



# Simple VXLAN/EVPN Fabric Setup with Nexus Dashboard

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# Webex App

## Questions?

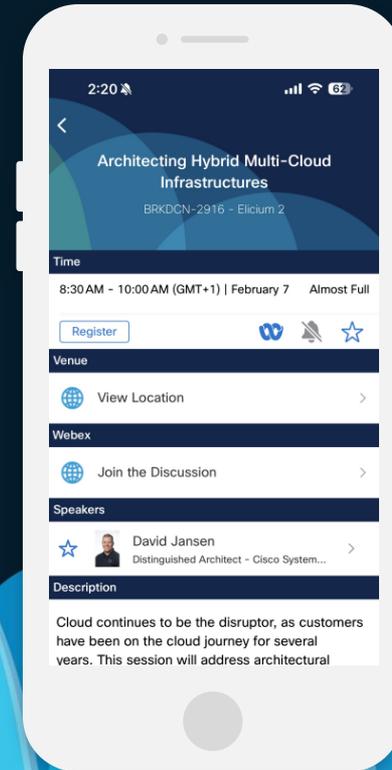
Use the Webex app to chat with the speaker after the session

## How

- 1 Find this session in the Cisco Events mobile app
- 2 Click “Join the Discussion”
- 3 Install the Webex app or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until February 28, 2025.

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# Agenda

- Introduction
  - EVPN VXLAN Design Fundamentals
  - Physical Connectivity and Logical Configuration
- Nexus Dashboard (ND)
  - Operations and Engineering Services Platform
  - Federation and One-View / Manage
- Nexus Dashboard Fabric Controller (NDFC)
  - NDFC Automation
  - NDFC Management
  - NDFC Visibility and Monitoring
  - NDFC Advanced Features

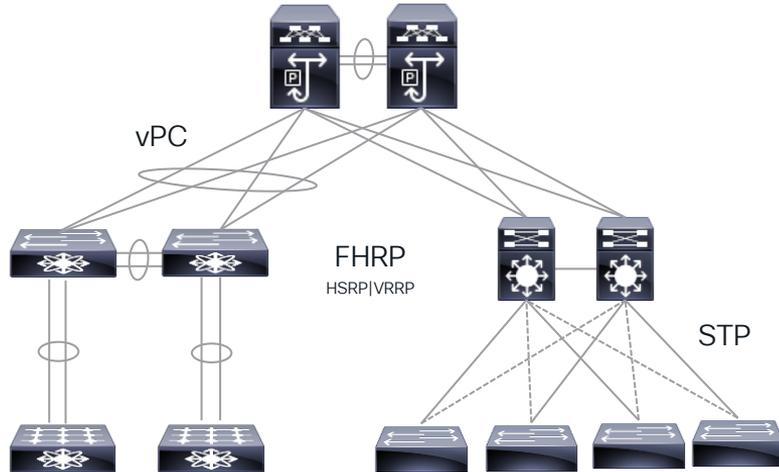
# Introduction



# Common Topologies

## Three-Tier Hierarchical

Inherent scale up topology building blocks  
Requires multiple independent protocols configured in concert to be able to use all network links



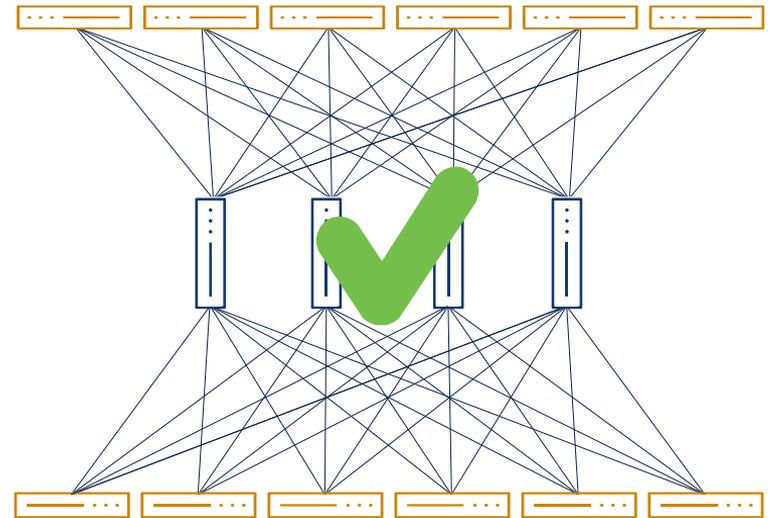
*"I always thought Ethernet forwarding with STP was a kludge, and the right solution was to do layer 3 forwarding..."*

~Radia Perlman

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## Clos Fabric

Fully Interconnected 'fabric' with multiple design variations  
Inherent modular scale out design (intra and inter-fabric)



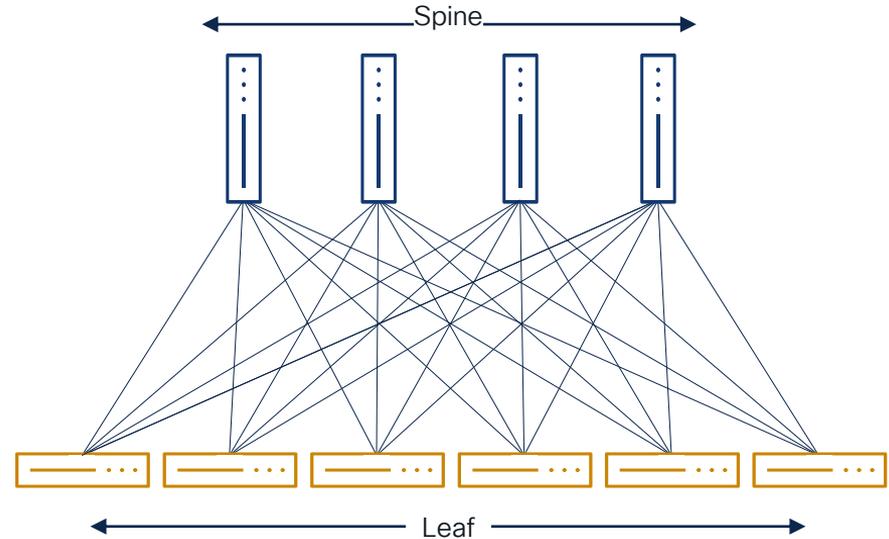
# Clos Topology

## A Leaf and Spine Topology

- Variations or Names of the same:
  - 2 Tier
  - Fat Tree
  - Folded Clos
  - 3 Stage Clos
  - Butterfly (5 Stage | PoD)

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## The Standard



### Fun Fact

Invented - Edwin Erwin 1938

Formalized - Charles Clos 1952

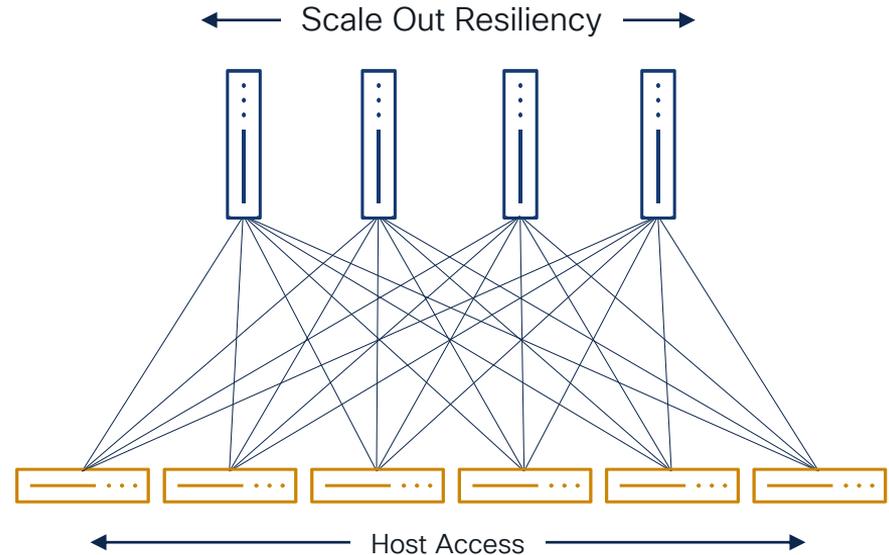
Honorable Mention - Almon Strowger 1888

# Clos Topology

## Scale Out Architecture

- Adding Spines results in:
  - Increased physical path redundancy
    - > Greater Resiliency
- Increased leaf count *without increasing oversubscription ratio(s)*
  - > More Access Ports

## Advantages



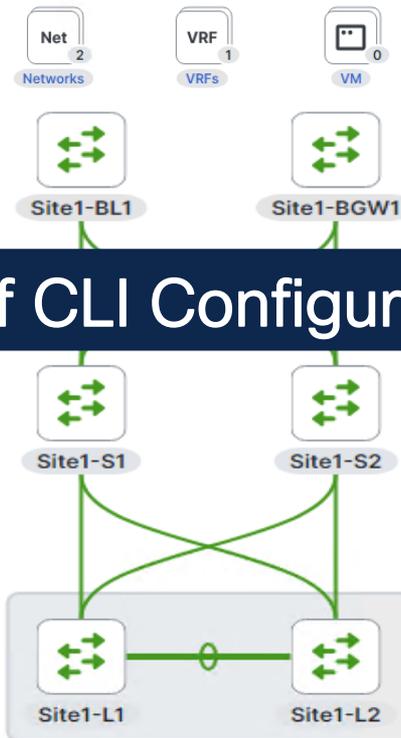
# Clos Topology – VXLAN EVPN Logical Configuration

```
Site1-L1# show vrf all
```

VRF-Name	VRF-ID	State	Reason
bluevrf	4	Up	--
default	1	Up	--
management	2	Up	--

```
Site1-L1# show nve vni
```

Interface	VNI	Multicast-group	State	Mode	Type [BD/VRF]	Flags
nve1	30000	239.1.1.1	Up	CP	L2 [2300]	
nve1	30001	239.1.1.1	Up	CP	L2 [2301]	
nve1	50000	n/a	Up	CP	L3 [bluevrf]	



```
Site1-BGW1# show run | count
435
```

```
Site1-S1# show run | count
443
```

```
Site1-L1# show run | count
593
```

# Nexus Dashboard Platform (v3.2.1)

# Cisco Nexus Dashboard



Your **key** to a simple operational experience

**Unify** data center network architectures

**Accelerate** business innovation, minimize risk

**Unleash** the power of AI for networking

Reactive, proactive and **predictive** insights

Leverage **open** protocols and standards



Provision

Once, deploy anywhere

Built-In automation | Infra-as-code



Secure

One source of truth

Segmentation | Zero-Trust



Manage

One logical network

Visibility | Maintenance



Analyze

Identify, troubleshoot, and fix faster

Tools | Reports | Prediction

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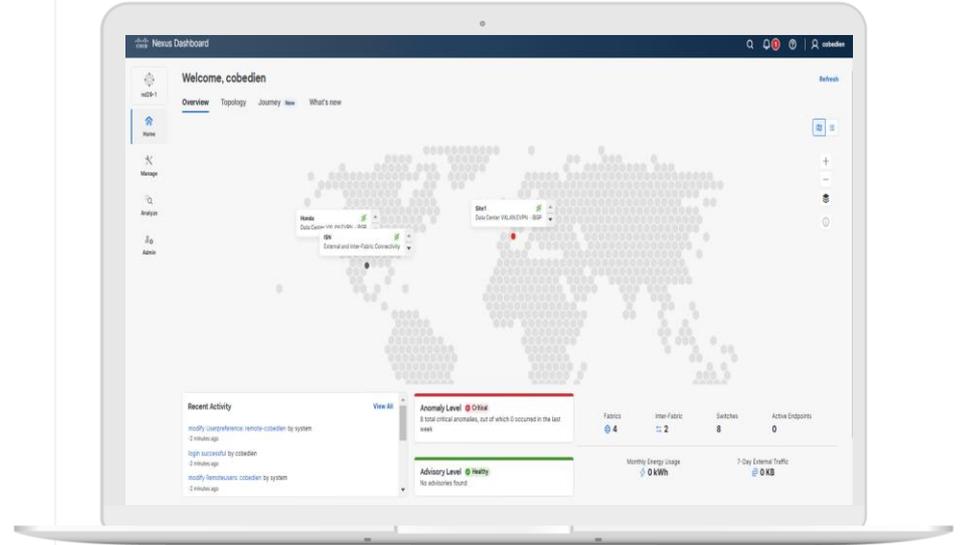
# Cisco Nexus Dashboard

