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7-10 March 2017 • Melbourne, Australia

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# ACI Multisite Deployment

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BRKACI-3502

# Session Objectives



At the end of the session, the participants should be able to:

- Articulate the different Multi-Fabric deployment options offered with Cisco ACI
- Understand the design considerations associated to those options

Initial assumption:

- The audience already has a good knowledge of ACI main concepts (Tenant, BD, EPG, L2Out, L3Out, etc.)

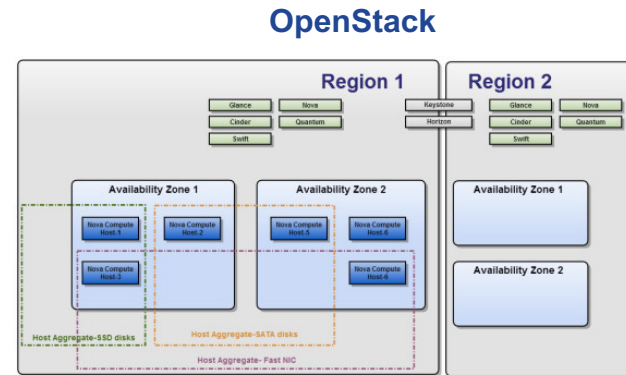
# Agenda

- Availability Design with ACI
- ACI Multi-Pod
- ACI Multi-Site
- Conclusions and Q&A

# Regions and Availability Zones

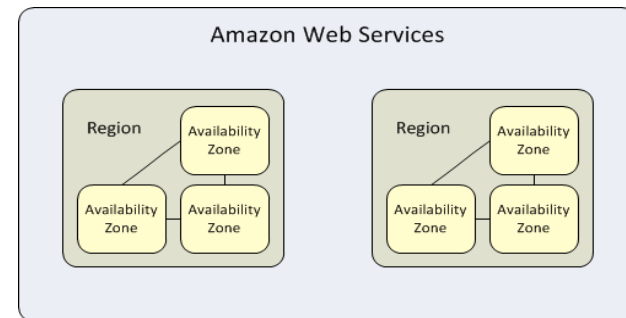
## OpenStack and AWS Definitions

- **Regions** - Each Region has its own full OpenStack deployment, including its own API endpoints, networks and compute resources
- **Availability Zones** - Inside a Region, compute nodes can be logically grouped into Availability Zones, when launching new VM instance, we can specify AZ or even a specific node in a AZ to run the VM instance



- **Regions** - Large and widely dispersed into separate geographic locations.
- **Availability Zones** - Distinct locations within a region that are engineered to be isolated from failures in other Availability Zones and provide inexpensive, low latency network connectivity to other Availability Zones in the same region

## Amazon Web Services



# In-Region and Out-of-Region Data Centres

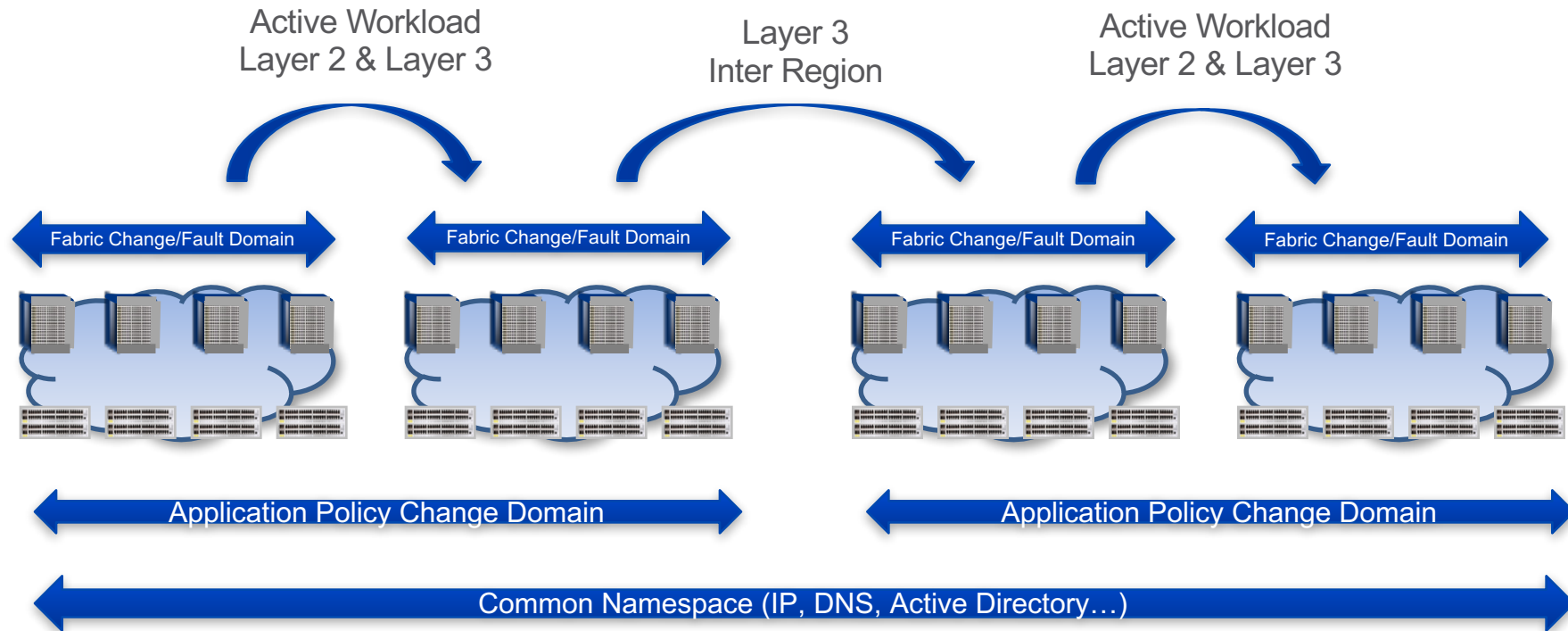
## Disaster Recovery and Business Continuity

- **Active/Active** — Traffic intended for the failed node is either passed onto an existing node or load balanced across the remaining nodes
- **Active/Passive** — Provides a fully redundant instance of each node, which is only brought online when its associated primary node fails
- **Out-of-Region** — Beyond the ‘Blast Radius’ for any disaster



# Regions and Availability Zones

## Change and Fault Isolation



# Terminology

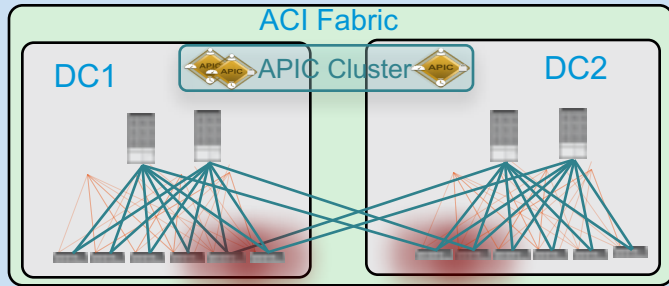
- **Pod**: a Leaf-Spine network sharing common control plane (ISIS, COOP, MP-BGP, ...)  
Pod == Availability Zone
- **Fabric**: scope of an APIC Cluster, can be one or more connected Pods  
Fabric == Region
- **Multi-Pod**: single APIC Cluster with multiple leaf spine networks  
Multi-Pod == Multiple Availability Zones within a Single Region (Fabric)
- **Multi-Site**: multiple APIC Clusters (Fabrics) + associated Pods  
Multi-Pod and Multi-Site can be complementary designs

# Interconnecting ACI Networks

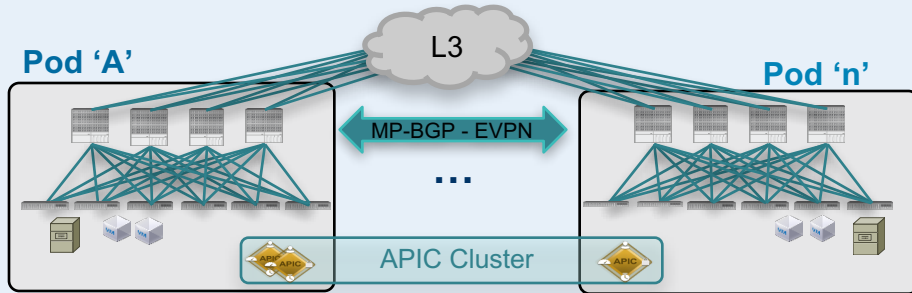
## Deployment Options

### Single APIC Cluster/Single Fabric

#### Stretched Fabric

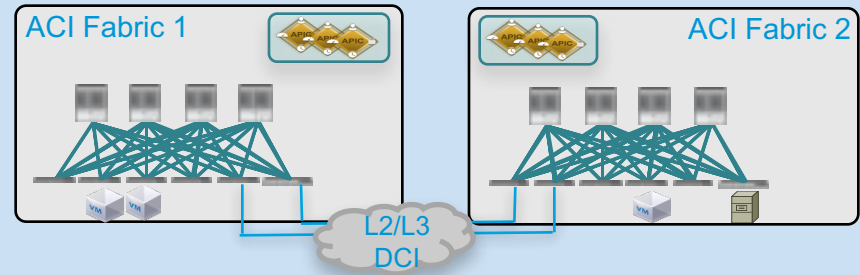


#### Multi-Pod (from 2.0 release)

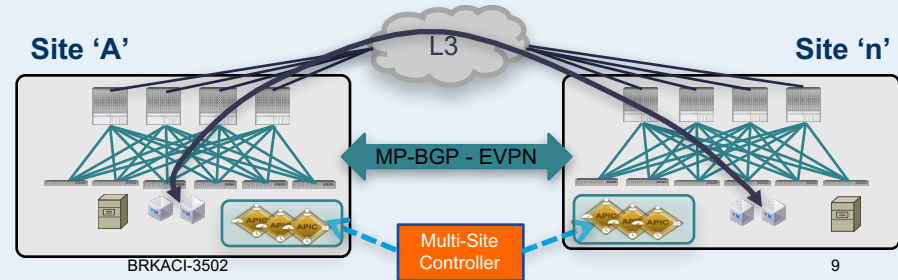


### Multiple APIC Clusters/Multiple Fabrics

#### Multi-Fabric (with L2 and L3 DCI)

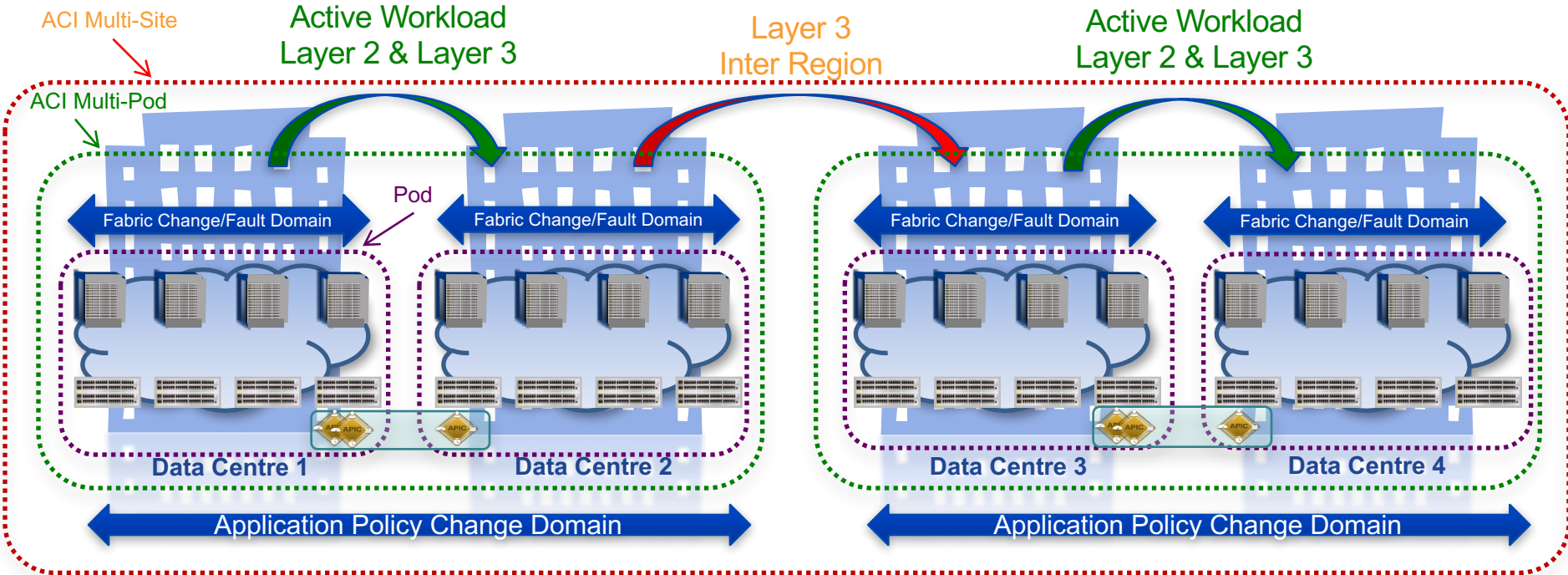


#### Multi-Site (Q3CY17)



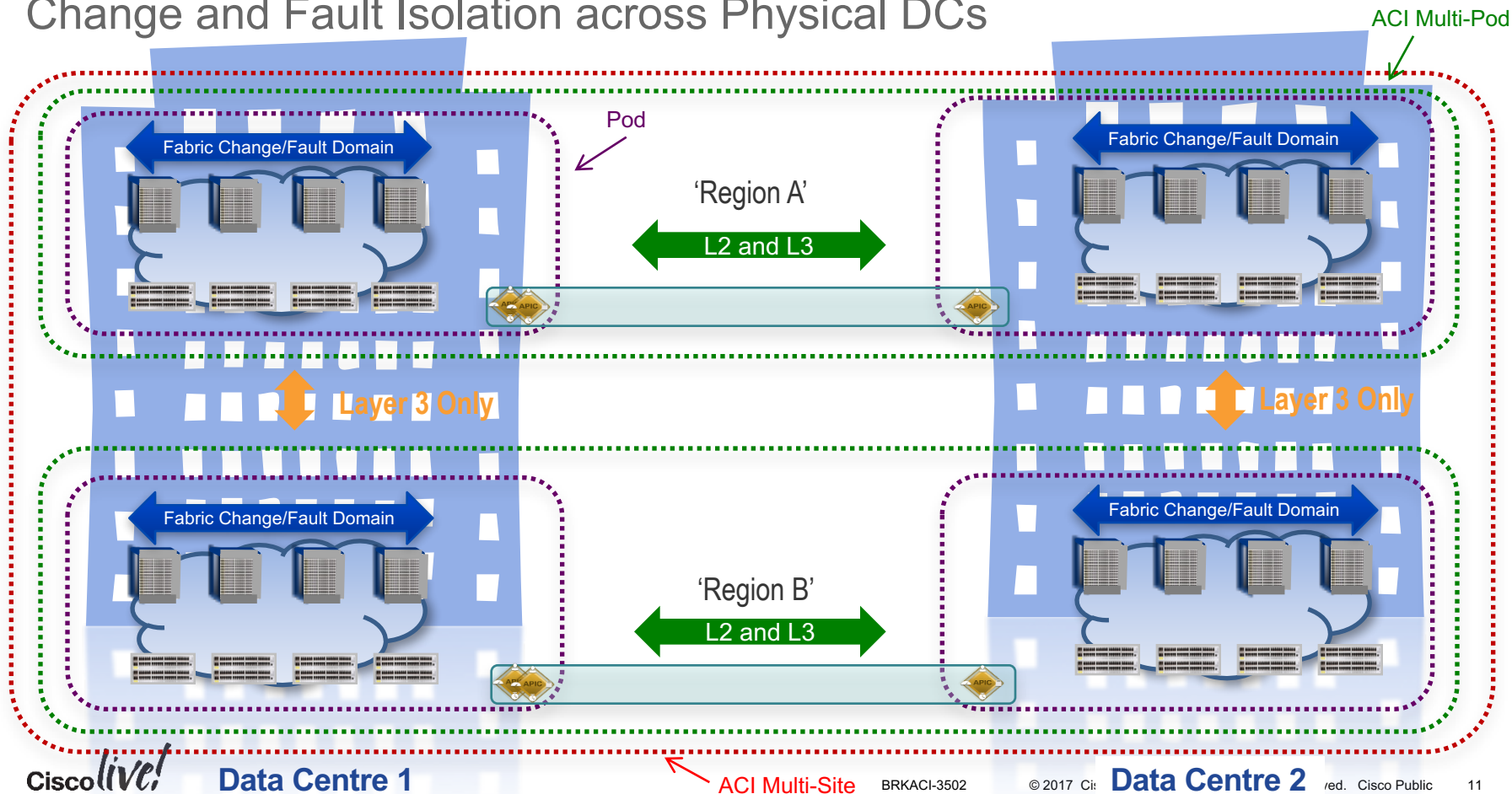
# How to Combine Those Options

## Change and Fault Isolation across Physical DCs



# How to Combine Those Options (2)

## Change and Fault Isolation across Physical DCs

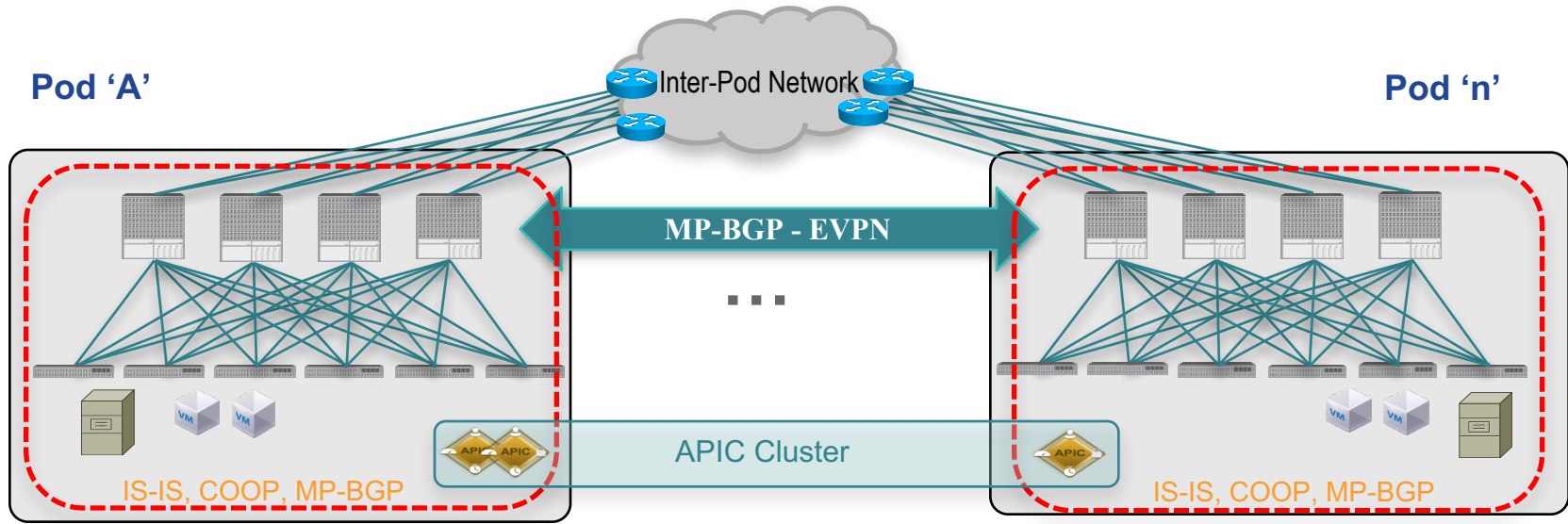


# Agenda

- Availability Design with ACI
- ACI Multi-Pod Deep Dive
- ACI Multi-Site Overview
- Conclusions and Q&A

