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How to setup an ACI Multi-Site with single Pod and Multi-Pod

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BRKACI-2291

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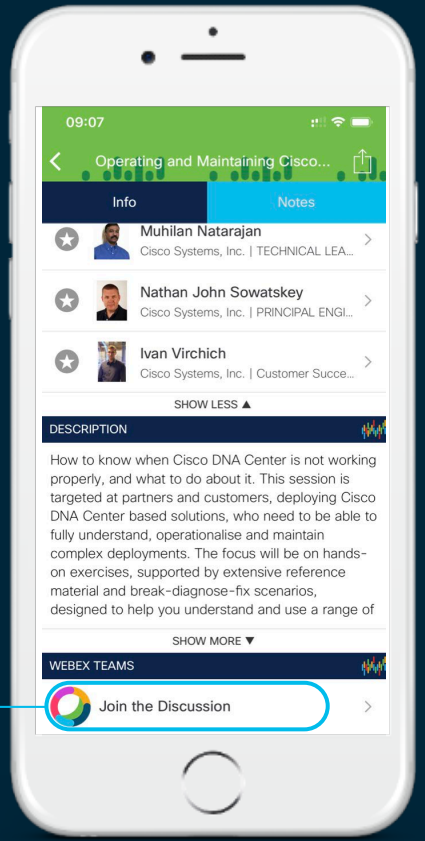

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Agenda

- Brief Multi-Pod/Multi-Site Review and Positioning
- Prerequisites
- Hardware Inspection and Installation
- Installing the First Site
- Expanding the Single Pod into a Multi-Pod Fabric
- Simplified Tenant Management through MSO
- Adding the DR Site on MSO
- MSO Additional Functionalities

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Brief Multi-Pod / Multi-Site Review and Positioning

Multi-Pod or Multi-Site?

That is the question...

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And the answer is...

BOTH!

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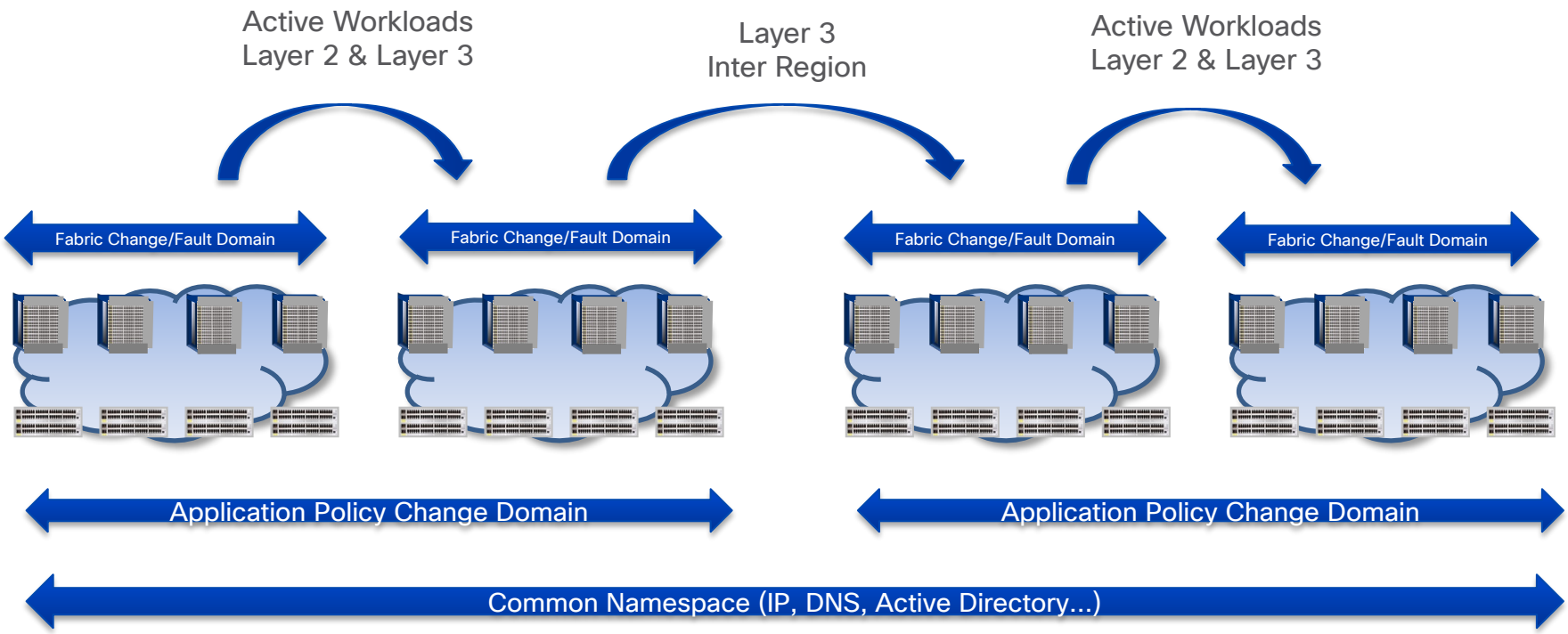
Systems View (How do these things relate)
Change and Fault Isolation



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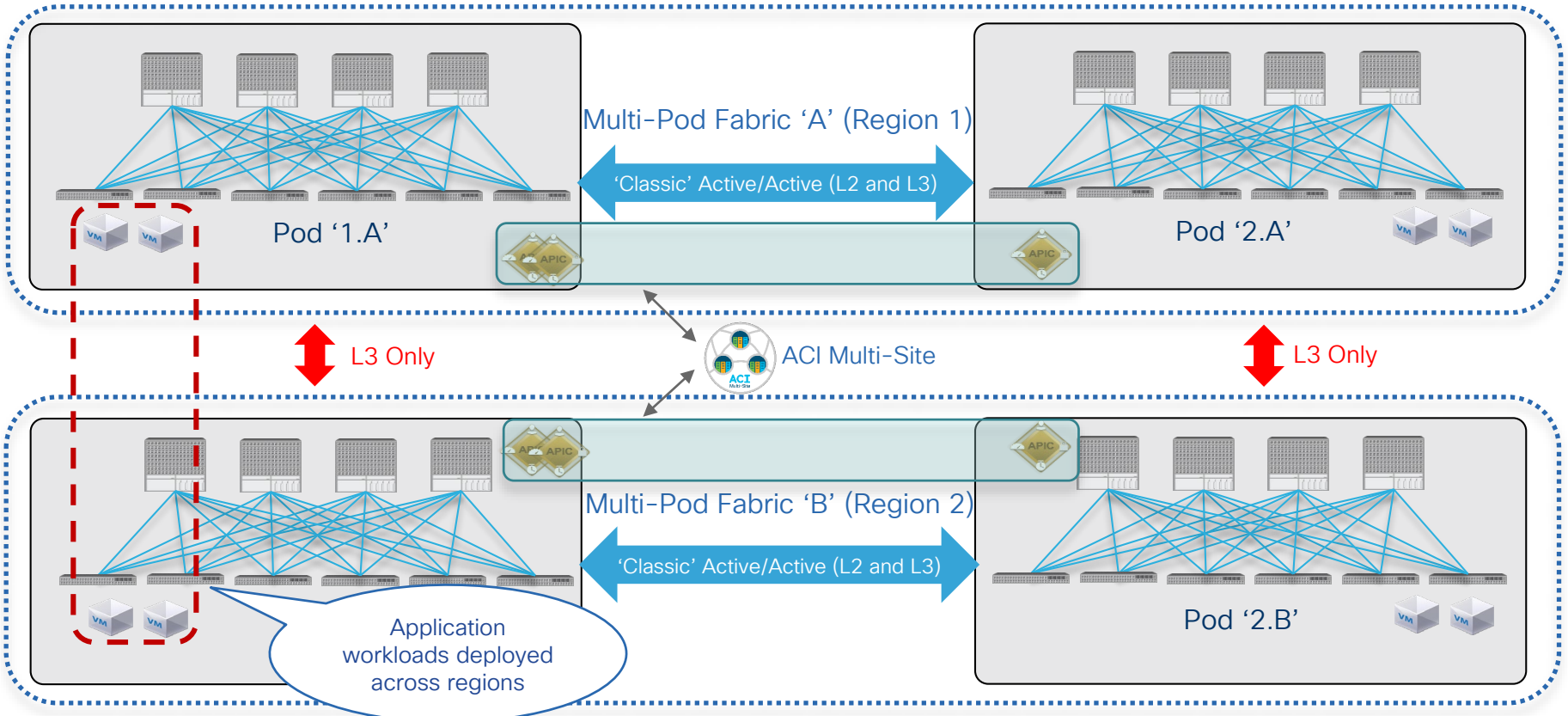
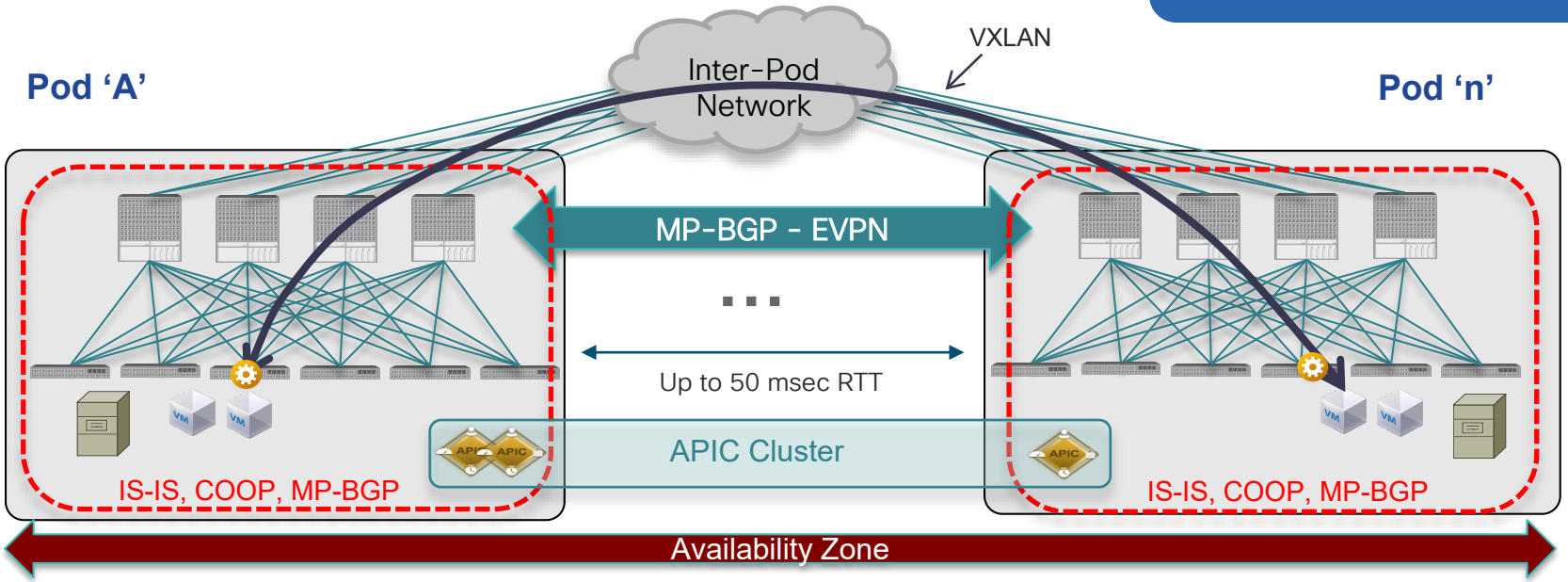
Typical Requirement
Creation of Two Independent Fabrics/AZs