Microservices Architecture

Both Virtual and Physical ND Supported

One Manage | Multi-Cluster Support

3-Node Active-Active High Availability



## Benefits

Flexibility and Scalability

Highly Customizable

Single Vantage Point

# Cisco Nexus Dashboard

## Platform Specifications

### Physical Form Factor (pND)

#### UCS C220 M6 *(Node-L4)*

Memory	256GB
CPU	1x 2.8GHz AMD
Hard Disk	4x2.4TB (9.6TB)
NVMe	1.6TB
SSD	960GB
PSU	1050W   1600W

### Virtual Form Factor (vND)

#### Virtual Appliance *(App Node)*

Memory	64GB
CPU	16 vCPUs
Disk	550G SSD

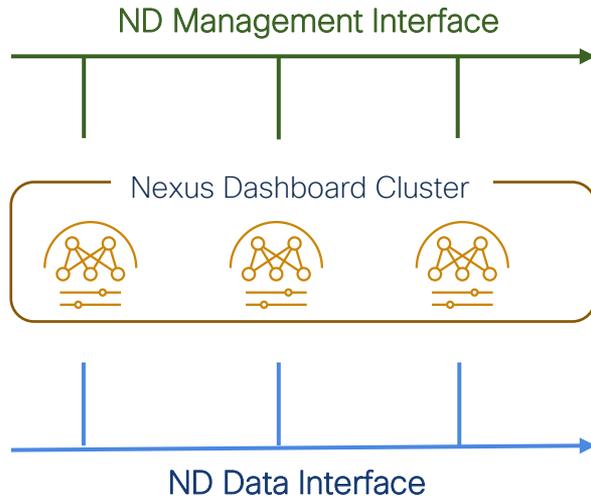


For the latest information check the specific scalability guide

[Nexus Dashboard Sizing and Capacity Planning](#)

# Cisco Nexus Dashboard

Each Nexus Dashboard Node in a cluster has two interfaces, each in a *different subnet*



## Nexus Dashboard Management Interface

Connects to the management network, and it provides web/API access to the Nexus Dashboard cluster

## The Nexus Dashboard Data Interface

Connects and provides IP reachability to the physical data center network infrastructure, via In-Band or Mgmt0 (OOB)

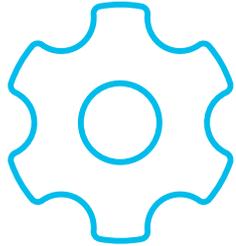
# Cisco Nexus Dashboard

The screenshot displays the Cisco Nexus Dashboard interface. At the top, the header includes the Cisco logo, the text "Nexus Dashboard", and user information "cobedien". A left-hand navigation menu contains icons for "All Clusters", "Home", "Manage", and "Admin". The main content area features a "Welcome, cobedien" message and a navigation bar with "Overview", "Topology", "Journey New", and "What's new". The central focus is a world map composed of hexagonal tiles, with callout boxes for "Site2" (Data Center VXLAN EVPN - IBGP), "nd29-2-Site2" (Meta), and "Site1" (Data Center VXLAN EVPN - IBGP). Below the map, two status boxes indicate "Anomaly Level Critical" (9 total anomalies) and "Advisory Level Healthy" (No advisories found). A summary row at the bottom shows "Clusters: 2", "Fabrics: 6", "Inter-Fabric: N/A", and "Switches: 13". The footer contains copyright information for 2025 Cisco Systems, Inc., the current date and time (January 28, 2025, 6:36:09 PM EST), and links for "Privacy policy" and "Terms of service".

## One-Manage View for Multi-Clusters

# Nexus Dashboard Fabric Controller (v12.2.2)

# Nexus Dashboard Fabric Controller



## Automation

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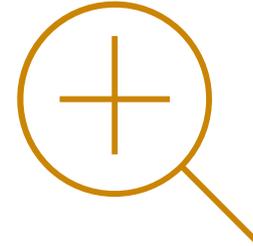
Accelerate provisioning  
and simplify deployments



## Management

---

In depth Management  
and control for all  
network deployments



## Visibility

---

Get Centralized Visibility  
and Monitoring views

# Nexus Dashboard Fabric Controller

## One-Manage / Federation For Multi-Cluster Deployment



Single sign-on for clusters

(With remote authentication)



Single dashboard

Including a summary of fabrics, switch details, etc.



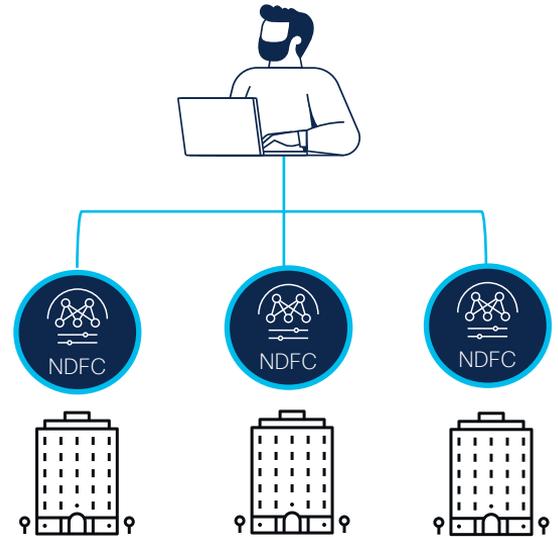
VXLAN EVPN Fabric

- Unified view and automation workflows for Multi-Fabric deployments
- Federation of MSDs
- L2/L3 Network stretch

4

Maximum clusters in a federation

Based on 12.2(2) scale



Distributed NDFC Data Centers

### Benefits

Scale Out NDFC Deployments

DCI Control Between DC and NDFC  
(Multi-Fabric)

DCI Connectivity Health, Tunnel Path  
and Statistics

# Nexus Dashboard Fabric Controller

## Scale Numbers (v12.2.2)

Deployment Type	Verified Limit	One Manage (4 Clusters)
1-Node vND (app node)	50 Switches	200 Switches
3-Node vND (app node)	100 Switches	400 Switches
5-Node vND (app node)	400 Switches	1600 Switches
1-Node pND	50 Switches	200 Switches
3-Node pND	500 Switches	2000 Switches

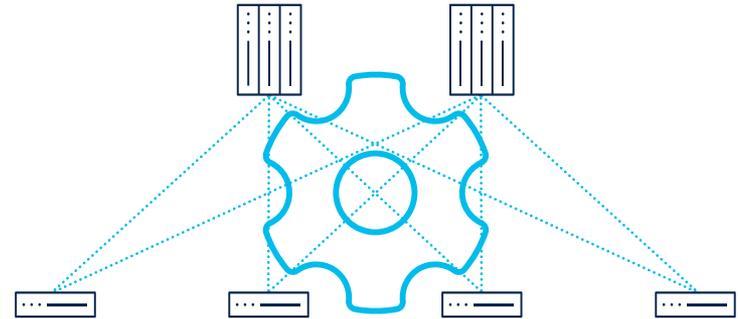


For the latest information check the specific scalability guide

[Verified Scalability Guild for Cisco NDFC, Release 12.2.2](#)

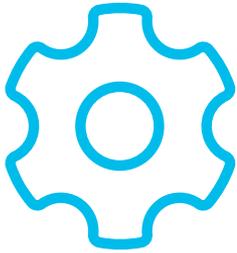
# NDFC Automation

(Engineering)



# Cisco Nexus Dashboard

## Nexus Dashboard Fabric Controller



### Automation

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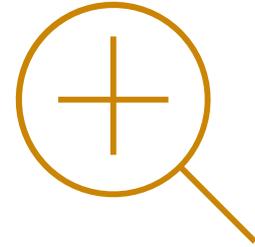
Accelerate provisioning  
and simplify deployments



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# Automation



## Accelerate Provisioning From Days to Minutes

### Day 0 - VXLAN EVPN Underlay Configuration

Define fabric settings (Underlay/Overlay), AS#, Replication Mode, IGP, IP Pools

Import Switches and Define Roles

Calculate and Deploy

---

### Day 1 - VXLAN EVPN Overlay Configuration

VRF and Network Configuration and Attach

Interface Policy and Attach

Calculate and Deployment

## Benefits

Simplify Fabric Deployments

Developer Agility

VXLAN EVPN Multi-Site

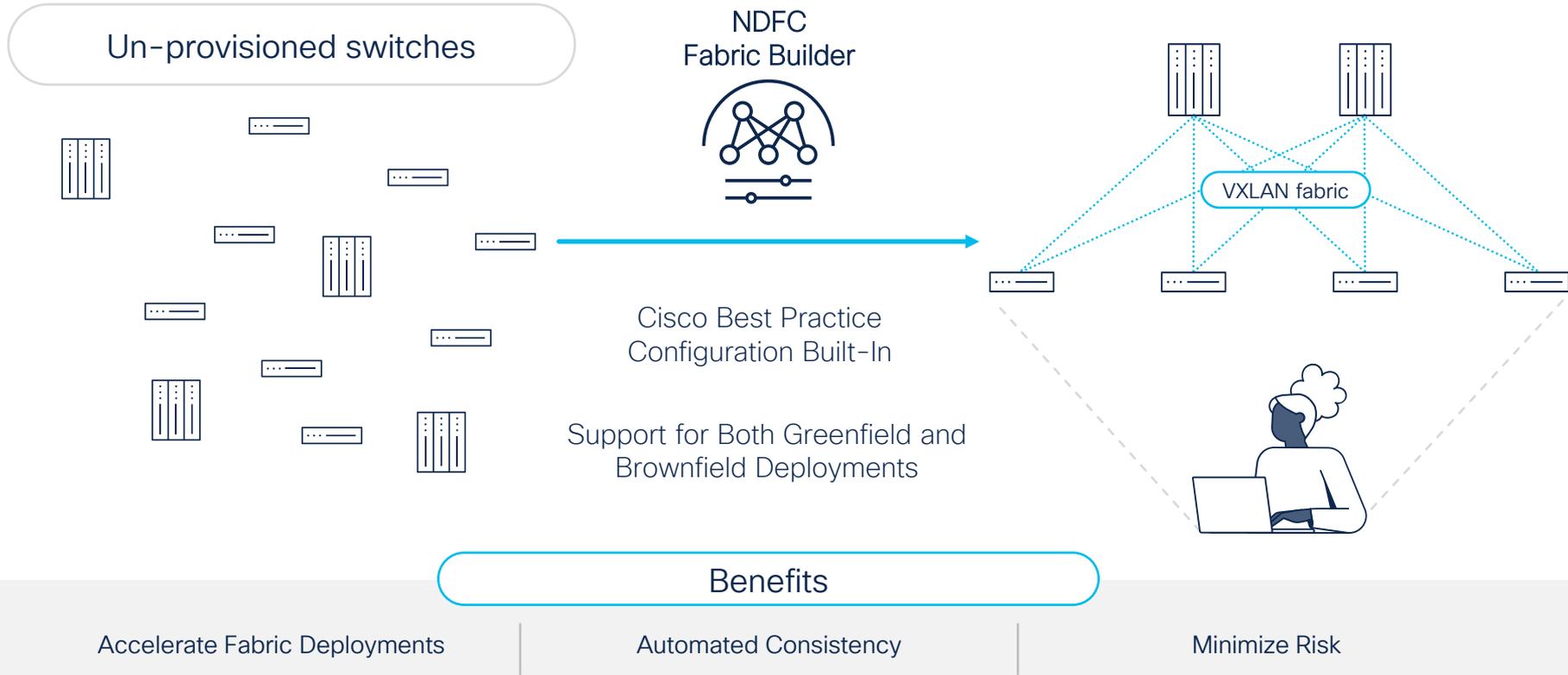
NDFC Day-0

VXLAN EVPN Underlay

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# Provision a New Fabric in Minutes



# Data Center VXLAN EVPN – Day-0 Underlay



## Step 2

### Discover

Import switches with POAP or Day-0 config  
Define switch Roles (Border, Leaf, Spine, etc)  
[Optional] Create vPC pairs



## Step 1

### Create

Define fabric settings (Underlay, Overlay) – AS#, Replication Mode, IGP, IP Pools, etc.