# Overview, Use Cases and Supported Topologies

# ACI Multi-Pod Overview



- Multiple ACI Pods connected by an IP Inter-Pod L3 network, each Pod consists of leaf and spine nodes
- 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

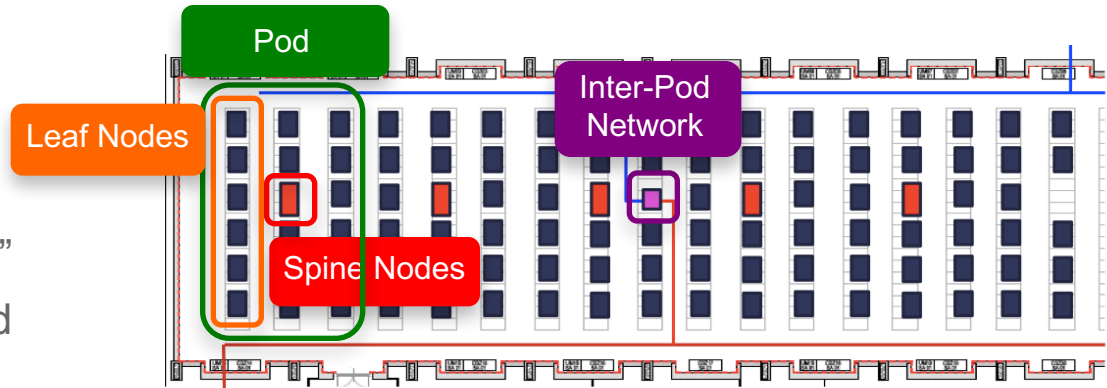
# ACI Multi-Pod Solution

## Use Cases

- Handling 3-tiers physical cabling layout

Cable constrain (multiple buildings, campus, metro) requires a second tier of “spines”

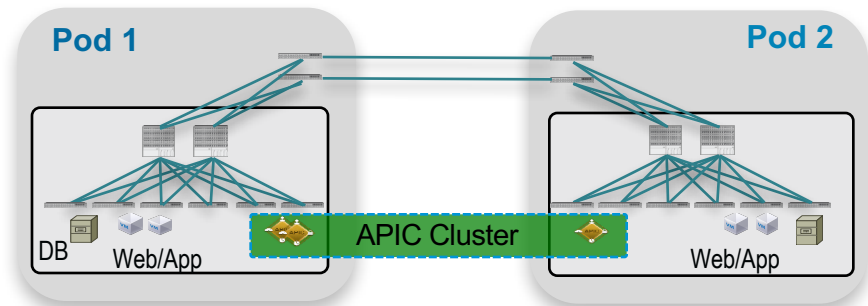
Preferred option when compared to ToR FEX deployment



- Evolution of Stretched Fabric design

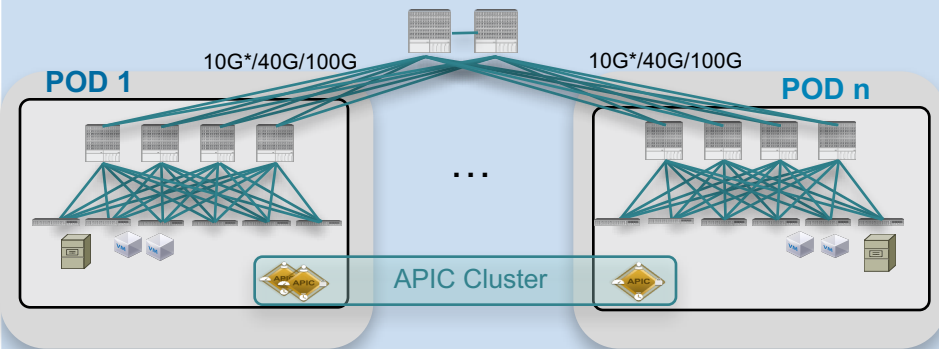
Metro Area (dark fibre, DWDM), L3 core

>2 interconnected sites

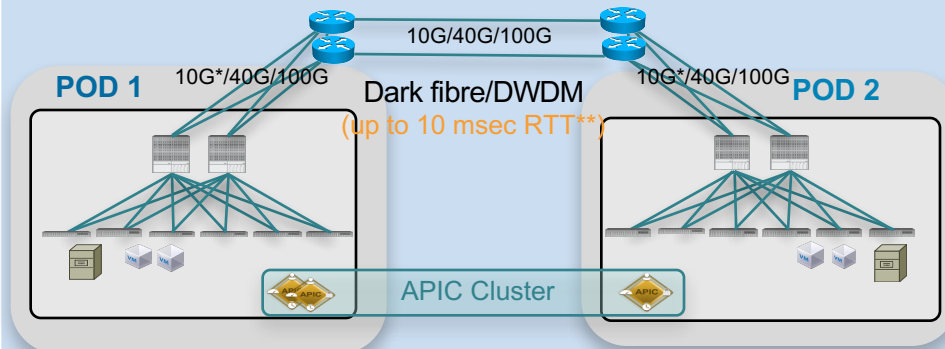


# ACI Multi-Pod Supported Topologies

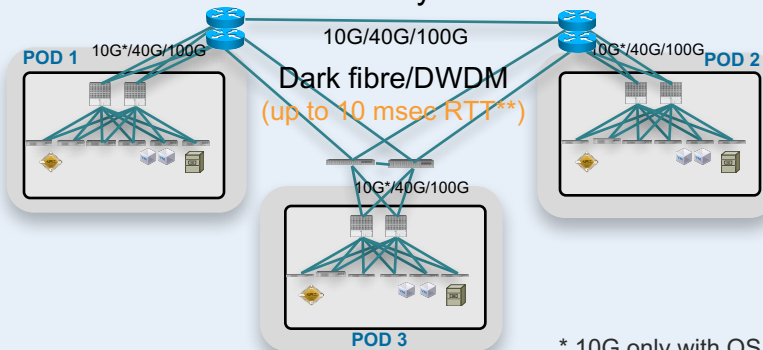
## Intra-DC



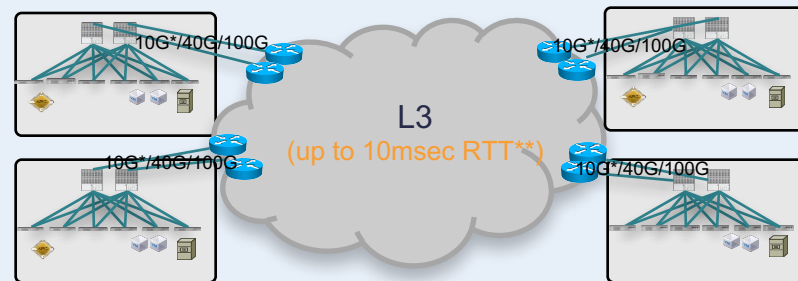
## Two DC sites directly connected



## 3 DC Sites directly connected



## Multiple sites interconnected by a generic L3 network



\* 10G only with QSA adapters on EX spines BRKACI-3502

\*\* Plans to support higher latency in Q2CY17 SW release

# ACI Multi-Pod Solution

## SW/HW Support and Scalability Values

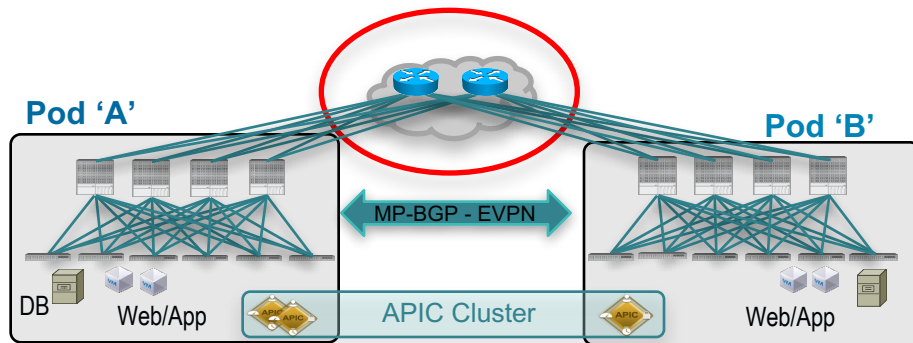


- All existing Nexus 9000 HW (first and second generation) supported
- Maximum number of supported ACI leaf nodes (across all Pods)
  - Up to 80 leaf nodes supported with a **3 nodes** APIC cluster
  - 300 with a **5 nodes** APIC Cluster
  - Maximum 200 leaf nodes per Pod
  - Up to 6 spines per Pod
- Maximum number of supported Pods
  - 4 in 2.0(1)/2.0(2) releases
  - 6 in 2.1(1) release
  - 12 in Q2CY17 SW release

# Inter-Pod Connectivity Deployment Considerations

# ACI Multi-Pod

## Inter-Pod Network (IPN) Requirements



- Not managed by APIC, must be separately configured (day-0 configuration)
- IPN topology can be arbitrary, not mandatory to connect to all spine nodes
- Main requirements:
  - ✓ Multicast BiDir PIM → needed to handle Layer 2 BUM\* traffic
  - ✓ OSPF to peer with the spine nodes and learn VTEP reachability
  - ✓ Jumbo MTU support (9150B) to handle VXLAN encapsulated traffic
  - ✓ DHCP-Relay

# Inter-Pod Connectivity

## Frequently Asked Questions

What platforms can or should I deploy in the IPN?



- Nexus 9200s, 9300-EX, but also any other switch or router supporting all the IPN requirements
- First generation Nexus 9300s/9500s **not supported** as IPN nodes

Can I use a 10G connection between the spines and the IPN network?

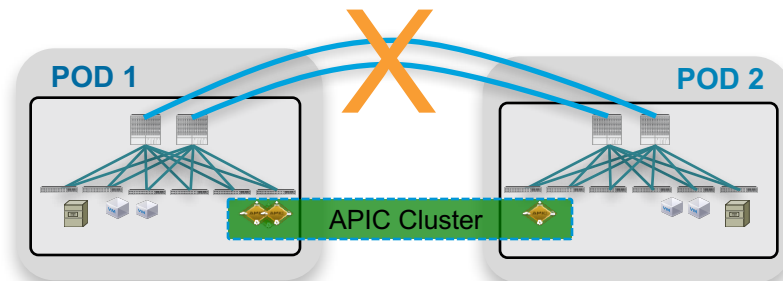


- **Yes**, with QSA adapters supported on the ACI spine devices  
Available from 2.1(1h) release **on EX based HW**  
No plans to introduce support for **first generation spines** (including 9336-PQ 'baby spine')

# Inter-Pod Connectivity

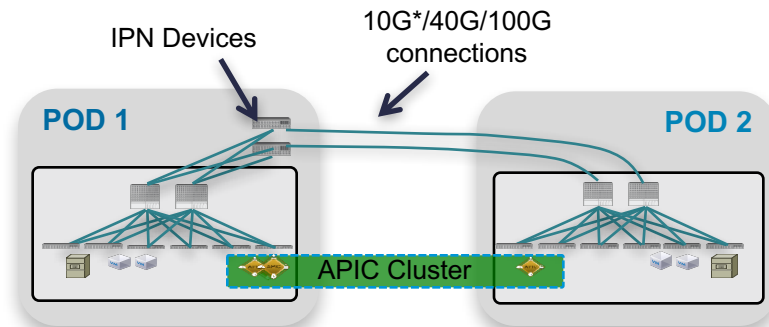
## Frequently Asked Questions (2)

I have two sites connected with dark fibre/DWDM circuits, can I connect the spines back-to-back?



- No, because of multicast requirement for L2 multi-destination inter-Pod traffic

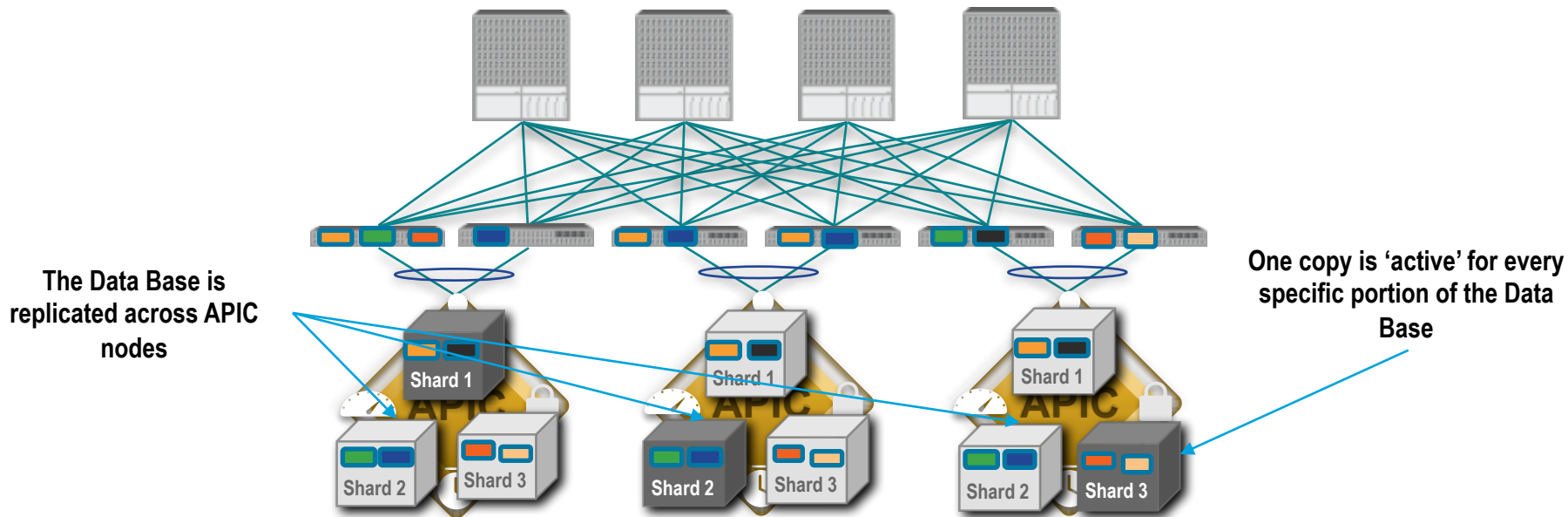
Do I need a dedicated pair of IPN devices in each Pod?



