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How to Setup an ACI Multi-Site with Single Pod and Multi-Pod

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BRKDCN-2919

Who Are the Presenters?

Max Ardica
Distinguished Engineer – DC Team
@maxardica

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Distinguished Engineer – CX TAC
@rsmeyers

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https://ciscolive.ciscoevents.com/ciscolivebot/#BRKDCN-2919
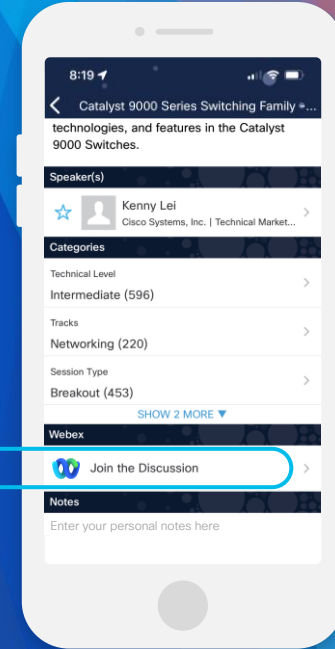
Agenda

- What We Want to Achieve Today
- Prerequisites
- Hardware Inspection and Installation
- Installing the First DC Site
- Expanding the Single Pod into a Multi-Pod Fabric
- Introducing Multi-Site and NDO
- Adding the DR Site on NDO
- NDO Additional Functionalities

What We Want to Achieve Today

Site1-Pod 1

WAN

Site 1
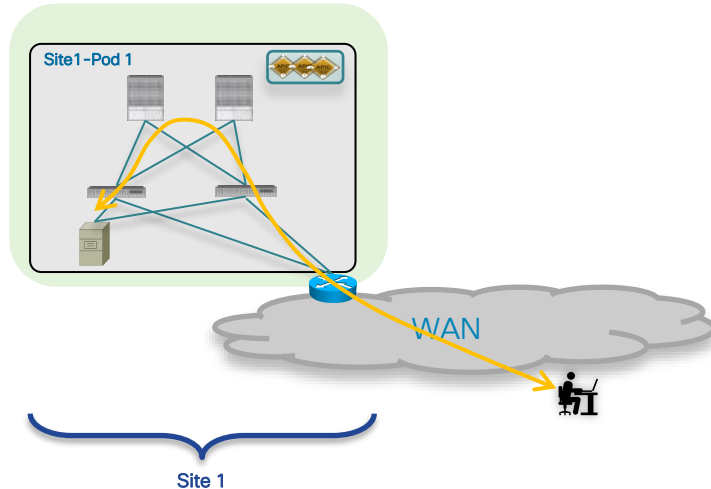
Starting Point

- RamMax Inc. starts its business operations with a single DC location

- Clients can successfully access the application inside the DC

What We Want to Achieve Today
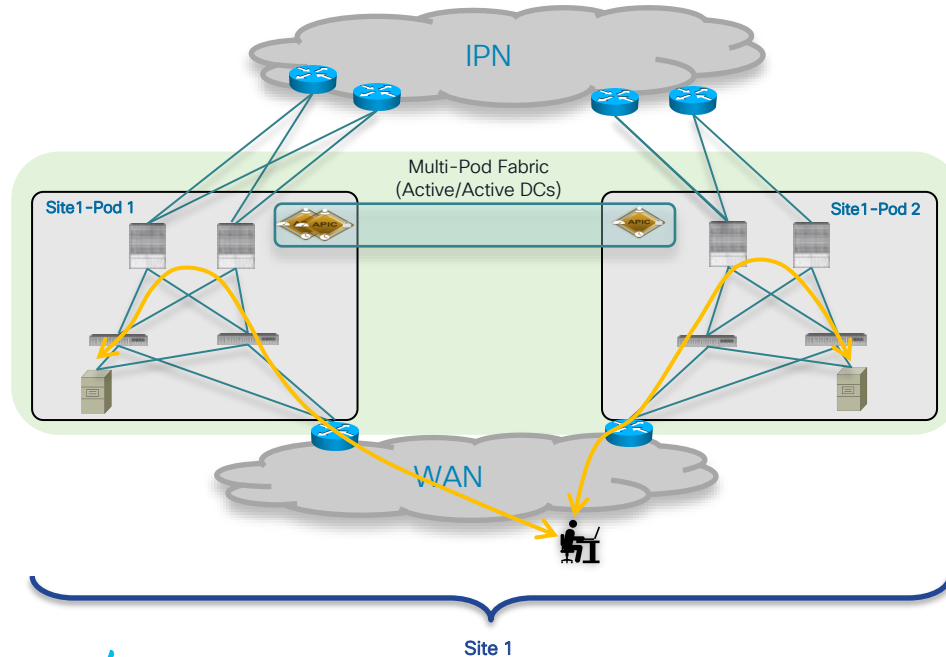
- RamMax's business is very successful and there is a need to grow the size of the DC fabric

- Multi-Pod is the architecture of choice to extend the ACI fabric presence across two DC locations in the same metro area (operated as active/active DCs)

What We Want to Achieve Today

- RamMax decides to build a DR site to ensure business continuance and recovery
- Multi-Site is the architecture used to interconnect the Prod DCs to the DR Site

Nexus Dashboard Orchestrator

Single external network used for IPN and ISN

IPN/ISN

Multi-Pod Fabric
(Active/Active DCs)