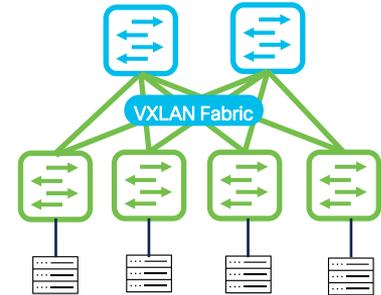


## Step 3

### Recalculate and Deploy

Generates config based on intent  
Preview side by side diffs

Cisco Best Practice Implemented



Fast, automated process



# Data Center VXLAN EVPN – Day-0 Underlay



## Step 1 – Create

# Zero Touch Deployment

## POAP - Power On Auto Provisioning



Flexible bootstrap and management via in-band (front-panel port) or out of band port



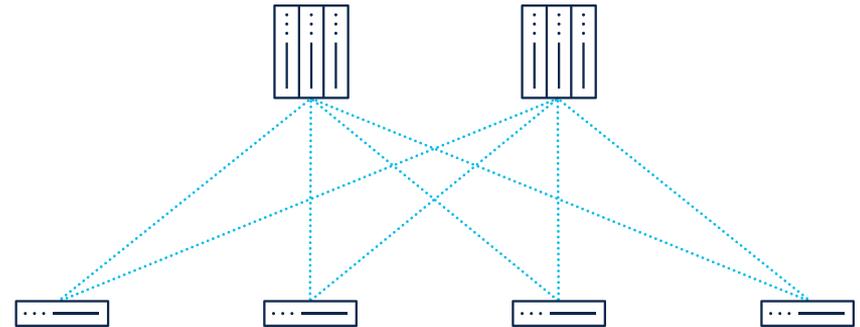
Supports VXLAN EVPN, classic LAN fabrics



Convenient connectivity options for all device roles: leaf, spine, border leaf, border spine



Inband or OOB Connectivity



Benefit

Zero Touch Fabric Onboarding and Management

# Data Center VXLAN EVPN – Day-0 Underlay

Enable POAP



Bootstrapping



Pre-Provision



## Step 2 – Discover

# NDFC Switch Role Example

## Different Roles for Border Gateway (BGW)

### Border Gateway

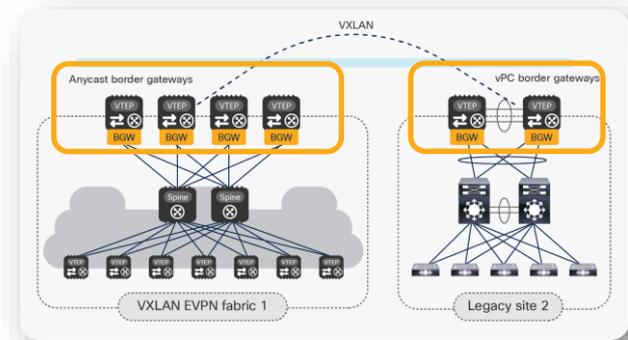
Layer 3 based Anycast BGW deployed at the Leaf Layer

### vPC Border Gateway

Used to locally dual-attach Layer 2 networks or Endpoints  
Allows Distributed Anycast Gateway (DAG)

### Border Gateway Spine

Layer 3 based Anycast BGW deployed at the Spine Layer



Spine
Leaf
Border
Border Spine
Border Gateway (current)
Border Gateway Spine
Super Spine
Border Super Spine
Border Gateway Super Spine

# Data Center VXLAN EVPN – Day-0 Underlay



## Step 3 – Recalculate and Deploy

# Virtual Port Channel (vPC) NDFC

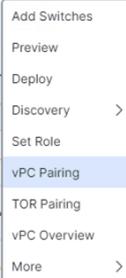
Fabric Overview - nac-ndfc1

Actions   

Overview Switches Links Interfaces Interface Groups Policies Networks VRFs Services Security Event Analytics History Resources Metrics

Filter by attributes

Actions ^

Switch	IP Address	Role	Serial Number	Mode	Config Status	Oper Status	Discovery Status	Model	VPC Role	VPC Peer	Software Version	Up	
<input checked="" type="checkbox"/> Site1-L1	10.3.1.13	Leaf	93ZYOGW6PQU	Normal	In-Sync	Minor	Ok	N9K-C9300v			9.3(8)	52	 <ul style="list-style-type: none"><li>Add Switches</li><li>Preview</li><li>Deploy</li><li>Discovery &gt;</li><li>Set Role</li><li>vPC Pairing</li><li>TOR Pairing</li><li>vPC Overview</li><li>More &gt;</li></ul>
<input type="checkbox"/> Site1-L2	10.3.1.14	Leaf	9ARKRC5QR7I	Normal	In-Sync	Minor	Ok	N9K-C9300v			9.3(8)	52	
<input type="checkbox"/> Site1-S1	10.3.1.11	Spine	93RU8UA6Z38	Normal	In-Sync	Minor	Ok	N9K-C9500v			9.3(8)	164	
<input type="checkbox"/> Site1-S2	10.3.1.12	Spine	9ETNEA7HZZJ	Normal	In-Sync	Minor	Ok	N9K-C9500v			9.3(8)	52	

vPC Pairing

Select vPC Peer for Site1-L1

Filter by attributes

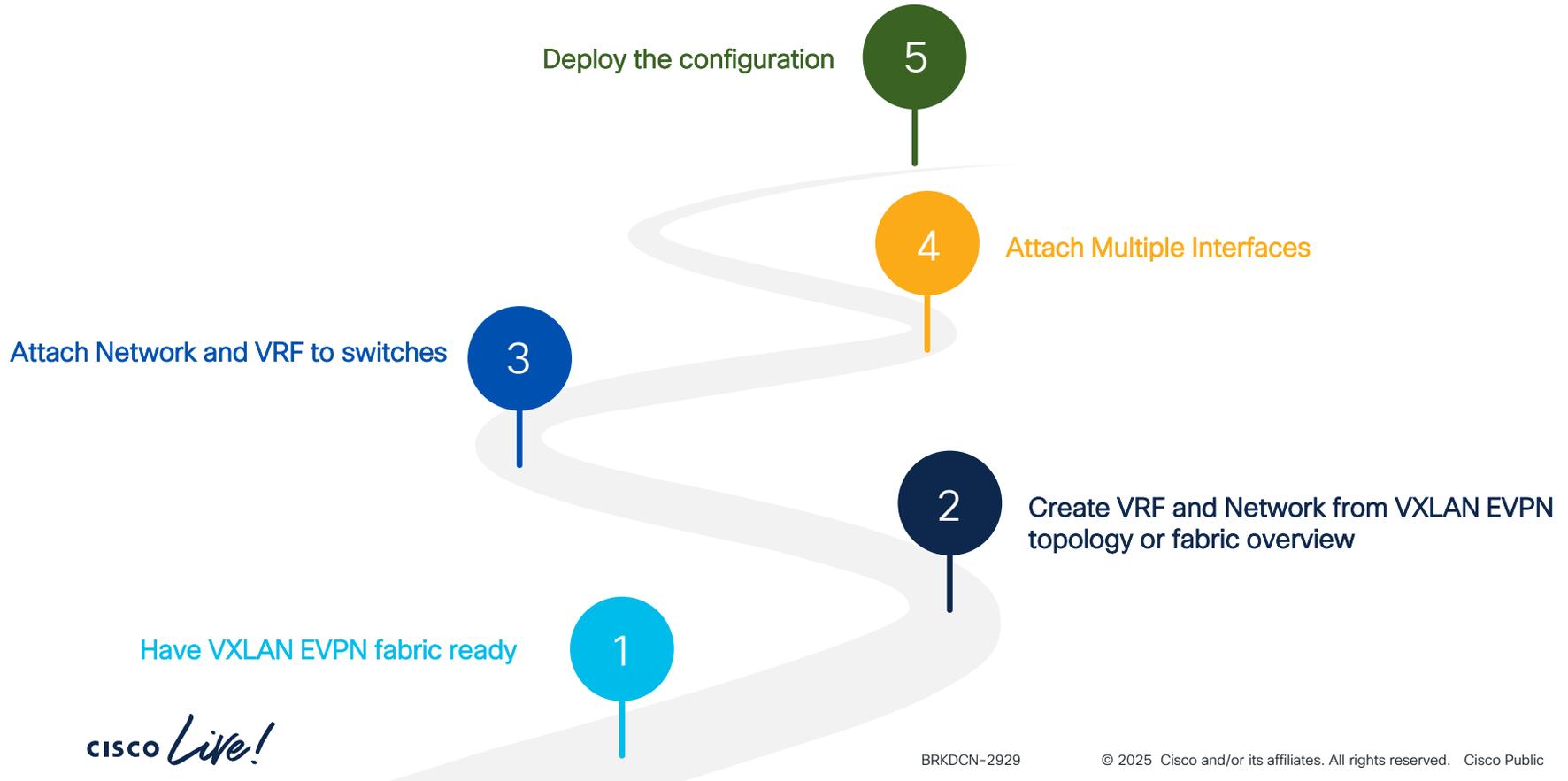
Virtual Peerlink

Device	Recommended	Reason	Serial Number	IP Address
<input checked="" type="radio"/> Site1-L2	False	Switch has Networks/VRFs attached	9ARKRC5QR7I	10.3.1.14