- Can use a single pair of IPN devices, but before 2.1(1h) release mandates the use of 40G/100G inter-Pod links

# APIC Cluster Deployment Considerations

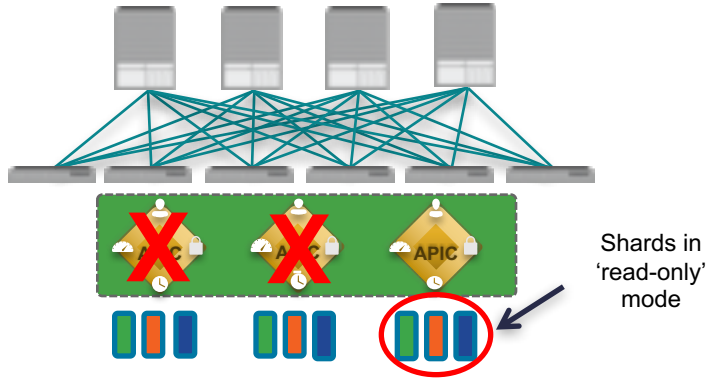
# APIC – Distributed Multi-Active Data Base



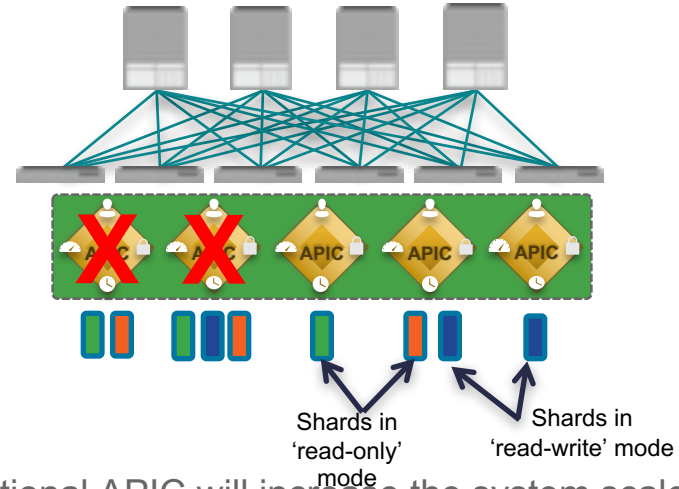
- Processes are active on all nodes (not active/standby)
- The Data Base is distributed as active + 2 backup instances (shards) for every attribute

# APIC Cluster Deployment Considerations

## Single Pod Scenario



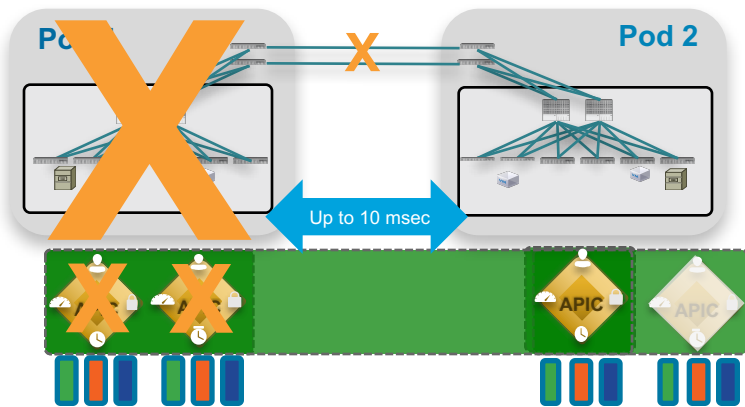
- APIC will allow read-only access to the DB when only one node remains active (standard DB quorum)
- **Hard failure** of two nodes cause all shards to be in 'read-only' mode (of course reboot etc. heals the cluster after APIC nodes are up)



- Additional APIC will increase the system scale (today up to 5 nodes supported) but does not add more redundancy
- **Hard failure** of two nodes would cause inconsistent behaviour across shards (some will be in 'read-only' mode, some in 'read-write' mode)

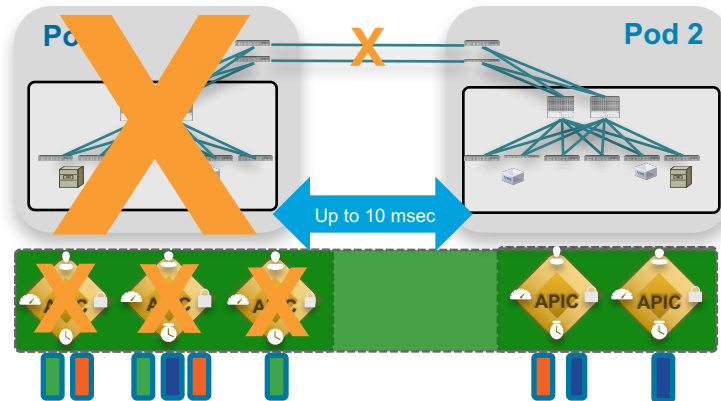
# APIC Cluster Deployment Considerations

## Multi-Pod – 2 Pods Scenario



- **Pod isolation scenario:** changes still possible on APIC nodes in Pod1 but not in Pod2. Cluster nodes fully re-join once Pods are reconnected
- **Pod hard failure scenario:** under major Pod failure, recommendation is to activate a standby node to make the cluster fully functional again

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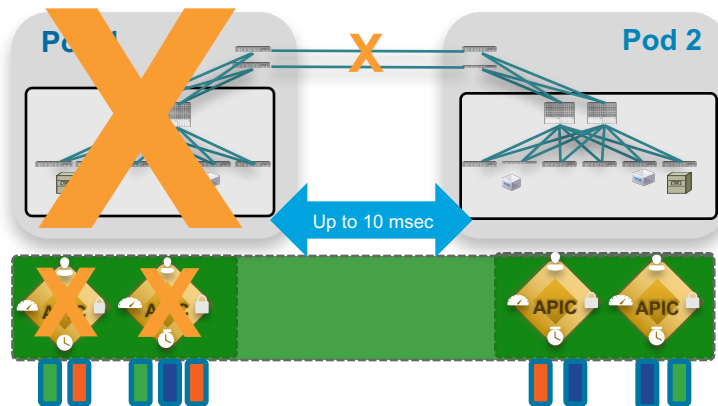
- **Pod isolation scenario:** same considerations as with single Pod (different behaviour across shards)
- **Pod hard failure scenario:** Pod1 major failure may cause the loss of information for the shards replicated across the 3 local nodes

Possible to restore the whole fabric state to the latest taken configuration snapshot ('ID Recovery' procedure – **needs BU and TAC involvement**)

# APIC Cluster Deployment Considerations

## What about a 4 Nodes APIC Cluster?

Q3CY17



Pending internal validation,  
scoped for Q3CY17

- Intermediate scalability values compared to a 3 or 5 nodes cluster scenario
- **Pod isolation scenario:** same considerations as with 5 nodes (different behaviour across shards)
- **Pod hard failure scenario**
  - No chance of total loss of information for any shard
  - Can bring up a standby node in the second site to regain full majority for all the shards

# APIC Cluster Deployment Considerations

## Deployment Recommendations

- **Main recommendation:** deploy a 3 nodes APIC cluster when less than 80 leaf nodes are deployed across Pods
- From Q3CY17 can deploy 4 nodes if the scalability requirements are met
- When 5 nodes are really needed for scalability reasons, follow the recommendations below:

|         | Pod1                                                                                                                                                                                                                                                  | Pod2                                                                                                                                                                                                                                                  | Pod3                                                                              | Pod4                                                                                | Pod5                                                                                | Pod6 |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|
| 2 Pods* |    |    |                                                                                   |                                                                                     |                                                                                     |      |
| 3 Pods  |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |      |
| 4 Pods  |                                                                                     |                                                                                                                                                                      |  |  |                                                                                     |      |
| 5 Pods  |                                                                                                                                                                      |                                                                                                                                                                      |  |  |  |      |
| 6+ Pods |                                                                                                                                                                      |                                                                                                                                                                      |  |  |  |      |

# Reducing the Impact of Configuration Errors

## Introducing Configuration Zones

- Common concern with Multi-Pod: the end-to-end propagation of configuration mistakes
  - If a policy is configured to be deployed on many nodes, a change to the policy is immediately propagated to all nodes by default
- It would be desirable to assess the impact of a policy change on a sub-set of nodes before propagating the change on all remaining nodes
  - Configuration Zones can be used for this purpose
- **Infra policies** are currently the only policies following zone deployment configuration
  - Tenant policies are immediately propagated to all nodes independently of zone configuration

# Reducing the Impact of Configuration Errors

## Introducing Configuration Zones

- Three different zone deployment modes:
  - **Enabled (default)**: updates are immediately sent to all nodes part of the zone

Note: a node not part of any zone is equivalent to a node part of a zone set to enabled.

  - **Disabled**: updates are postponed until the zone deployment mode is changed (or a node is removed from the zone)
  - **Triggered**: send postponed updates to the nodes part of the zone
- The deployment mode can be configured for an entire Pod or for a specified set of leaf switches

The screenshot shows the Cisco configuration interface for 'Config Zones'. The 'Tenants' tab is selected. The 'Deployment Mode' is set to 'Enabled'. The 'Pods' section shows a table with one pod. The 'Leaf Switches' section shows a table with one switch. The 'Pending Changes' section shows a table with one policy. Annotations with arrows point to the 'Tenants' tab, 'Deployment Mode', 'Pods', 'Leaf Switches', and 'Pending Changes' sections.

**Annotations:**

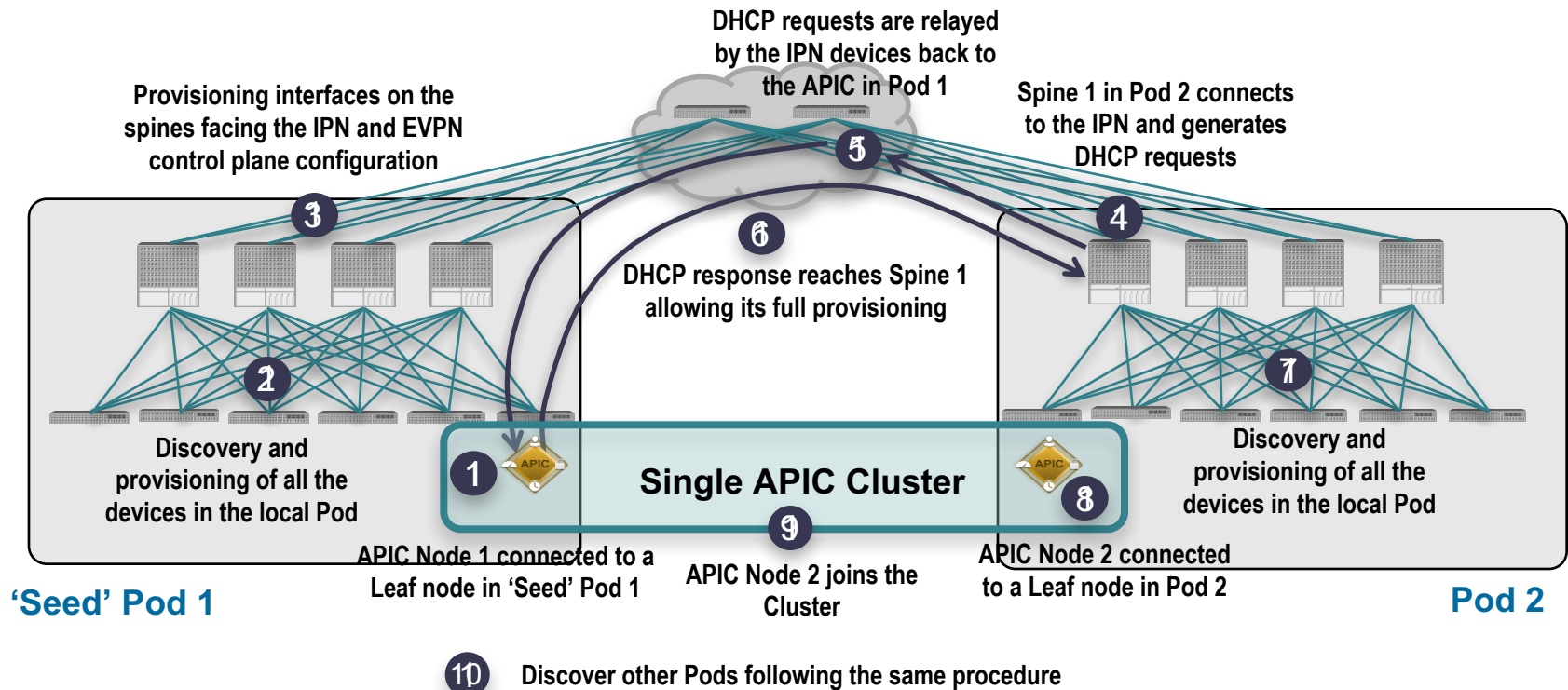
- Select entire Pod (points to the 'Pods' section)
- Change the deployment mode (points to the 'Deployment Mode' dropdown)
- Select specific Leaf Switches (points to the 'Leaf Switches' section)
- Show the changes not applied yet to a Disabled zone (points to the 'Pending Changes' section)

# Multi-Pod Control and Data Planes

# ACI Multi-Pod Solution

## Auto-Provisioning of Pods

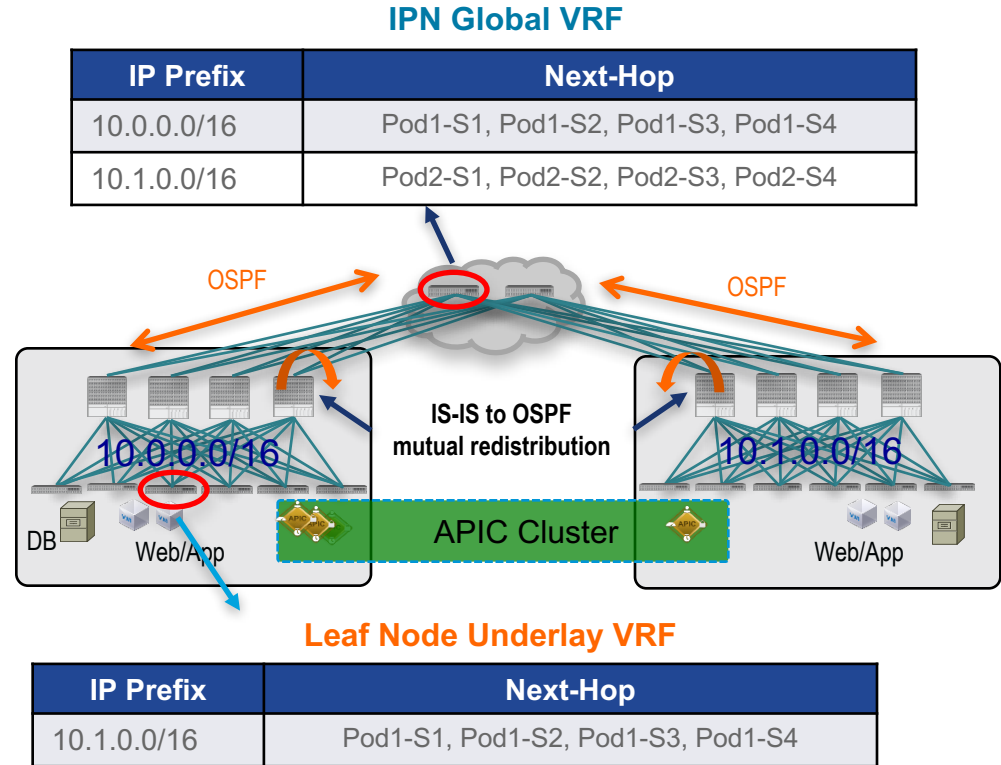
For more information on how to setup an  
ACI Fabric from scratch:  
[BRKACI-2004](#), [BRKACI-2820](#)



# ACI Multi-Pod Solution

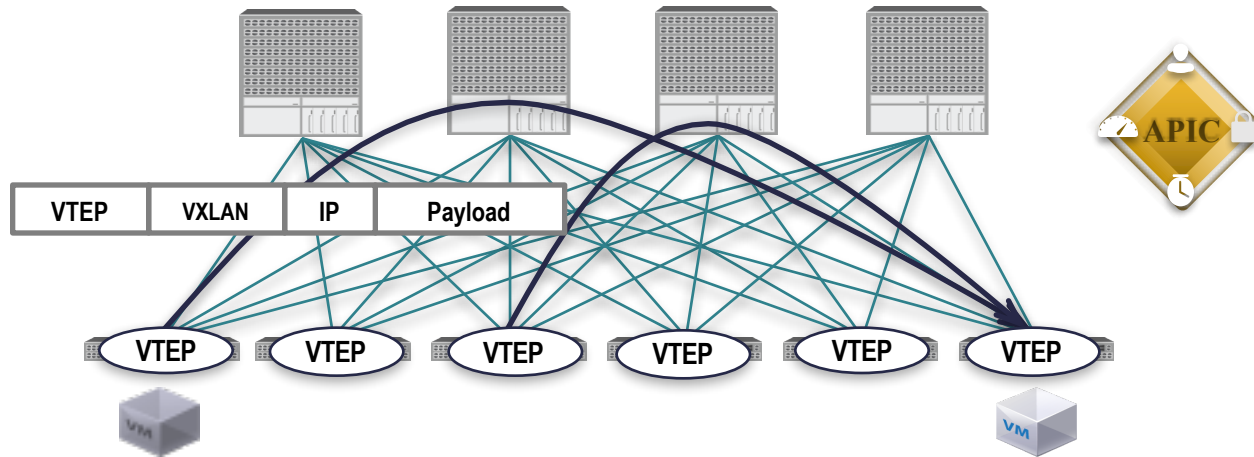
## IPN Control Plane

- Separate IP address pools for VTEPs assigned by APIC to each Pod  
Summary routes advertised toward the IPN via OSPF routing
- Spine nodes redistribute other Pods summary routes into the local IS-IS process  
Needed for local VTEPs to communicate with remote VTEPs