Site1-Pod 1

APIC

APIC

Site1-Pod 2

DR Site

Site2-Pod 1
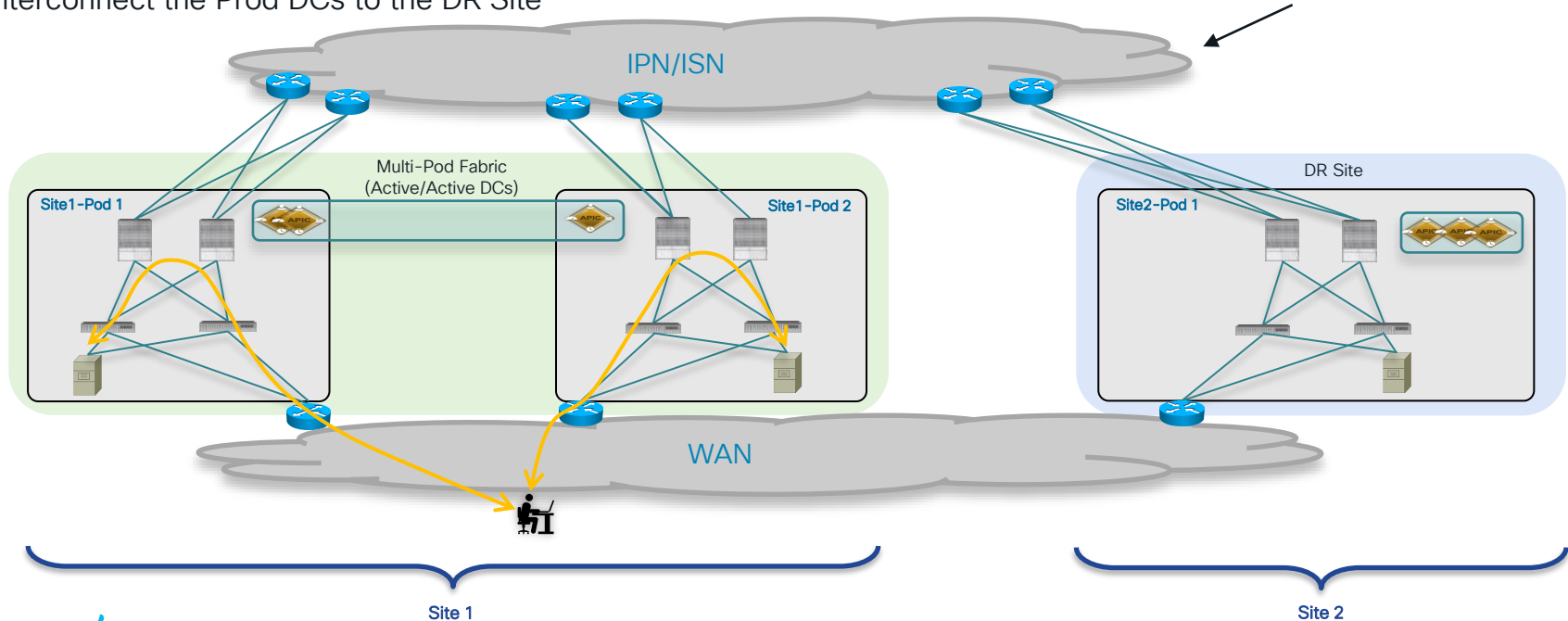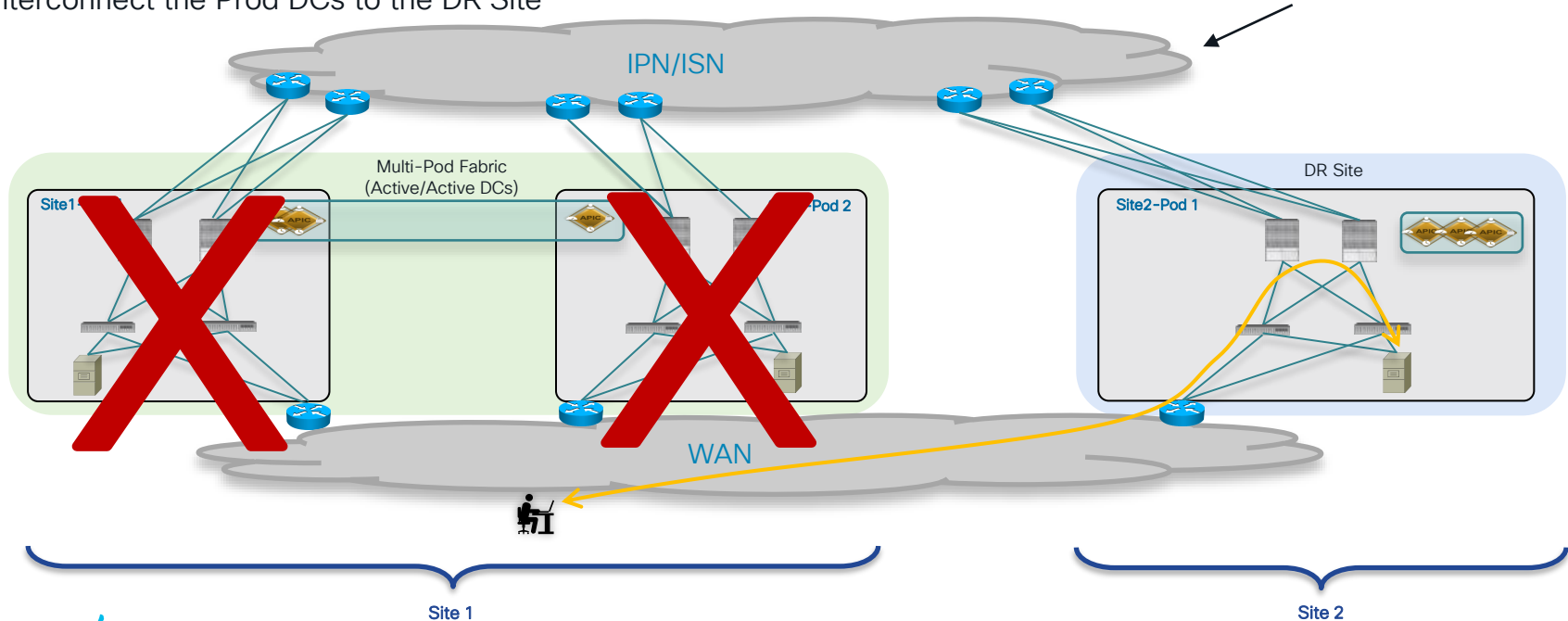
APIC APIC APIC

WAN

Site 1

Site 2

What We Want to Achieve Today

- RamMax decides to build a DR site to ensure business continuance and recovery
- Multi-Site is the architecture used to interconnect the Prod DCs to the DR Site

Nexus Dashboard Orchestrator

Single external network used for IPN and ISN

Prerequisites

Prerequisites

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

Hardware Inspection and Installation
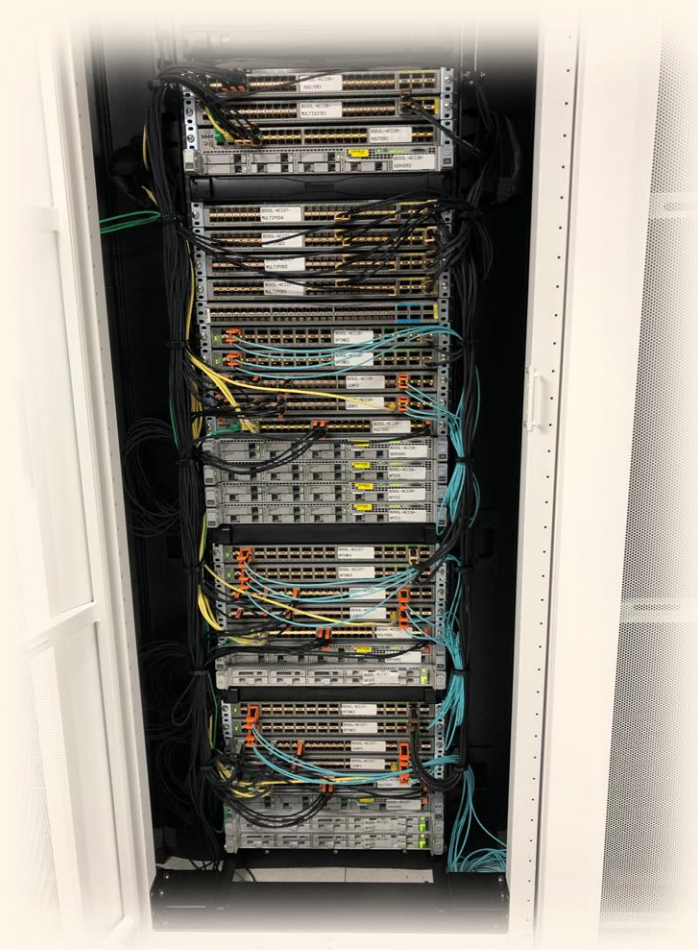
Our Setup for Today (Detailed View)