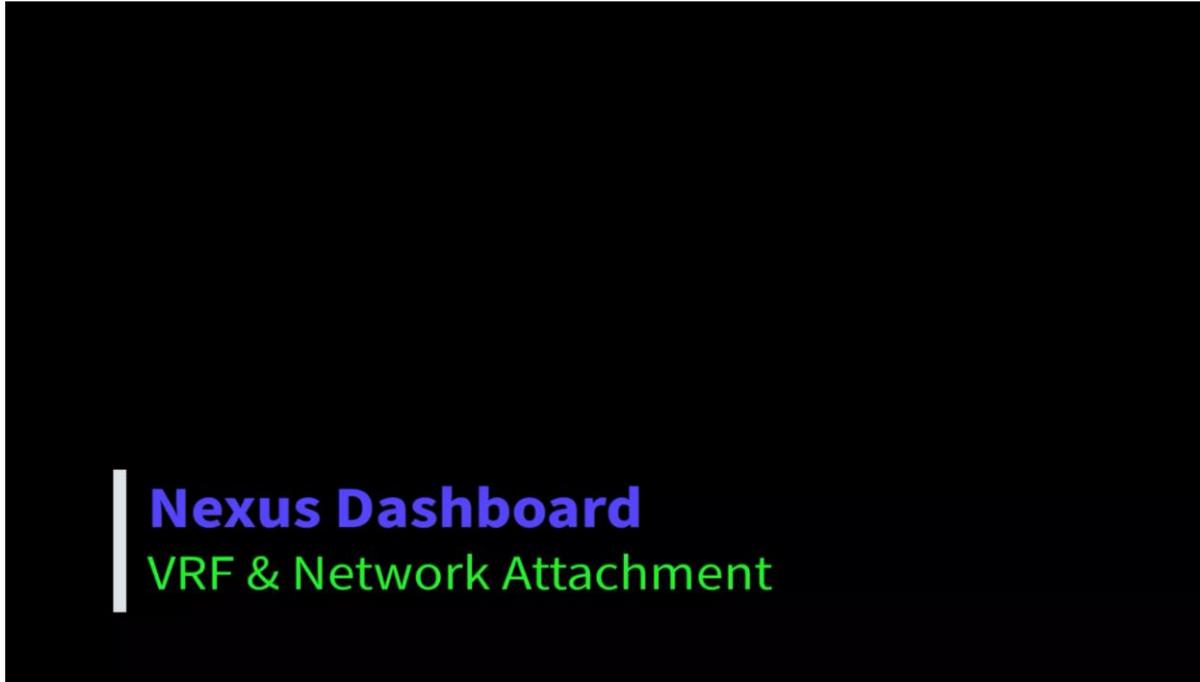
# NDFC Day-1

## VXLAN EVPN Overlay

# Data Center VXLAN EVPN – Day-1 Overlay

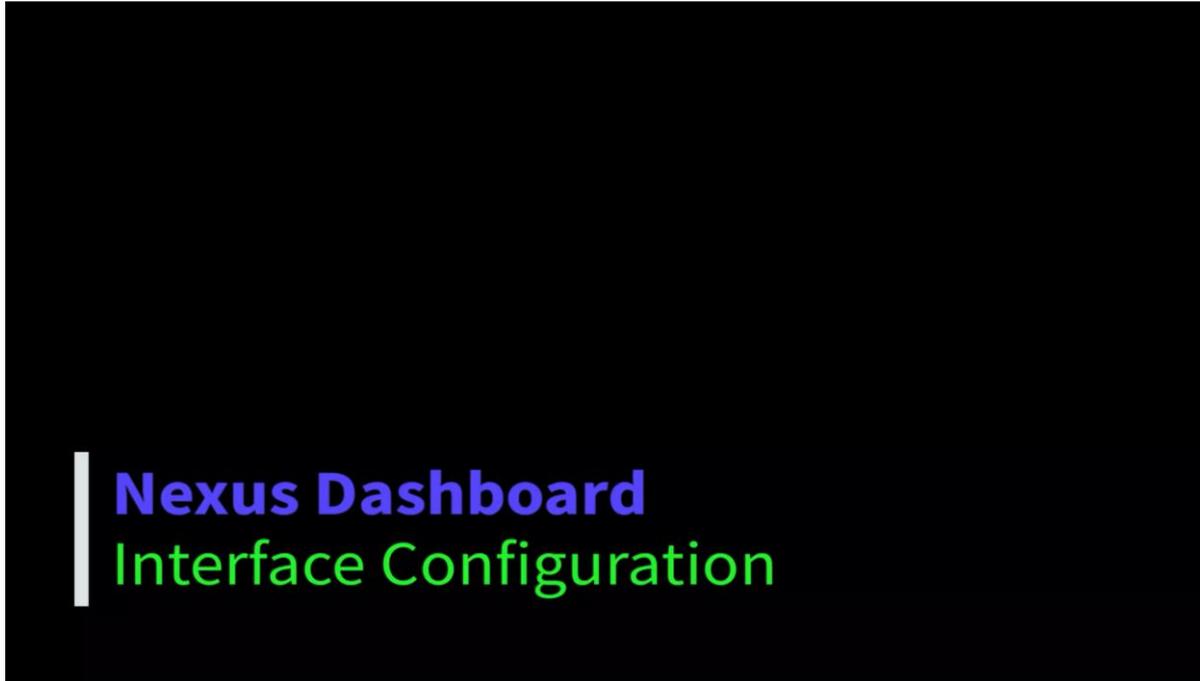


# Data Center VXLAN EVPN – Day-1 Overlay



## Create VRF and Network

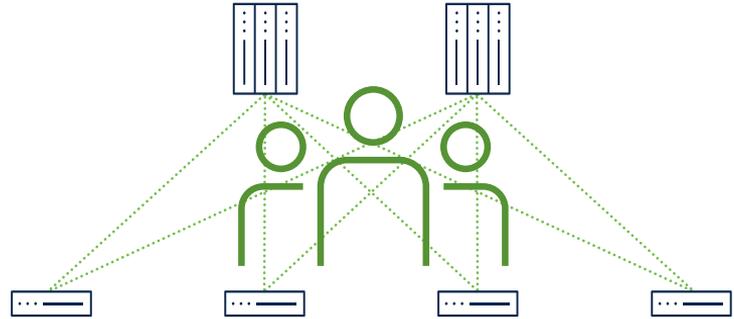
# Data Center VXLAN EVPN – Day-1 Overlay



Attach Interface

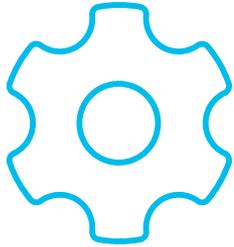
# NDFC Management

(Operations)



# Cisco Nexus Dashboard

## Nexus Dashboard Fabric Controller



### Automation

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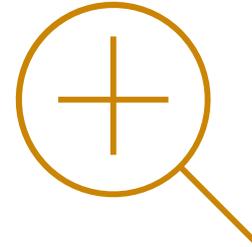
Accelerate provisioning  
and simplify deployments



### Management

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In depth Management  
and control for all  
network deployments



### Visibility

---

Get Centralized Visibility  
and Monitoring views

# Management



## Single Point of Management for Data Center Operations

Configuration Compliance

Image and Patch Management

Fabric Backup and Restore

Hardware Replacement / RMA

Role Based Access Control (RBAC) and Change Control

Management for non-Nexus platforms

### Benefits

Reliability

Compliance

Secure

# Configuration Compliance

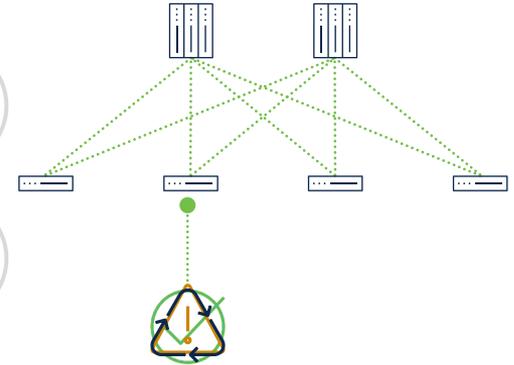


Ensure fabric consistency

Continuously monitors if configuration is compliant with user intent

Error detection, flag drifts for remediation

Benefits



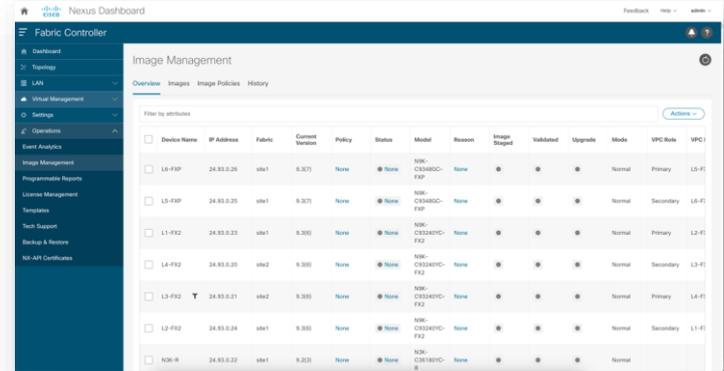
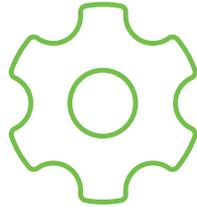
Fabric Reliability and Visibility

Operations Confidence

# Streamlined Image and Patch Management

## Maintenance mode

- Guided workflows
- Image upgrades, EPLD upgrades and downgrades, SMU



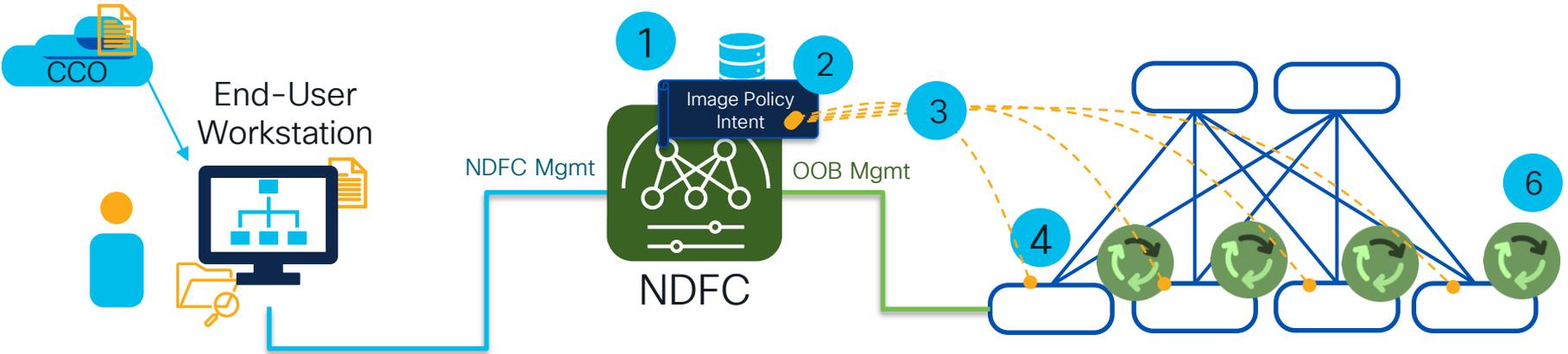
## Benefits

Simplified

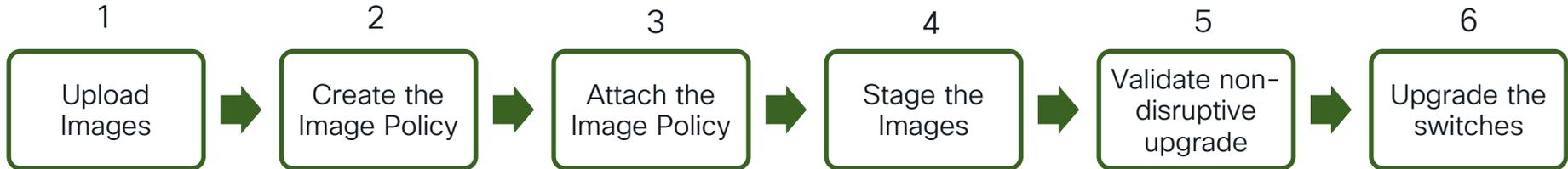
Intuitive

Customizable

# Image Management Workflow



Discover the switches into Nexus Dashboard Fabric Controller.