ACI Multi-Pod
Overview

For More Information on ACI Multi-Pod: BRKACI-2003



- Multiple ACI Pods connected by an IP Inter-Pod L3 network, each Pod consists of leaf and spine nodes
- Up to 50 msec RTT supported between Pods
- Managed by a single APIC Cluster
- Single Management and Policy Domain
- Forwarding control plane (IS-IS, COOP) fault isolation
- Data Plane VXLAN encapsulation between Pods
- End-to-end policy enforcement

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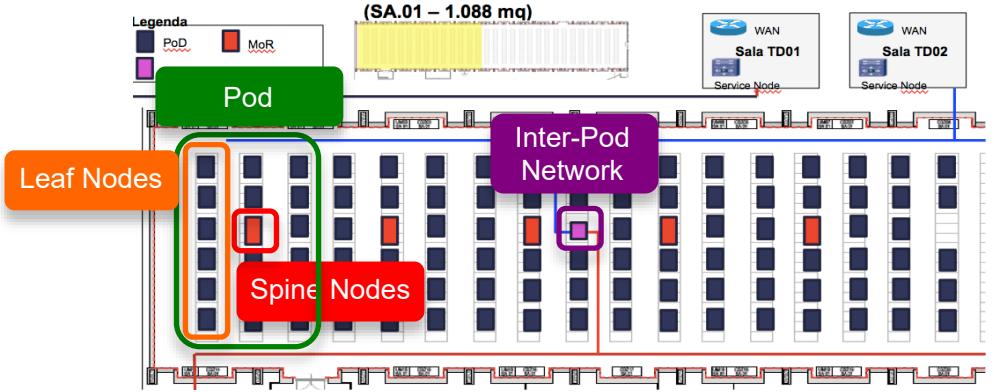
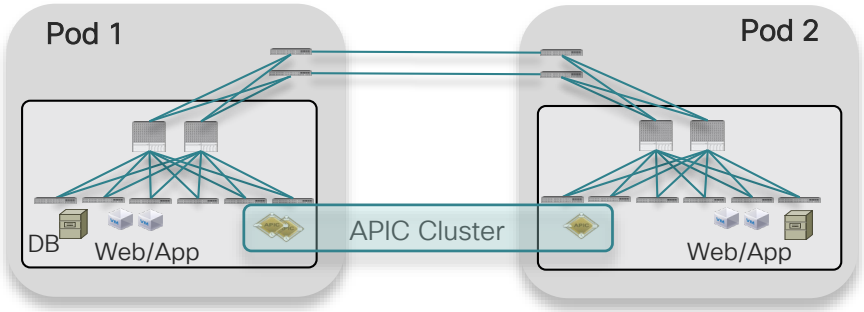
ACI Multi-Pod
Most Common Use Cases

- Need to scale up a single ACI fabric above 200 leaf nodes supported in a single Pod
- Handling 3-tiers physical cabling layout (for example traditional N7K/N5K/N2K deployments)



- True Active/Active DC deployments
  - Single VMM domain across DCs (stretched ESXi Metro Cluster, vSphere HA/FT, DRS initiated workload mobility,...)
  - Deployment of Active/Standby or Active/Acive clustered network services (FWs, SLBs) across DCs
  - Application clustering (L2 BUM extension across Pods)



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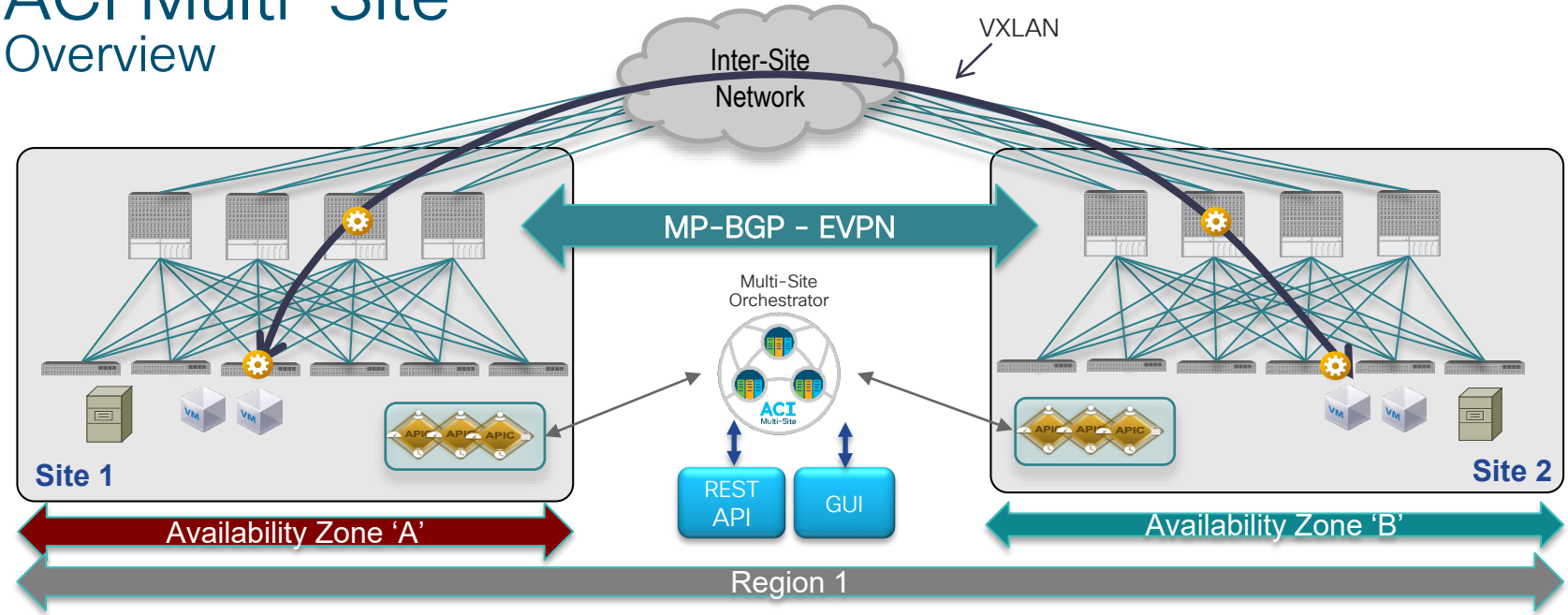
ACI Multi-Site
Overview



- Separate ACI Fabrics with independent APIC clusters
- No latency limitation between Fabrics
- ACI Multi-Site Orchestrator pushes cross-fabric configuration to multiple APIC clusters providing scoping of all configuration changes

- MP-BGP EVPN control plane between sites
- Data Plane VXLAN encapsulation across sites
- End-to-end policy definition and enforcement

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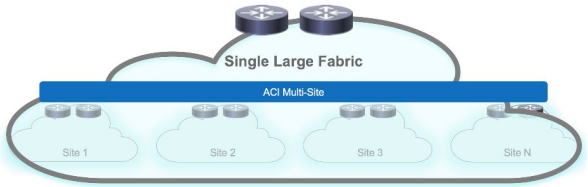
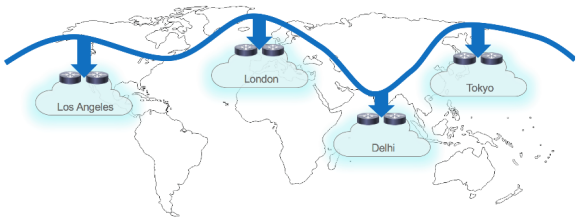
ACI Multi-Site
Most Common Use Cases