Bru ACI Fabric POD 37 & 38
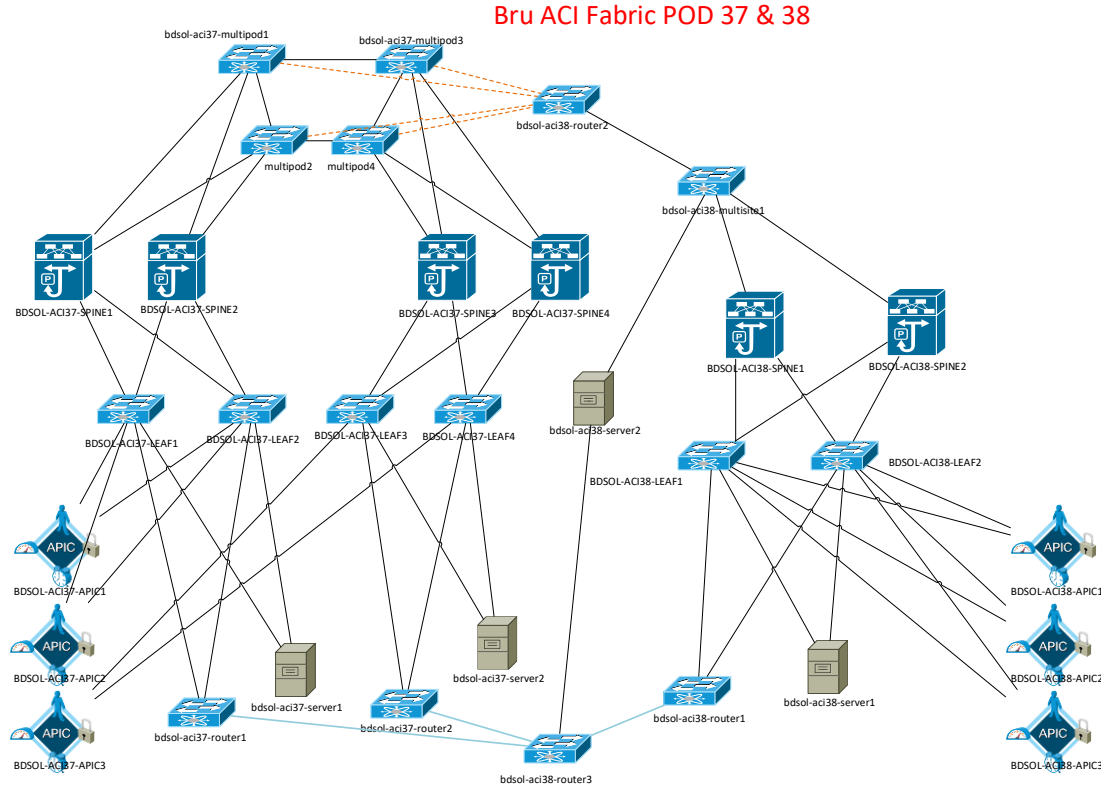
Installing the First DC Site
Site1-Pod1 Configuration

Installing the First DC 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

Installing the First DC Site

Site1-Pod1 Fabric
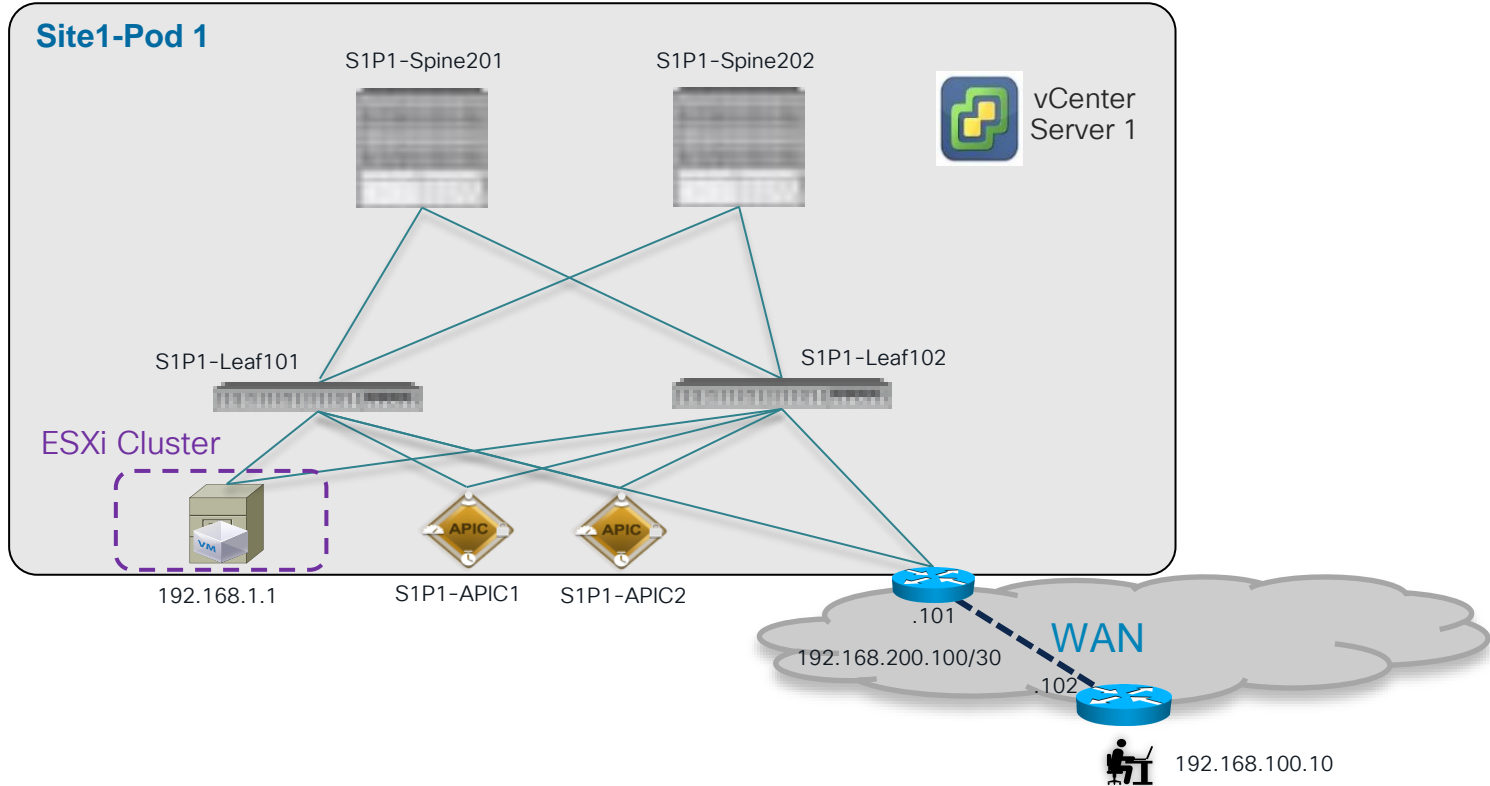
Installing the First DC Site

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

Installing the First DC 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

Demo 1
NTP, VMM, L3Out Configuration
and Pod Verification

Expanding the Single Pod into a Multi-Pod Fabric

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Expanding the Single Pod into a Multi-Pod Fabric