# Fabric Image Policy Management

Image Policy

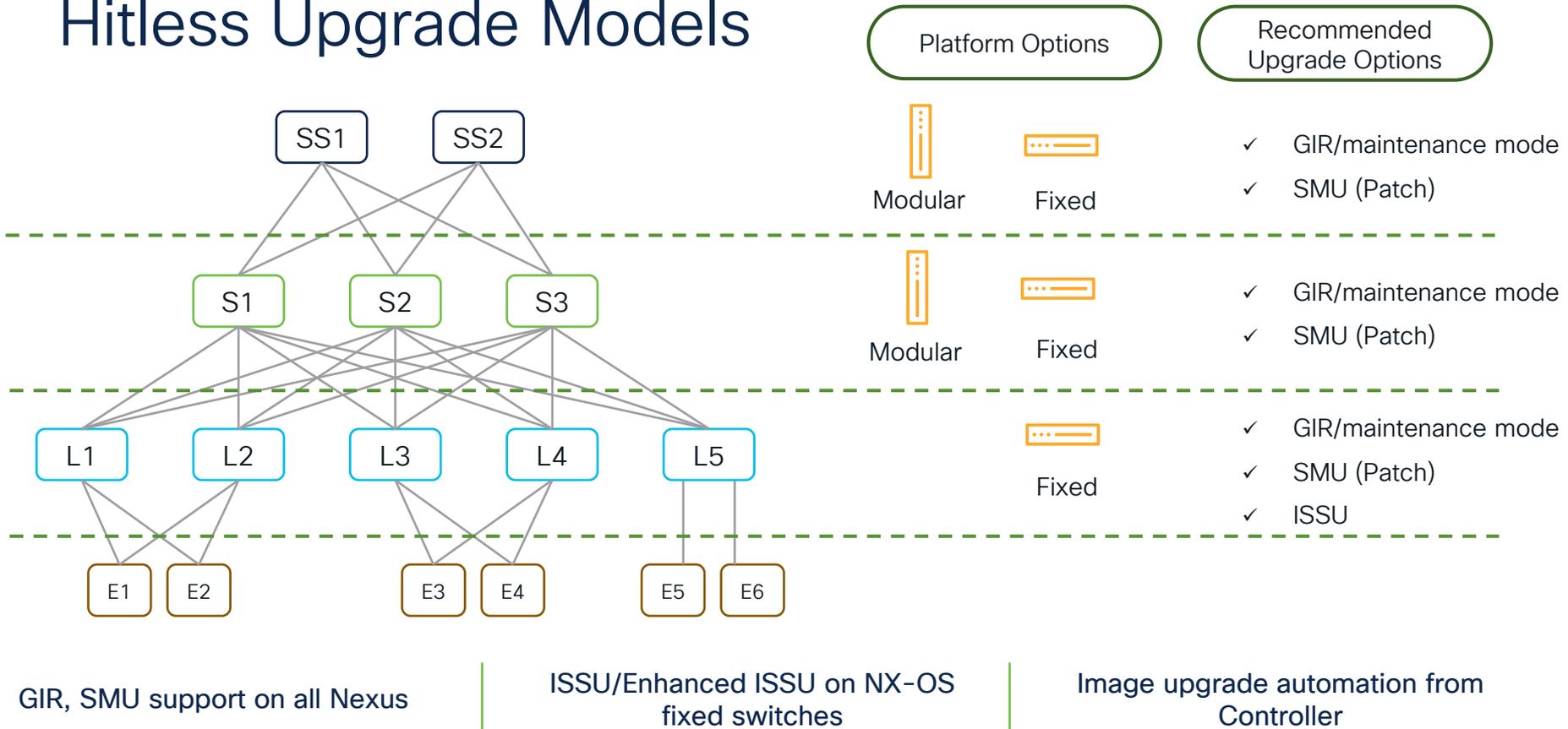


Fabric Image Management

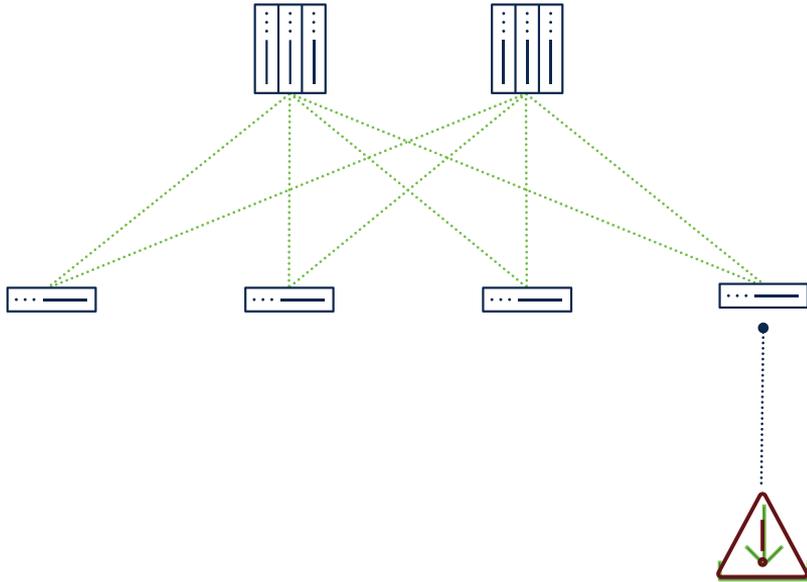


Image Management

# Hitless Upgrade Models



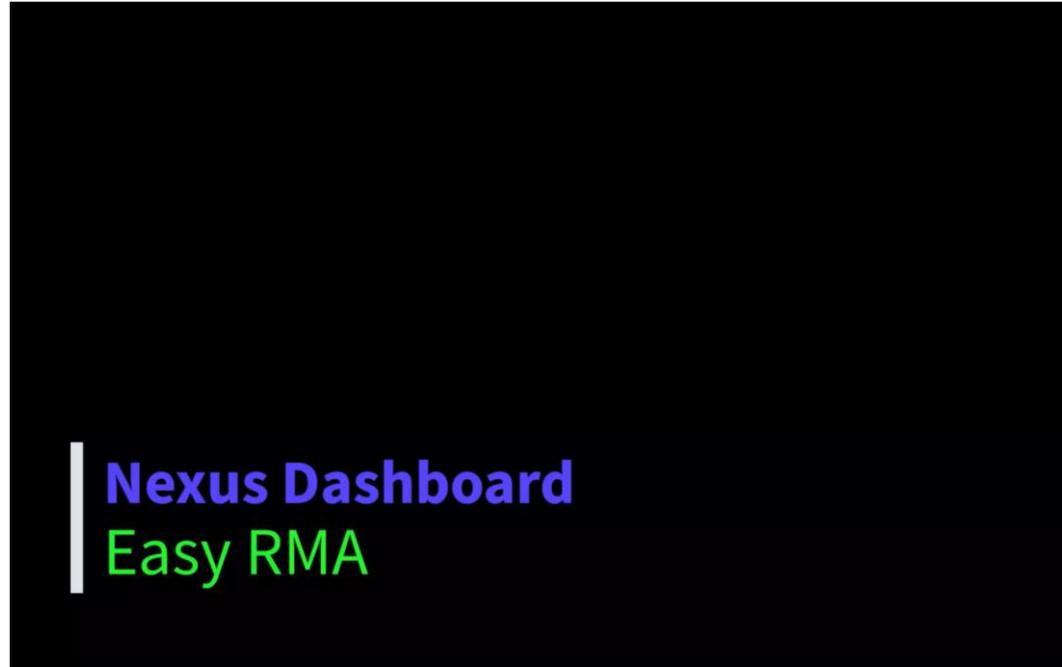
# RMA Replacement



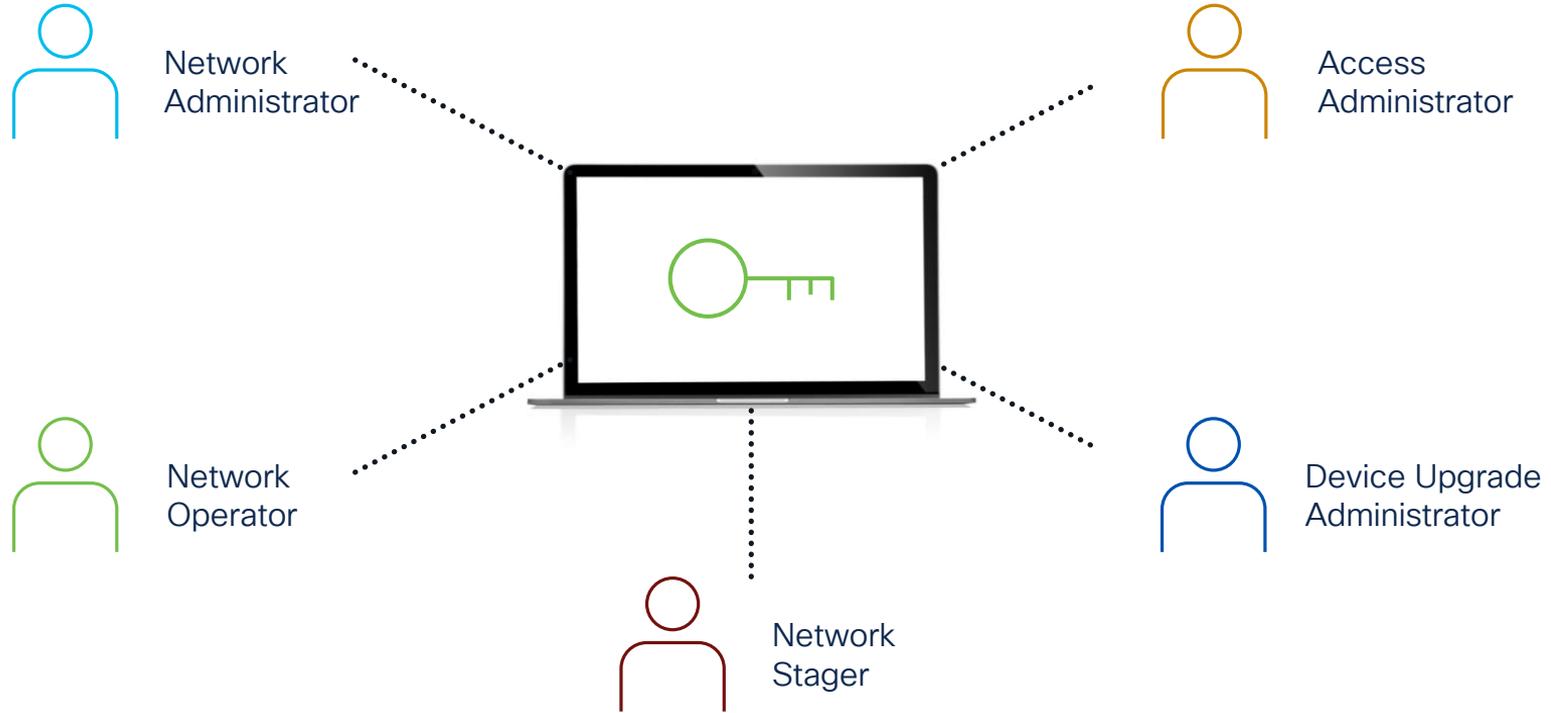
RMA for Defective Switch is Required

Easily Perform RMAs from NDFC UI

# RMA Workflow Demo



# Role-Based Access Control (RBAC)



Increase Efficiency and Productivity with Granular Roles Orchestrated from Nexus Dashboard

# Backup and Restore Workflows

Backup



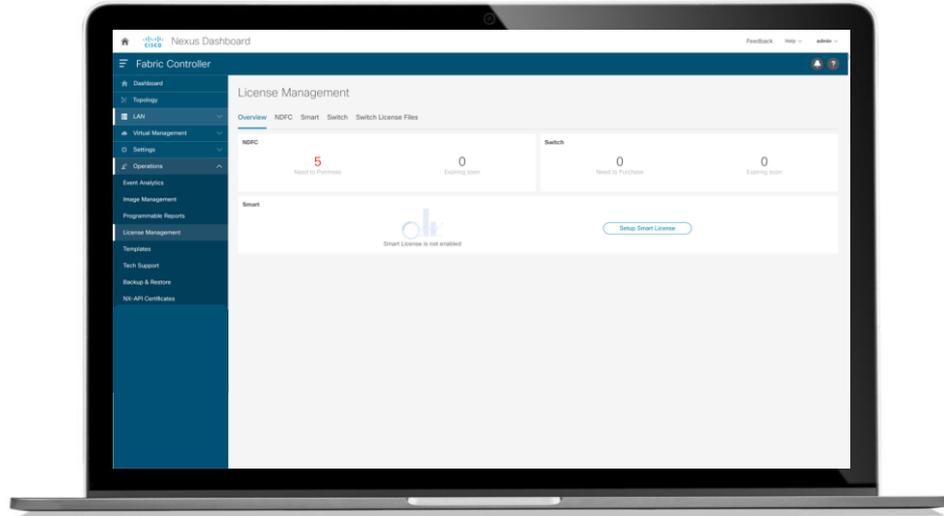
Restore



Managing Failure and Recovery

# License Management

NDFC offers unified license management for NX-OS and MDS deployments



Easily activate and configure Smart Licensing from NDFC UI

## Benefits

Easily License your Devices

Monitor License Usage

Ensure Compliance

# Management for Non-Nexus Platforms

Configuration management for Cisco  
IOS-XR devices

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VXLAN EVPN management for Cisco IOS-XE  
Catalyst devices

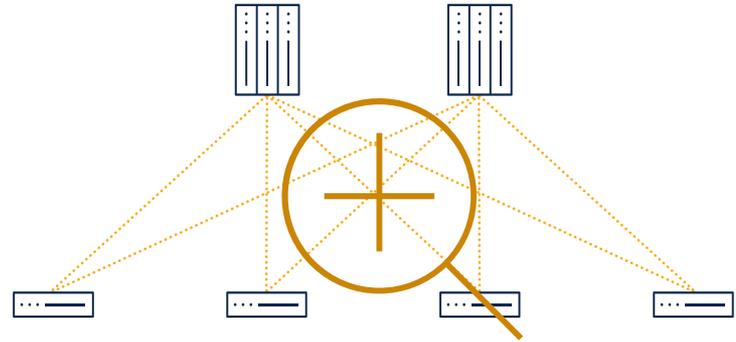
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Discovery and basic monitoring for  
third-party devices

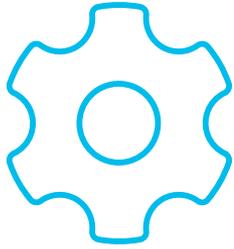


# NDFC Visibility and Monitoring



# Cisco Nexus Dashboard

## Nexus Dashboard Fabric Controller



### Automation

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Accelerate provisioning  
and simplify deployments



### Management

---

In depth Management  
and control for all  
network deployments



### Visibility

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Get Centralized Visibility  
and Monitoring views