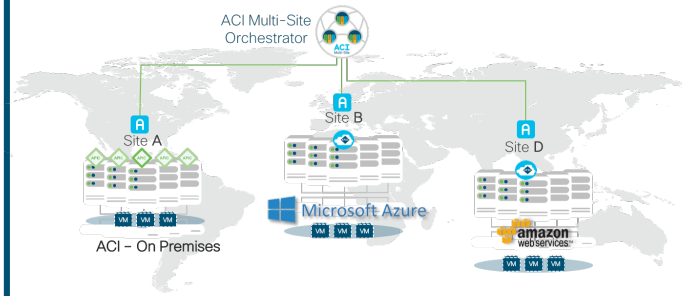
- Scale-up model to build a very large intra-DC network (above 400 leaf nodes)



- Data Centre Interconnect (DCI)
  - Extend connectivity and policy between 'loosely coupled' DC sites
  - Disaster Recovery and IP mobility use cases



- ACI Multi-Cloud
  - Integration between on-prem and public clouds



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Prerequisites

Prerequisites

For More Information on starting an ACI fabric from scratch: BRKACI-2004

- Before starting, you should have:
  - For each APIC a routable IP addresses for OOB mgmt and CIMC
  - Functional NTP server
  - Serial number of all leaf and spine nodes
  - Optionally but recommended:
    - 1 IP per leaf and spine for OOB
    - SCP / FTP / HTTP server (software)
    - Console / serial server
  - Infrastructure VLAN / VTEP pool
  - vCenter IP address and credentials

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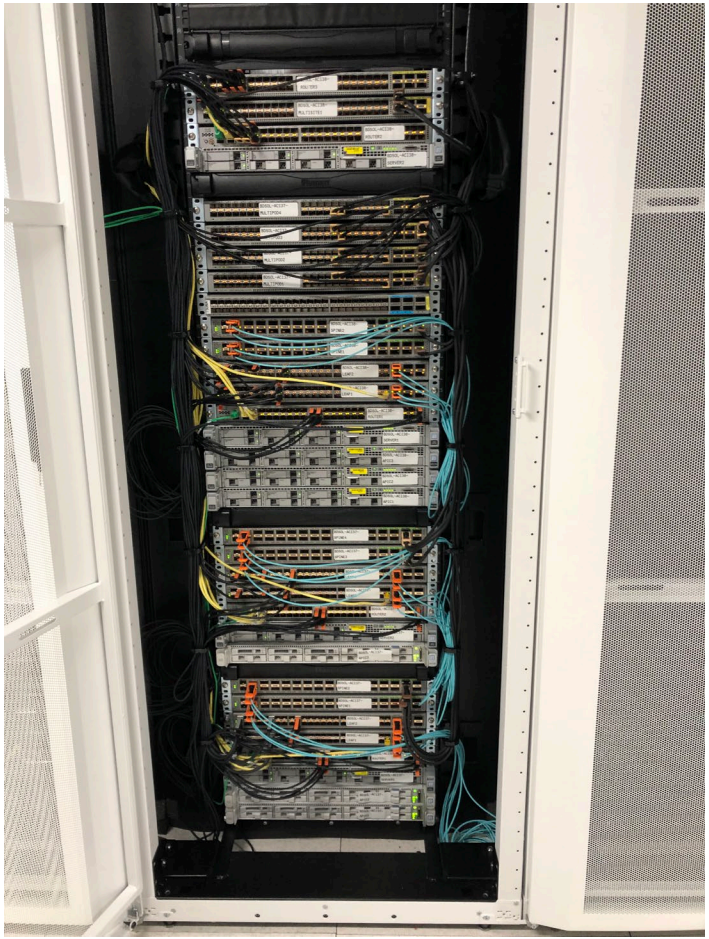
Hardware Inspection and Installation



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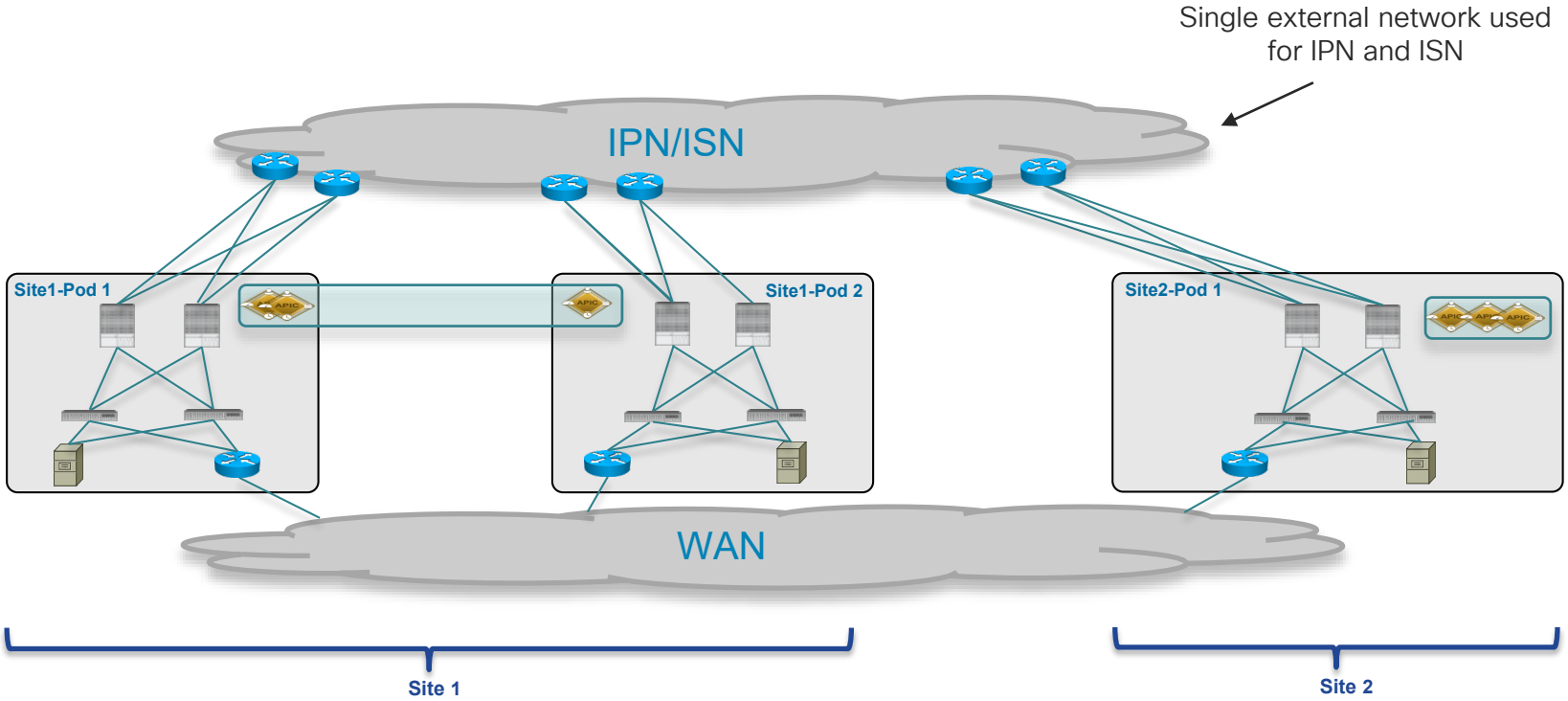
Our Setup for Today (High Level View)



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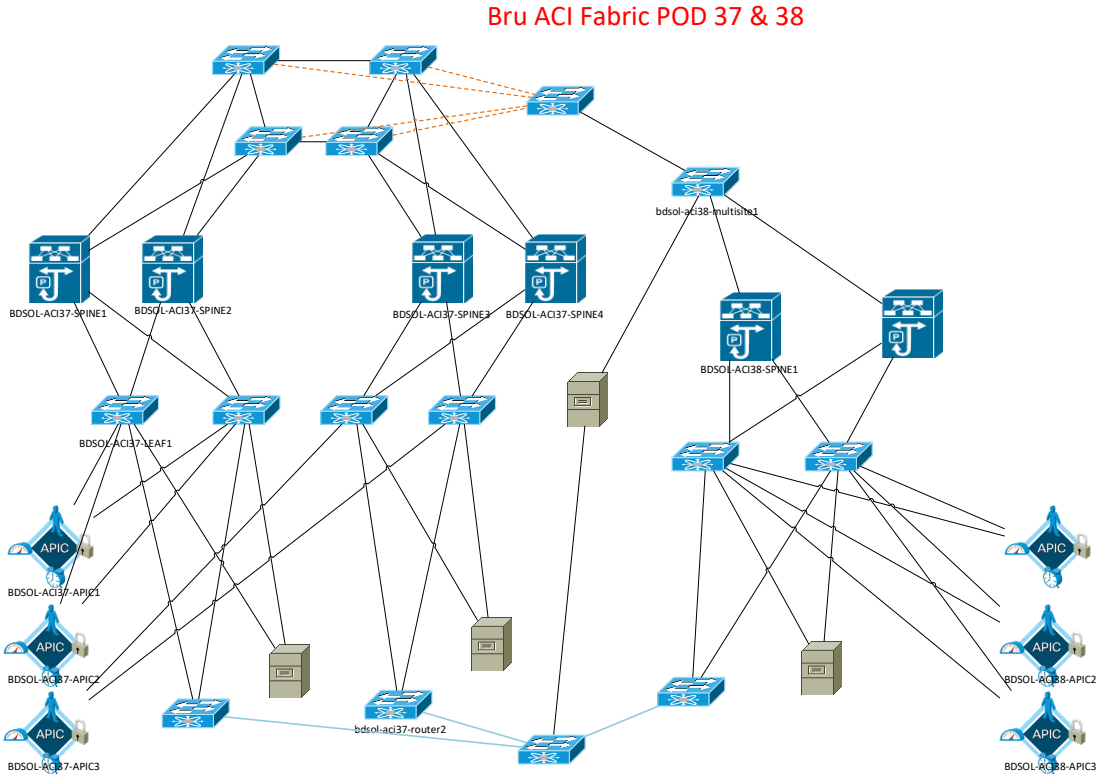
Our Setup for Today (Detailed View)