Adding the IPN and Site1-Pod2

- Step 1: verify the Inter-Pod Network (IPN) configuration
- 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

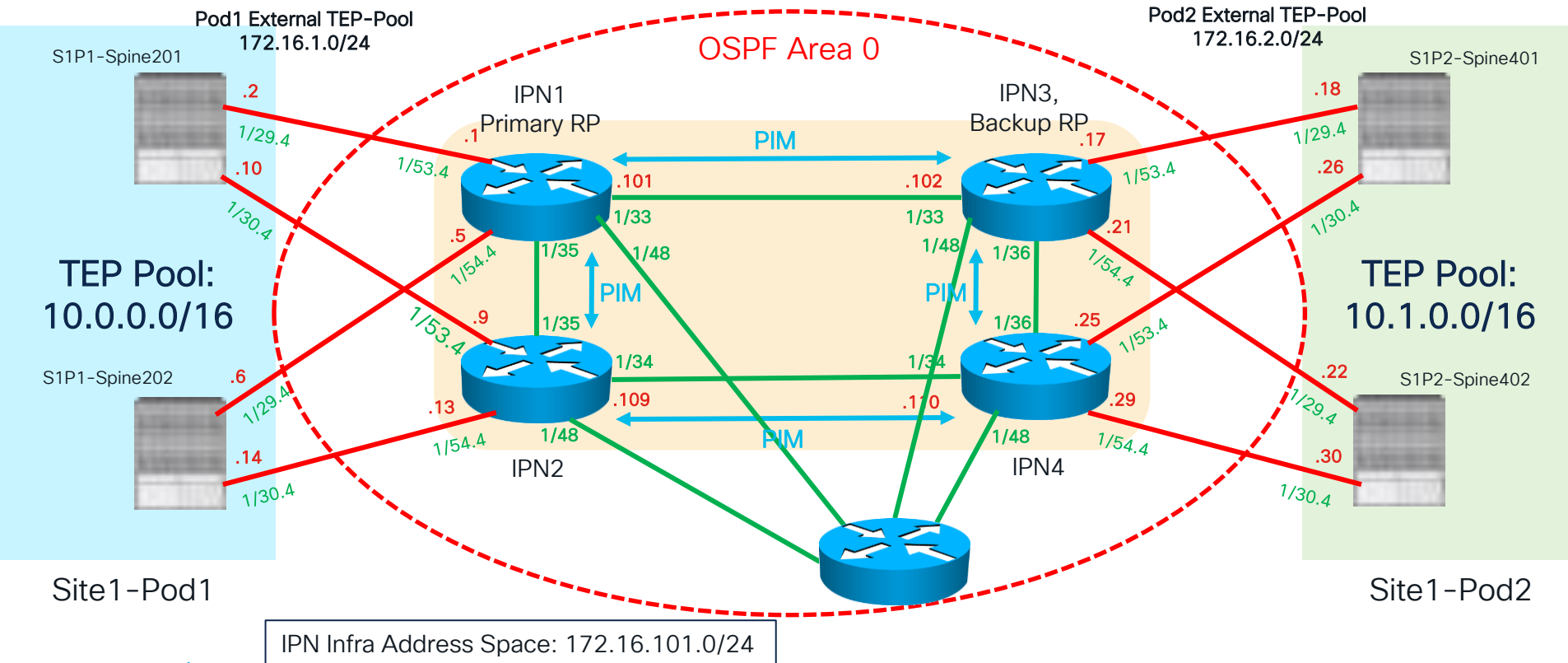# Expanding the Single Pod into a Multo-Pod Fabric

Adding the IPN and Site1-Pod2

Expanding the Single Pod into a Multi-Pod Fabric

Step1: Verify the Inter-Pod Network (IPN) Configuration

Demo 2
Verify the Inter-Pod
Network (IPN) Configuration

Demo 3
Create the Multi-Pod Fabric
Using the APIC Wizard

Expanding the Single Pod into a Multi-Pod Fabric

Step2: 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

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
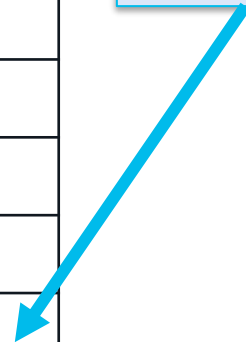
Expanding the Single Pod into a Multi-Pod Fabric