# Visibility and Monitoring



## Get comprehensive monitoring

Enhanced Topology Views

Compute and Endpoint Visibility

OAM support with NDFC

Detailed Inventory, Health, Resource Consumption Information on Devices

End-to-End Visibility, Monitoring and Troubleshooting

Integrate with Day 2 Operations

## Benefits

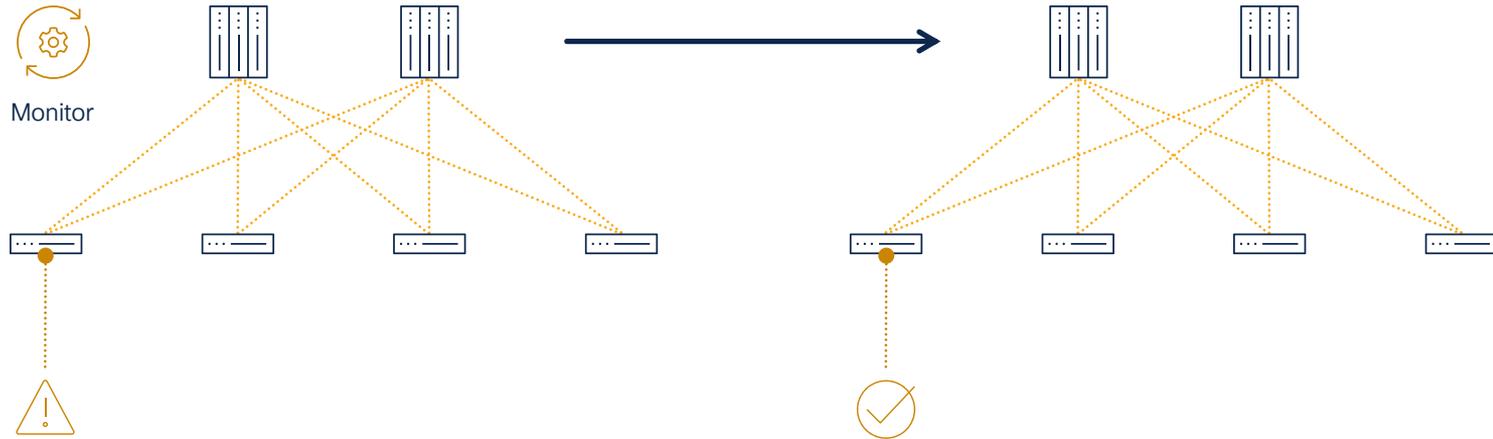
Intuitive

Deep Visibility

Enhanced Monitoring

# Operations, Administration and Maintenance

NDFC supports OAM for VXLAN, external, and classic LAN fabrics

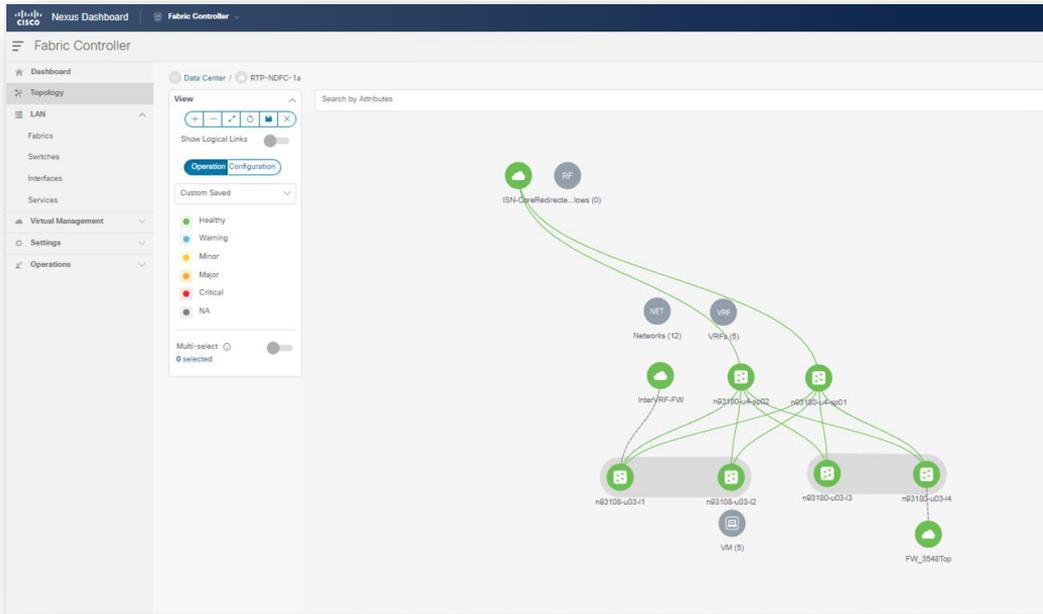


Benefits

Enhance Management

Monitoring and Troubleshooting Capabilities

# Visualize Multiple Fabrics with Topology Views



Drill-down into a single fabric and detect anomalies

In-context fabric, switch, end-point details

Inventory View (Switches, ports, endpoints)

Zoom in/Zoom out and Search in a fabric

Multi-Pod & Multi-Fabric overlay visibility (ND 4.0)

Security and Segmentation view (future)

## Benefit

Dynamic and Intuitive, Superior App Experience

# VMM Visibility

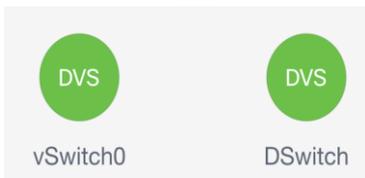


vCenter Instance

Visualise the virtual infrastructure at different layer



Hosts



DVS



VM

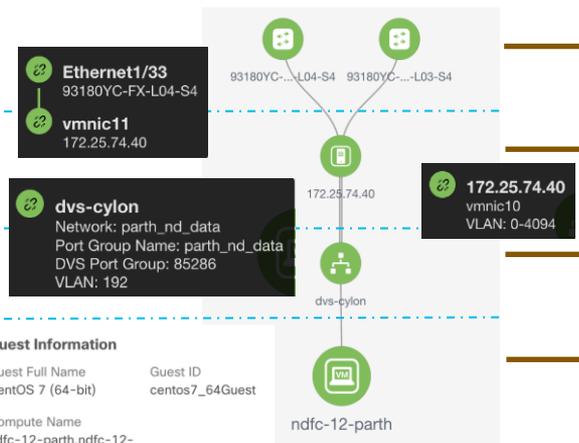
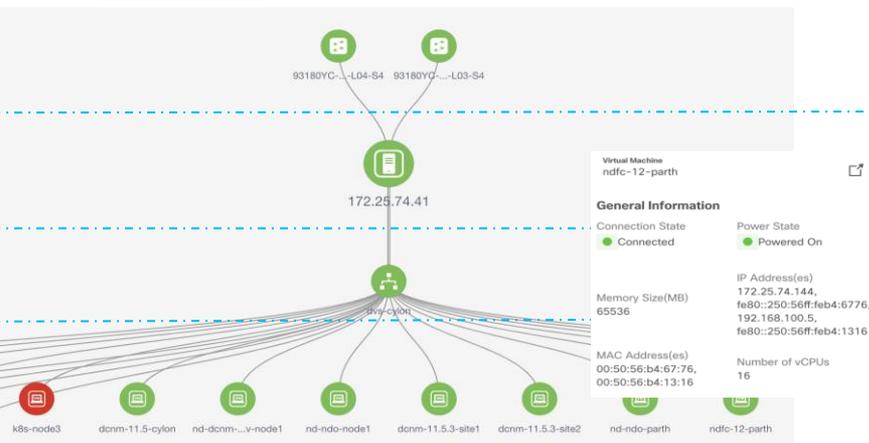
Display connectivity details

Leaf nodes

Physical Host

DVS

Virtual Machines



**Virtual Machine**  
ndfc-12-parth

**General Information**

Connection State	Powered State
● Connected	● Powered On
Memory Size(MB)	IP Address(es)
65536	172.25.74.144, fe80::250:56ff:feb4:6776, 192.168.100.5, fe80::250:56ff:feb4:1316
MAC Address(es)	Number of vCPUs
00:50:56:b4:67:76, 00:50:56:b4:13:16	16

**Ethernet1/33**  
93180YC-FX-L04-S4

**vmnic11**  
172.25.74.40

**dvs-cylon**

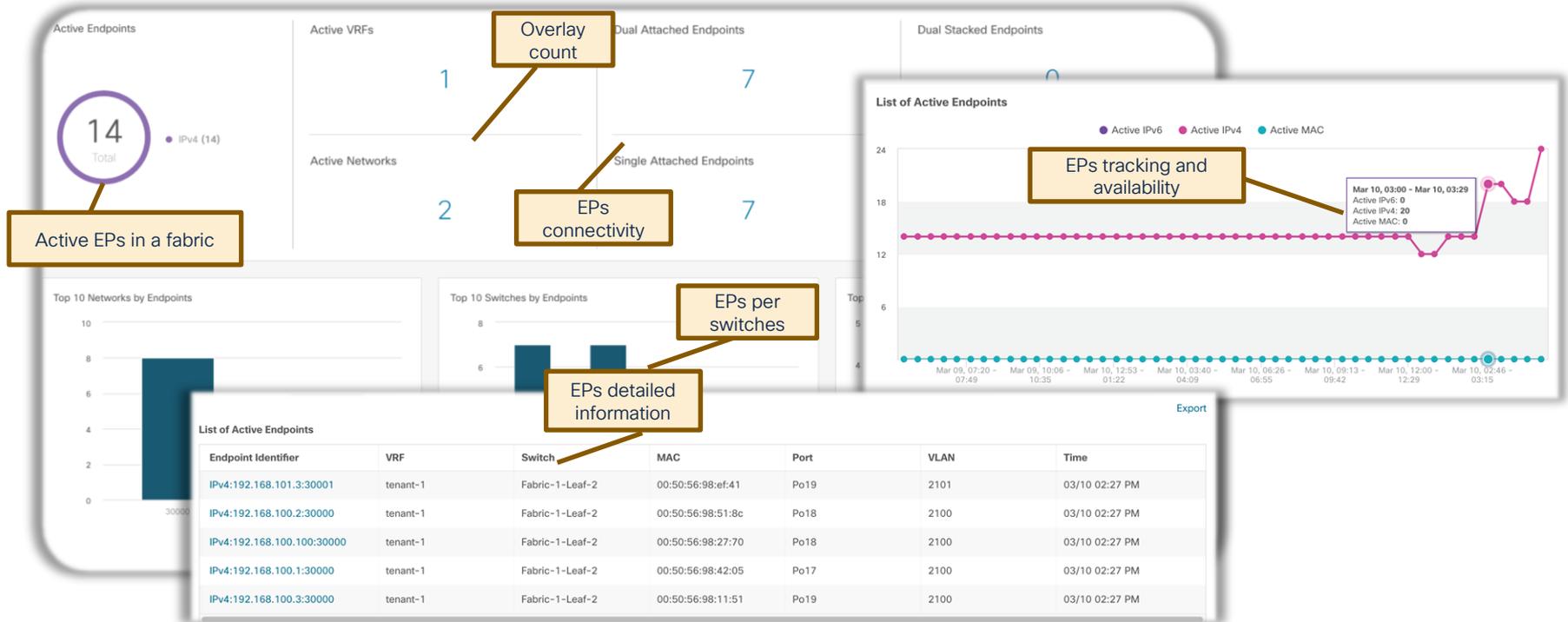
Network: parth\_nd\_data  
Port Group Name: parth\_nd\_data  
DVS Port Group: 85286  
VLAN: 192

**Guest Information**

Guest Full Name	Guest ID
CentOS 7 (64-bit)	centos7_64Guest
Compute Name	
ndfc-12-parth.ndfc-12-parth.case.local	



# Endpoint Locator and Visualizer



## Benefit

Almost Real-Time Data on Active Endpoints

Single Pane of glass for all EP Visualization

Endpoint Life and History

Active VRFs and Networks

# Enhanced Endpoint Capabilities

## Viewing vCenter VMs

Dashboards

Overview vCenter VMs Kubernetes Pods

Filter by attributes

VM Name	IP Address	MAC Address	VLAN	Physical NIC	Host	Fabric	vSwitch	Switch	Switch Interface	VPC ID	Port Channel	State
vlan1-VM2				vmnic5	vinci-ucs117.cisco	corefab	DVS2	L6-FXP	Ethernet1/47	0		CONNECTED
vlan1-VM2				vmnic4	vinci-ucs117.cisco	corefab	DVS2	L5-FXP	Ethernet1/47	0		CONNECTED
11.5-2-S29	192.168.89.1	00:50:56:b5:e:99	99	vmnic2	172.28.8.134	bgfab	vSwitch2	L3-FX2	Ethernet1/52	0		CONNECTED
11.5-1-S29	192.168.89.1	00:50:56:b5:c:99	99	vmnic2	172.28.8.134	bgfab	vSwitch2	L3-FX2	Ethernet1/52	0		CONNECTED
centos7_K8s	192.168.126.1	fe80::0f:a6:1	126	vmnic7	172.28.8.231	corefab	vSwitch3	L6-FXP	Ethernet1/1	0		CONNECTED
centos7_K8s	192.168.126.1	fe80::0f:a6:1	126	vmnic6	172.28.8.231	corefab	vSwitch3	L5-FXP	Ethernet1/1	0		CONNECTED
ubuntu20_K8s	192.168.126.1	fe80::250:56:f	126	vmnic7	172.28.8.231	corefab	vSwitch3	L6-FXP	Ethernet1/1	0		CONNECTED