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Installing the First Site
Site1-Pod1 Configuration

Installing the First Site
Site1-Pod1: Initial Fabric Setup (Already Done)

- APIC initial configuration (S1P1-APIC1) [only the 1st one for now]
- 1st leaf discovery
- Spines discovery
- 2nd leaf discovery
- S1P1-APIC2 configuration
- Verification
- OOB mgmt → IPs for leaf and spine nodes

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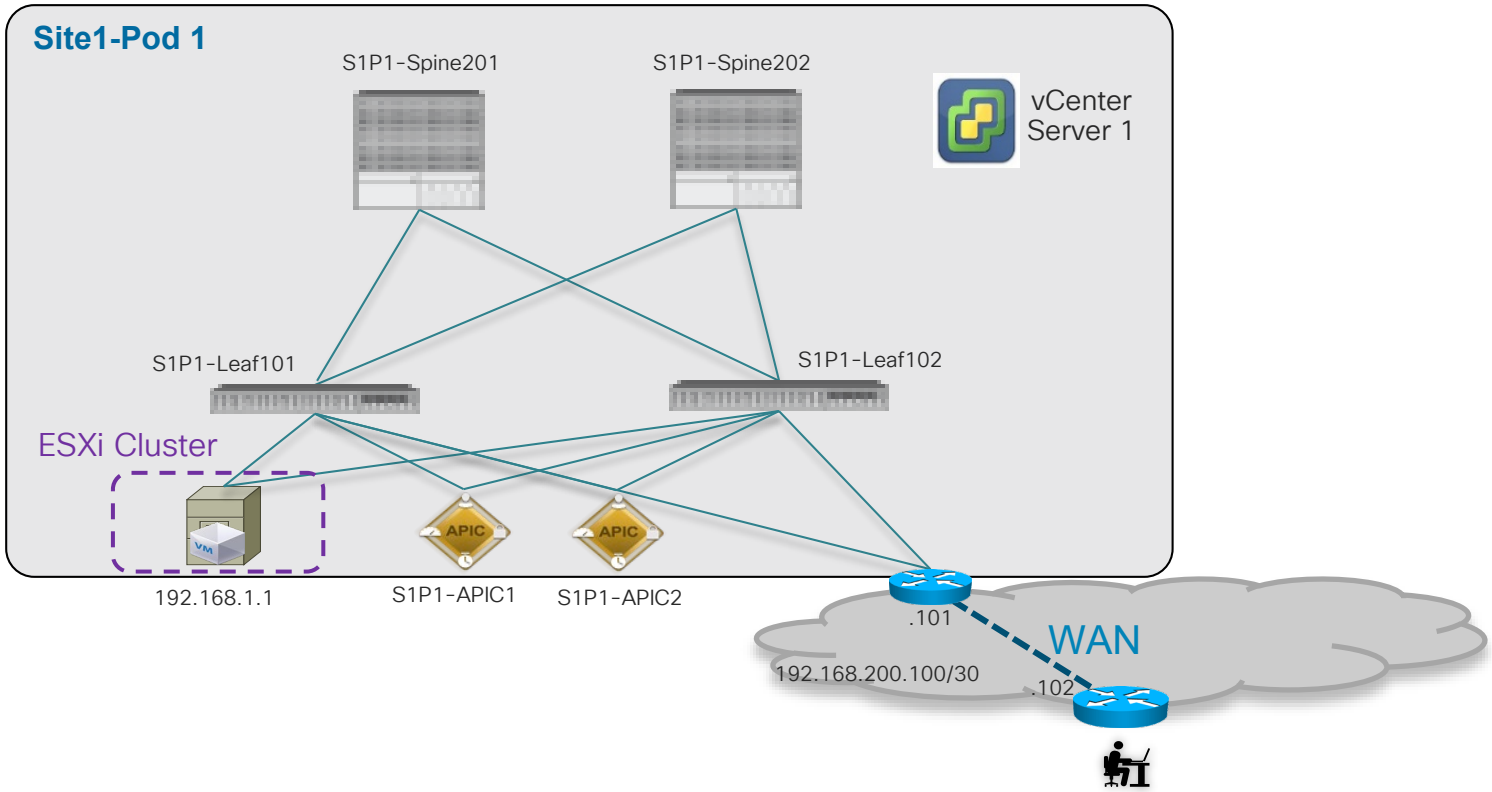
Installing the First Site
Site1-Pod1 Fabric



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Installing the First Site
Parameters for the APIC Initial Setup Script

	S1P1-APIC1	S1P1-APIC2
Fabric name	Fabric1	Fabric1
Fabric ID	1	1
Active controllers	3	3
Pod ID	1	1
Controller ID	1	2
TEP Pool	10.0.0.0/16	10.0.0.0/16
Infra VLAN	3937	3937

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Installing the First Site
Site1-Pod1: Remaining Configuration Steps to Do

- NTP configuration
- Route Reflector for intra-BGP VPNv4 sessions
- VMM integration
- Tenant configuration with ‘Ecommerce’ running application
- ‘Ecommerce’ app connectivity verification
- L3Out creation and external connectivity verification

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Demo 1

NTP, VMM, L3Out Configuration and Pod Verification

Expanding the Single Pod into a Multi-Pod Fabric

Expanding the Single Pod into a Multi-Pod Fabric
Adding the IPN and Site1-Pod2

- Step 1: setup the Inter-Pod Network (IPN)
- Step 2: create the Multi-Pod fabric using the APIC Wizard
  - Add Site1-Pod1
  - Add Site1-Pod2
  - Discovery of Pod2's leaf and spines nodes
- Step 3: S1P2-APIC3 in Pod2 joins the APIC cluster
- Step 4: extend 'Ecommerce' Tenant to Pod2 (L3Out, ESXi host, access policies)
- Verification Steps:
  - Verify that the existing tenant configuration is extended into the Multi-Pod fabric
  - Verify East-West and North-South connectivity

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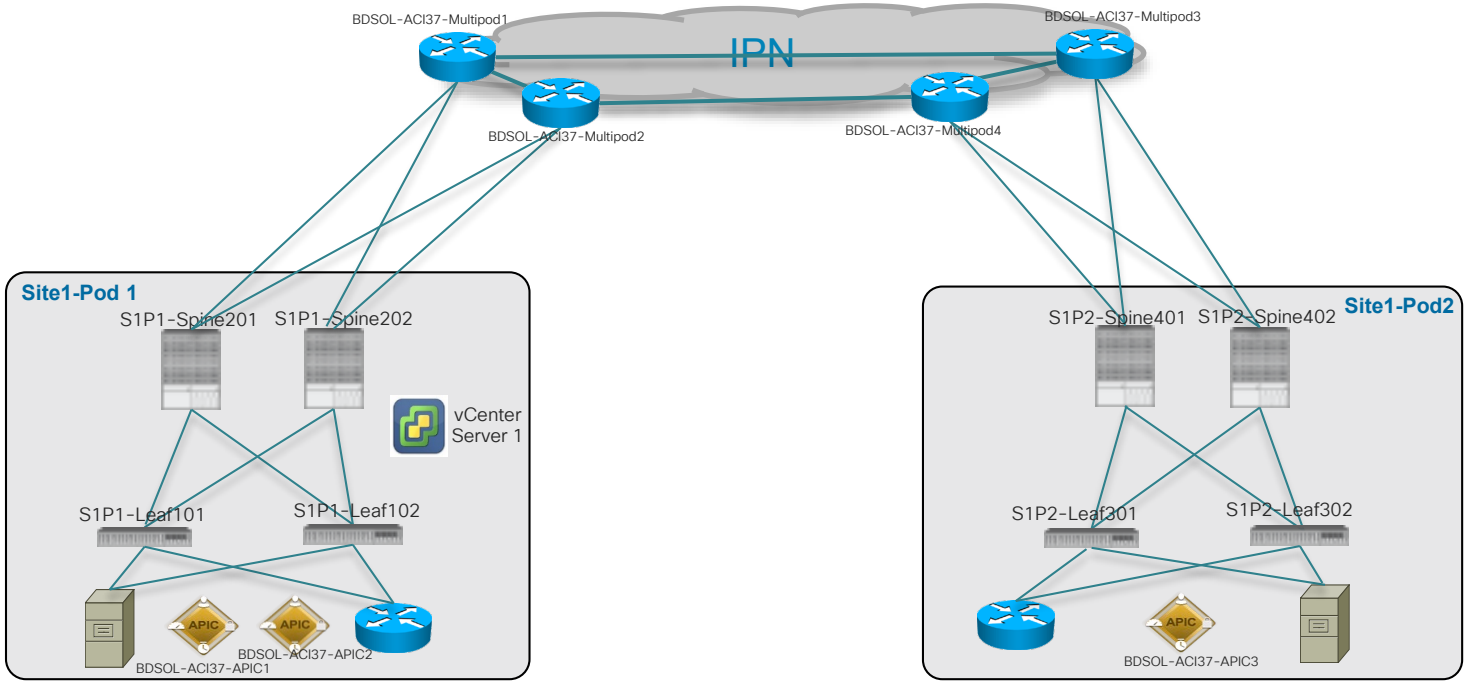
Expanding the Single Pod into a Multi-Pod Fabric
Adding the IPN and Site1-Pod2