Full OSPF Adjacencies between Spines and IPN in both Pods

OSPF Area 0

Pod1 External TEP-Pool
172.16.1.0/24

Pod2 External TEP-Pool
172.16.2.0/24

S1P1-Spine201

IPN1
Primary RP

IPN3,
Backup RP

S1P2-Spine401

PIM

.2
1/29.4
.10
1/30.4

.1
1/53.4
.101
1/33
1/35

.102
1/33
1/48

.17
1/53.4
.21
1/36

.18
1/29.4
.26
1/30.4

TEP Pool:
10.0.0.0/16

PIM

PIM

TEP Pool:
10.1.0.0/16

.5
1/54.4
.9
1/53.4

1/35

1/36
.25

1/54.4

S1P1-Spine202

.6
1/29.4
.13
1/54.4
.14
1/30.4

1/34
.109
1/48

1/34
.110

1/53.4
.29
1/48

.22
1/29.4
.30
1/30.4

S1P2-Spine402

PIM

IPN2

IPN4

1/54.4

Site1-Pod1

Site1-Pod2

IPN Infra Address Space: 172.16.101.0/24

Expanding the Single Pod into a Multi-Pod Fabric

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

Demo 5
Extend 'Ecommerce' tenant
configuration to Pod2
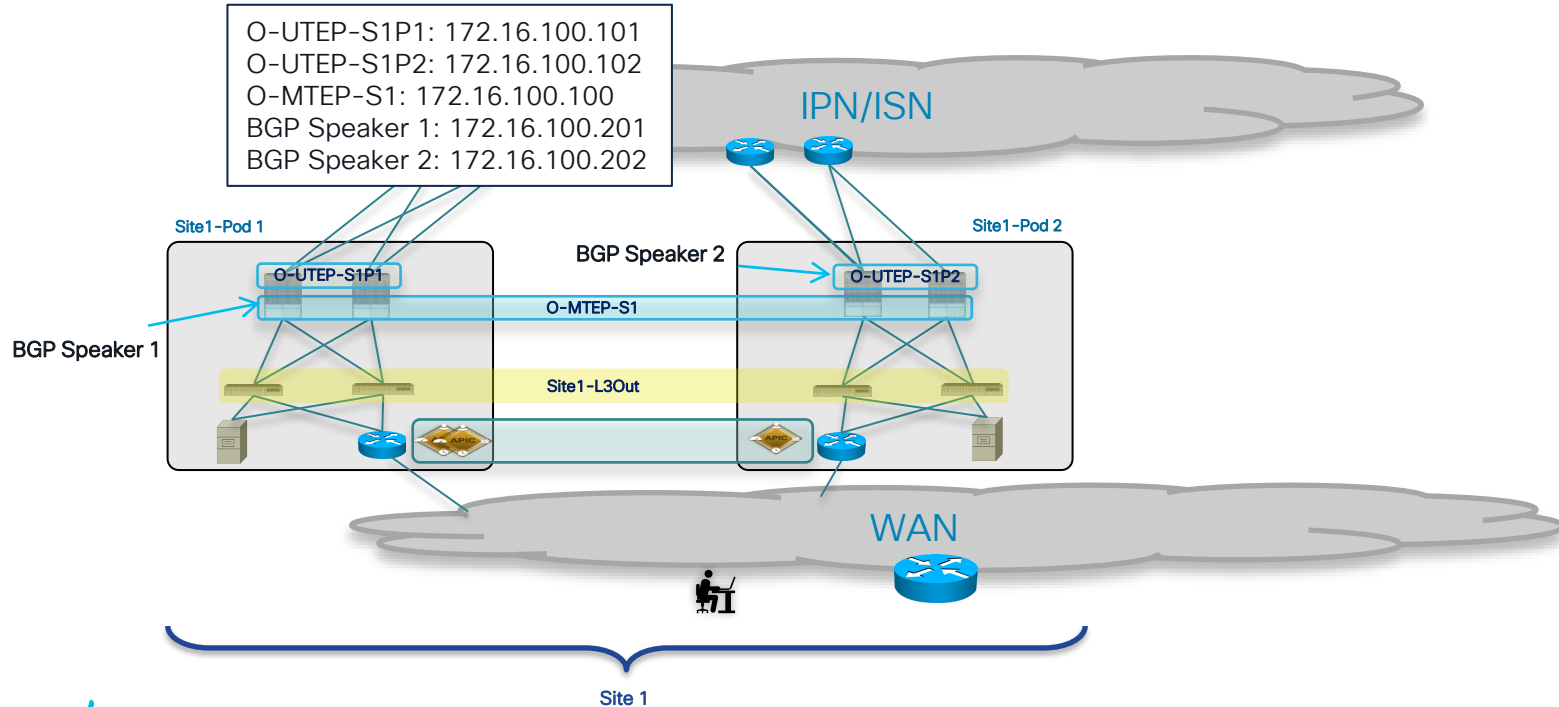
Introducing NDO and Multi-Site

Introducing NDO and Multi-Site
Configuration Steps

- Initial setup of ND/NDO

- Adding the Multi-Pod fabric as first site on ND/NDO

  - Onboarding the Multi-Pod Fabric on ND

  - Setting the Multi-Pod Fabric as "Managed" on NDO

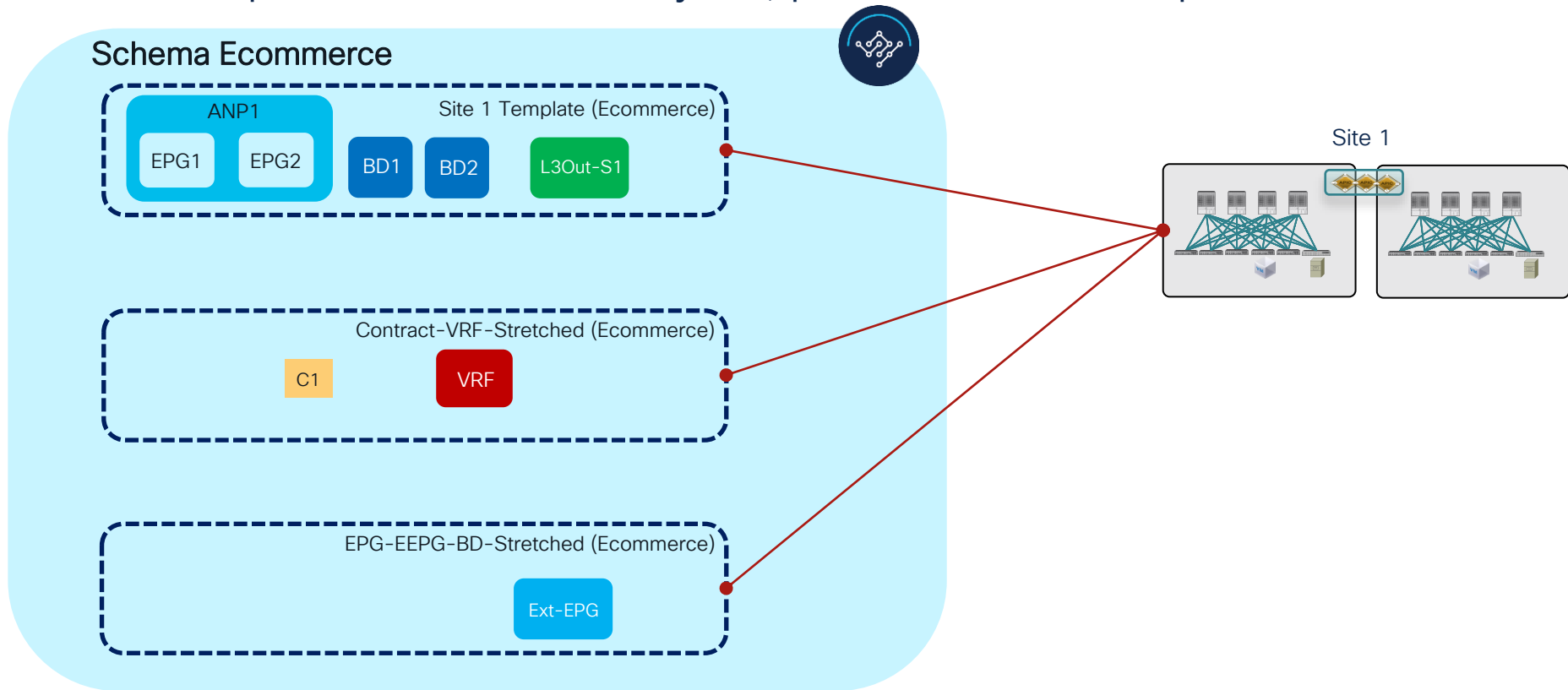- Importing existing 'Ecommerce' tenant configuration on NDO

Adding the Multi-Pod Fabric on NDO
Assign Multi-Site TEP Addresses and BGP EVPN Router-IDs

O-UTEP-S1P1: 172.16.100.101
O-UTEP-S1P2: 172.16.100.102
O-MTEP-S1: 172.16.100.100
BGP Speaker 1: 172.16.100.201
BGP Speaker 2: 172.16.100.202

IPN/ISN

Site1-Pod 1

Site1-Pod 2

BGP Speaker 2

O-UTEP-S1P1

O-UTEP-S1P2

O-MTEP-S1

BGP Speaker 1

Site1-L3Out

WAN

Site 1

Schema Design (Initial State)

One Template for Site 1 local objects, plus 'Stretched' Templates

Demo 6
Simplified Tenant Management through NDO

Adding the DR Site on NDO

Adding the DR Site on NDO

DR Site Preparation

- Through automation, create the necessary configuration for the DR site
  - Access policies
 - VMM domain integration

Adding the DR Site on NDO
Configuration Steps

- Adding the DR fabric as a second site on ND/NDO (onboarding it on ND, managing it on NDO, assigning Multi-Site TEP addresses, BGP EVPN Router-IDs and External TEP pool, establishing OPSF connectivity between spines and IPN routers)

