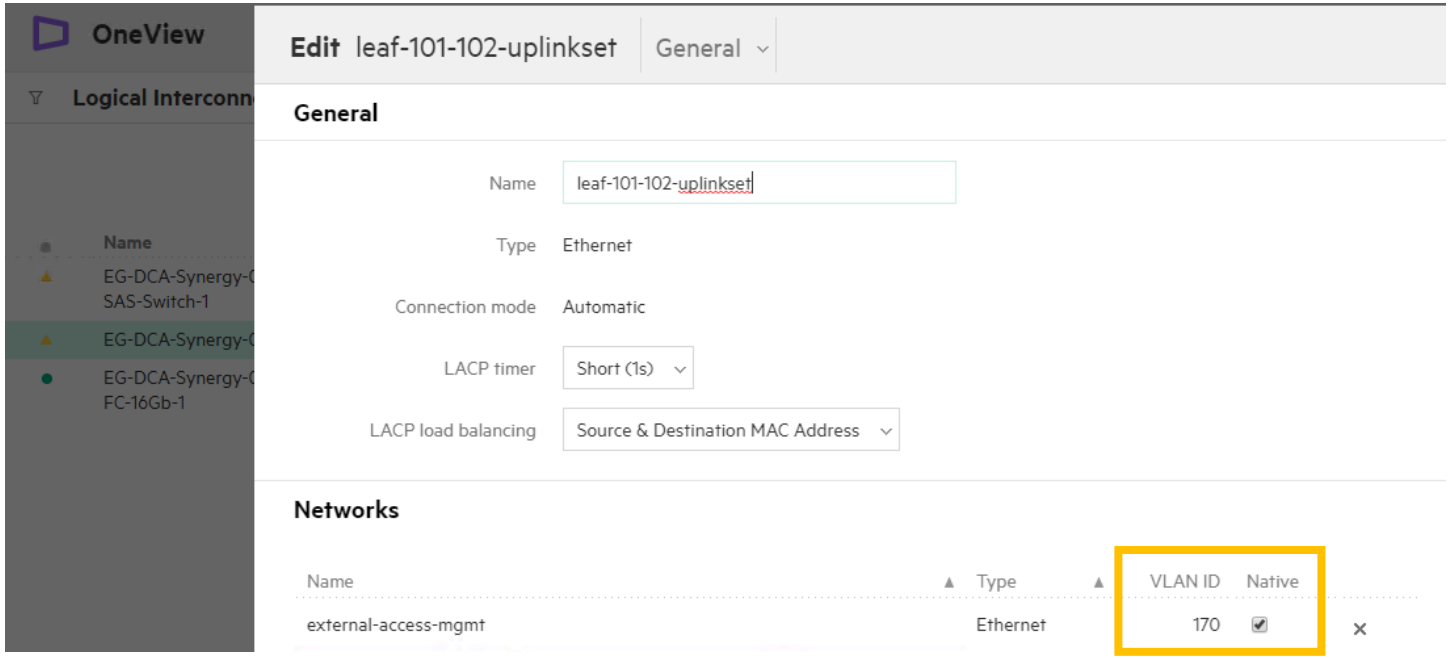
Synergy Server Connection Configuration



ACI/Synergy Network Configuration with Synergy Tagged Networks





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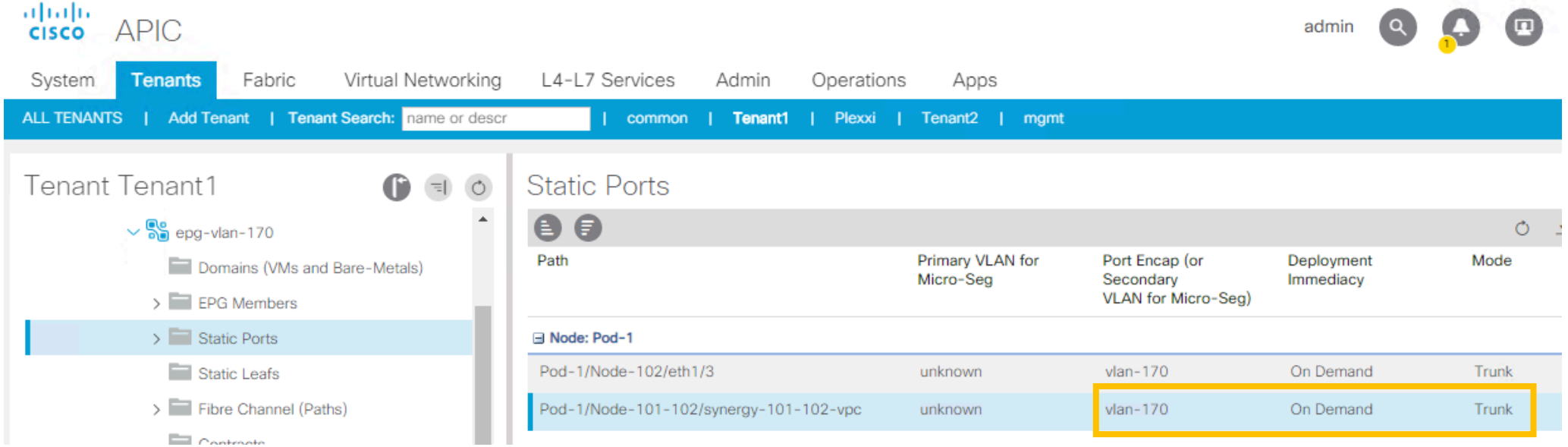
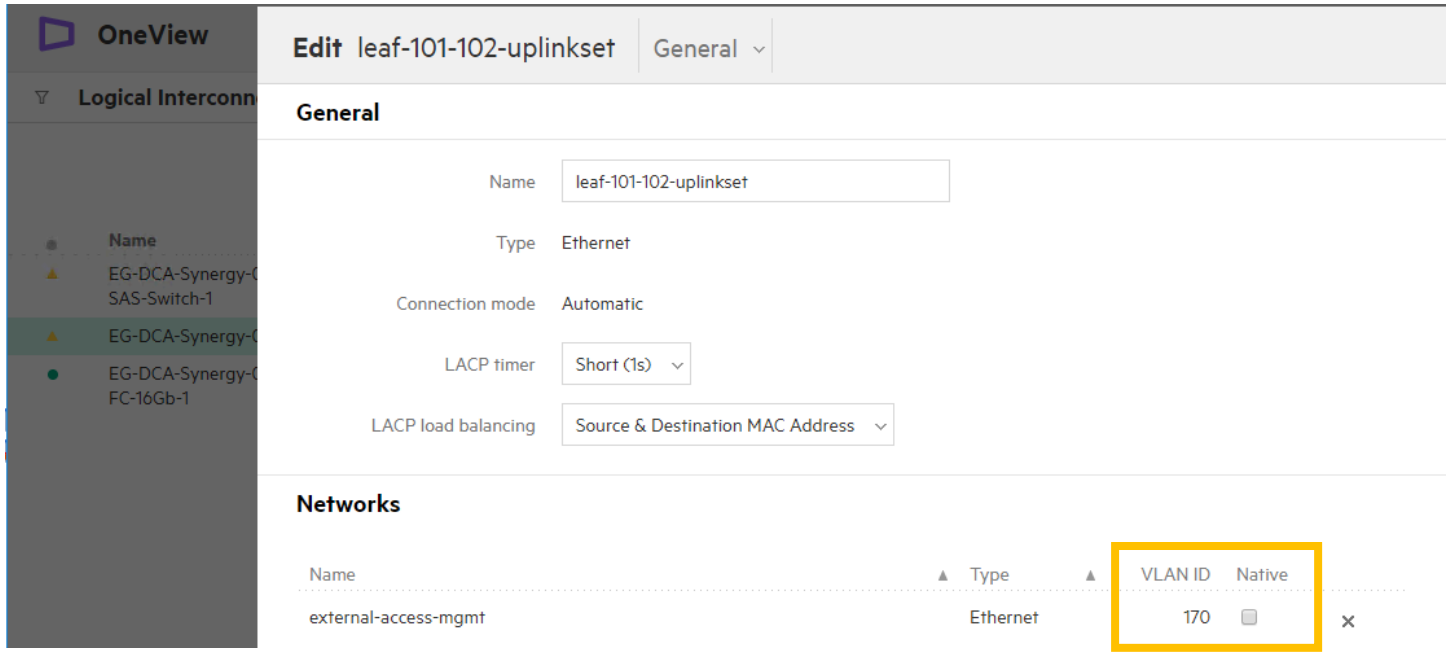
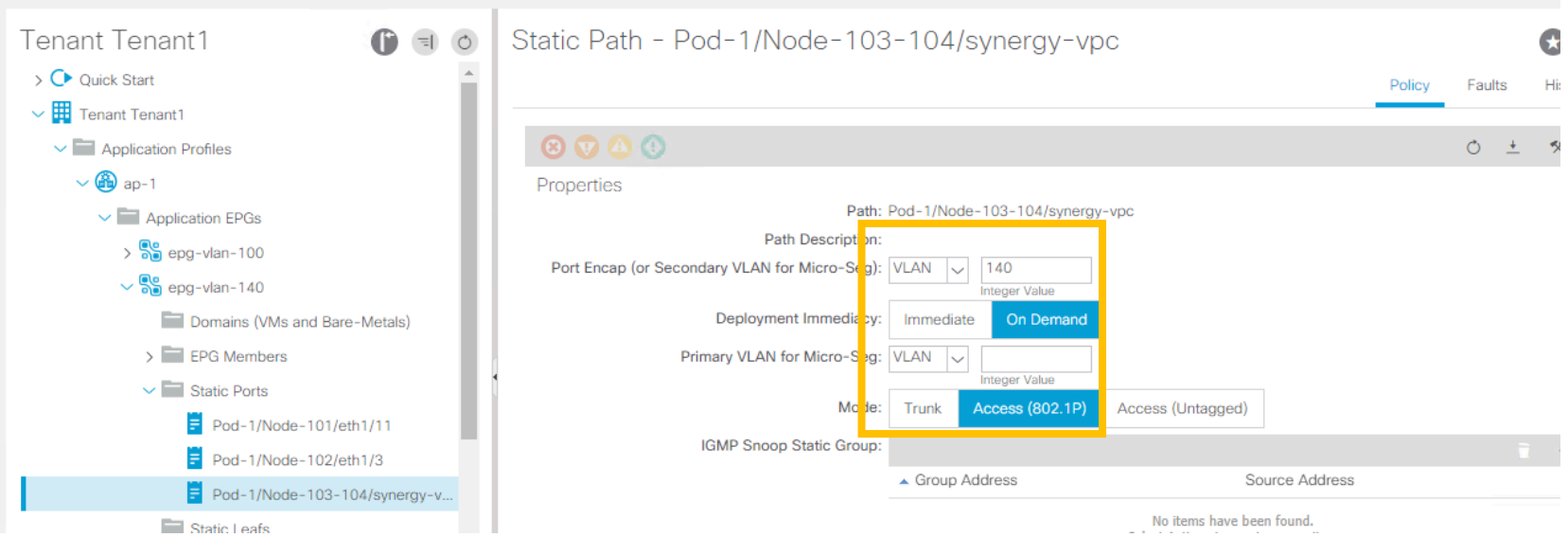
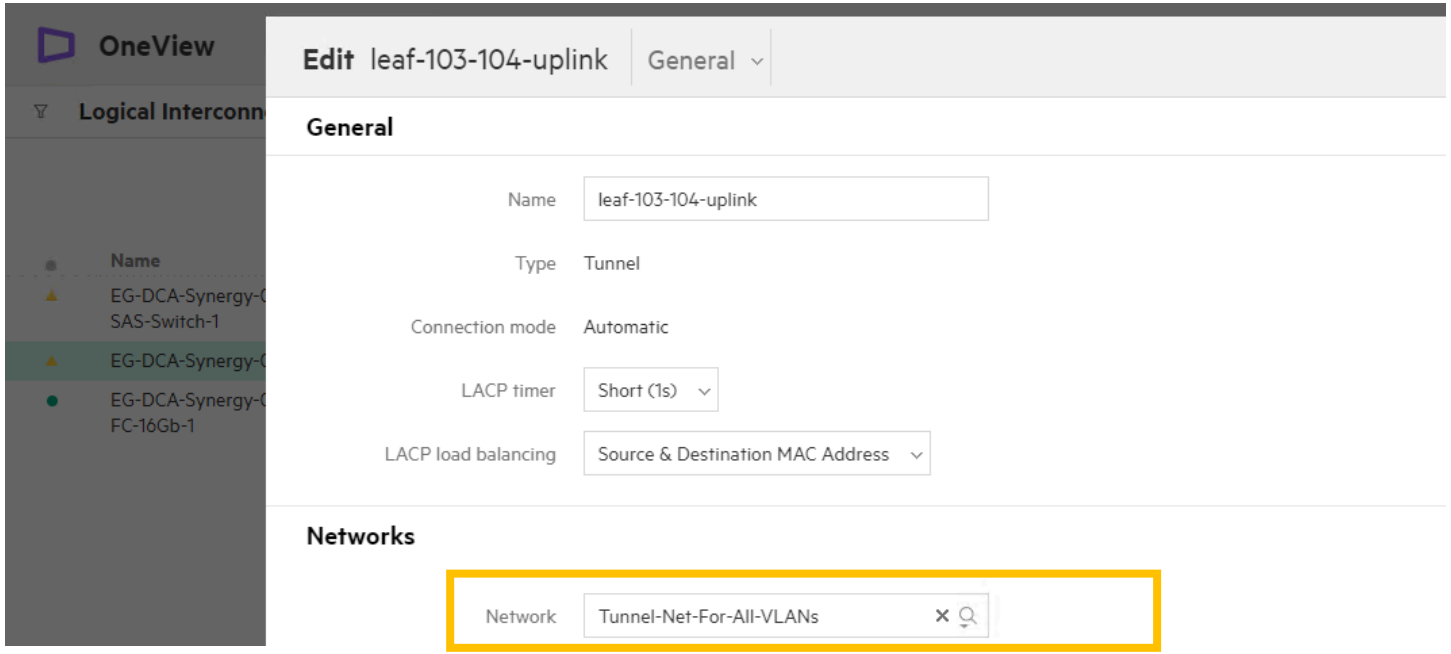