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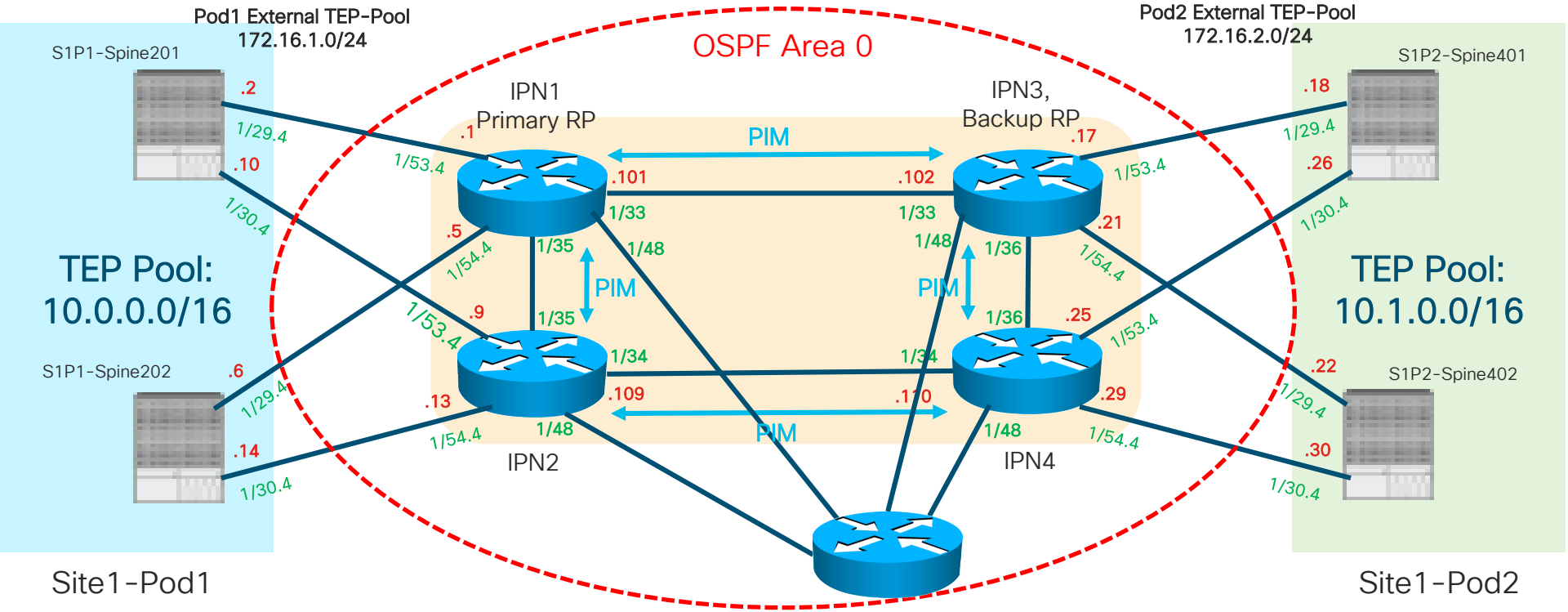
Expanding the Single Pod into a Multi-Pod Fabric
Step 1: Setup the Inter-Pod Network (IPN)



IPN Infra Address Space: 172.16.101.0/24

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Demo 2

Setup the Inter-Pod Network

Expanding the Single Pod into a Multi-Pod Fabric

Step 2: Create the Multi-Pod Fabric Using the APIC Wizard and import Pod2 Spine and Leaf Nodes

Nodes automatically discovered in Site1-Pod2 that need to be added to the APIC fabric membership table

Node ID	Pod ID	Name	S/N
301	2	S1P2-Leaf301	FDO224702ET
302	2	S1P2-Leaf302	FDO223007J4
401	2	S1P2-Spine401	FDO22472FCV
402	2	S1P2-Spine402	FDO22391NP2

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Demo 3

Create the Multi-Pod Fabric Using the APIC Wizard

Expanding the Single Pod into a Multi-Pod Fabric
Step 3: S1P2-APIC3 in Pod2 Joins the APIC Cluster

	S1P1-APIC1	S1P1-APIC2	S1P2-APIC3
Fabric name	Fabric1	Fabric1	Fabric1
Fabric ID	1	1	1
Active controllers	3	3	3
Pod ID	1	1	2
Controller ID	1	2	3
TEP Pool	10.0.0.0/16	10.0.0.0/16	10.0.0.0/16
Infra VLAN	3937	3937	3937

Pod2 uses TEP Pool 10.1.0.0/16 but S1P2-APIC3 resides in TEP Pool of Pod1

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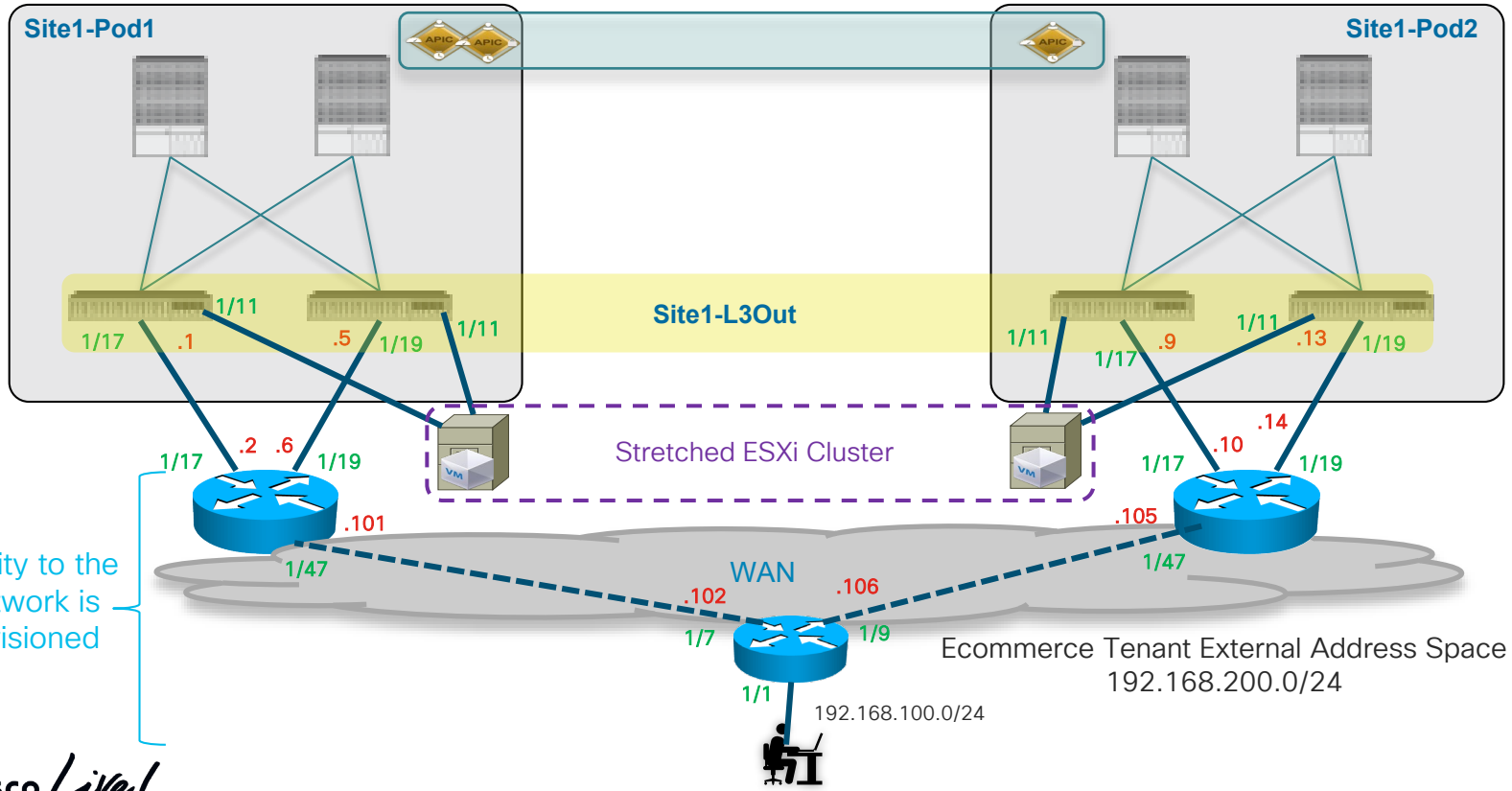
Demo 4

S1P2-APIC3 in Pod2 Joins the APIC Cluster

Expanding the Single Pod into a Multi-Pod Fabric

Step 4: Extend ‘Ecommerce’ Tenant to Pod2 (L3Out, ESXi Host to VDS, etc.)