## Viewing Kubernetes Pods

Dashboards

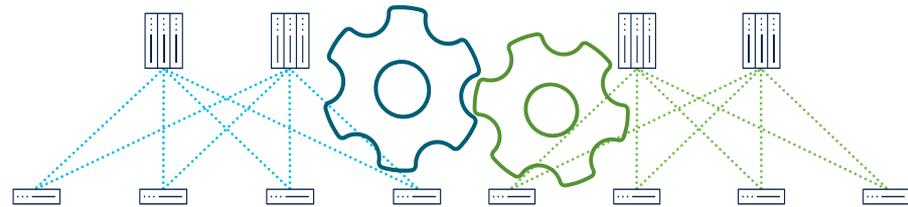
Overview vCenter VMs Kubernetes Pods

Filter by attributes

Pod Name	Pod IP	Phase	Reason	Application	Namespa...	Node Name	Node IP	Cluster Type	Physical NIC	Physical Switch	Switch Interface	Cluster Name	Port Channel	VLAN	Fabric
webse- rep-depl	192.168.126.1	Running			kube-system	centos7-k8s-w1	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
elcc-vm- k8s-master	192.168.126.1	Running			kube-system	vm-k8s-master	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
kube-proxy- 80ns	192.168.126.1	Running		kube-proxy	kube-system	centos7-k8s-w2	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
kube-proxy- stus	192.168.126.1	Running		kube-proxy	kube-system	centos7-k8s-w1	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
coredns- 666f467f8- 8pms	10.32.0.3	Running		kube-dns	kube-system	vm-k8s-master	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
kube- apiserver- vm-k8s-master	192.168.126.1	Running			kube-system	vm-k8s-master	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab
kube-proxy- pgr48	192.168.126.1	Running		kube-proxy	kube-system	vm-k8s-master	192.168.126.1	Kubernetes	vmnic7	L6-FXP	Ethernet1/1	192.168.126.1		126	corefab

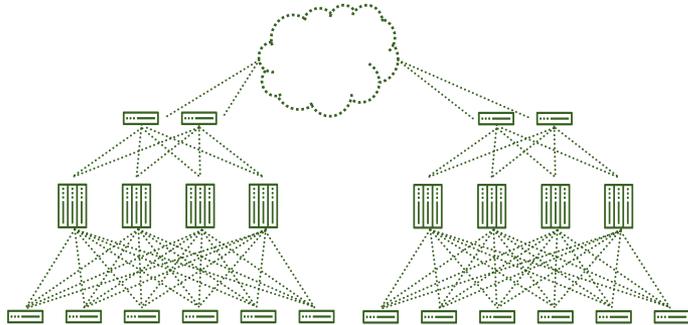
NDFC Provides Superior Visibility to the End Points

# NDFC Advanced Features

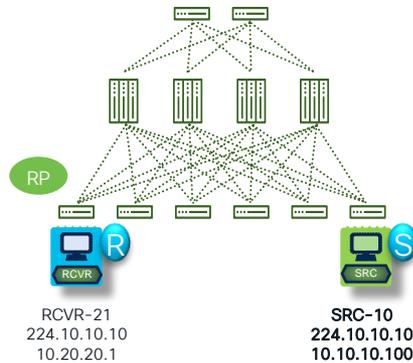


# Advanced NDFC Features

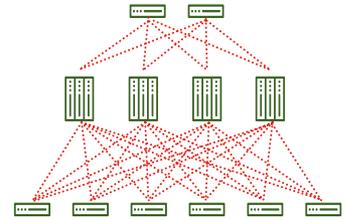
Muti-Site



Multicast



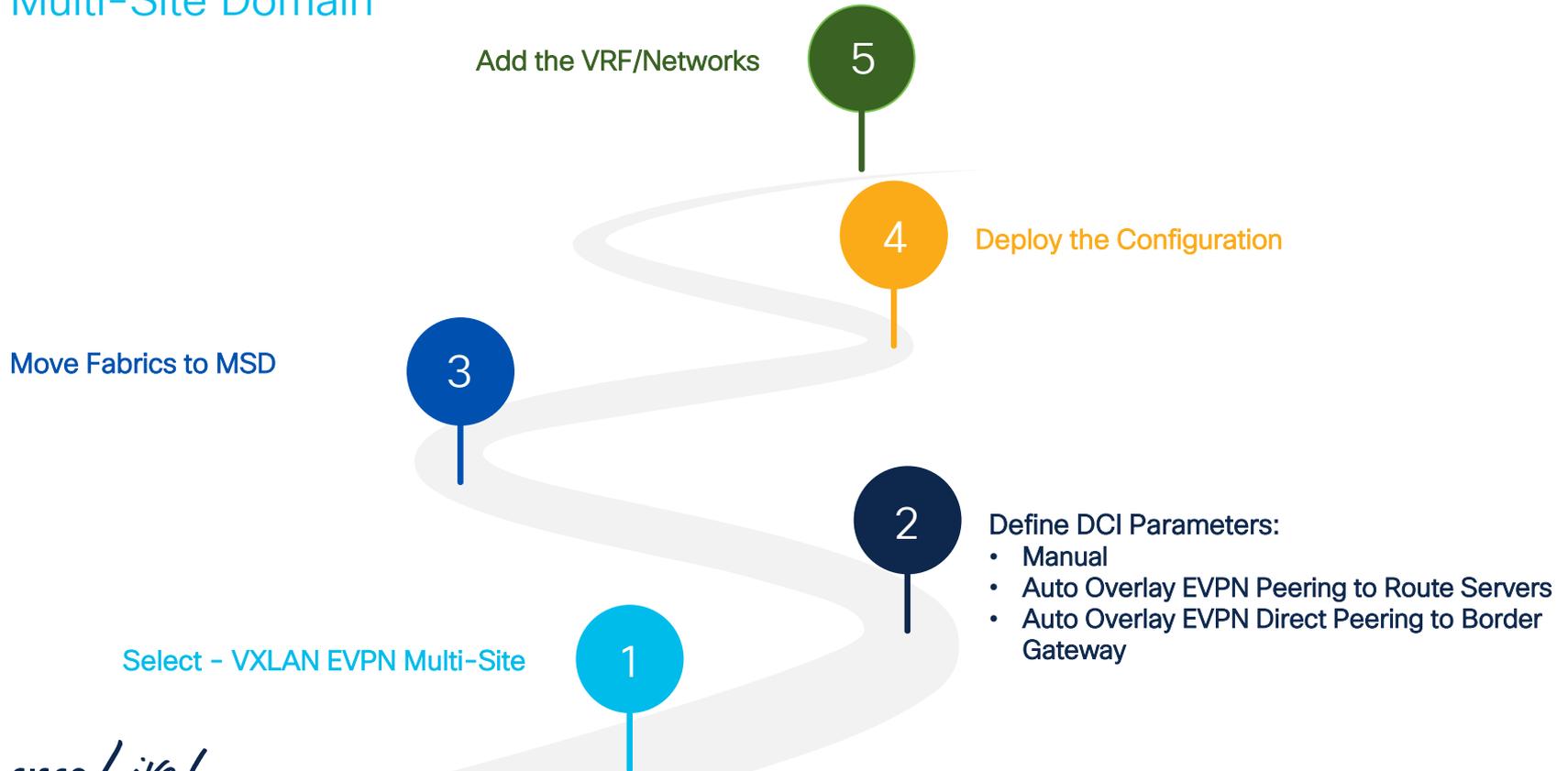
MacSec



1000's of CLI Configuration Lines

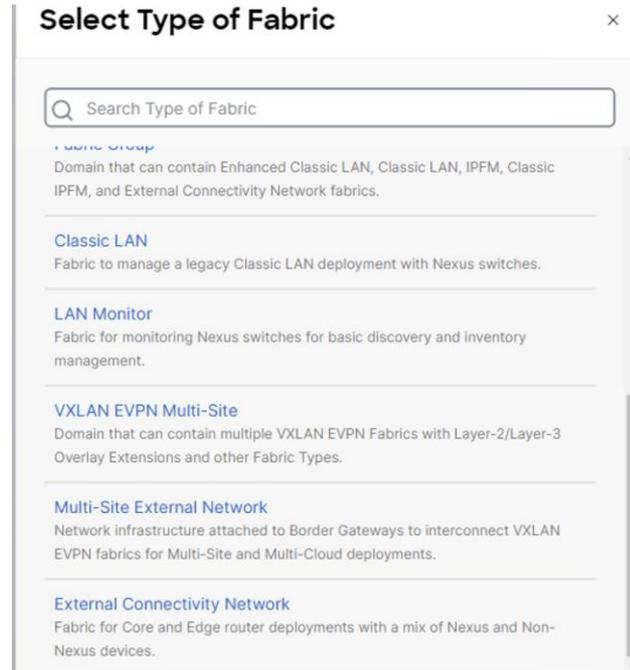
# Data Center VXLAN EVPN

## Multi-Site Domain



# Data Center VXLAN EVPN

## Step 1 -> Select - VXLAN EVPN Multi-Site



# Data Center VXLAN EVPN

## Step 2 -> Define DCI Parameters:



Fabric Name

Pick Fabric  
[VXLAN EVPN Multi-Site >](#)

---

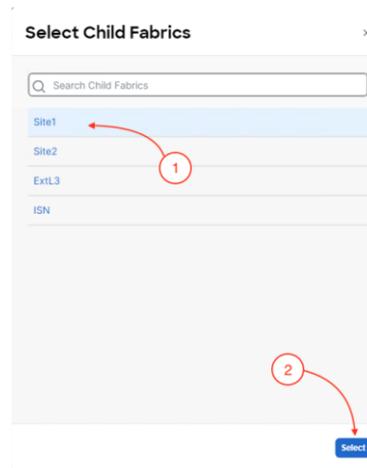
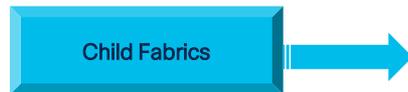
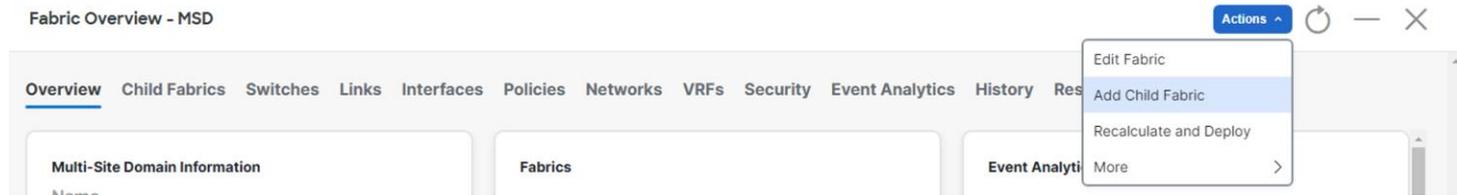
**General Parameters** **DCI** Security Resources Configuration Backup

Multi-Site Overlay IFC Deployment Method\*

Manual	Manual, Auto Overlay EVPN Peering to Route Servers, Auto Overlay EVPN Direct Peering to Border Gateways
Manual	Multi-Site Route-Server peer list (typically loopback IP address on Route-Server for Multi-Site EVPN peering with BGWs), e.g. 128.89.0.1, 128.89.0.2. Provide a list of IPv6 addresses for IPv6 underlay, e.g. fd00::b10-1, fd00::b10-2
Centralized_To_Route_Server	
Direct_To_BGWS	

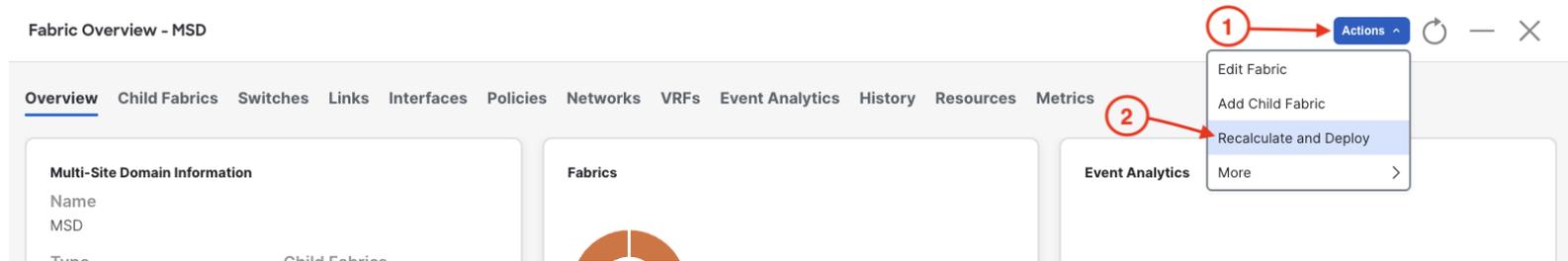
# Data Center VXLAN EVPN

## Step 3 -> Move Fabrics to MSD



# Data Center VXLAN EVPN

## Step 4 -> Deploy the Configuration



Recalculating Config on Switches



15% - Setup Border Gateway devices configuration for all fabrics

# Data Center VXLAN EVPN

## Step 5 -> Add the VRF/Networks

Fabric Overview - MSD

Overview Child Fabrics Switches Links Interfaces Policies **Networks** VRFs Event Analytics History Resources Metrics