- Verifying IPN connectivity

- Extending the tenant 'Ecommerce' to the DR site

- Create the Site2 local L3Out directly on NDO in the "L3OUt Template" (new NDO 4.1(1) feature)

- Extending the existing 'Ecommerce' **tenant configuration** to the DR site

- Verify East-West and North-South connectivity

Adding the DR Site on NDO
Site2-Pod1 Fabric
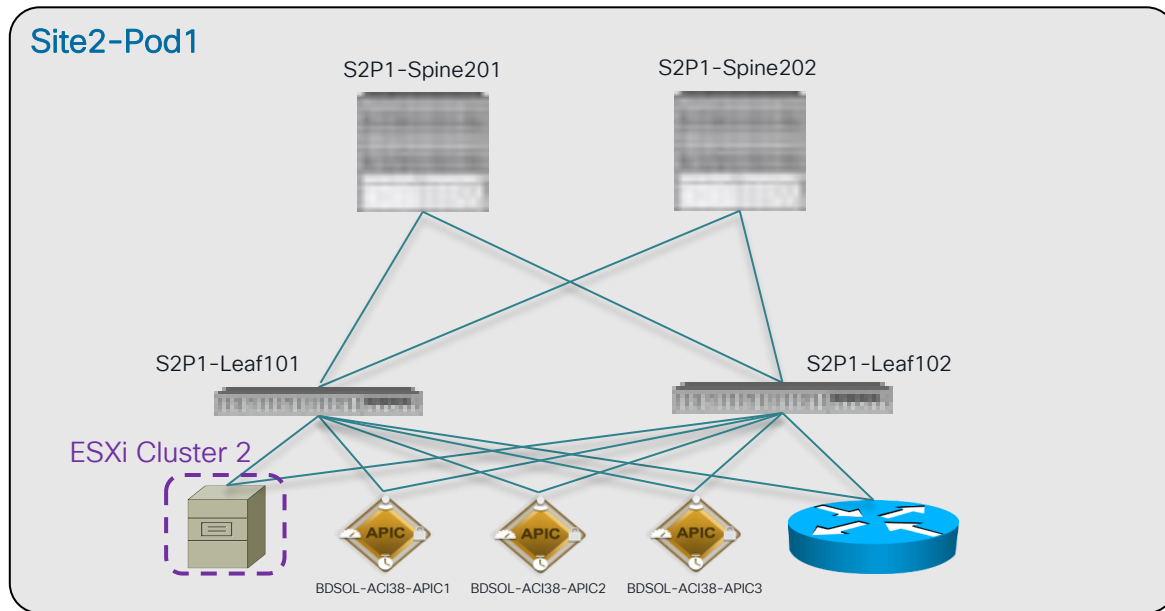
Adding the DR Site on NDO
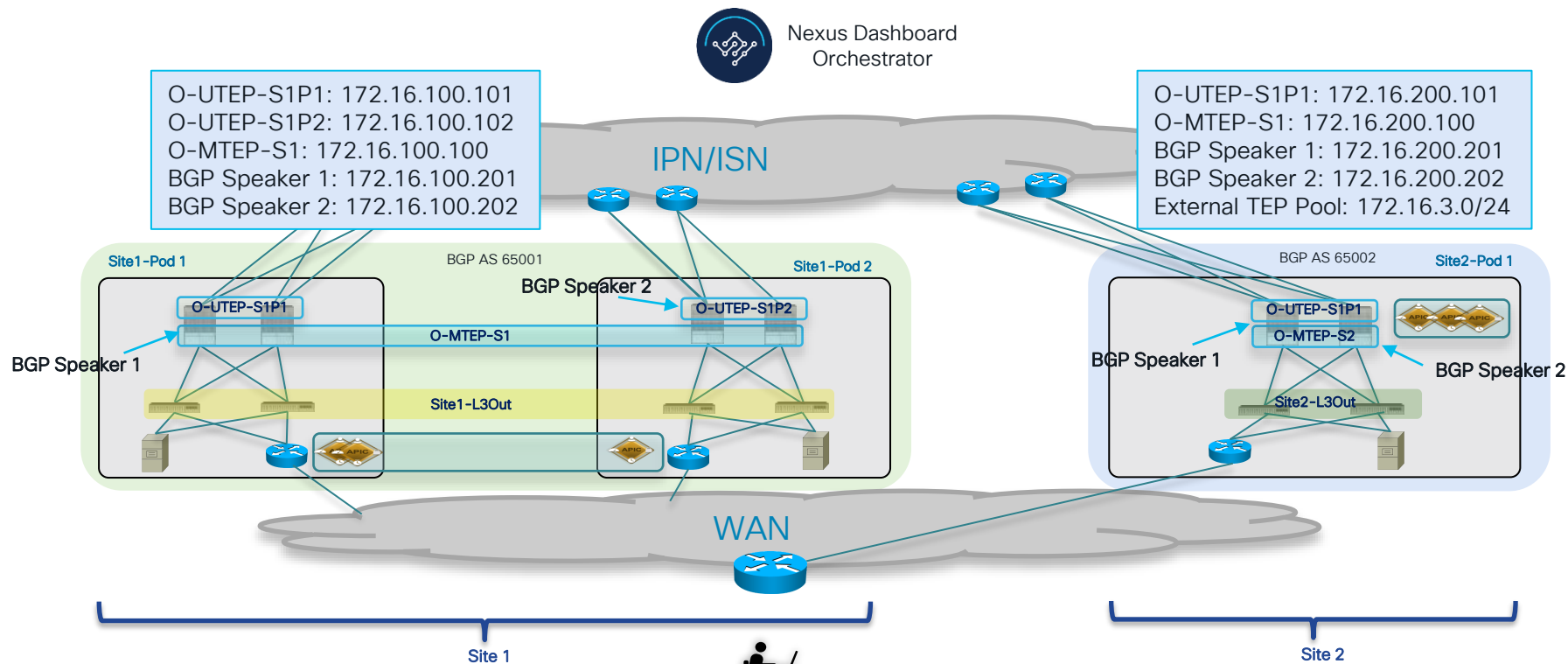## Parameters for the APIC Initial Setup Script (Already Done)