ACI/Synergy Network Configuration with Synergy Tagged Networks





ACI/Synergy Network Configuration with Synergy Tunnel Networks

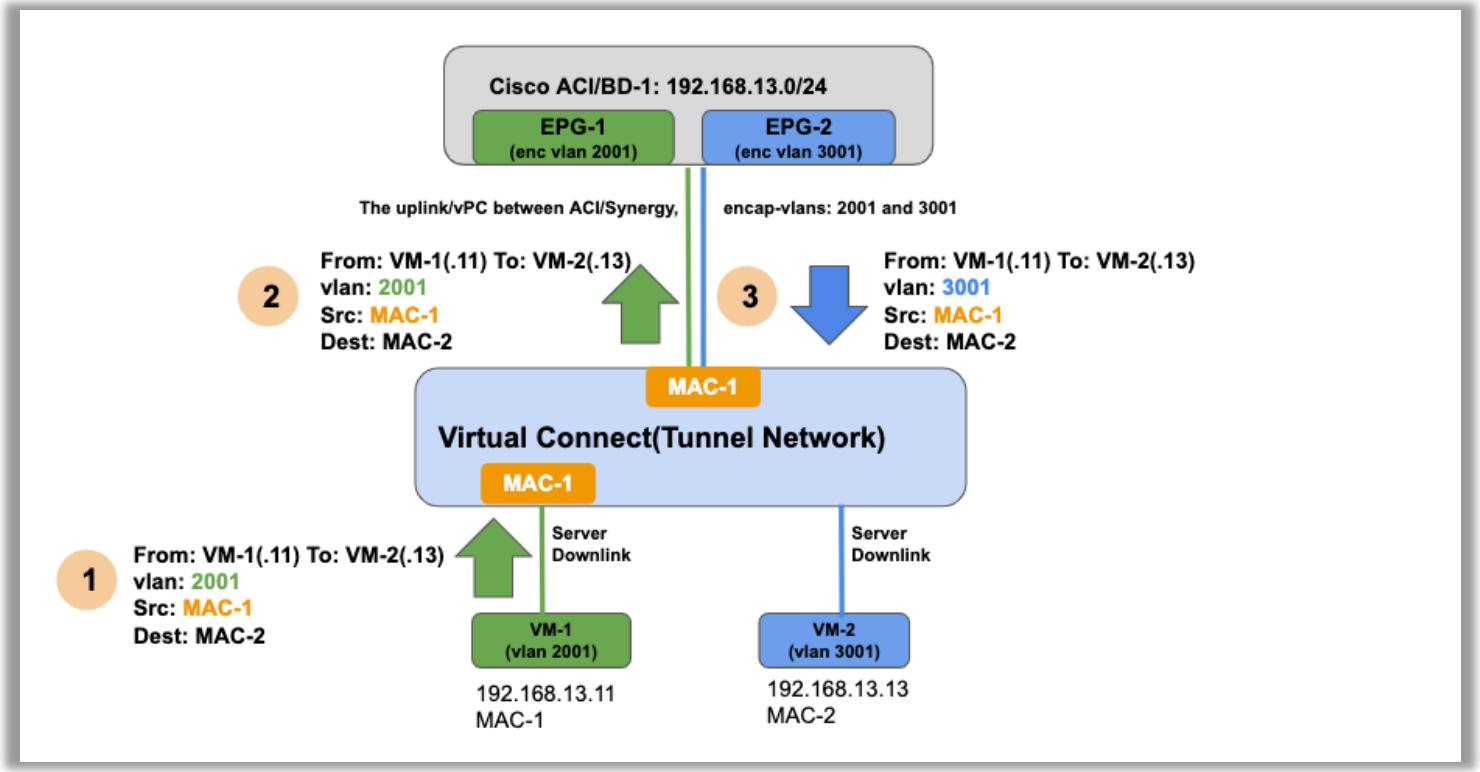




Synergy Tunnel network when ACI doing Inter-VLAN Bridging

For **Tunnel** mode, one ACI use case requiring user attention where ACI is doing **Inter-VLAN bridging.**