# ACI Fabric – Integrated Overlay

## Decoupled Identity, Location & Policy



- ACI Fabric decouples the tenant end-point address, its “identifier”, from the location of that end-point which is defined by its “locator” or VTEP address
- Forwarding within the Fabric is between VTEPs (ACI VXLAN tunnel endpoints) and leverages an extender VXLAN header format referred to as the ACI VXLAN policy header
- The mapping of the internal tenant MAC or IP address to location is performed by the VTEP using a distributed mapping database

# Host Routing - Inside

Inline Hardware Mapping DB - 1,000,000+ hosts



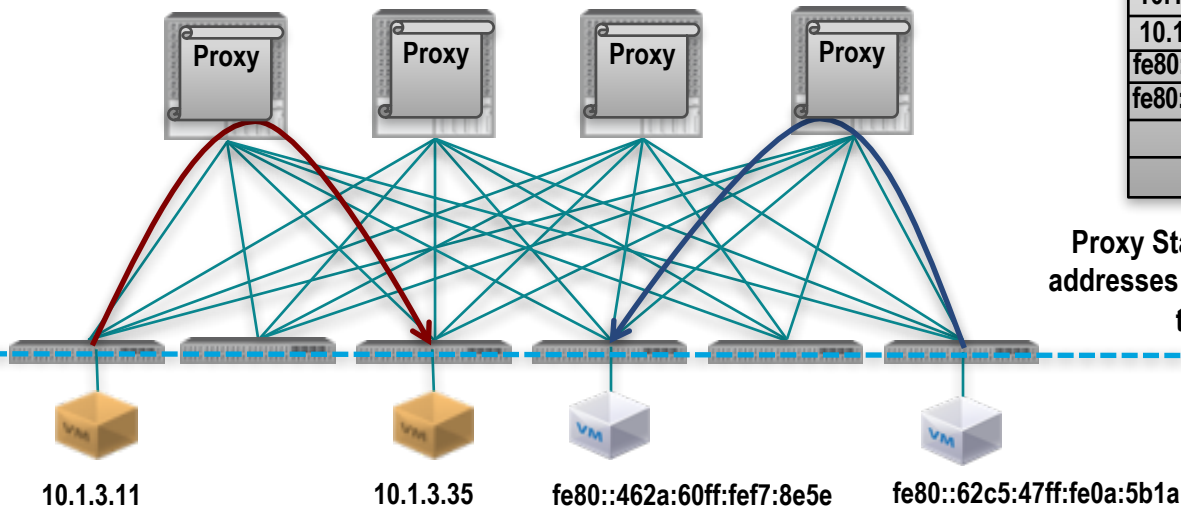
Global Station Table contains a local cache of the fabric endpoints

|           |        |
|-----------|--------|
| 10.1.3.35 | Leaf 3 |
|           |        |
|           |        |

|   |         |
|---|---------|
| * | Proxy A |
|---|---------|

|           |        |
|-----------|--------|
| 10.1.3.11 | Port 9 |
|           |        |
|           |        |

Local Station Table contains addresses of 'all' hosts attached directly to the Leaf



|            |        |
|------------|--------|
| 10.1.3.35  | Leaf 3 |
| 10.1.3.11  | Leaf 1 |
| fe80::8e5e | Leaf 4 |
| fe80::5b1a | Leaf 6 |
|            |        |
|            |        |

Proxy Station Table contains addresses of 'all' hosts attached to the fabric

- The Forwarding Table on the Leaf Switch is divided between local (directly attached) and global entries
- The Leaf global table is a cached portion of the full global table
- If an endpoint is not found in the local cache the packet is forwarded to the 'default' forwarding table in the spine switches (1,000,000+ entries in the spine forwarding table)

# ACI Multi-Pod Solution

## Inter-Pod MP-BGP EVPN Control Plane

- MP-BGP EVPN to sync Endpoint (EP) and Multicast Group information

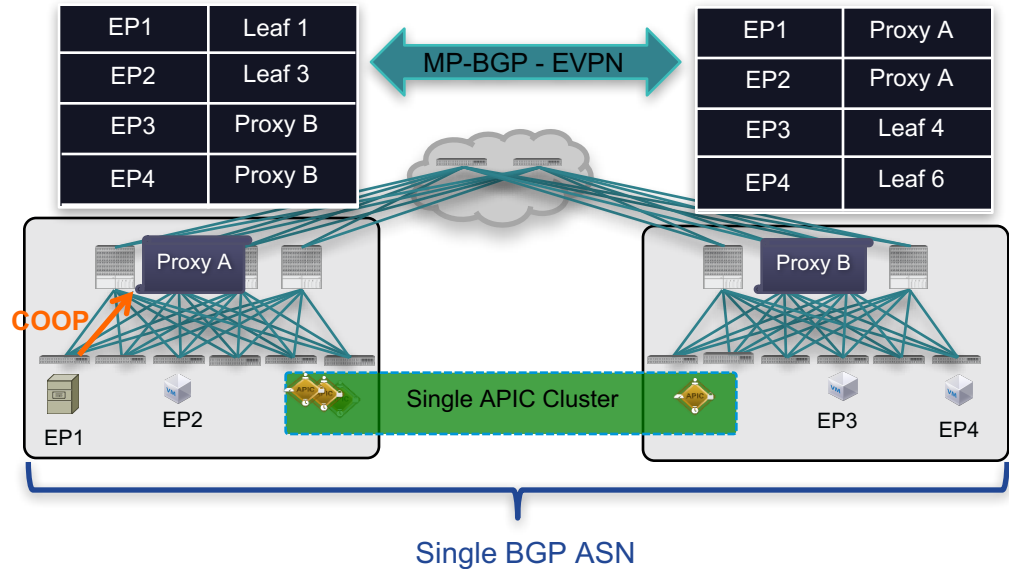
All remote Pod entries associated to a Proxy VTEP next-hop address that **should be globally routable** (i.e. not part of Pod's TEP Pool)

Same BGP AS across all the Pods

- iBGP EVPN sessions between spines in separate Pods

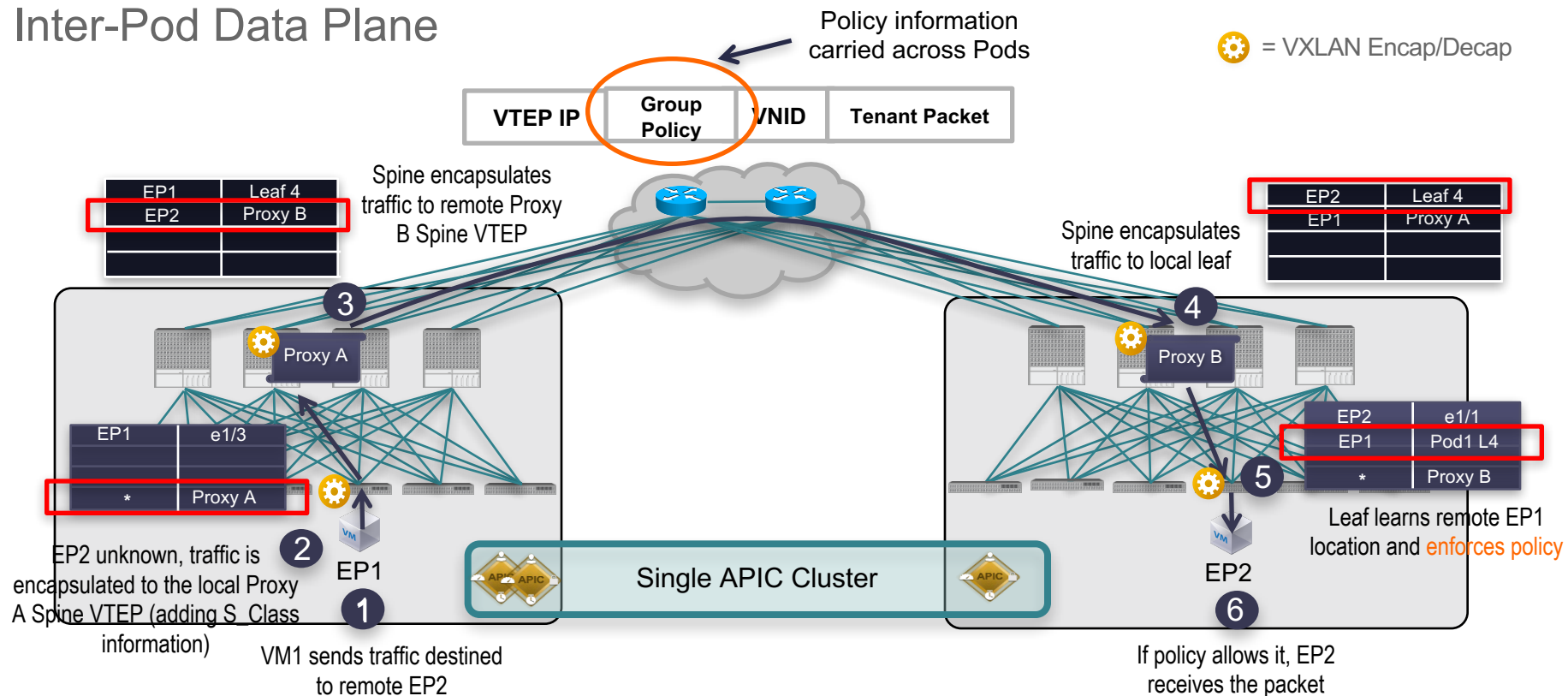
Full mesh MP-iBGP EVPN sessions between local and remote spines (default behaviour)

Optional RR deployment (recommended one RR in each Pod for resiliency)



# ACI Multi-Pod Solution

## Inter-Pod Data Plane

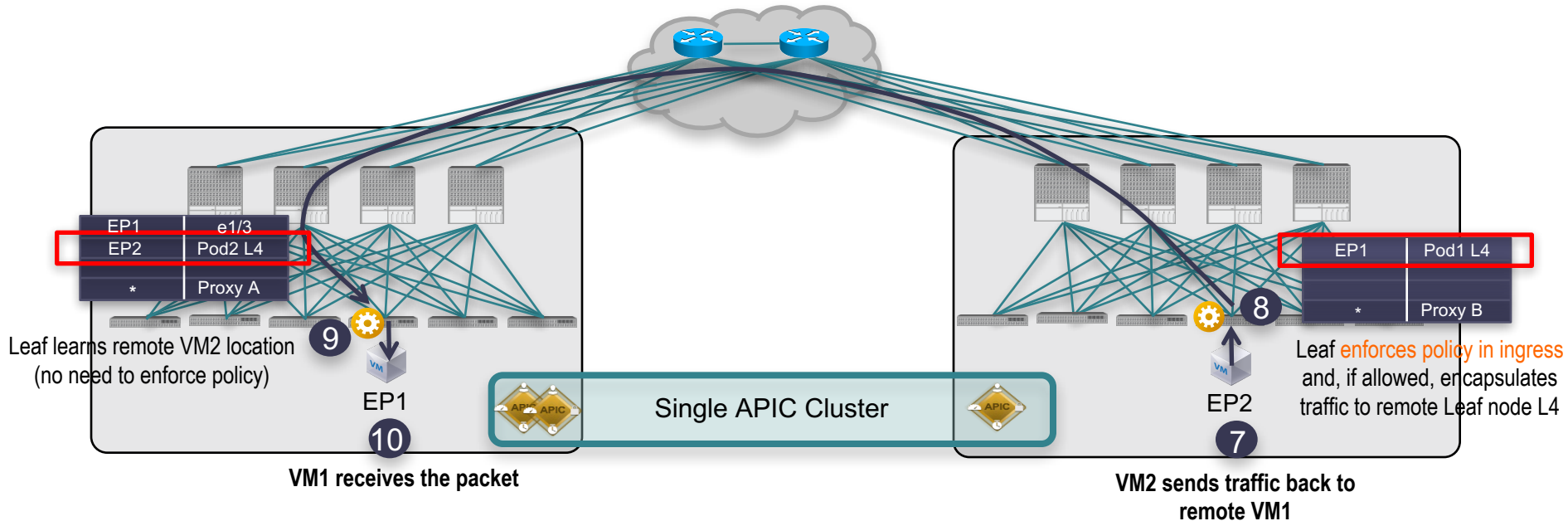


# ACI Multi-Pod Solution

## Inter-Pod Data Plane (2)

⚙️ = VXLAN Encap/Decap

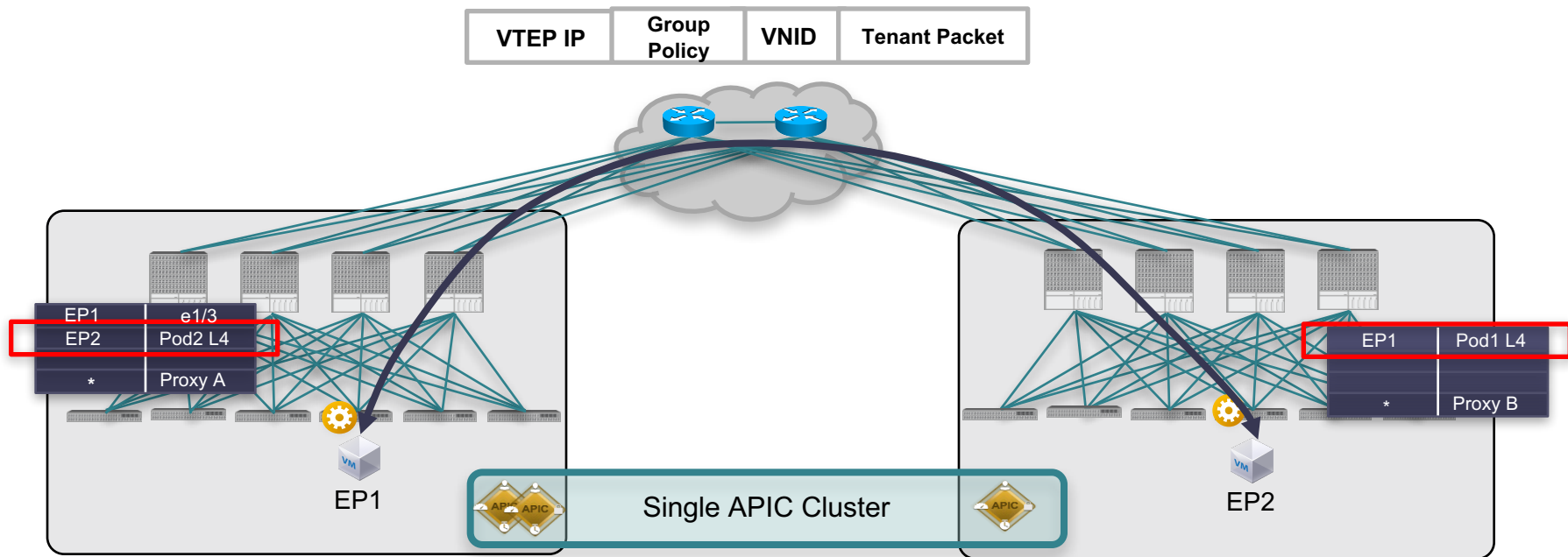
| VTEP IP | Group Policy | VNID | Tenant Packet |
|---------|--------------|------|---------------|
|---------|--------------|------|---------------|



# ACI Multi-Pod Solution

## Inter-Pod Data Plane (3)

⚙️ = VXLAN Encap/Decap



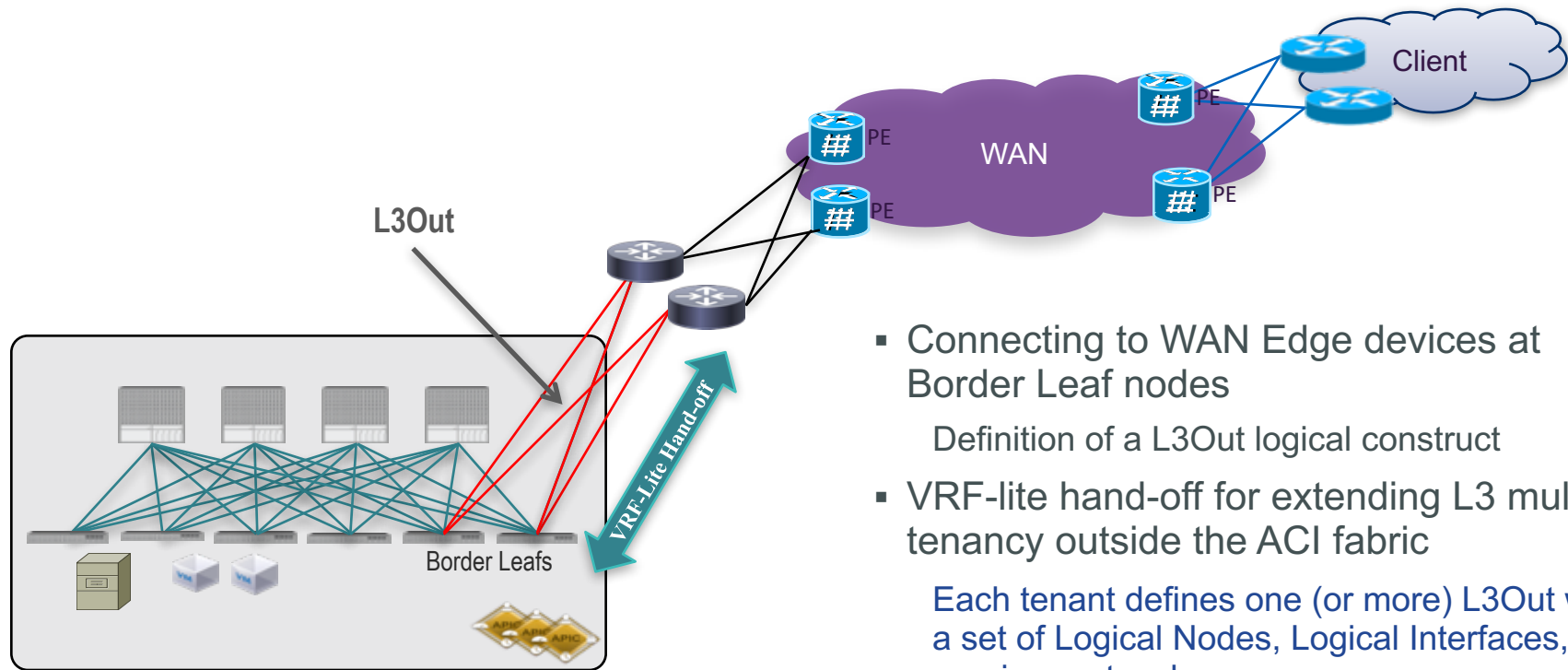
From this point EP1 to EP2 communication is encapsulated Leaf to Leaf (VTEP to VTEP) and policy always applied at the ingress leaf (applies to both L2 and L3 communication)