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Demo 5

Extend ‘Ecommerce’ tenant configuration to Pod2

Simplified Tenant Management through MSO

Simplified Tenant Management through MSO
Configuration Steps

- Initial setup of MSO
- Adding the Multi-Pod fabric as first site on MSO
- Importing existing ‘Ecommerce’ tenant configuration on MSO

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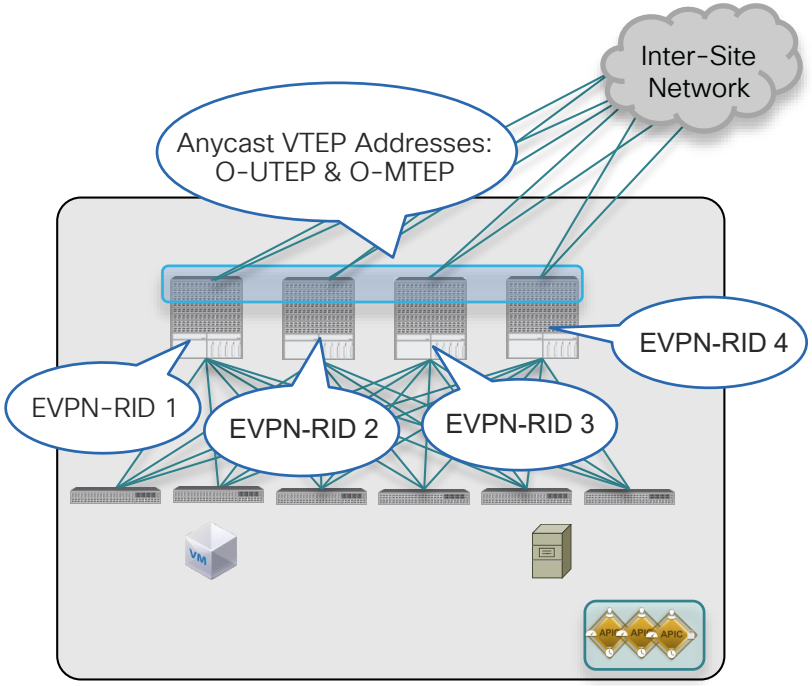
ACI Multi-Site
BGP Inter-Site Peers



- EVPN-RID, O-UTEP and O-MTEP addresses are assigned from the Multi-Site Orchestrator and **must be routable across the ISN**
- Inter-site communication always happens encapsulating traffic to one of the Anycast TEP address (O-UTEP for L3/L3 unicast forwarding, O-MTEP for BUM forwarding)

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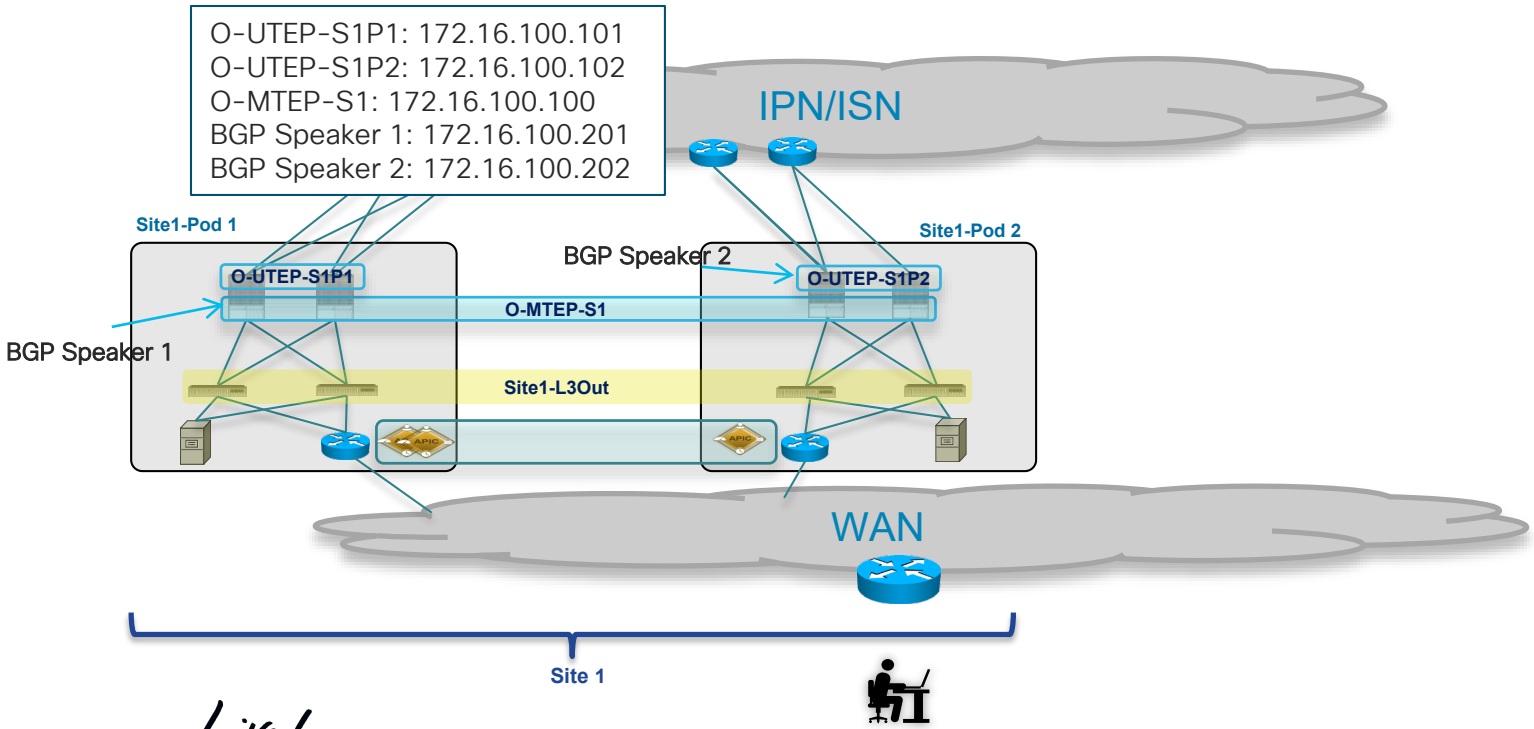
Adding the DR Site on MSO

Assign Routable TEP Addresses and BGP EVPN Router-IDs



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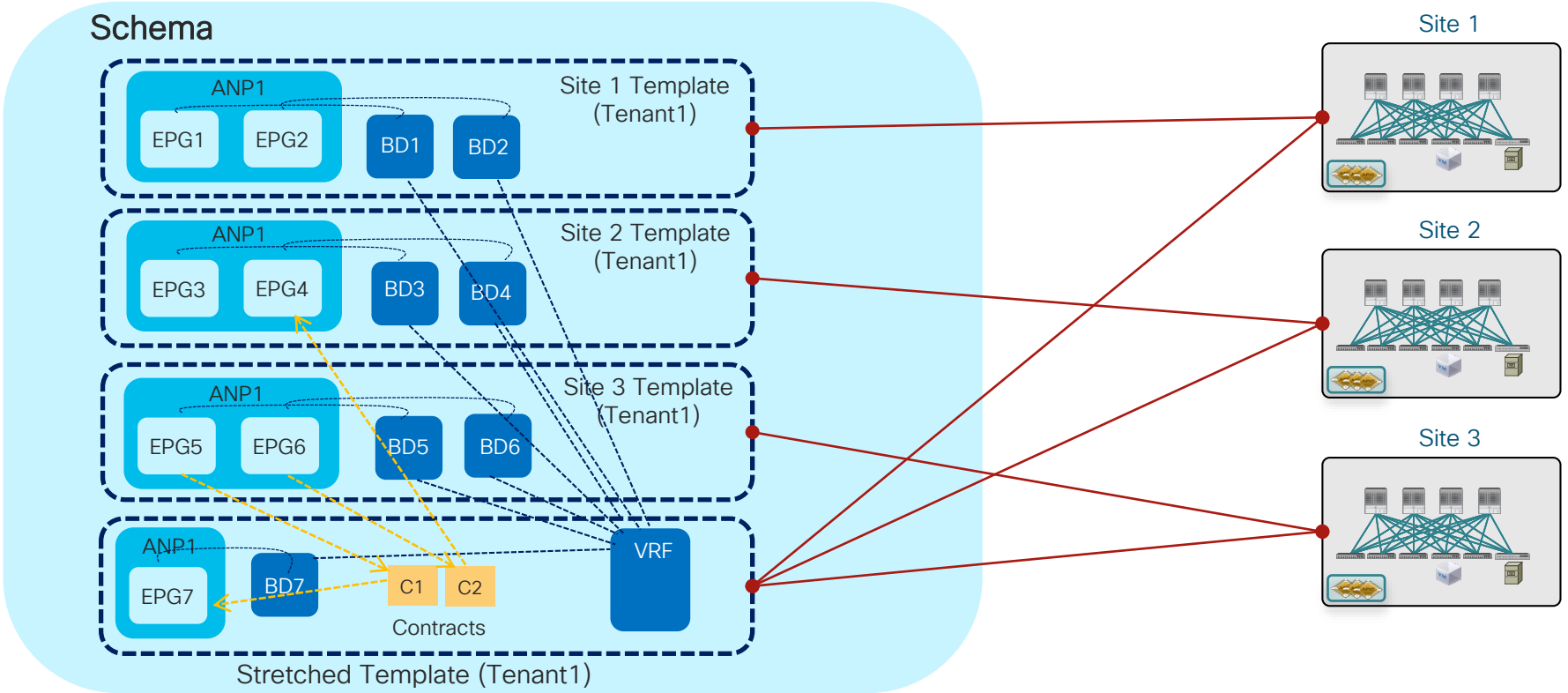
Schema Design