- Multiple EPGs are under one BD **AND**
- These EPGs share the same IP subnet defined on BD



ACI inter-vlan bridging will switch the packets with the same source MAC address across different encapsulation VLANs like MAC-1 shown in the diagram across EPG VLAN 2001 and 3001.

Synergy Tunnel mode does not look into user VLANs when switching traffic so it will regard the same MAC-1 address learned from both downlink and uplink at the same time.

As a result, Synergy will interrupt the traffic forwarding for the packets with MAC-1 source address.

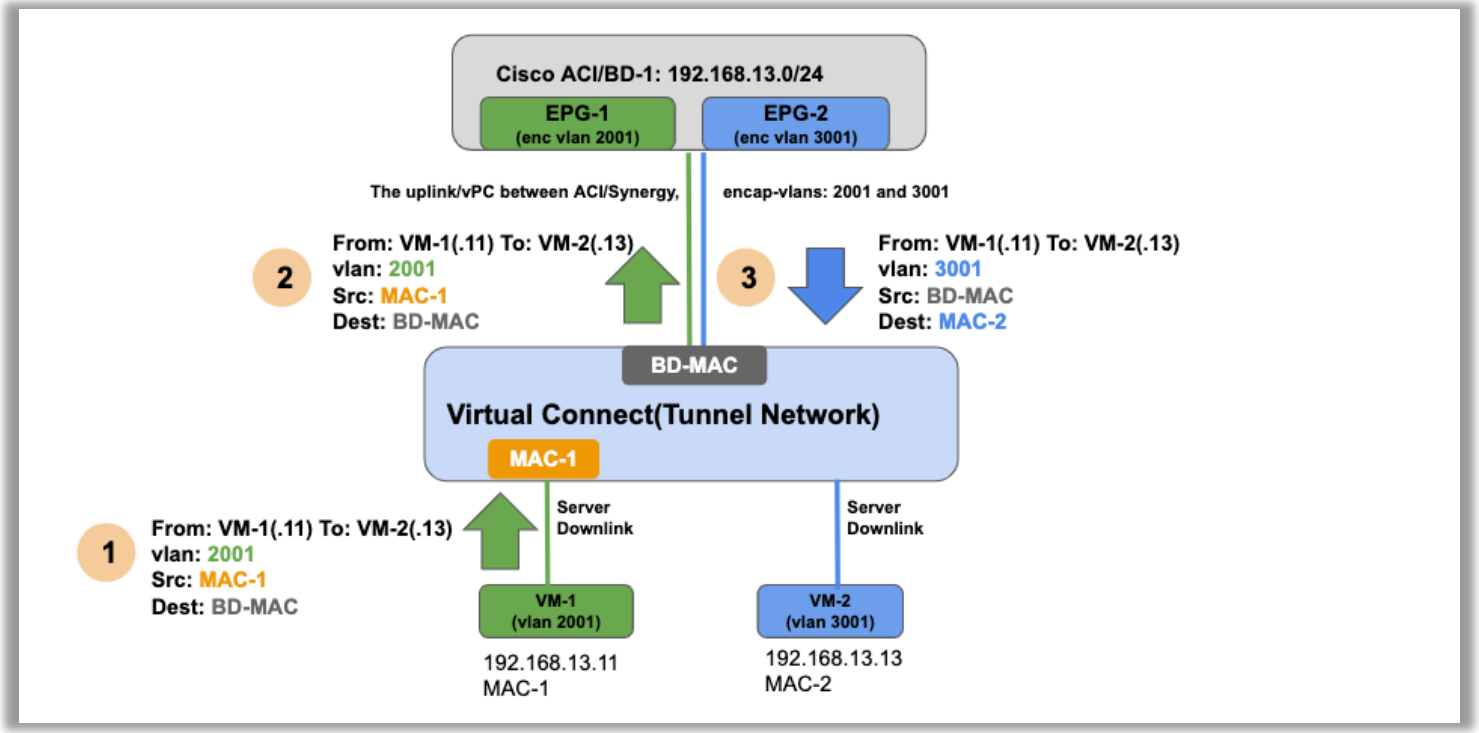
Introducing ACI “Proxy-ARP” feature

The issue for ACI inter-VLAN bridging with Synergy tunnel mode can be solved with ACI “Proxy-ARP” feature.

Note: ACI Proxy-ARP is not a feature configured separately. It is implemented behind the scene in various ACI features like Flood-in-Encapsulation, Micro-segmentation and Intra-EPG isolation.

About Proxy ARP

Proxy ARP in Cisco ACI enables endpoints within a network or subnet to communicate with other endpoints without knowing the real MAC address of the endpoints. Proxy ARP is aware of the location of the traffic destination, and offers its own MAC address as the final destination instead.



ACI proxy-ARP will switch packets source MAC with its own BD MAC when doing inter-VLAN bridging.

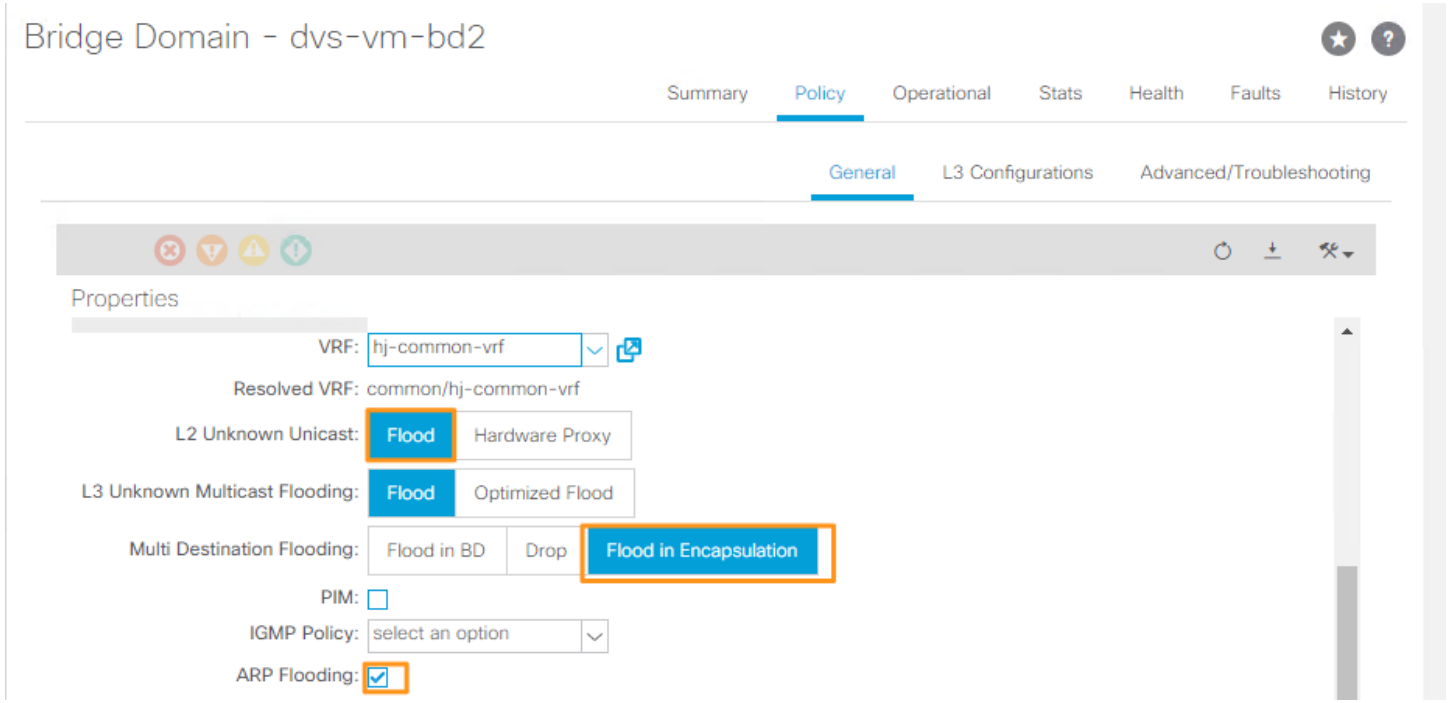
Endpoints will learn source MACs for other endpoints in different EPGs under same BD as ACI BD MACs.