11

# Multi-Pod and Layer 3 External Connectivity

# Connecting ACI via Layer 3

## 'Traditional' L3Out on the BL Nodes



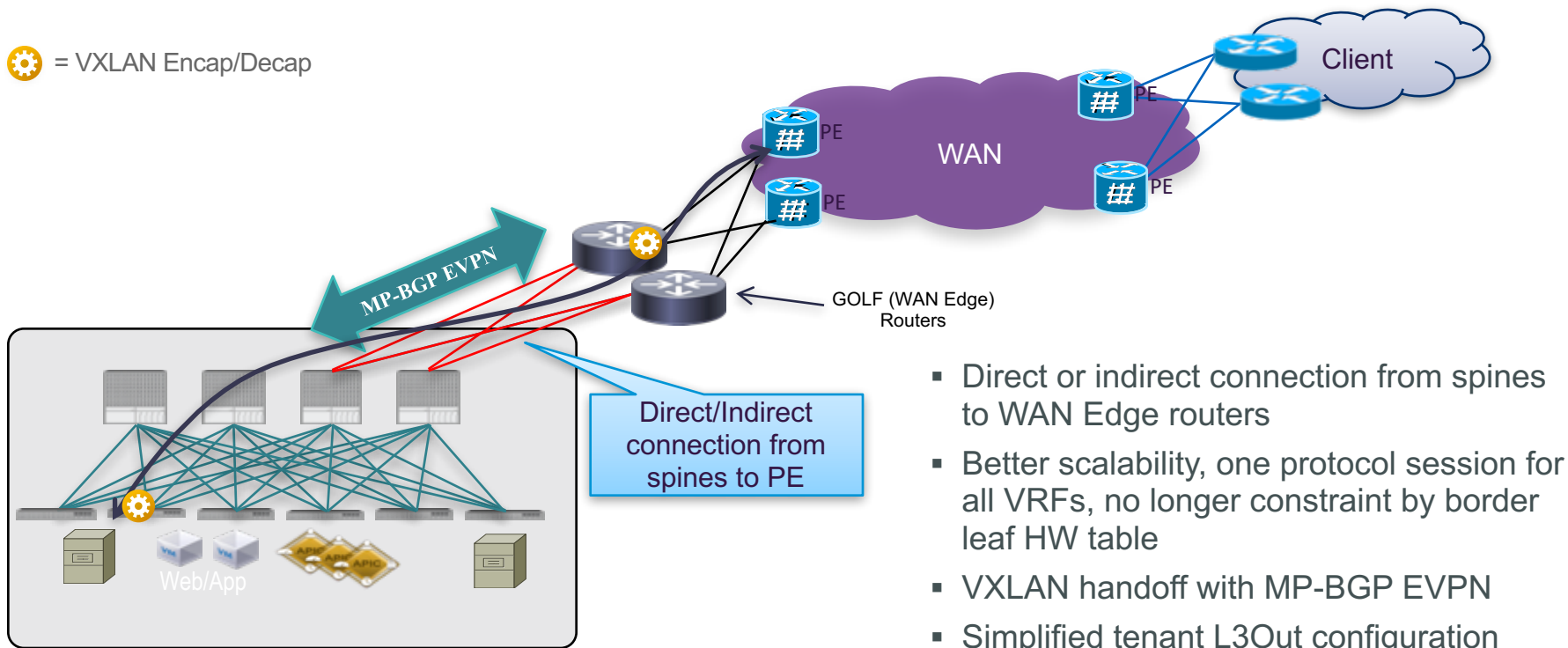
- Connecting to WAN Edge devices at Border Leaf nodes
  - Definition of a L3Out logical construct
- VRF-lite hand-off for extending L3 multi-tenancy outside the ACI fabric

Each tenant defines one (or more) L3Out with a set of Logical Nodes, Logical Interfaces, peering protocol

# Connecting ACI via Layer 3

## 'GOLF' Design (from ACI 2.0 Release)

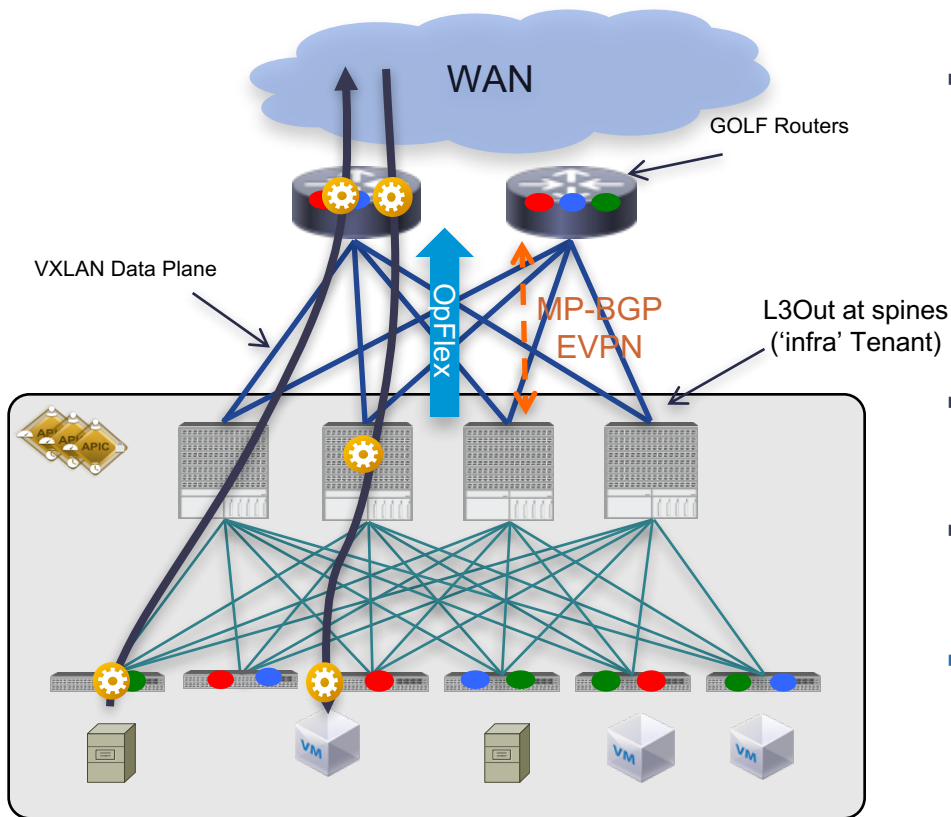
⚙️ = VXLAN Encap/Decap



- Direct or indirect connection from spines to WAN Edge routers
- Better scalability, one protocol session for all VRFs, no longer constraint by border leaf HW table
- VXLAN handoff with MP-BGP EVPN
- Simplified tenant L3Out configuration

# Layer 3 EVPN Services for Fabric WAN

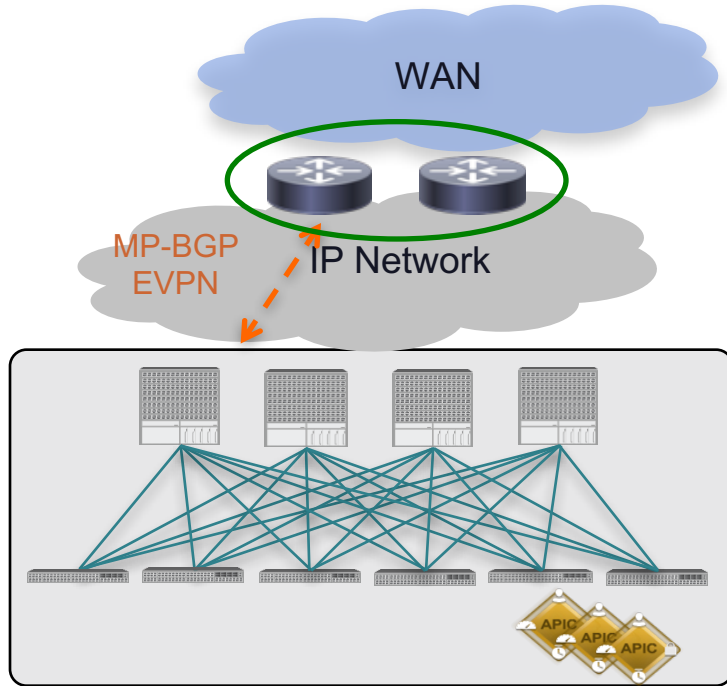
## 'GOLF' Design (ACI 2.0 Release)



- Connect an ACI Fabric to the **external L3 domain** (no support for L2 GOLF with ACI)
  - WAN Edge devices functionally behave as ACI 'border leafs'
  - Control plane and data plane scale
  - OpFlex for automating the exchange of config parameters (VRF names, BGP Route-Targets, etc.)
- MP-BGP EVPN control plane between ACI spine and WAN Edge routers
- VXLAN data plane between ACI spine and WAN Edge routers
- Consistent policy (Drop/No-Drop, PBR, Copy Services, etc.) for north-south traffic applied at ACI leaf (both ingress and egress directions)

# ACI Integration with GOLF

## Supported WAN Edge Platforms



- WAN Edge Router initial choices

**Nexus 7000/7700:** F3 line card in 7.3.0.DX(1)ES. M3 support in Q4CY16

**ASR 9000:** IOS-XR 6.1.1 for platforms with RSP2\*, RSP440 and RSP880 supervisors

**ASR 1000:** 16.4 release (Q4CY16), including also CSR1Kv support

- High level whitepaper available on CCO:

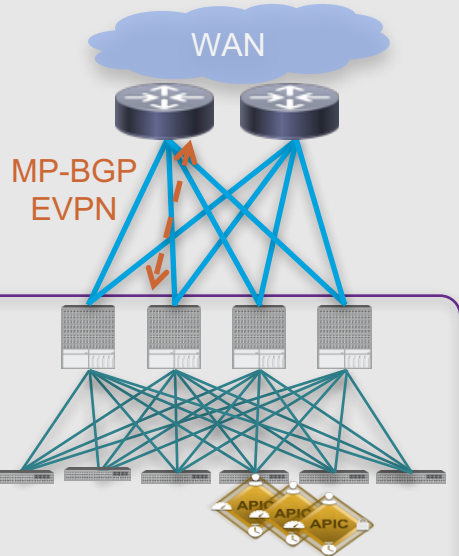
<http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-736899.html>

\*OpFlex support will be added in 6.2.1 release

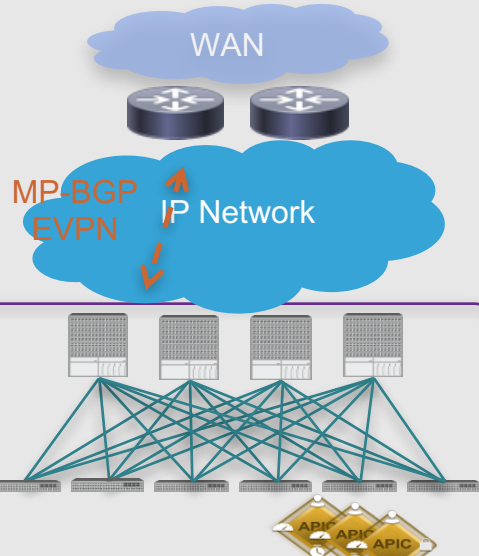
# ACI Integration with GOLF

## Supported Topologies

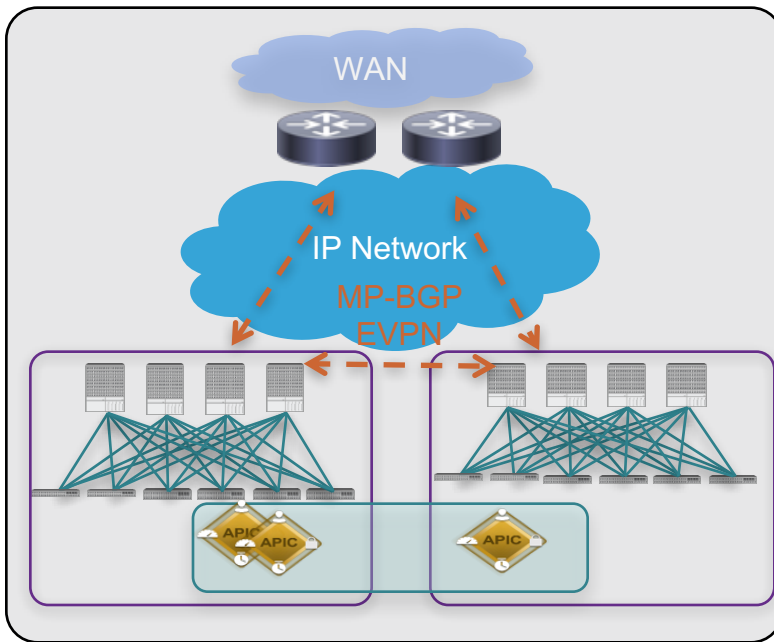
Directly Connected  
WAN Edge Routers



Indirectly Connected  
WAN Edge Routers



Multi-Pod\*

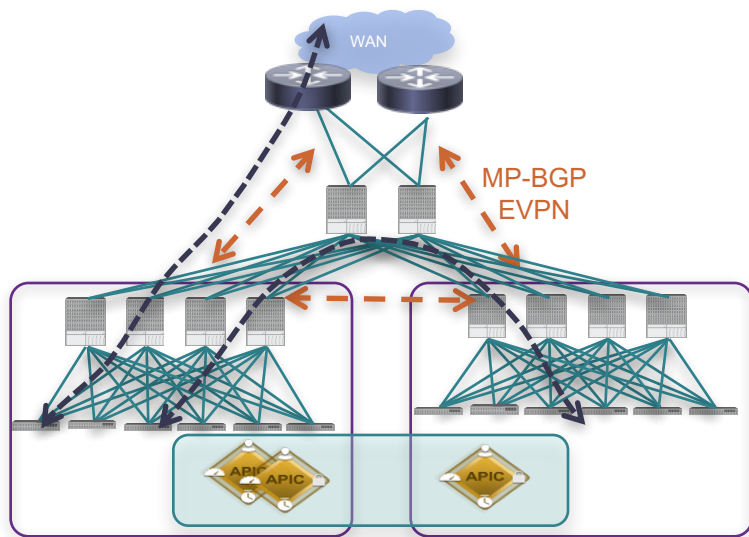


\*Supported from 2.1 Release (Q4CY16)

# Multi-Pod and GOLF Integration

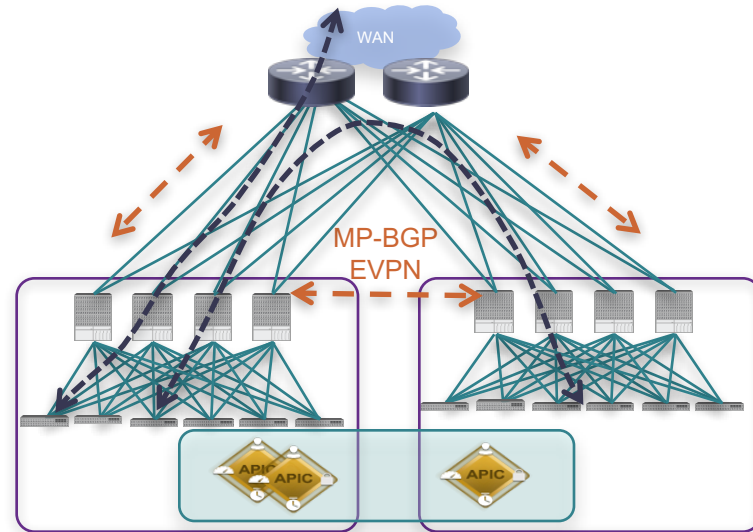
## Centralised Scenario (Intra-DC)