One Template per Site, plus a ‘Stretched’ Template



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Demo 6

Simplified Tenant Management through MSO

Adding the DR Site on MSO

Adding the DR Site on MSO
Configuration Steps

- Installing the DR fabric (already done)
- Adding the DR fabric as a second site on MSO (assign routable TEP addresses and BGP EVPN Router-IDs)
- Verifying IPN connectivity
- Extending the tenant ‘Ecommerce’ to the DR site
- Create access policies, VMM and a local L3Out in the DR fabric
- Extending the existing ‘Ecommerce’ **tenant configuration** to the DR site
- Verify external connectivity

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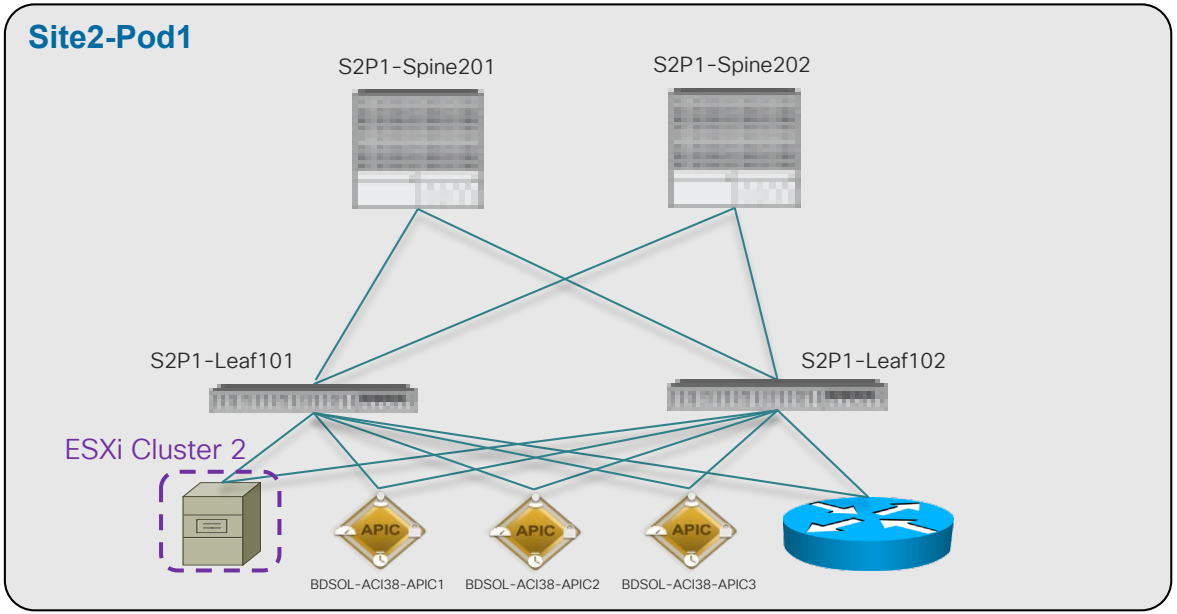
Adding the DR Site on MSO
Site2-Pod1 Fabric



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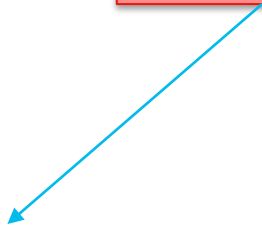
Adding the DR Site on MSO
Parameters for the APIC Initial Setup Script (Already Done)

	S2P1-APIC1	S2P1-APIC2	S2P1-APIC3
Fabric name	Fabric2	Fabric2	Fabric2
Fabric ID	1	1	1
Active controllers	3	3	3
Pod ID	1	1	1
Controller ID	1	2	3
TEP Pool	10.2.0.0/16	10.2.0.0/16	10.2.0.0/16
Infra VLAN	3937	3937	3937

Recommended to use non overlapping with existing sites.



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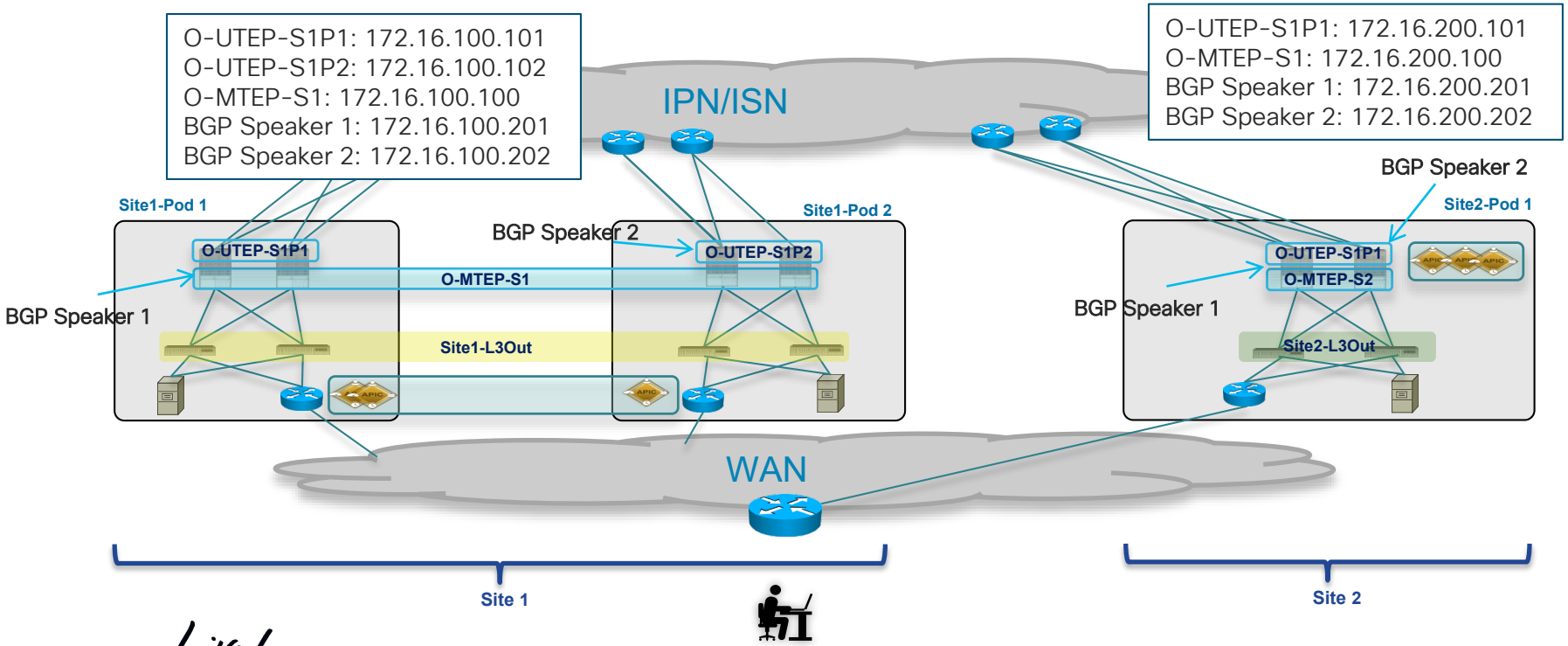
Adding the DR Site on MSO
Assign Routable TEP Addresses and BGP EVPN Router-IDs



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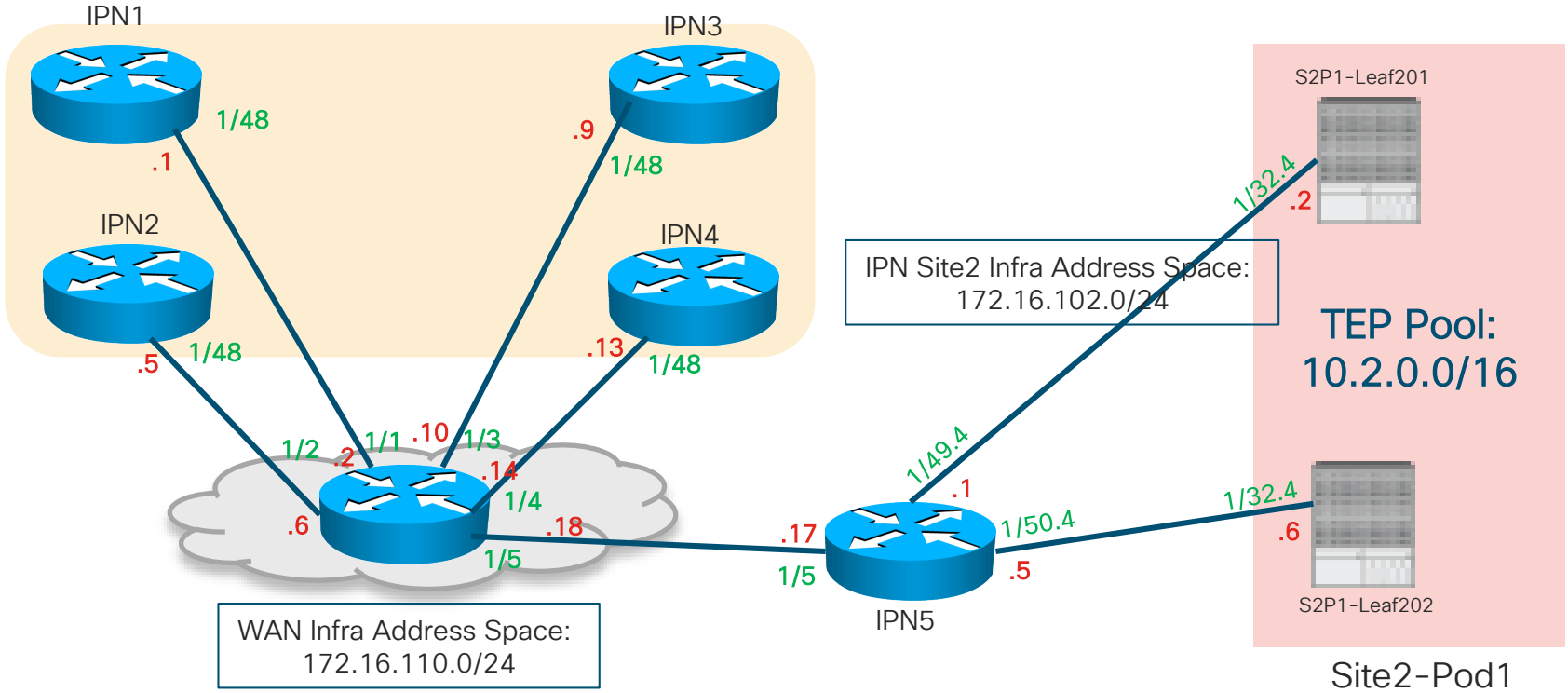
Adding the DR Site on MSO
Verifying IPN connectivity