This will ensure Synergy always learn true source endpoint MACs from downlinks and BD MAC from the uplink and hence forward the traffic successfully.

Option 1 for Synergy Tunnel network with ACI Inter-VLAN Bridging

ACI 3.1(1) has introduced the “Flood-in-Encapsulation” enhancement specifically for this use case

Configuring flood in encapsulation for all protocols and proxy ARP across encapsulations	In this release, on the Cisco ACI switches with the Application Leaf Engine (ALE), all protocols are flooded in encapsulation. Multiple EPGs are now supported under one bridge domain with an external switch. When two EPGs share the same bridge domian and the **Flood in Encapsulation** option is turned on, the EPG flooding traffic does not reach the other EPG. It overcomes the challenges of using the Cisco ACI switches with the Virtual Connect (VC) tunnel network. For more information, see the *Cisco APIC Layer 2 Networking Configuration Guide*.



Users should enable “Flood in Encapsulation” and set “L2 Unknown Unicast” as ”Flood” under BD.

The reason “L2 Unknown Unicast” needs to be set in “Flood” when doing “Flood in Encapsulation” is specified in APIC Layer2 configuration guide

Note:

“L2 Unknown Unicast” as “Flood” will automatically enable “ARP flooding” as prompted in APIC GUI.

Endpoints and APIC view with ACI Proxy-ARP

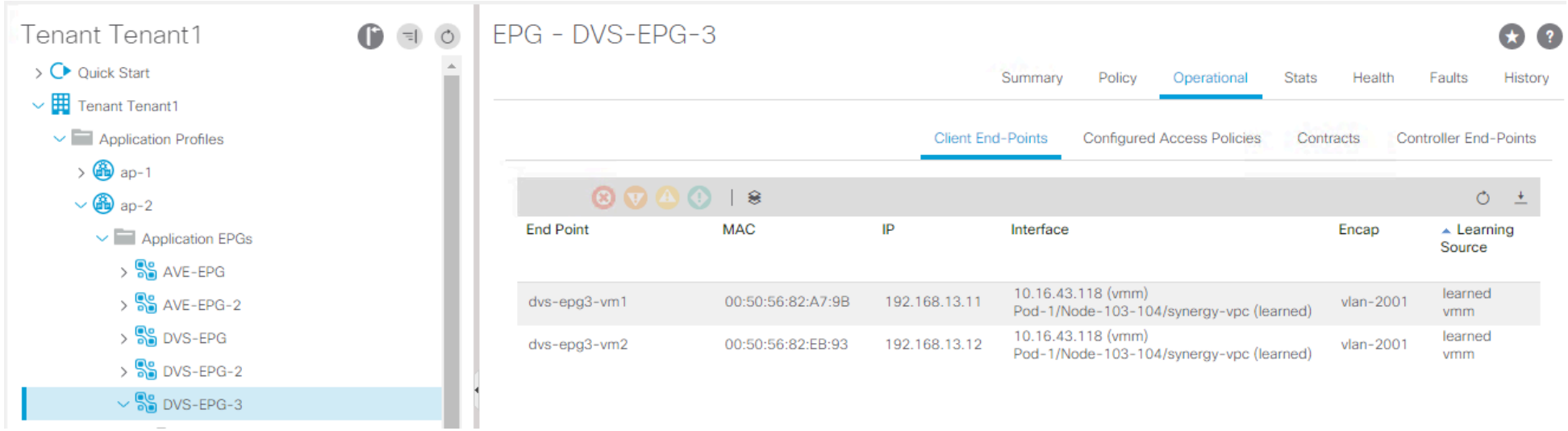
Endpoints see other endpoints from different EPGs in same BD doing inter-vlan bridging as BD MACs

```
[root@dvs-epg3-vm1 ~]# ip addr show eno16780032 | egrep "ether|inet "
    link/ether 00:50:56:82:a7:9b brd ff:ff:ff:ff:ff:ff
    inet 192.168.13.11/24 brd 192.168.13.255 scope global eno16780032
[root@dvs-epg3-vm1 ~]# arp
Address                  HWtype  HWaddress           Flags Mask            Iface
192.168.13.1             ether   00:22:bd:f8:19:ff   C                     eno16780032
192.168.13.12            ether   00:50:56:82:eb:93   C                     eno16780032
192.168.13.13            ether   00:22:bd:f8:19:ff   C                     eno16780032
```

VM-1 arp tables shows inter-EPG VM-2(13.13) MAC as BD MAC 19:ff.

The other intra-EPG VM(13.12) has original VM MAC

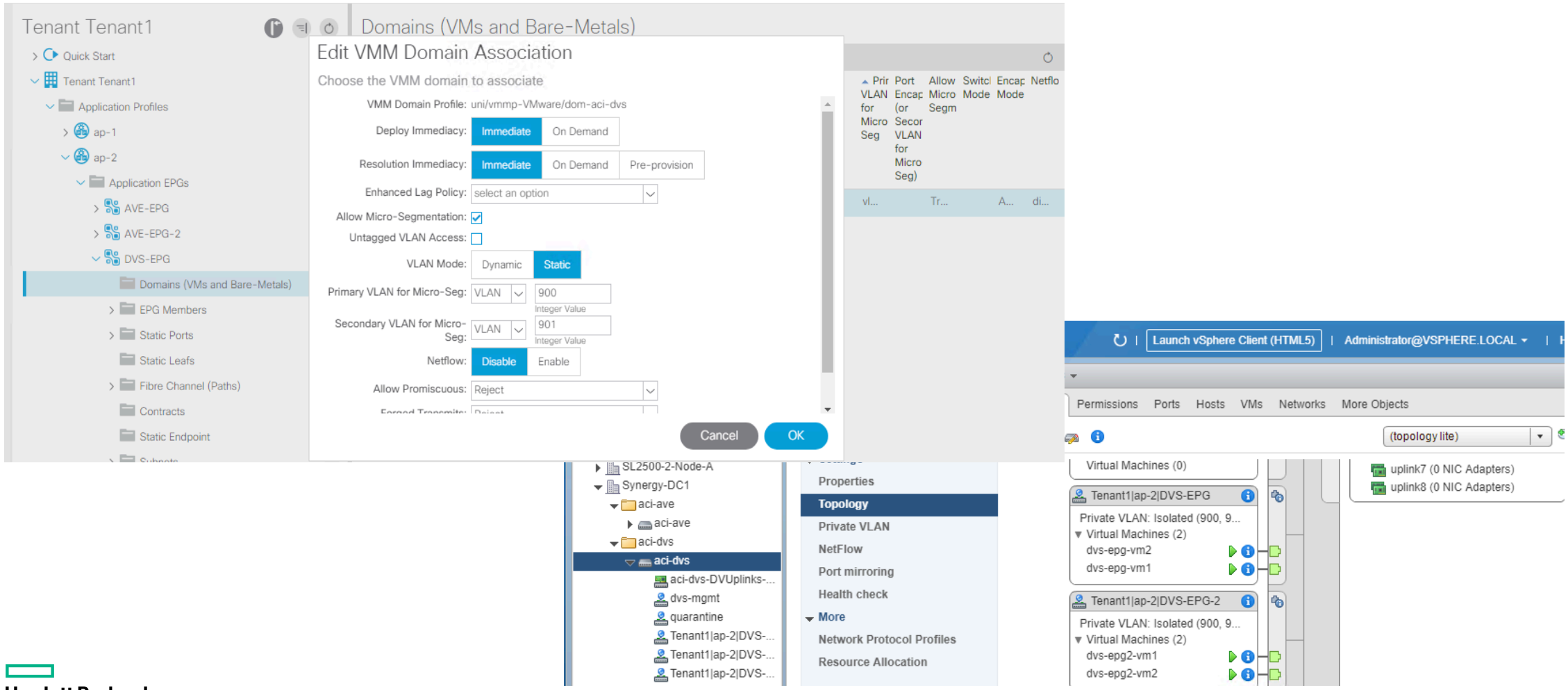
ACI sees all true endpoints MACs



Option 2 for Synergy Tunnel network with ACI Inter-VLAN Bridging

Proxy-ARP is also enabled behind the scene for EPGs enabled for Micro-segmentation.