### WAN Edge Devices Connected to IPN



- Inter-Pod VXLAN traffic exchanged via the IPN devices
- WAN to DC traffic VXLAN encapsulated between ACI fabric and WAN Edge devices

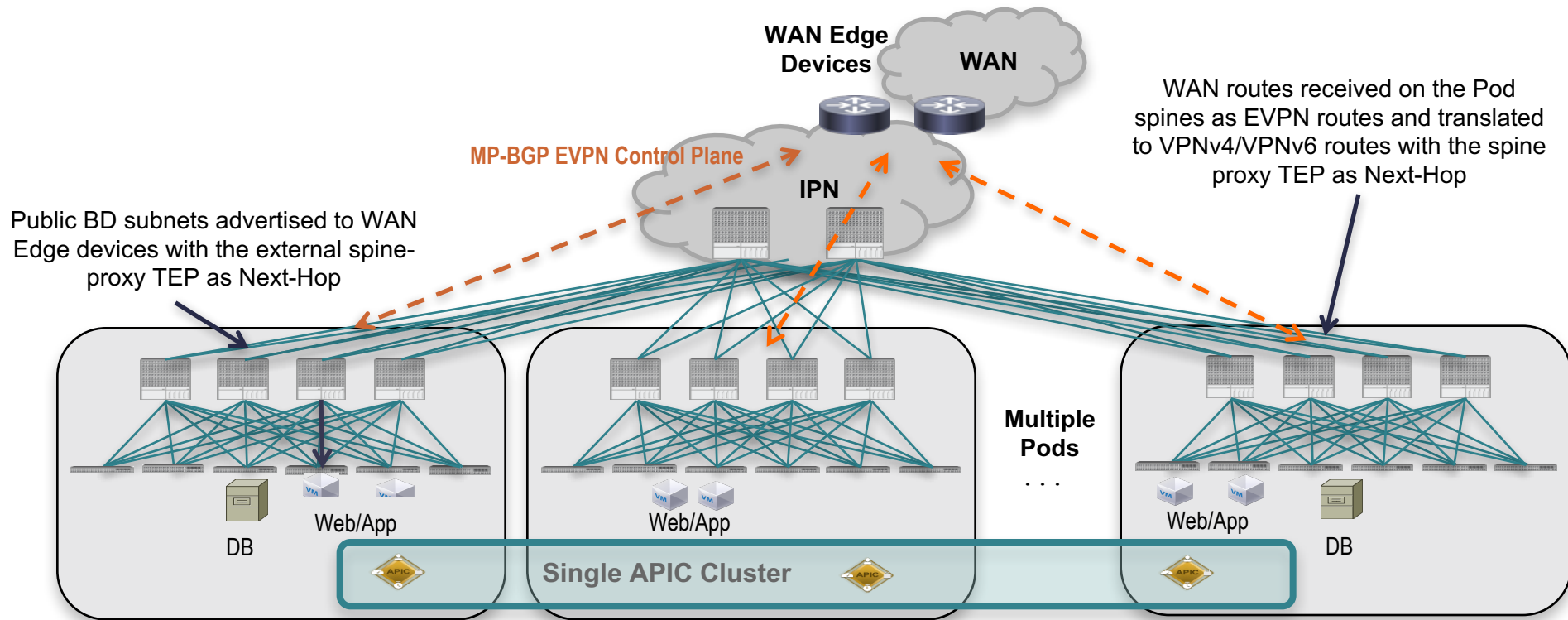
### WAN Edge Devices Connected to Pod Spines



- WAN Edge devices perform a dual function:
  - Pure L3 routing for Inter-Pod VXLAN traffic
  - VXLAN Encap/Decap for WAN to DC traffic flows

# Multi-Pod and GOLF Integration

## Intra-DC Deployment – Control Plane



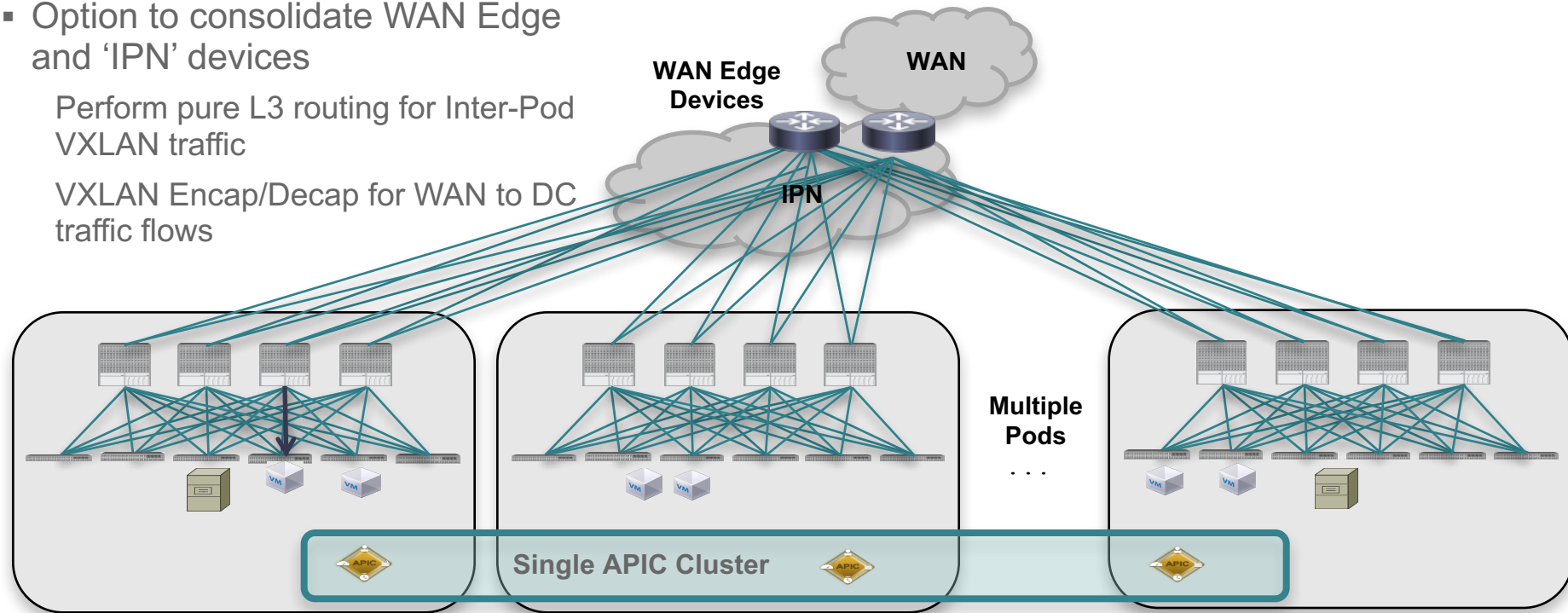
# Multi-Pod and GOLF Integration

## Intra-DC Deployment – Control Plane

- Option to consolidate WAN Edge and 'IPN' devices

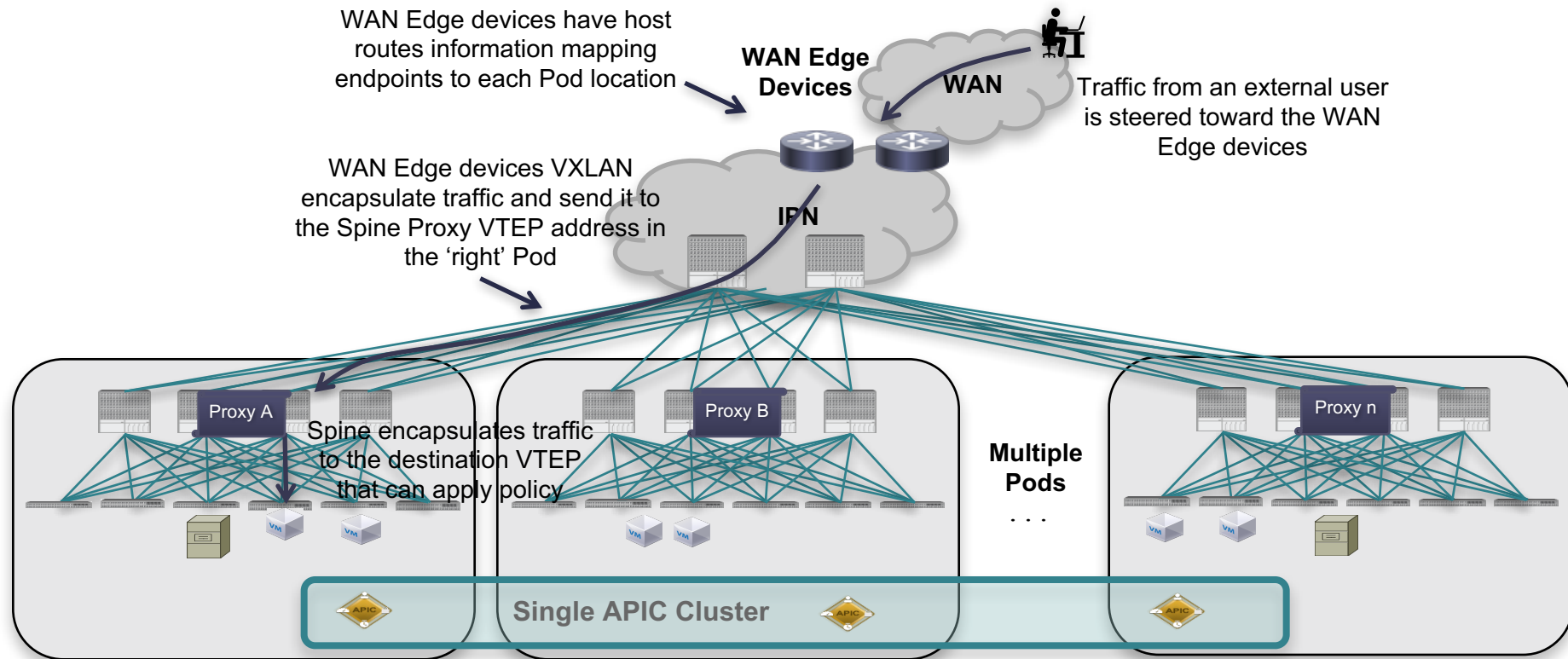
Perform pure L3 routing for Inter-Pod  
VXLAN traffic