	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

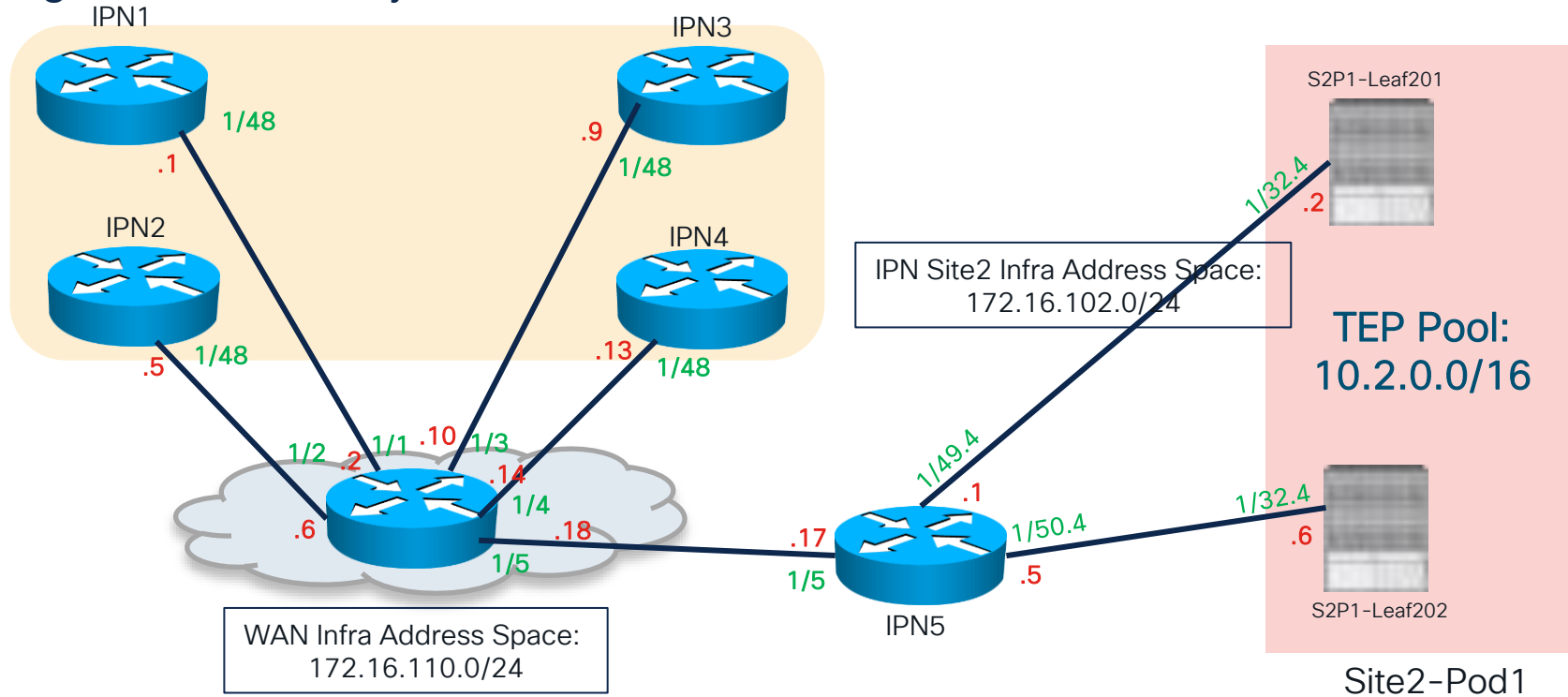Recommended not to use overlapping TEP Pools with existing sites

Adding the DR Site on NDO
Assign Routable TEP Addresses and BGP EVPN Router-IDS

Nexus Dashboard Orchestrator

O-UTEP-S1P1: 172.16.100.101
O-UTEP-S1P2: 172.16.100.102
O-MTEP-S1: 172.16.100.100
BGP Speaker 1: 172.16.100.201
BGP Speaker 2: 172.16.100.202

O-UTEP-S1P1: 172.16.200.101
O-MTEP-S1: 172.16.200.100
BGP Speaker 1: 172.16.200.201
BGP Speaker 2: 172.16.200.202
External TEP Pool: 172.16.3.0/24

IPN/ISN

Site1-Pod 1   BGP AS 65001   Site1-Pod 2

BGP Speaker 2

O-UTEP-S1P1   O-UTEP-S1P2

O-MTEP-S1

BGP Speaker 1

Site1-L3Out

APIC   APIC

BGP AS 65002   Site2-Pod 1

O-UTEP-S1P1
O-MTEP-S2

BGP Speaker 1   BGP Speaker 2

Site2-L3Out

WAN

Site 1   Site 2

Adding the DR Site on NDO

Verifying IPN connectivity

Demo 7
Adding the DR Site on NDO

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Adding the DR Site on NDO

Create a Local L3Out in the DR Site Directly on NDO

Site2-Pod1

S2P1-Leaf101 (RID: 192.168.200.205)   S2P1-Leaf102 (RID: 192.168.200.206)

Site2-L3Out

1/17   .17   .21   1/19

Ecommerce Tenant External
Address Space
192.168.200.0/24
(VLAN Tag 901)

.18   .22

1/17   1/19

.109   1/47

.110   1/11

1/1

192.168.100.10/24

Create a Local L3Out Directly on NDO

Cross-Referencing Different Types of Templates

Tenant Policy Template

Interface routing policy
- OSPF Interface Policy

L3Out Template

L3Out1

VRF

Protocol: OSPF

Nodes   Policy
101   Pol1
102   Pol2

Interfaces   Policy
101/1/1   Pol1
102/1/1   Pol1

Interface Group
Policy Pol1

App Template

BD1

VRF1
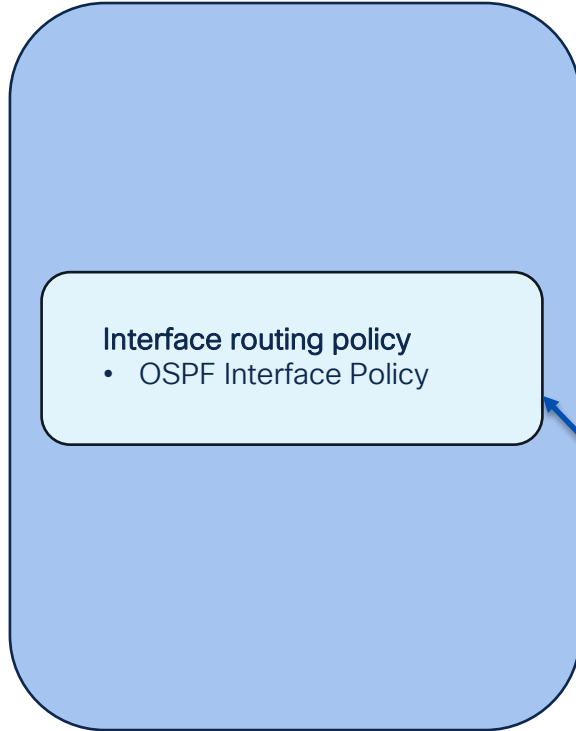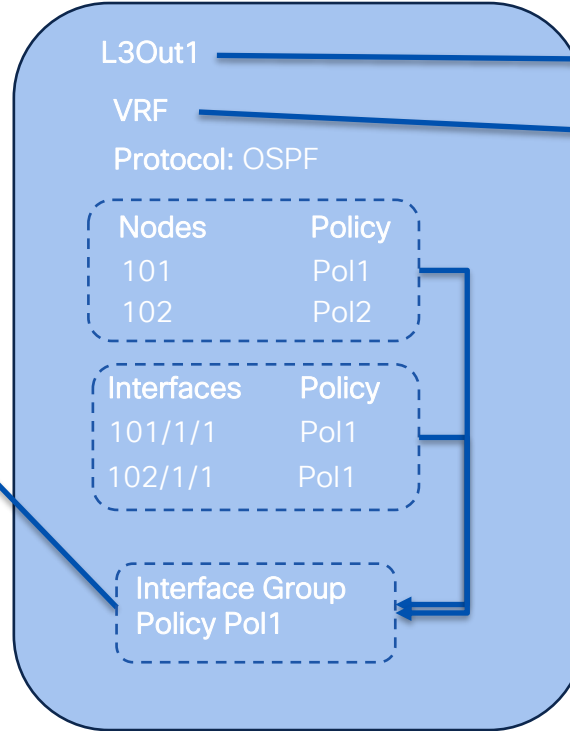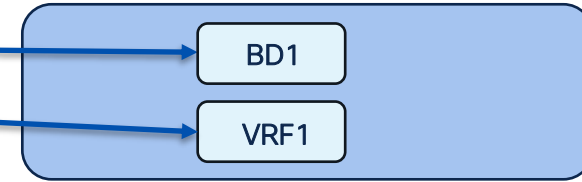
Schema Design (Today)