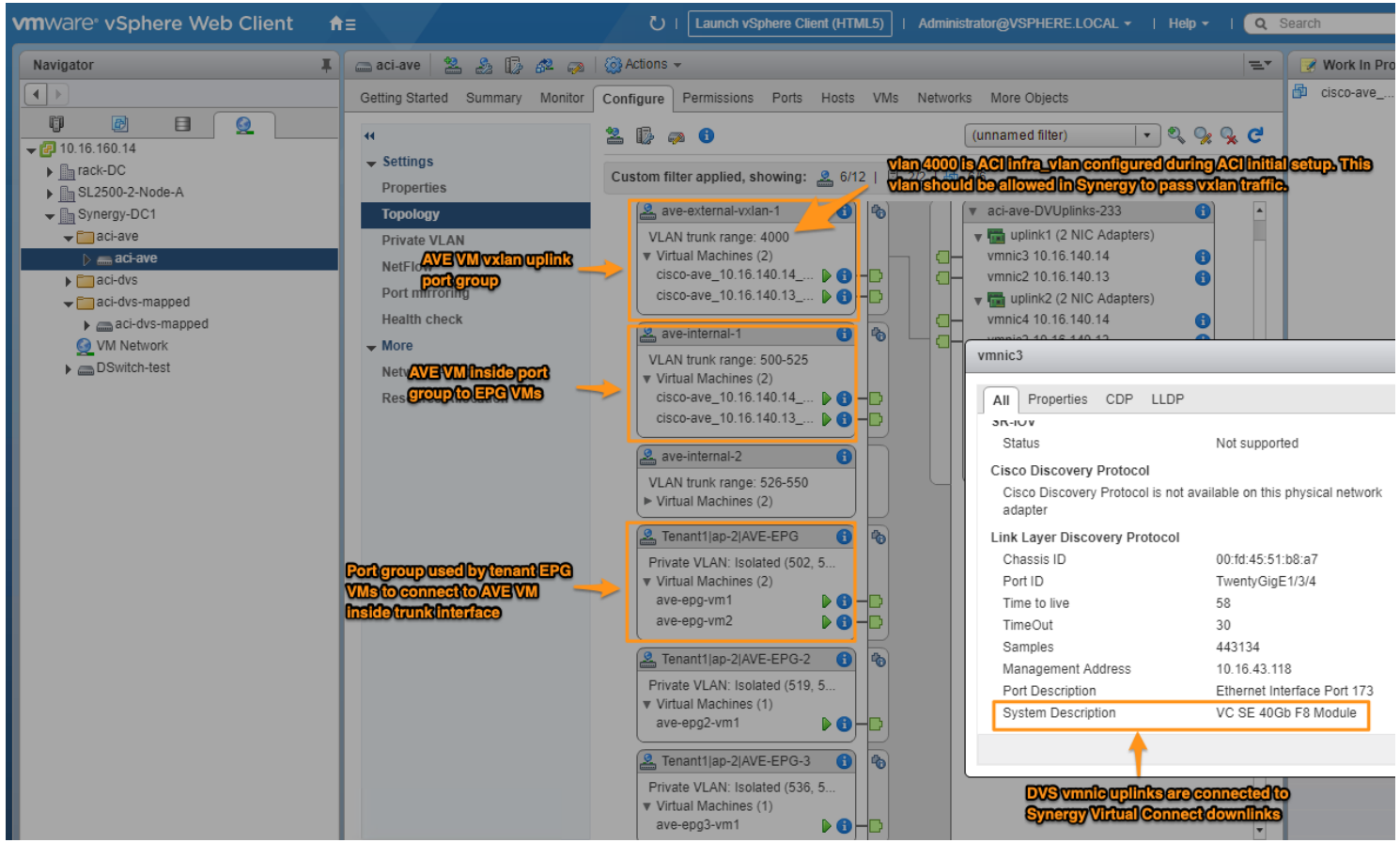
Note: Users don't need to configure any ACI uSeg for Proxy-ARP to take affect.



Option 3 for Synergy Tunnel network with ACI Inter-VLAN Bridging

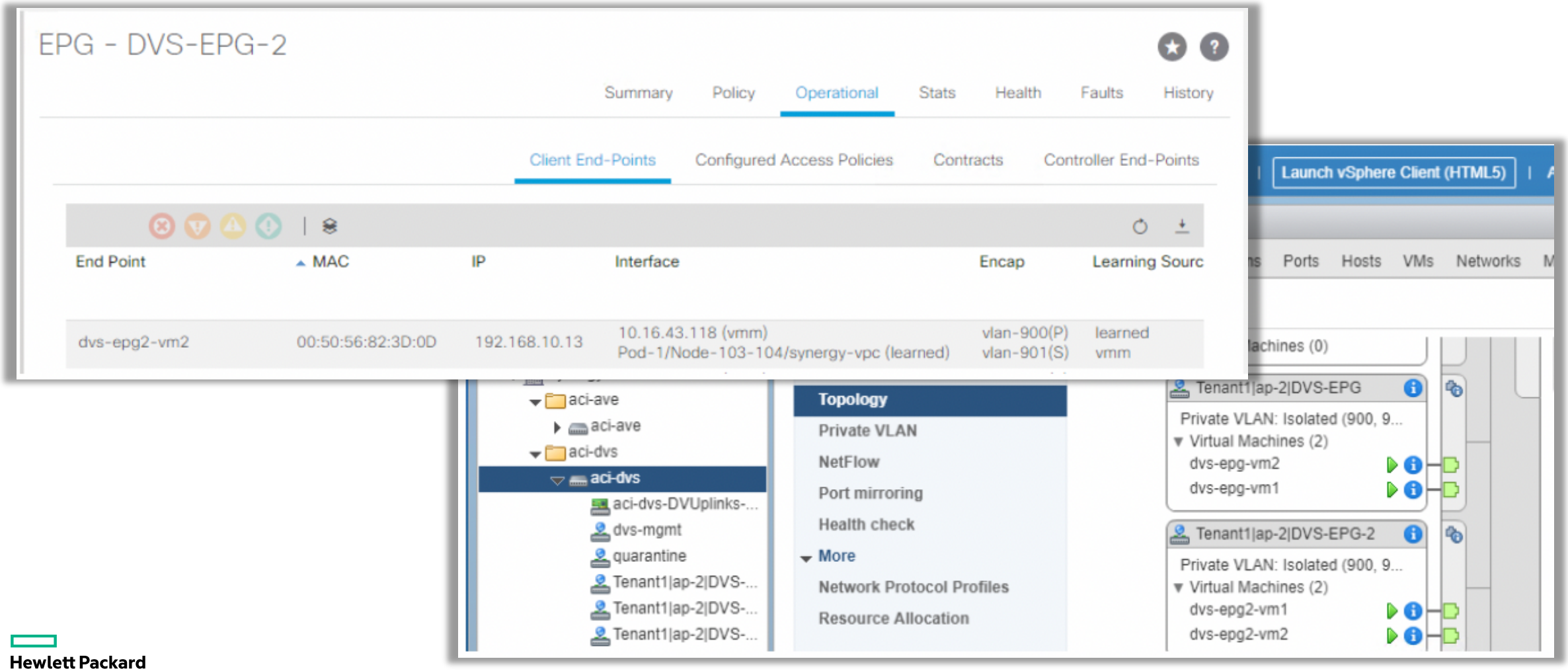
A typical AVE deployment uses VXLAN to carry traffic between AVEs and ACI leaf nodes. The VXLAN traffic is encapsulated using a single ACI infra VLAN through Synergy. All underlying endpoint VLAN operation like inter-VLAN bridging is transparent to Synergy.

Users only need to config a single mapped or tunnel network to allow this infra VLAN traffic through Synergy.



Synergy and ACI VMM Integration

Synergy Tunnel mode really simplifies ACI VMM integration as it can pass the traffic from DVS port-group derived from ACI dynamic vlan pool without any Synergy configuration changes.