VXLAN Encap/Decap for WAN to DC  
traffic flows



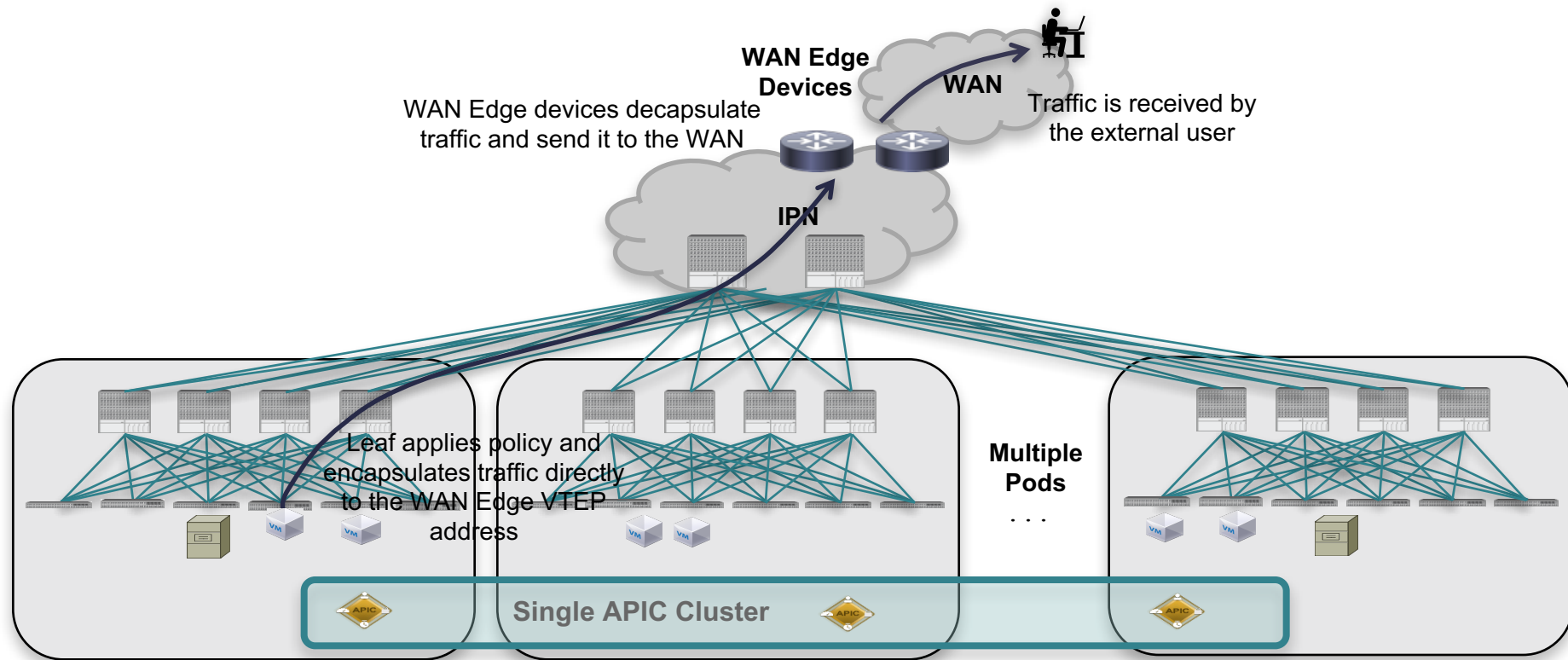
# Multi-Pod and GOLF Integration

## Intra-DC Deployment – Data Plane



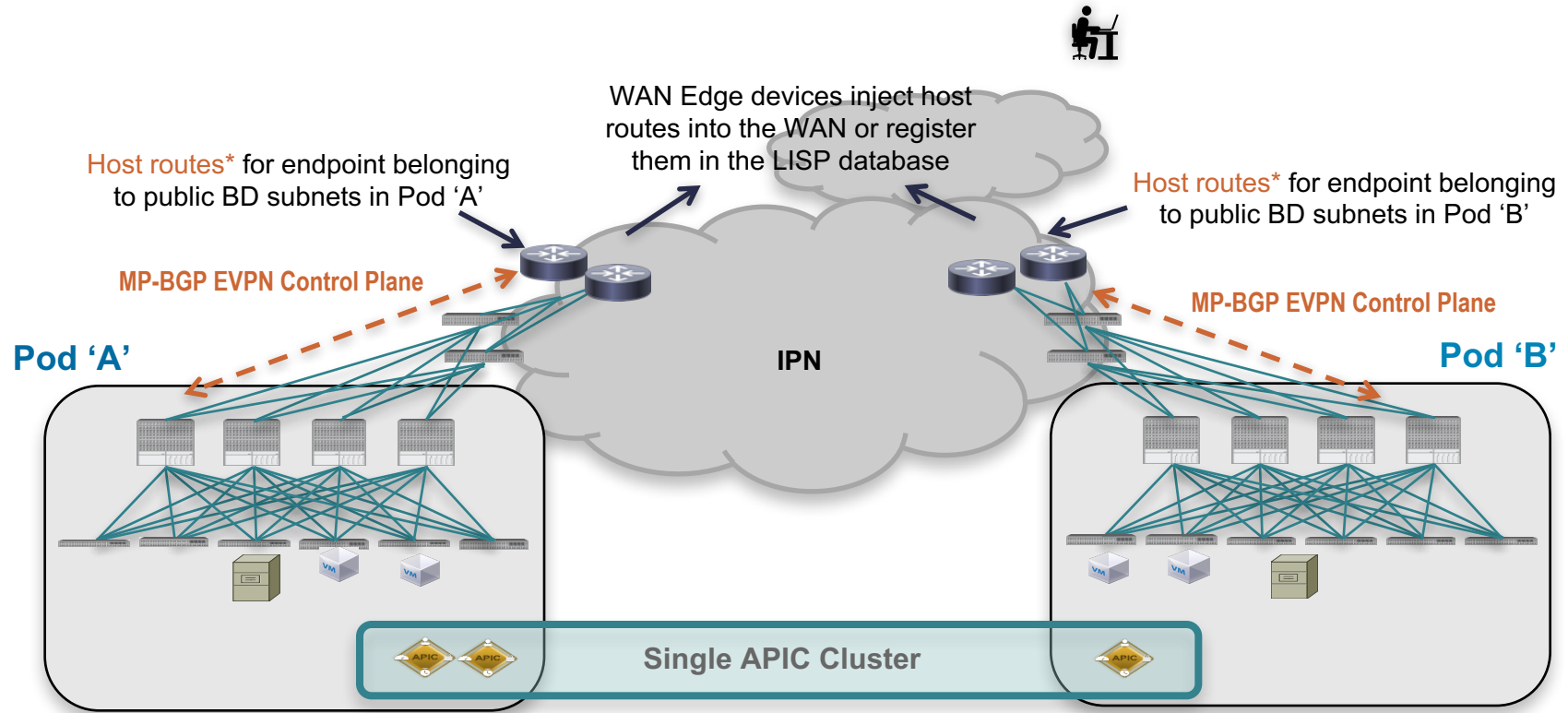
# Multi-Pod and GOLF Integration

## Intra-DC Deployment – Data Plane (2)



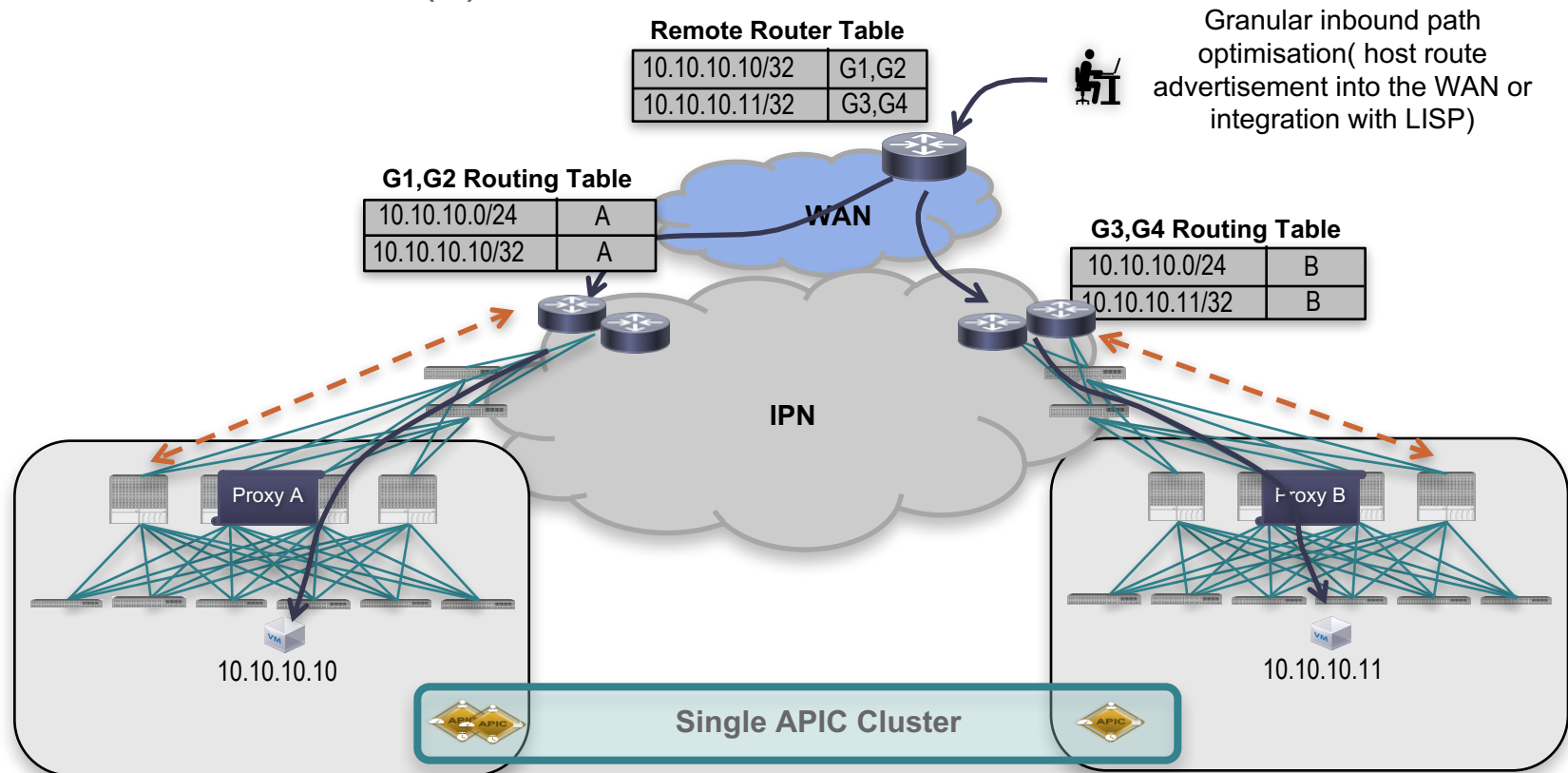
# Multi-Pod and GOLF Integration

## Inter-DC Scenario



# Multi-Pod and GOLF Integration

## Inter-DC Scenario (2)



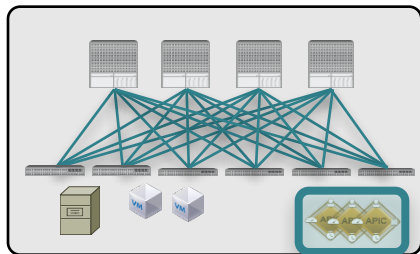
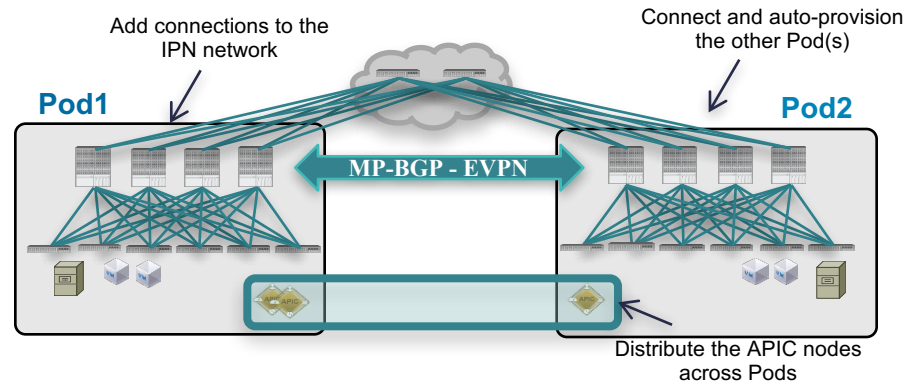
# Migration Scenarios

# Migration Scenarios

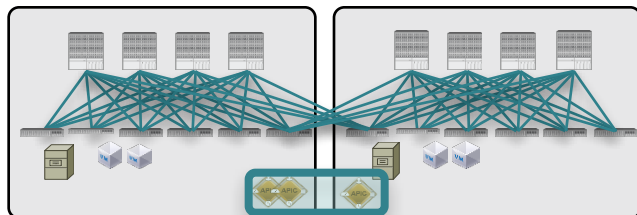
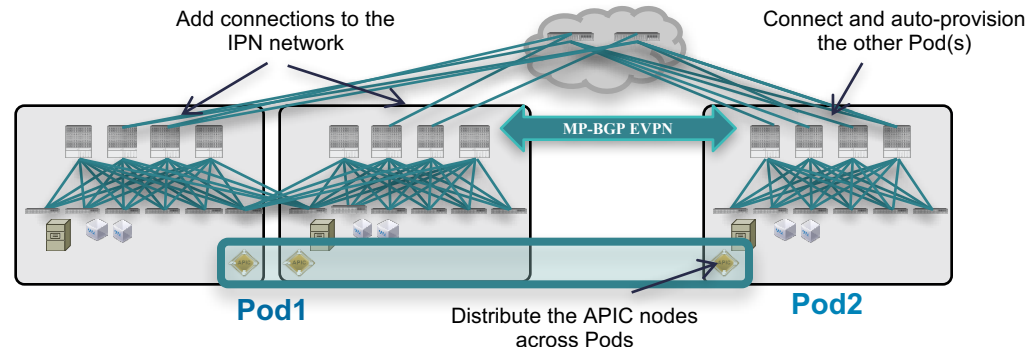
## Adding Pods to an Existing ACI



1



2

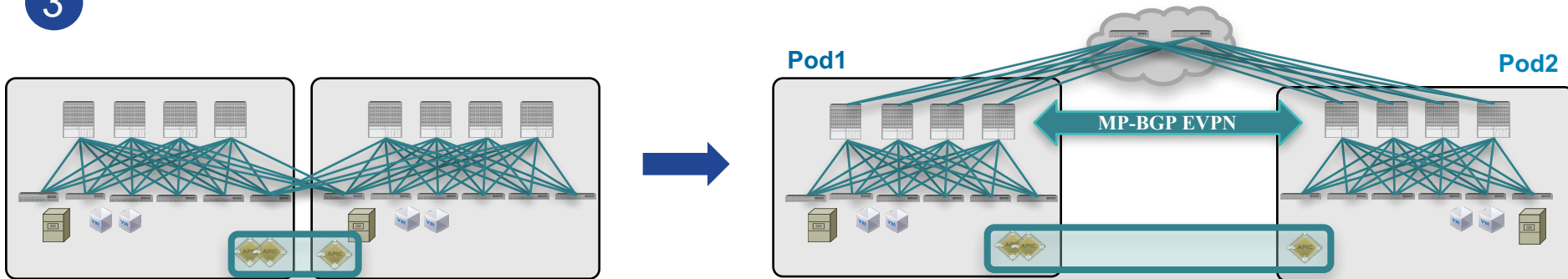


# Migration Scenarios

## Converting Stretched Fabric to Multi-Pod



3



- Re-cabling of the physical interconnection (especially when using DWDM circuits that must be reused)
- Re-addressing the VTEP address space for the second Pod → disruptive procedure as it requires a clean install on the second Pod
- **Not internally QA-validated or recommended**

# ACI Multi-Pod Solution

## Summary



- ✓ ACI Multi-Pod solution represents the natural evolution of the Stretched Fabric design
- ✓ Combines the advantages of a centralised management and policy domain with fault domain isolation (each Pod runs independent control planes)
- ✓ Control and data plane integration with WAN Edge devices (Nexus 7000/7700 and ASR 9000) completes and enriches the solution
- ✓ The solution is planned to be available in Q3CY16 and will be released with a companion Design Guide

# Agenda

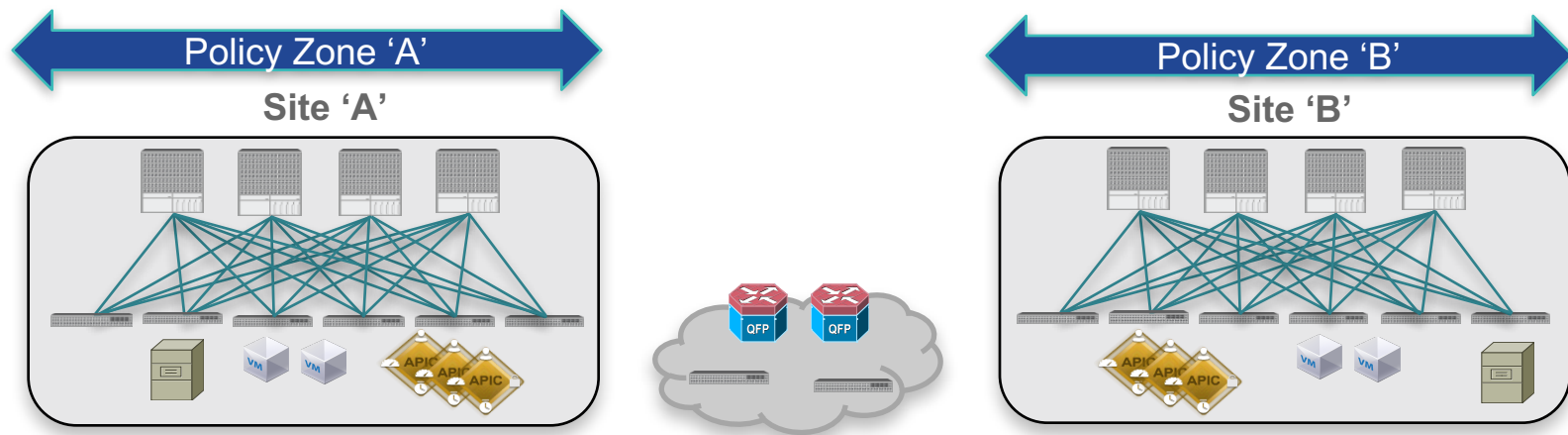
- Availability Design with ACI
- ACI Multi-Pod Deep Dive
- **ACI Multi-Site Overview**
- Conclusions and Q&A



Most of the information contained in the following slides is roadmap only and not fully committed yet (hence may change without warning)

# ACI Multi-Site Solutions

## Providing Complete Isolation between ACI Fabrics



- Multi-Fabric Scenarios

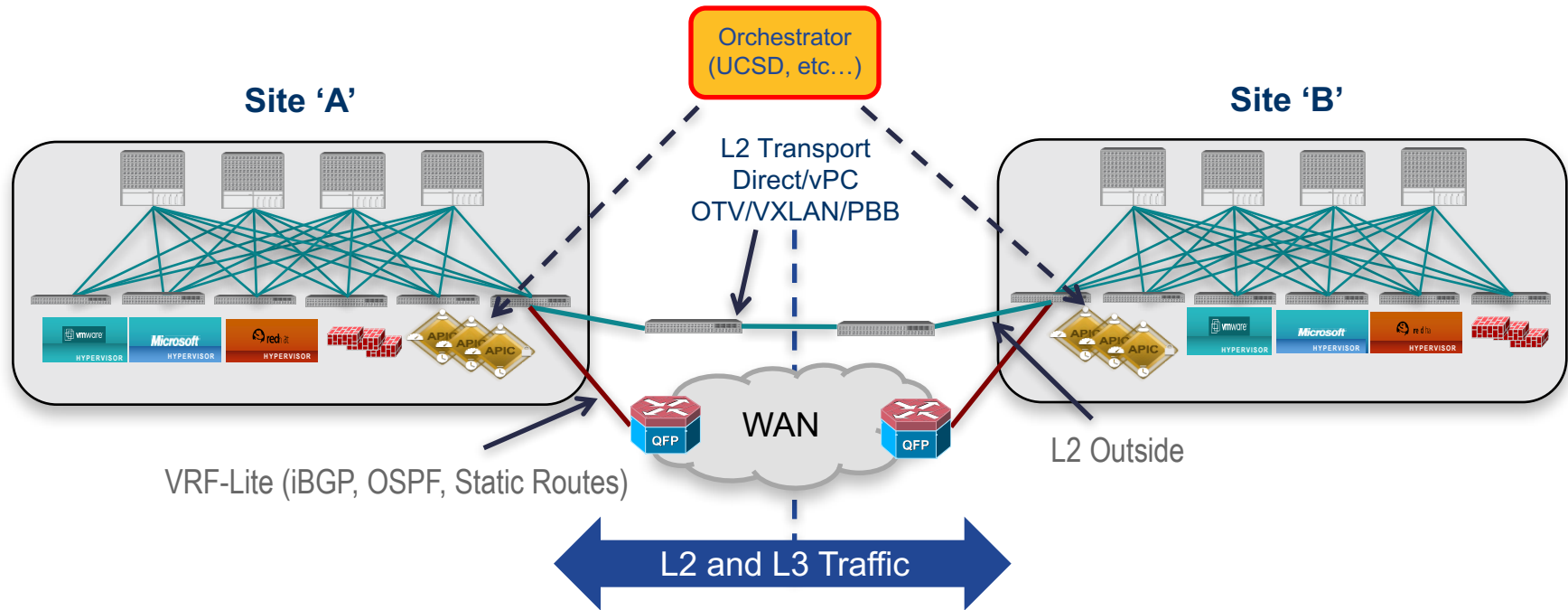
Primary use case is to support multiple “Availability Zones”

### Use Cases

- Multiple Fabrics within a single site (includes Multi-Floor, Multi-Room Data Centres)
- Multi-Building cross campus and metro distances (Majority of larger customers require a dual site active/active design)

# ACI Multi-Site Solutions

## Current Deployment Option – Multi-Fabric

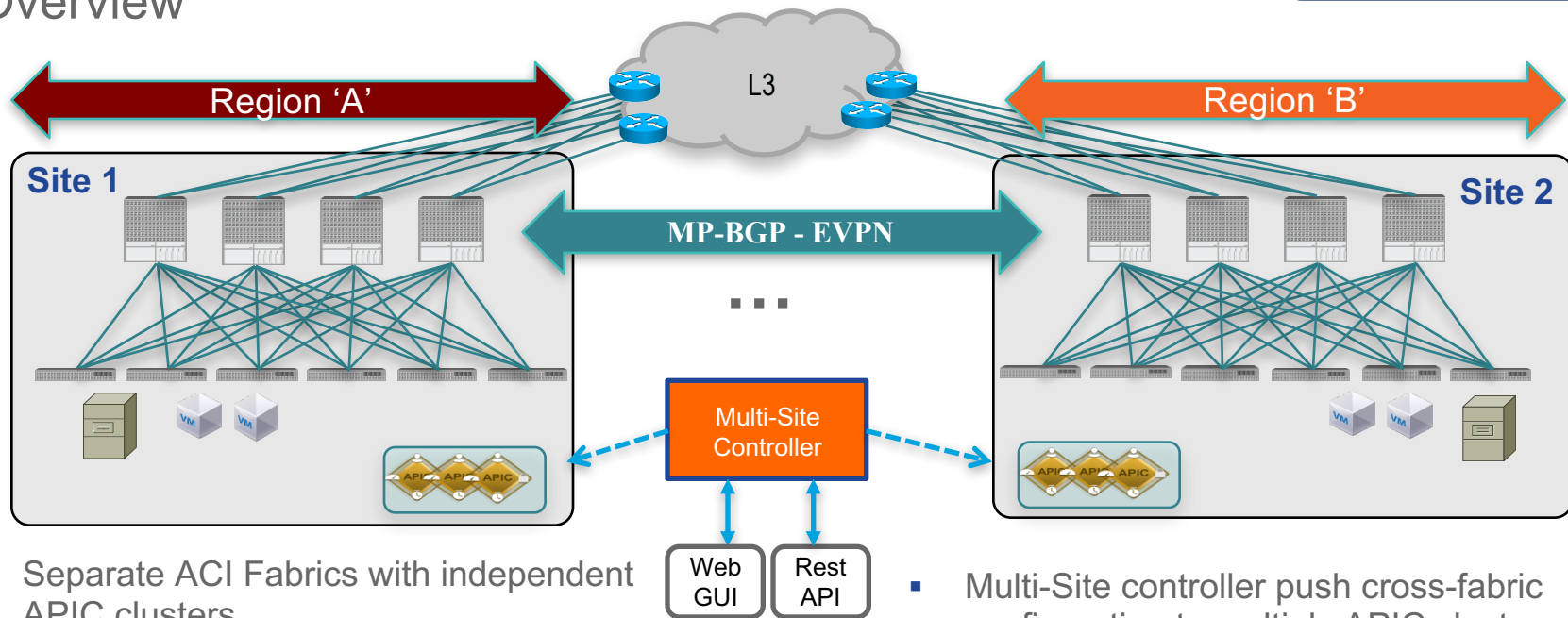


ACI Multi-Fabric Design Guide

<http://www.cisco.com/c/en/us/solutions/data-center-virtualization/application-centric-infrastructure/white-paper-c11-737077.pdf>