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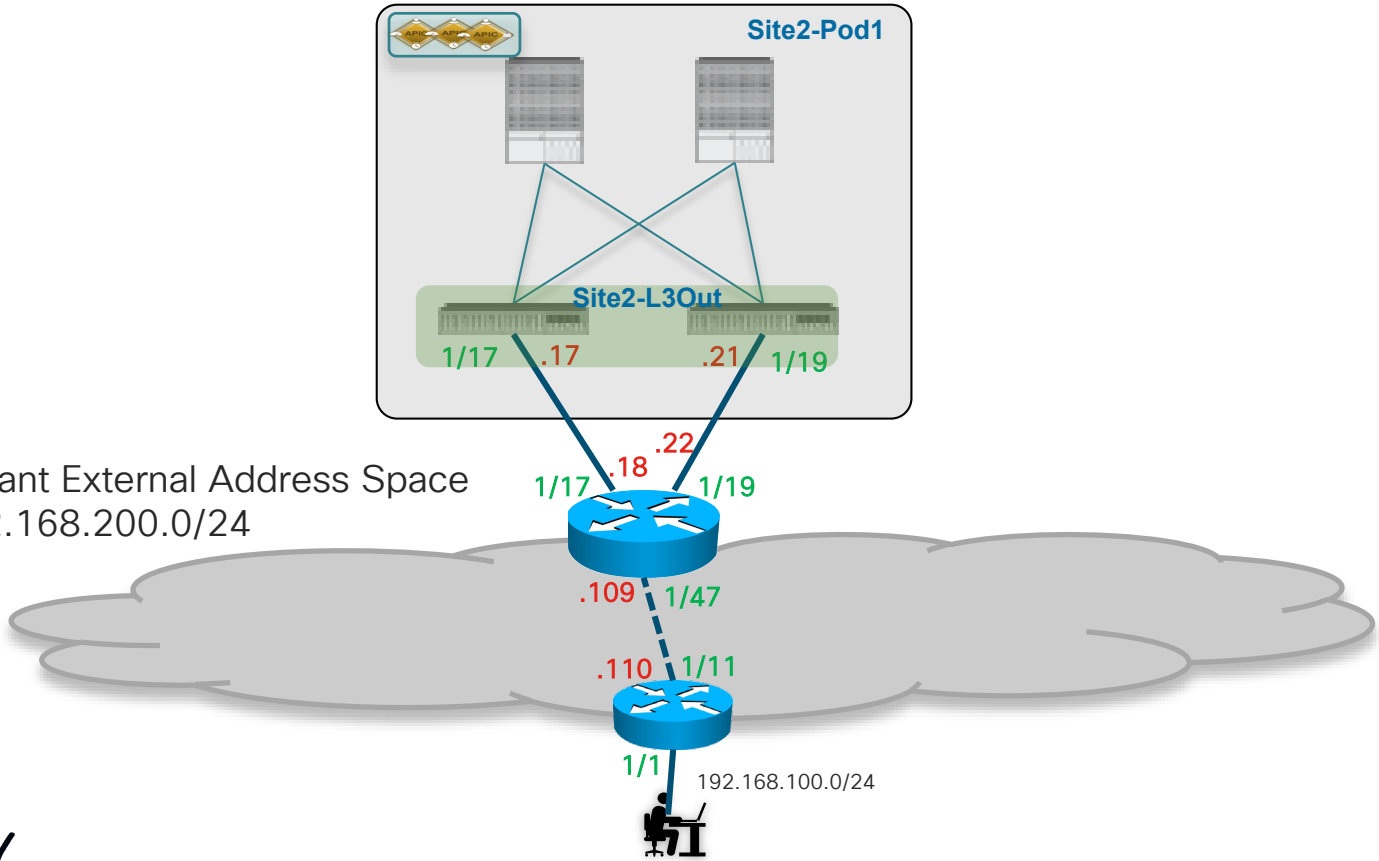
Adding the DR Site on MSO

Create a Local L3Out in the DR Site



Ecommerce Tenant External Address Space
192.168.200.0/24

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Demo 7

Adding the DR Site on MSO

MSO Additional Functionalities

MSO Additional Functionalities

- End host connectivity verification
- Host route advertisement (inbound traffic optimization)
- Enabling CloudSec encryption between sites

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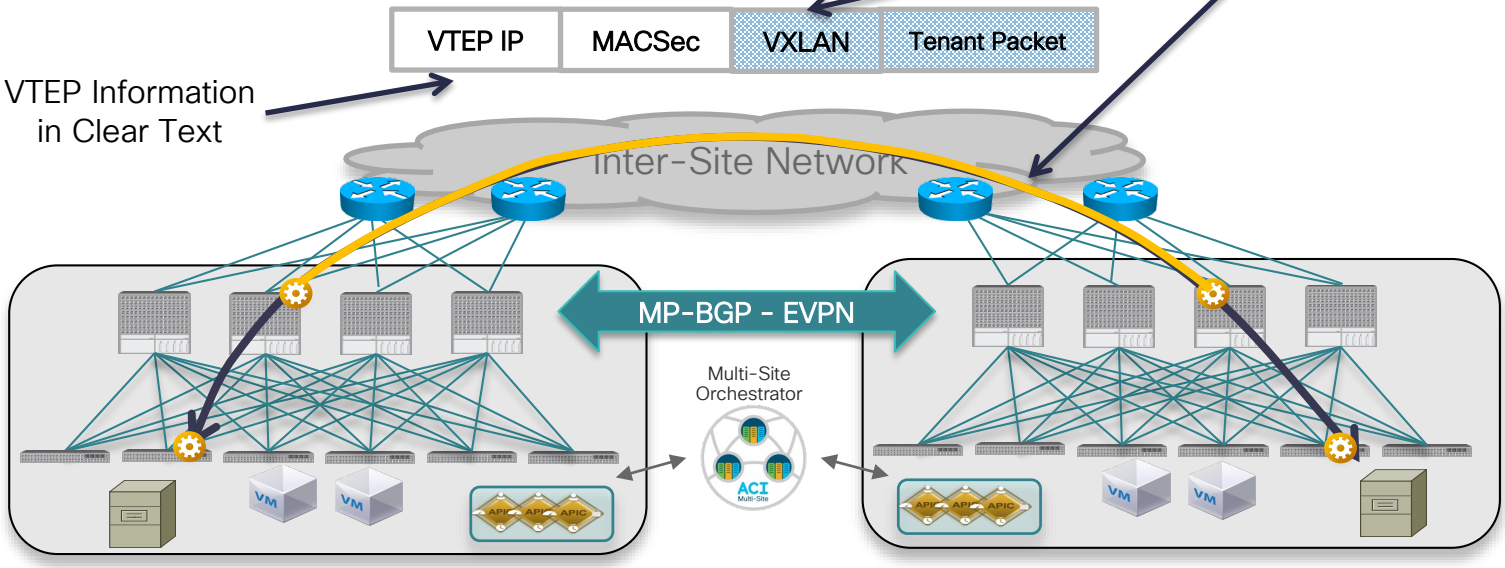
ACI Multi-Site
CloudSec Encryption for VXLAN Traffic

CloudSec = “TEP-to-TEP MACSec”

Encrypted Fabric to Fabric Traffic
[GCM-AES-256-XPN (64-bit PN)])



Supported from ACI 4.0(1) release for FX line cards and 9332C/9364C platforms

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Demo 8
MSO Additional Functionalities

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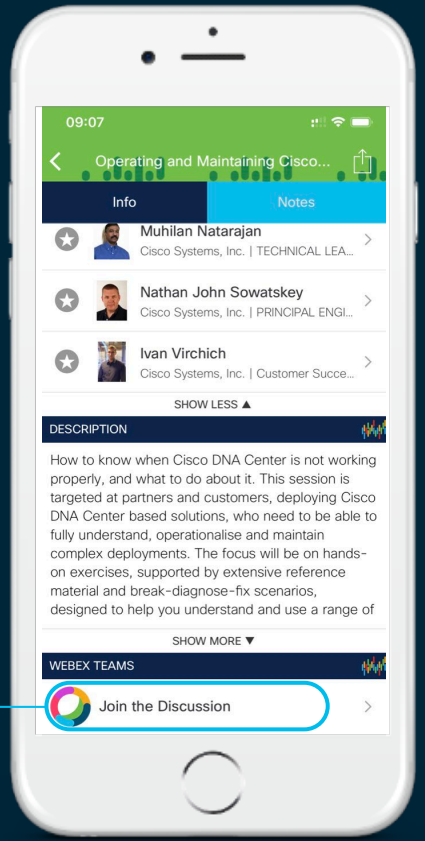

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