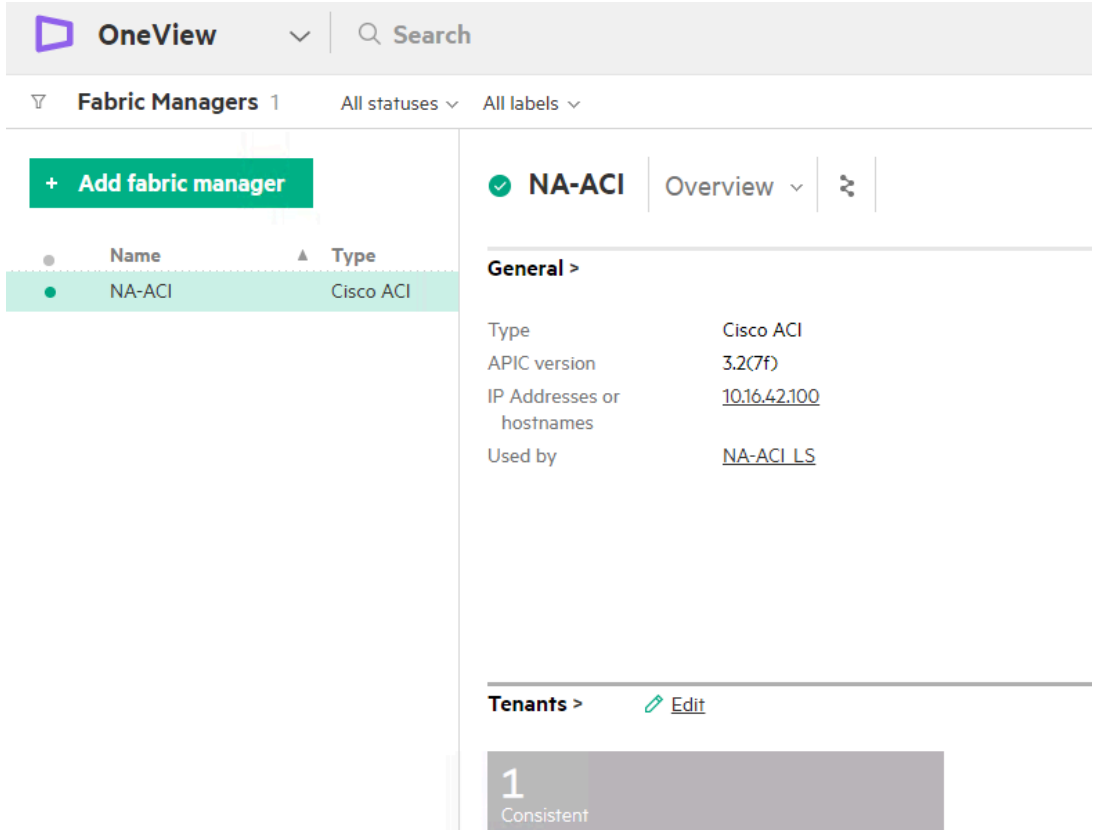


Synergy Fabric Managers with ACI Integration

Synergy Fabric Manager aligns HPE OneView resources as defined by Cisco ACI APIC policies.

It intends to help Synergy admins to match Synergy network configurations with APIC polices so network configuration mismatch can be prevented.

Note: Users don’t have to config Fabric Manager feature in order to pass traffic successfully between ACI and Synergy.



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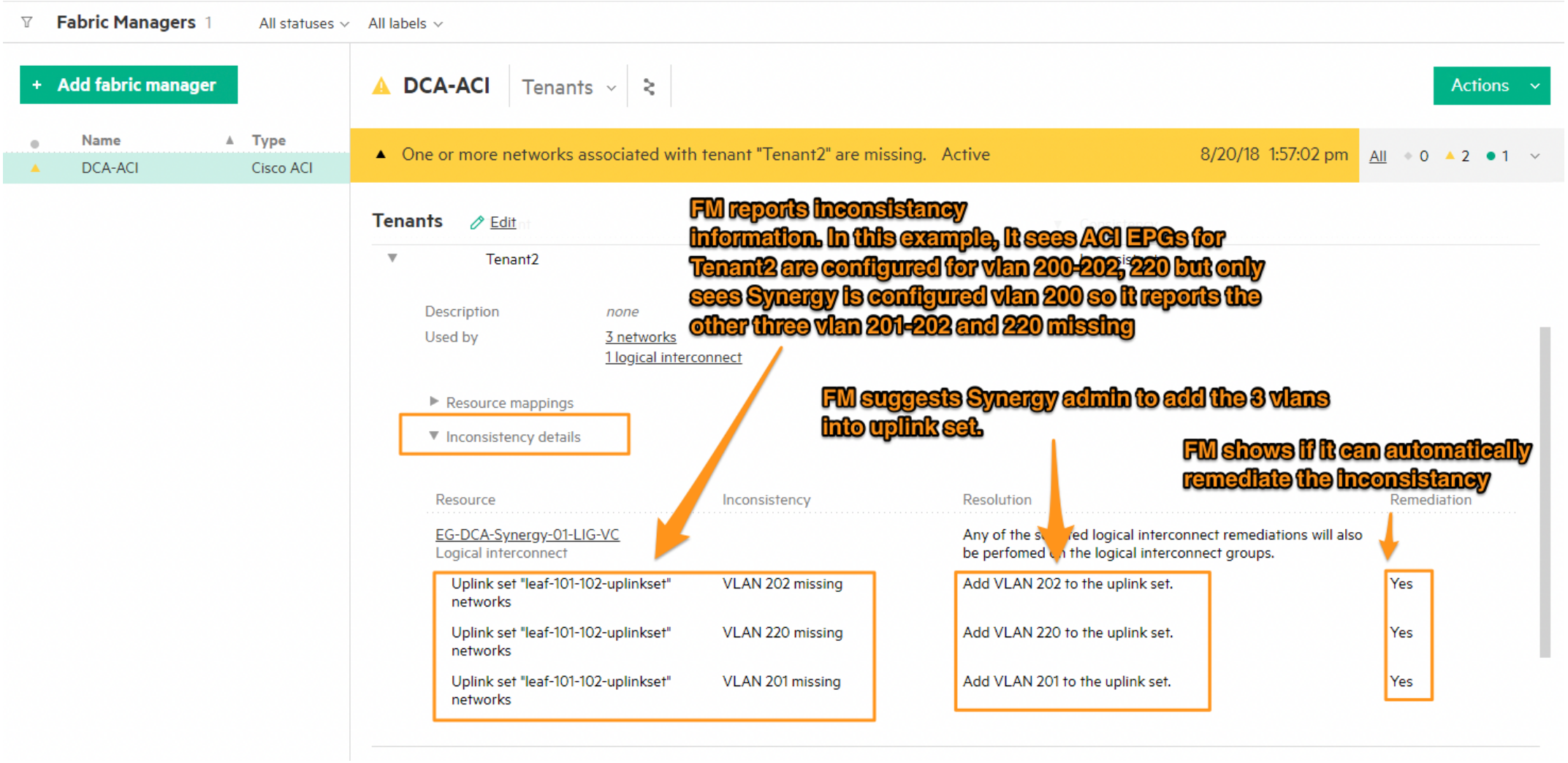
Synergy Fabric Managers with ACI Integration