One Template for Site 1 local objects, plus 'Stretched' Templates

Schema Ecommerce

ANP1 — Site 1 Template (Ecommerce)

EPG1 EPG2 BD1 BD2 L3Out-S1

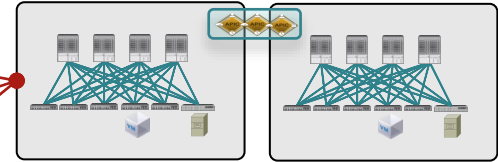Contract-VRF-Stretched (Ecommerce)

C1 VRF

EPG-EEPG-BD-Stretched (Ecommerce)

Ext-EPG
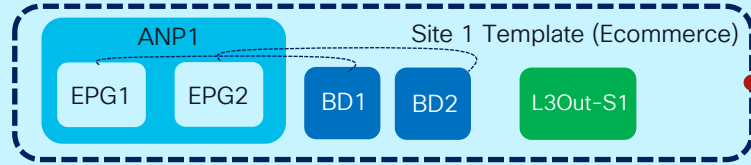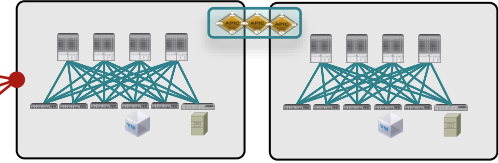
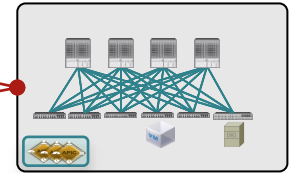Site 1

Schema Design (Final State)

Migrating EPGs/BDs to the Stretched Template
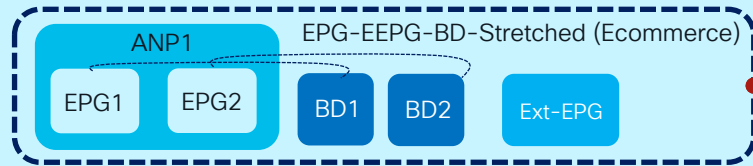
NDO Additional Functionalities

NDO Additional Functionalities

- End host connectivity verification

- Host route advertisement (inbound traffic optimization)

Demo 8
NDO Additional Functionalities

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Where to Go for More Information

✓ ACI Multi-Pod White Paper

http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-737855.html?cachemode=refresh

✓ ACI Multi-Pod Configuration Paper

https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-739714.html

✓ ACI Multi-Pod and Service Node Integration White Paper

https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-739571.html

✓ ACI Multi-Site White Paper

https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-739609.html

✓ Cisco Multi-Site Deployment Guide for ACI Fabrics

https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-739609.html

✓ ACI Multi-Site and Service Node Integration White Paper

https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-743107.html

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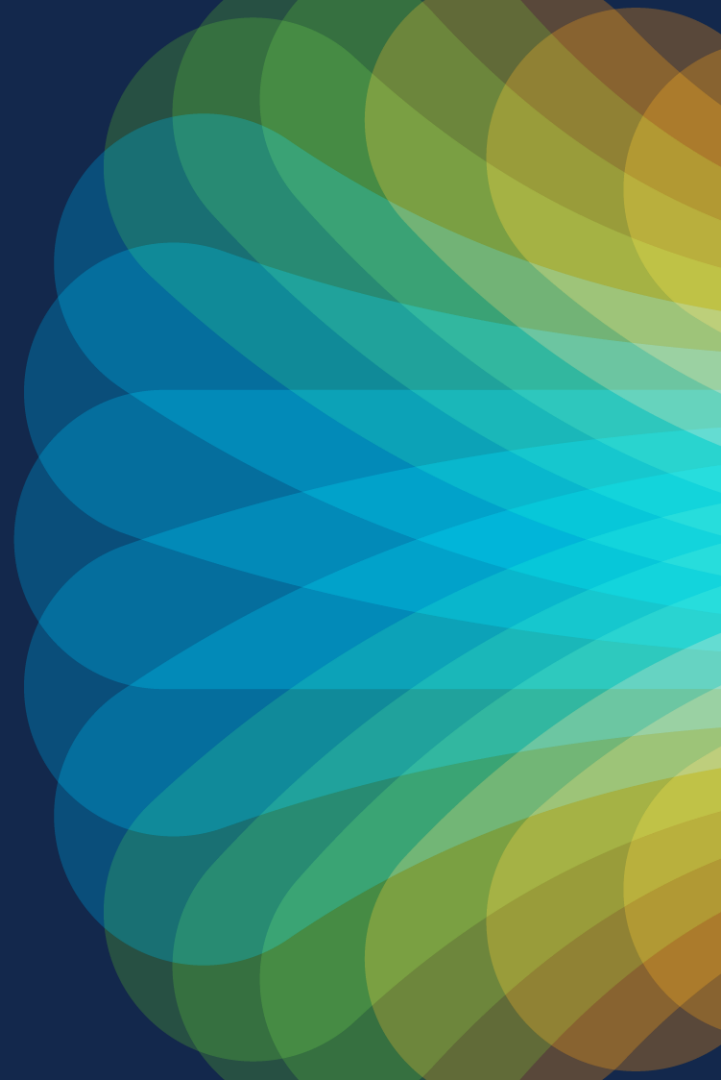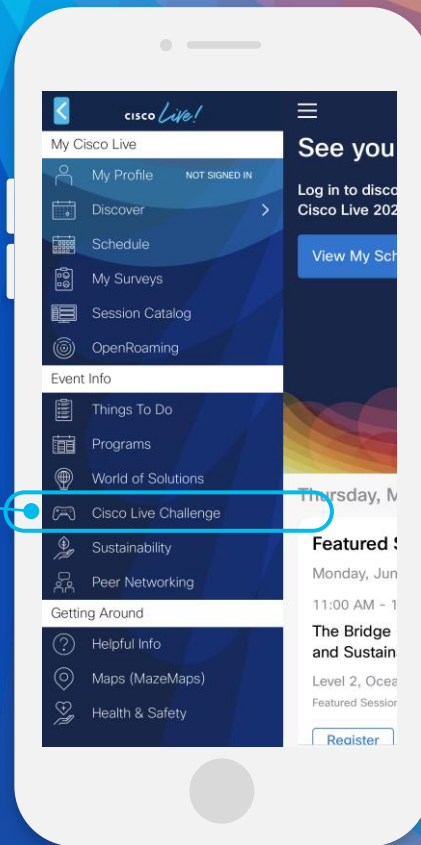- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

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