# ACI Multi-Site Overview

Q3CY17



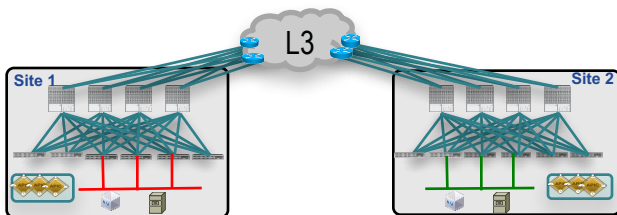
- Separate ACI Fabrics with independent APIC clusters
- Each fabric is considered as different region and availability zone
- Scoping of configuration changes
- DR and Active/Active use cases support

- Multi-Site controller push cross-fabric configuration to multiple APIC clusters
- MP-BGP EVPN control plane between sites
- Data Plane VXLAN encapsulation across sites
- End-to-end policy enforcement

# ACI Multi-Site Main Use Cases

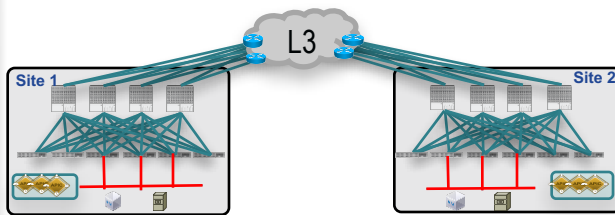
Q3CY17

## 1 Layer 3 only across Sites



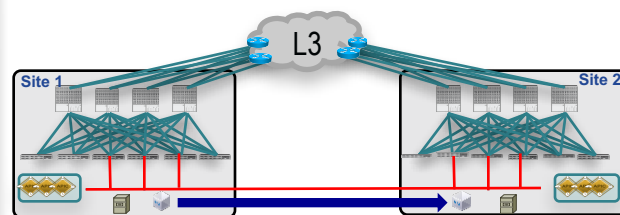
- BDs not extended across Sites
- Layer 3 Intra-VRF or Inter-VRF communication only
- Each Site can represent an ACI Multi-Pod Fabric\*

## 2 IP Mobility for Disaster Recovery



- Same IP subnet defined in separate Sites
- Support for IP Mobility ('cold' VM migration) and intra-subnet communication across sites
- **No Layer 2 flooding across sites**

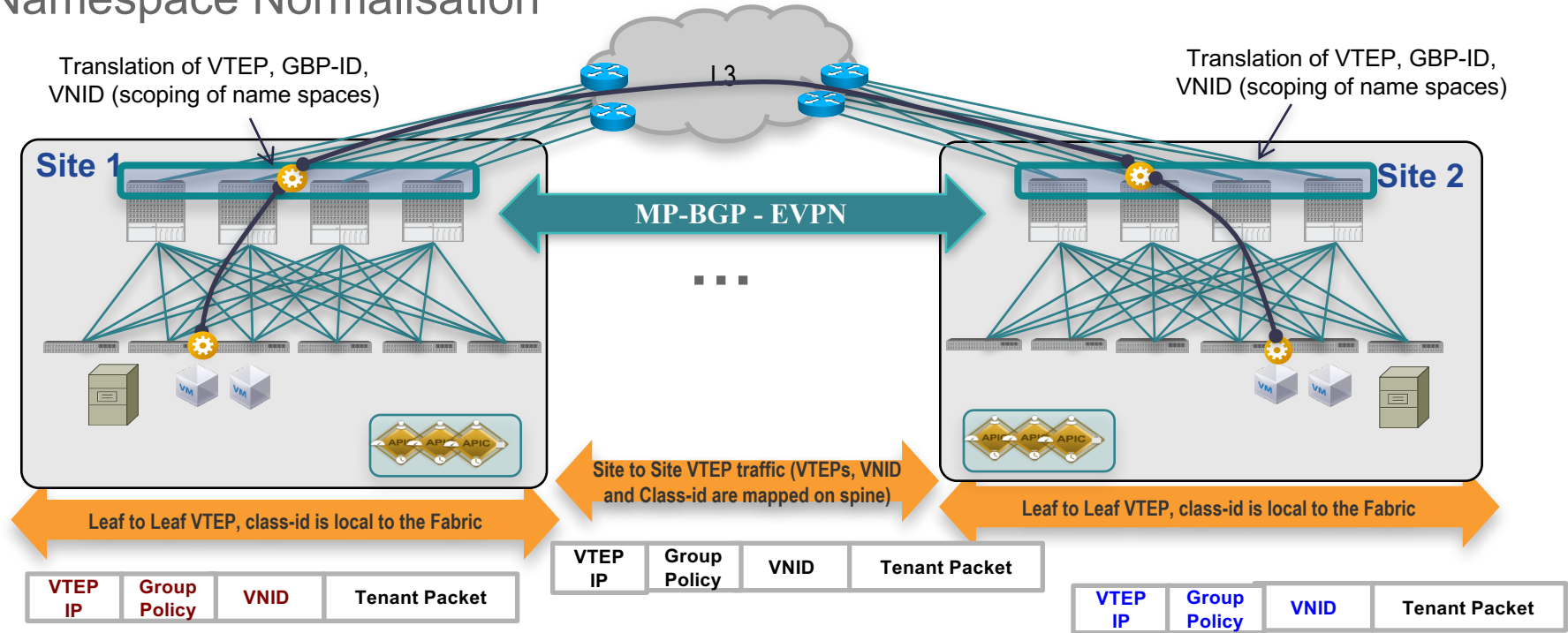
## 3 Highly scalable active/active DCs



- Interconnecting separate Fabrics to create a 'bigger Fabric'
- Layer 2 domains stretched across Sites
- Support for 'hot' VM migration
- **Layer 2 flooding across sites**

# ACI Multi-Site Namespace Normalisation

Q3CY17



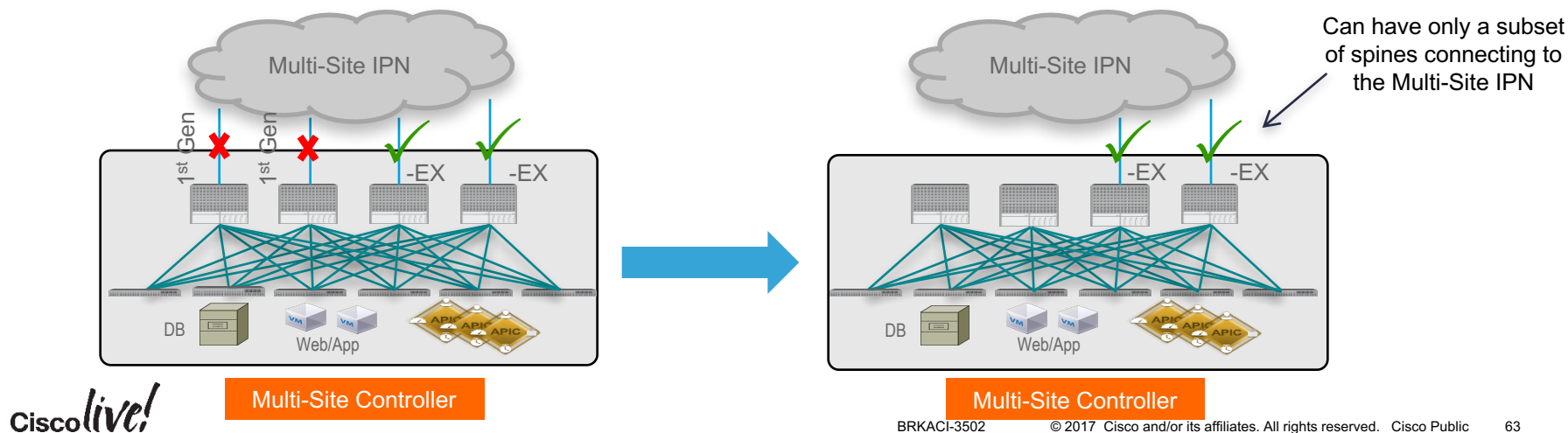
- Maintain separate name spaces with ID translation performed on the spine nodes
- Requires HW support for this functionality

# ACI Multi-Site (Q3CY17)

## Hardware Requirements

Q3CY17

- Support all ACI Leaf switches (NS, -E, -EX, -FX)
- Spine LC **“MUST”** be –EX line card (or newer) with new FC-E fabric card
- 1<sup>st</sup> generation spines (including 9336PQ) not supported
- New ‘baby spine’ (64 ports) will be available in Q3CY17 timeframe



# APIC vs. Multi-Site Controller Functionalities

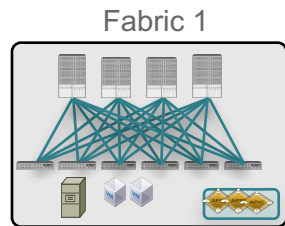


Multi-Site  
Controller

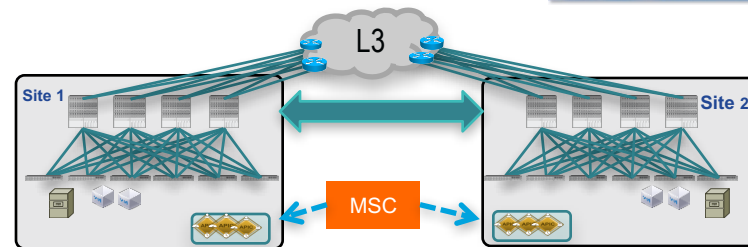
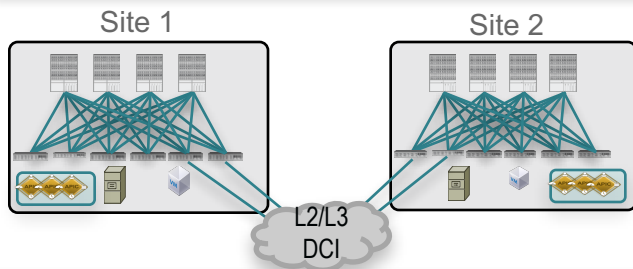
- Central point of management and configuration for the Fabric
- Responsible for all Fabric local functions
  - Fabric discovery and bring up
  - Fabric access policies
  - Service graphs
  - Domains creation (VMM, Physical, etc.)
  - ...
- Integration with third party services
- Maintain runtime data (VTEP address, VNID, Class\_ID, GIPo, etc.)
- No participation in the fabric data plan and control plan

- Does not replace but complement APIC
- Provisioning and managing of “Inter-Site Tenant and Networking Policies”
- Scope of changes
  - Granularly propagate policies to multiple APIC clusters
- Can import and merge configuration from different APIC clusters
- End-to-end visibility and troubleshooting
- No run time data, configuration depository
- No participation in the fabric data plan and control plan

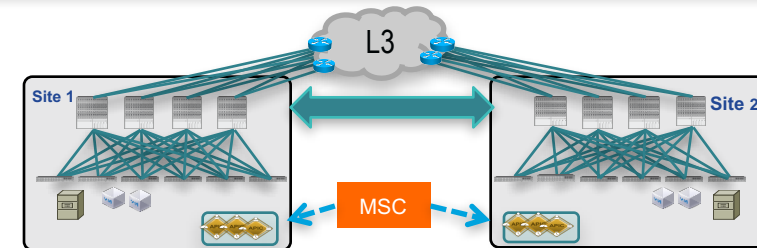
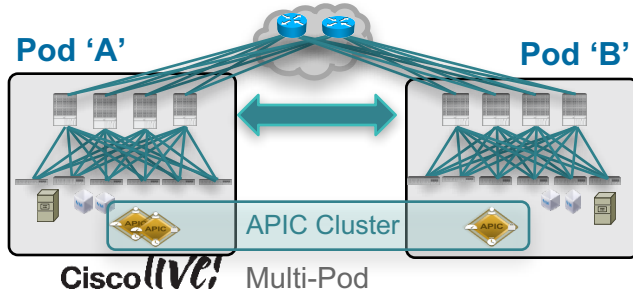
# Migration Paths



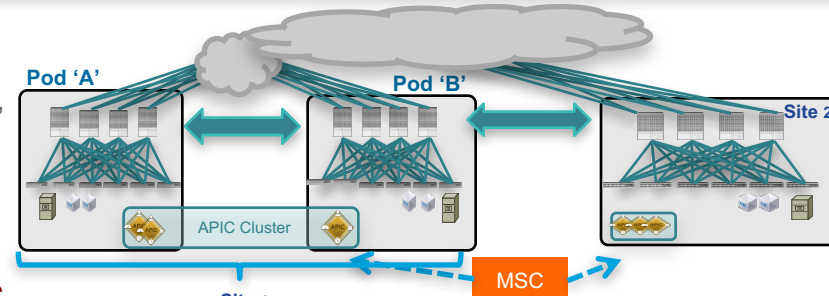
'Brownfield' ACI Fabric to Multi-Site



Dual Fabric Design to Multi-Site



Multi-Pod to 'Hierarchical Multi-Site'

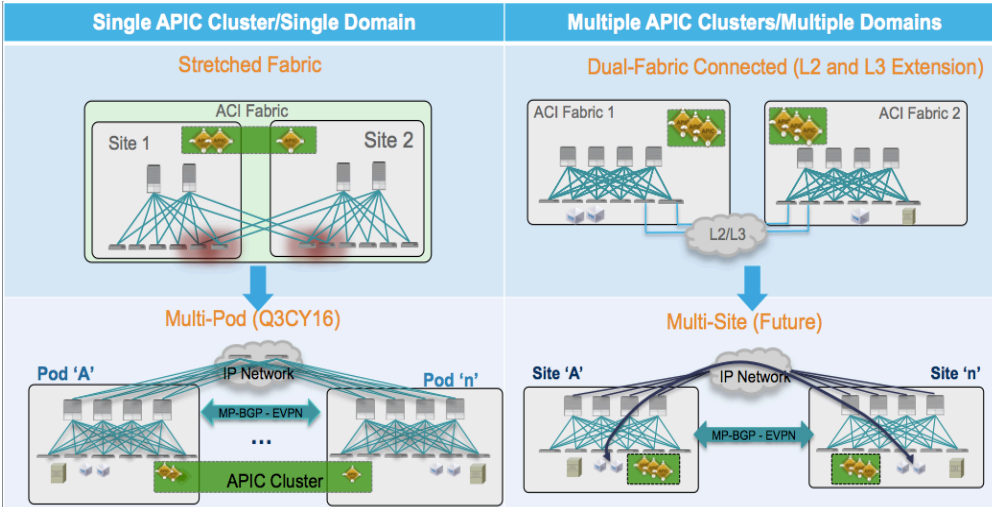


Not available at FCS

# Agenda

- ACI Multi-Fabric Design Options
- ACI Stretched Fabric Overview
- ACI Multi-Pod Deep Dive
- ACI Multi-Site Solutions Overview
- Conclusions and Q&A

# Conclusions



- Cisco ACI offers different multi-fabric options that can be deployed today
- There is a solid roadmap to evolve those options in the short and mid term
  - ✓ Multi-Pod represents the natural evolution of the existing Stretched Fabric design
  - ✓ Multi-Site will replace the Dual-Fabric approach
- Cisco will offer migration options to drive the adoption of those new solutions



# Where to Go for More Information

- ✓ ACI Stretched Fabric White Paper

[http://www.cisco.com/c/en/us/td/docs/switches/datacenter/aci/apic/sw/kb/b\\_kb-aci-stretched-fabric.html#concept\\_524263C54D8749F2AD248FAEBA7DAD78](http://www.cisco.com/c/en/us/td/docs/switches/datacenter/aci/apic/sw/kb/b_kb-aci-stretched-fabric.html#concept_524263C54D8749F2AD248FAEBA7DAD78)

- ✓ 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 Dual Fabric Design Guide

<http://www.cisco.com/c/en/us/solutions/data-center-virtualization/application-centric-infrastructure/white-paper-c11-737077.html?cachemode=refresh>

- ✓ ACI and GOLF High Level Integration Paper

<http://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-736899.html>

# Q & A

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# Thank you



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