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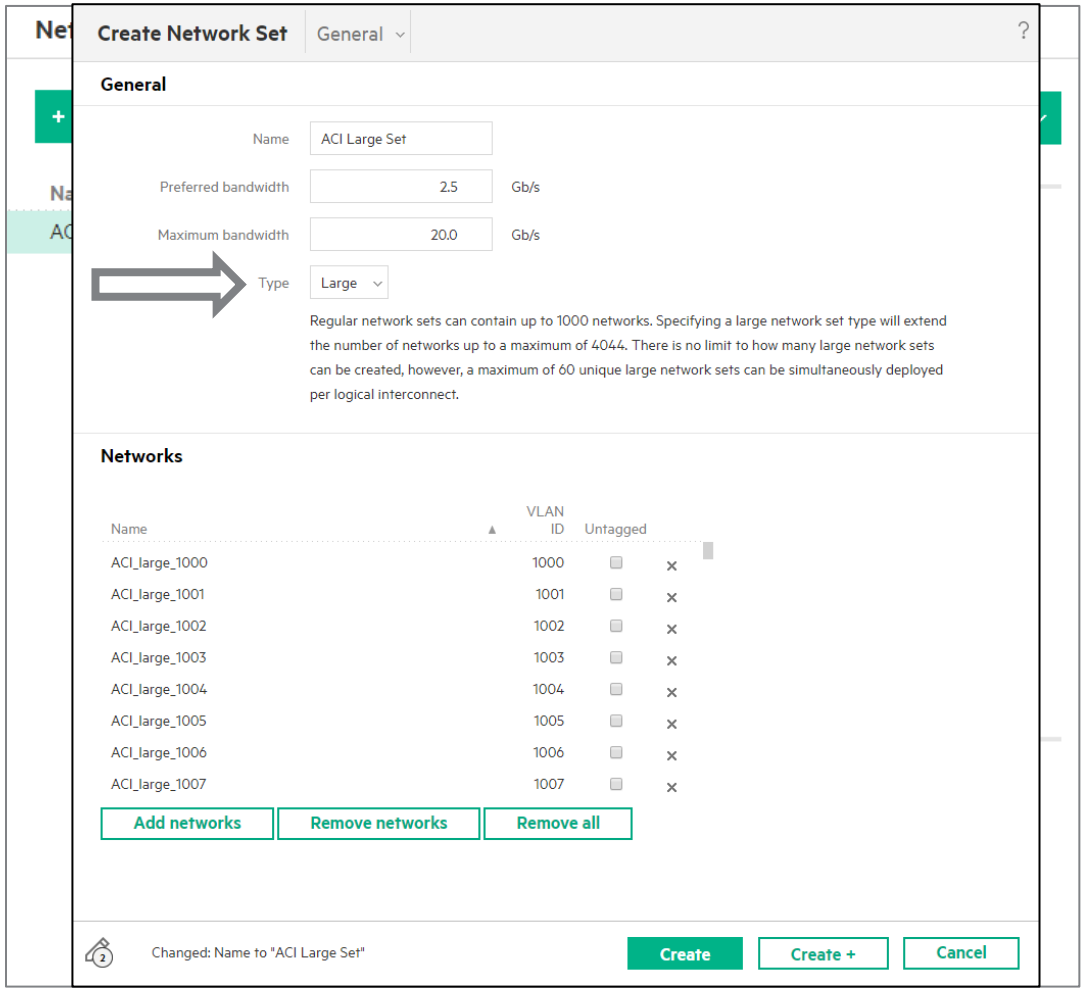
OneView 5.0 Synergy Networking Features

Large Network Sets on VC SE 100Gb F32 Module

Eliminates current VLAN limits imposed on the network sets

"I want to define and utilize large number of discrete networks without having to resort to tunnel mode" - Customer

- OneView 3.x
  - Network Sets were limited to 162 VLANs
  - One had to use Tunnel networks to achieve higher limits
- OneView 4.00
  - Network Set limits increased up to 1000 VLANs (in a single frame)
- Large Network Sets
  - Completely eliminates VLAN limits
  - Enables Synergy mapped networks full interoperability with Cisco ACI and allows users to define a large number of EPGs in the same ACI Bridge Domain



Synergy Automated VLAN Provisioning

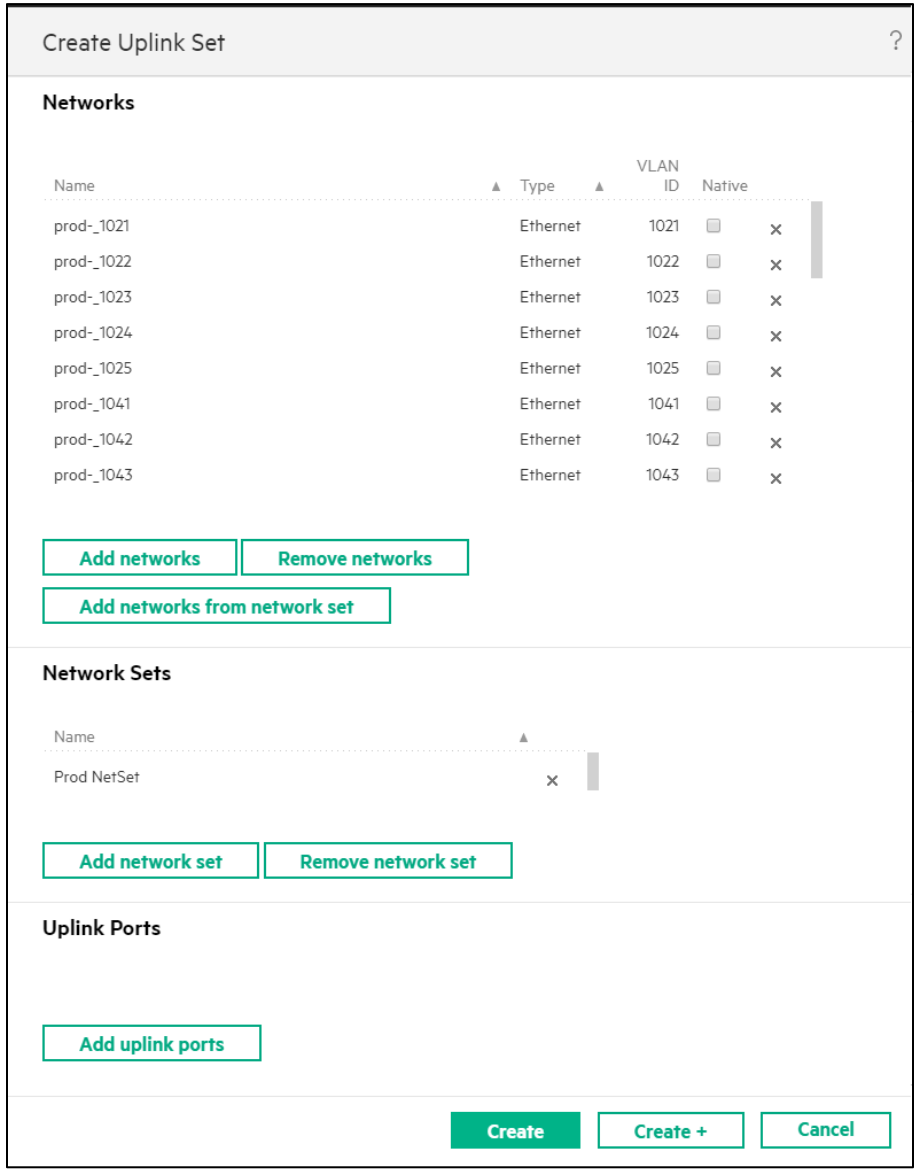
Streamlines network deployment across OneView resources in a single step

> “It takes too many steps to create a network, provision into a logical interconnect, network set, and finally serve profile" - Customer

– Direct association of a network set with an uplink set immediately propagates all network set modifications to the uplink sets

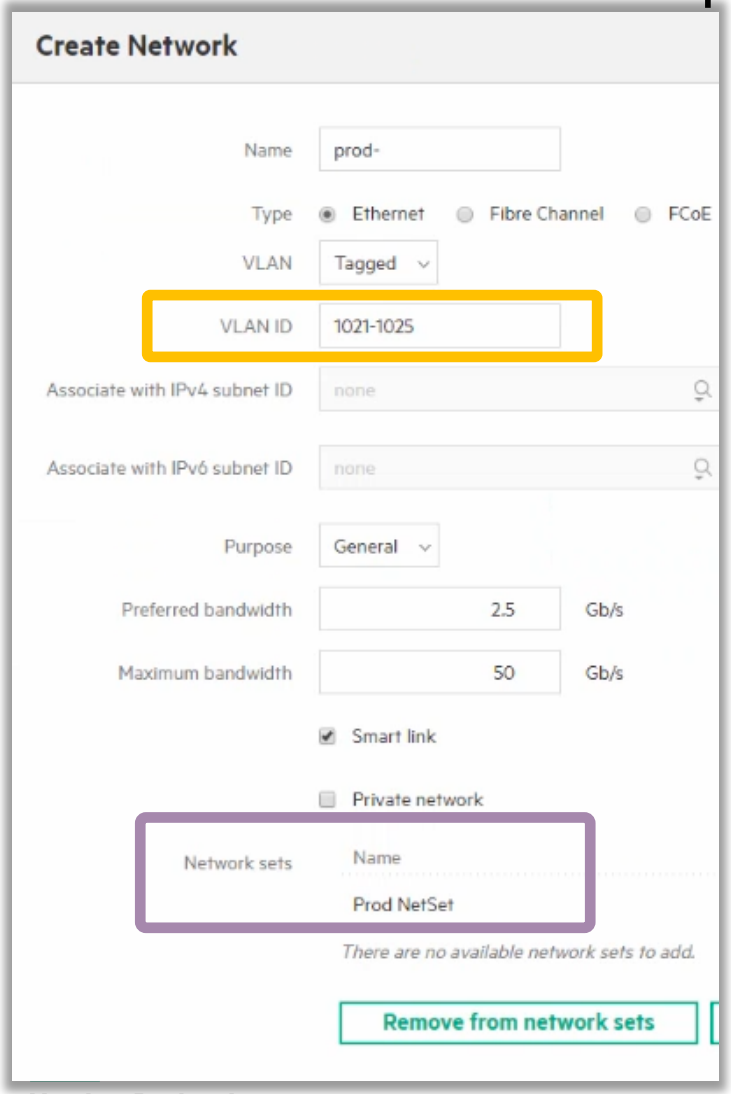
– Reduces time, effort, and risk of error when adding networks to an uplink set

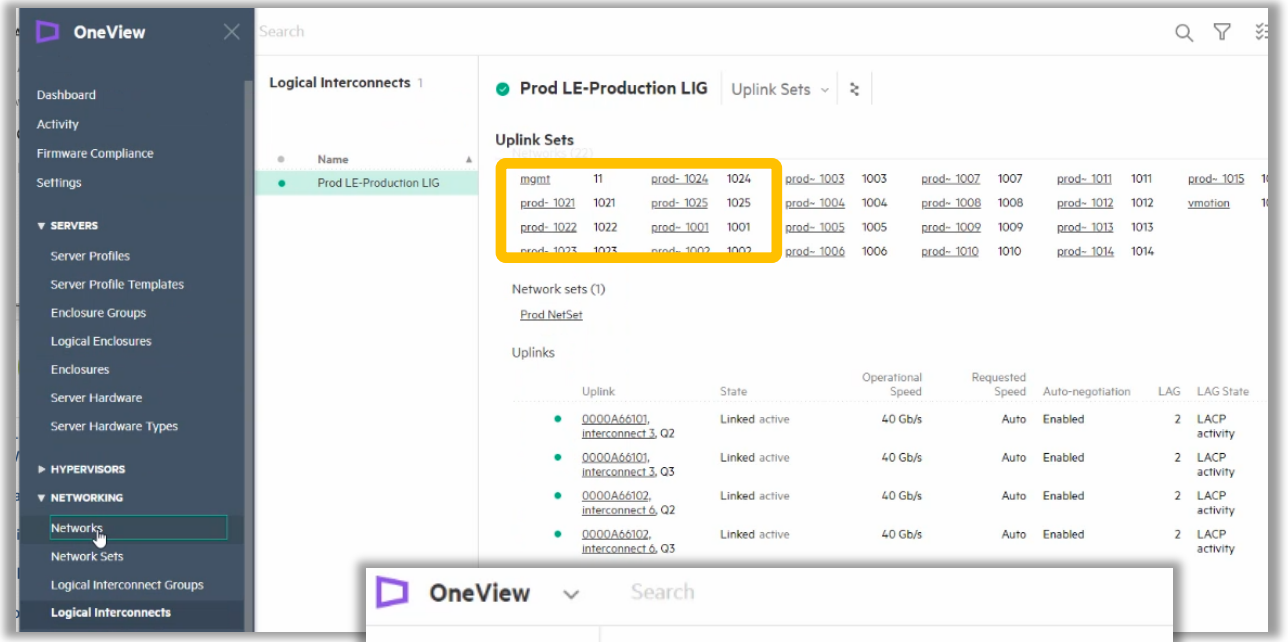
– When a network is added and associated with an existing network set, it will be automatically deployed across both the uplink sets on LIG/LI and server profiles where network set is provisioned

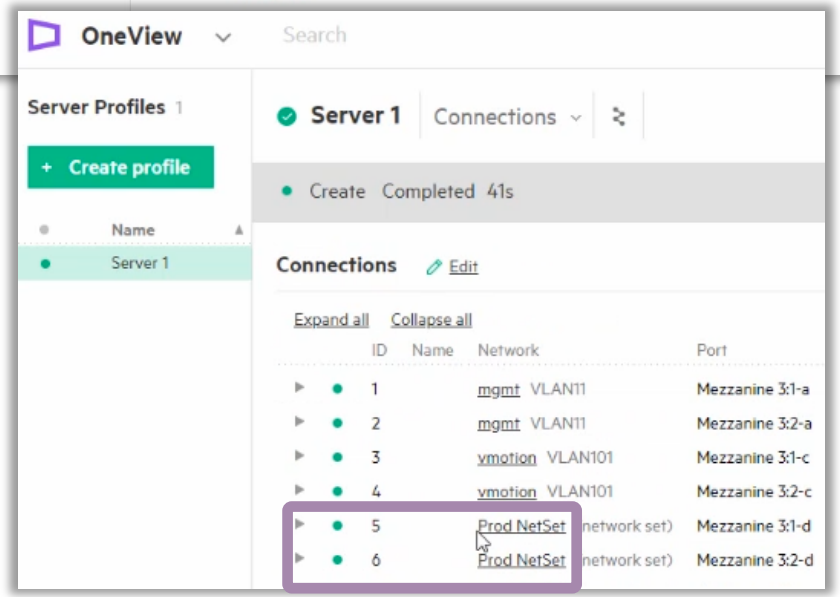


Synergy Automated VLAN Provisioning

Streamlines network deployment across OneView resources in a single step







OneView for Synergy 5.0 Interop features

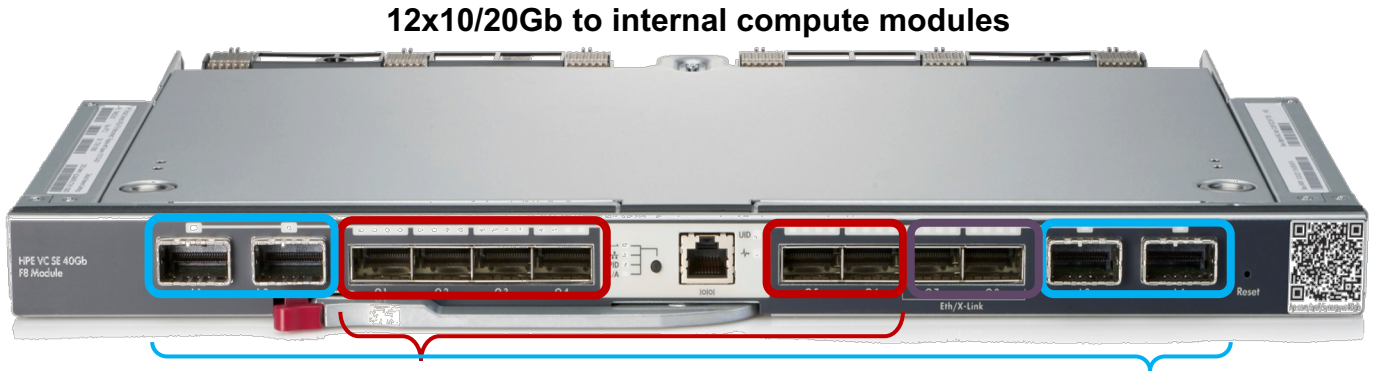
- **Synergy Fabric Manager with ACI**
  - On demand ability to download APIC policy alerts for investigating issues in APIC policy configurations.
  - Selectable granular remediation options within a tenant

- **Integration will monitor Arista Leaf ToR switches and model them as part of the Logical Switch resource.**
  - It will display physical switch and port attributes, such as switch model, health information, as well as, LLDP neighbor data, connector info and per port statistical information. OneView will configure Synergy ICM and compute profile connectivity while simultaneously provisioning corresponding VLANs to the Arista ToR ports connected to the Synergy ICMs. This will enable Synergy administrators to discover and validate Synergy to Arista cabling and connectivity, receive an alert on connection errors allowing basic troubleshooting and remediation. This release adds support for additional Arista switch families - 7050, 7260, and 7160, in addition to already supported 7060.

Thank You

Backup

Synergy Virtual Connect SE 40Gb F8 module



6x 40Gb uplink ports

– Q1-Q6: 40Gb, 4x10Gb Ethernet/FCoE, or 4x8Gb Fibre Channel

2x 40Gb cluster ports

– Q7-Q8: 40Gb ICM cluster ports (exclusively reserved)

4x 120Gb interconnect link ports

– AOC ICM cables (3m, 7M, 10M and 15M)

– DAC cables (1m, 1.6m and 2.1m)

– High performance, low latency
  – 2.56 Tbps switching capacity
  – 1.0 µ sec for port to port
– Converged network and resilient fabric
  – Ethernet, FCoE, Fibre Channel, and iSCSI
  – MLAG for resilient fabric
– Composable for multiple frames
  – Optimize the bandwidth for workloads
  – Adding new frames does not impact traffic on existing frames

Synergy VC SE 40Gb F8 Module Uplink Ports to Cisco ACI

6x 40Gb uplink ports

Q1-Q6: 40Gb, 4x10Gb Ethernet/FCoE, or 4x8Gb Fibre Channel