Filter by attributes

Network Name	Network ID	VRF Name	IPv4 Gateway/Prefix	IPv6 Gateway/Prefix	Network Status	VLAN ID
<input type="checkbox"/> BlueNet2	30001	BlueVRF			Multi-Attach of Networks	
<input checked="" type="checkbox"/> BlueNet1	30000	BlueVRF				
<input type="checkbox"/> Auto_Net_VNI49000_VLA	49000	RedVRF				

Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 3

Filter by attributes

Switch	IP Address	Serial Number	Model Number	Role
<input checked="" type="checkbox"/> Site1-BGW1	10.3.32.16	9FTVLUBJL3	N9K-C9300v	border gateway
<input type="checkbox"/> Site1-BL1	10.3.32.15	97DIFSNVSGU	N9K-C9300v	border
<input type="checkbox"/> Site1-L1	10.3.32.13	9FOTQ3VTGQH	N9K-C9300v	leaf
<input checked="" type="checkbox"/> Site2-BGW1	10.3.32.19	9Y2CISRU8B9	N9K-C9300v	border gateway
<input checked="" type="checkbox"/> Site2-L1	10.3.32.18	9XKX0BAPUKY	N9K-C9300v	leaf

5 items found

Multi-Attach of Networks

Select Interfaces

Filter by attributes

Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
<input checked="" type="checkbox"/> BlueNet1	Site2-L1			eth1/5	<a href="#">View Interfaces</a>
<input checked="" type="checkbox"/> BlueNet1	Site2-BGW1				<a href="#">View Interfaces</a>
<input checked="" type="checkbox"/> BlueNet1	Site1-BGW1				<a href="#">View Interfaces</a>

3 items found

Rows per page 20

< 1 >

Cancel Previous Next

# Broadcast, Unknown Unicast and Multicast (BUM)

## Ingress/Headend Replication or Tenant Routed Multicast (TRM)

### Ingress / Headend Replication

- Replicate and **send copy of BUM traffic to all VTEPs** in the L2VNI
  - List of VNI to VTEP pairing (type 3 route)

### Multicast (Underlay)

- Send **single copy of BUM traffic** to multicast group (L2VNI)
  - Any vPC peer can encapsulate traffic and send to anycast RP (spine) -> only one of the vPC peers is elected to de-encapsulate traffic

#### An illustrative example for ingress-replication

- ToR with 48x 10G Host facing | 16 ToR Total
- Each Host port is creating 0.01% BUM traffic
- Each Host port in different VLAN (=VNI) (768 total)

This example would create a little under 800Mbps BUM traffic on your uplinks. Nothing dramatic or impactful in the world of 40/100/400G but this will grow depending on the network size, amount of BUM traffic, number of VLANs etc..

Scale | Efficiency | Preference

# Tenant Routed Multicast (TRM)

## Enable TRM



## VRF/VLAN Config



## Tenant Routed Multicast

# MacSec

Edit Fabric : nac-ndfc1

Fabric Name

nac-ndfc1

Pick Fabric

[Data Center VXLAN EVPN >](#)

[General Parameters](#) [Replication](#) [VPC](#) [Protocols](#) [Security](#) [Advanced](#) [Resources](#)

Enable MACsec



Enable MACsec in the fabric. MACsec fabric parameters are used for configuring MACsec on a fabric link if MACsec is enabled on the link.

MACsec Cipher Suite\*

GCM-AES-128

[Configure Cipher Suite](#)

MACsec Primary Key String\*

12345678901234567890123456789012345678901234!

[Cisco Type 7 Encrypted Octet String](#)

MACsec Primary Cryptographic Algorithm\*

AES\_128\_CMAC

[AES\\_128\\_CMAC or AES\\_256\\_CMAC](#)

MACsec Fallback Key String\*

98765432109876543210987654321098765432109876:

[Cisco Type 7 Encrypted Octet String](#)

MACsec Fallback Cryptographic Algorithm\*

AES\_128\_CMAC

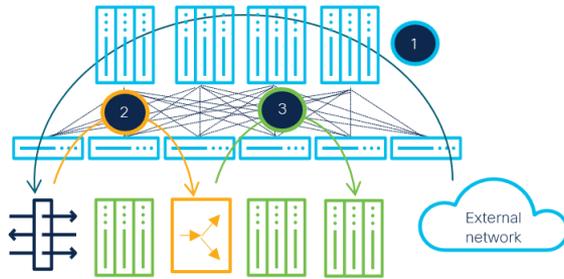
[AES\\_128\\_CMAC or AES\\_256\\_CMAC](#)



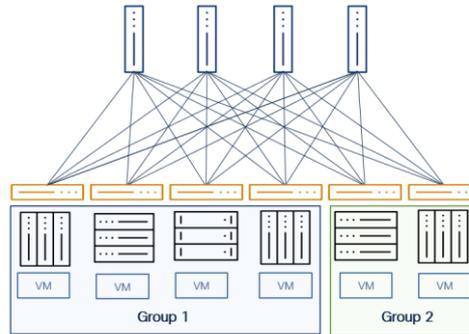
## Line Rate Encryption of a Link / Port

# Advanced NDFC Features

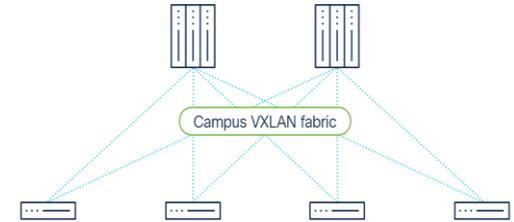
L4-7 Service Insertion



Segmentation / GPO

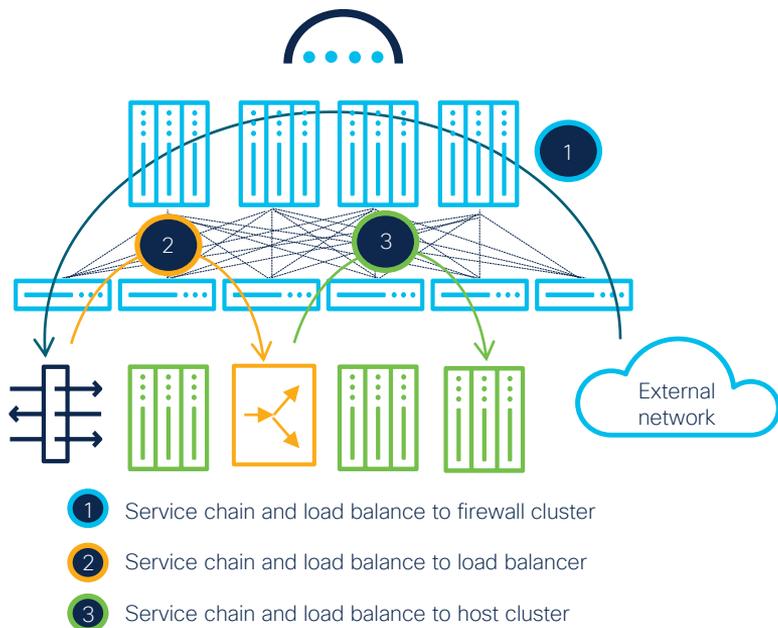


Campus VXLAN EVPN



1000's of CLI Configuration Lines

# L4-L7 Service Insertion and Chaining



## Enhanced Policy Based Redirect (ePBR)

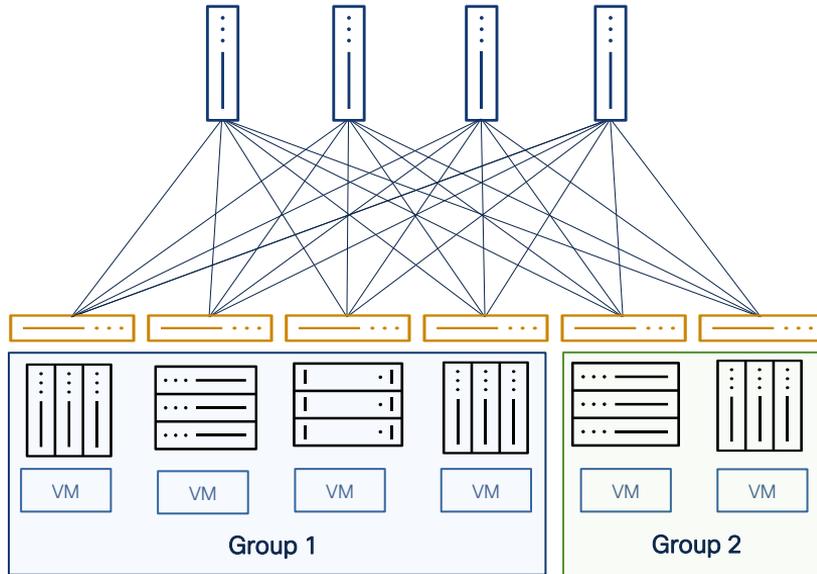
- Load balance across cluster of service nodes
- Service chain between different service node clusters
- Apply filters at each step
- Monitor for service node health with multiple failover options
- Deploy with:
  - VXLAN fabrics
  - EPBR Single fabric
  - EPBR Multi-fabric (*Planning Q1CY25*)

## Benefits

Load-Balancing and Service-Chaining

Line Rate, Hardware Based Multi-Terabit

# VXLAN Group Policy Option (GPO)



Segment East-West Traffic  
Reduce Attack Surface



## Flexible Security Isolation

### Grouping

- Classify endpoints to create groups
- Based on IP, VM or VLAN attributes

### VXLAN GPO

- Group Policy Object **carried in standard VXLAN header**
- Based on IETF draft-lrssi-bess-evpn-group-policy-00
- Extension to VXLAN that allows policy enforcement
- Backward compatible

### Micro-Segmentation using GPO

- Ability to segment east-west traffic
- Smaller attack surface and better security
- Flexible security isolation

# Campus VXLAN EVPN Management



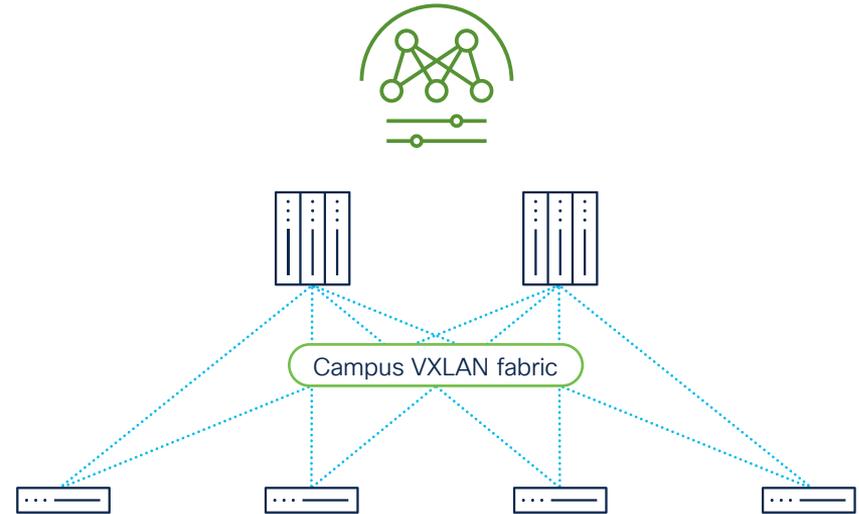
Manage Catalyst VXLAN EVPN Deployments with NDFC



Support for configuration automation via Fabric Builder



Single Point of automation and provisioning for all VXLAN EVPN deployments



Benefit

Unified and Seamless Management Across Various Platforms

# Increase Developer Agility with NDFC DevOps



Utilize GUI or automation through APIs

Integrations with Ansible and Terraform

<https://netascode.cisco.com/>

## Benefits

Accelerate Deployments

Increase Consistency

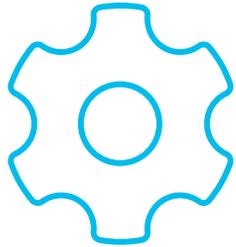
Minimize Risk

# Conclusion



# Cisco Nexus Dashboard

## Nexus Dashboard Fabric Controller



### Automation

---

Accelerate provisioning  
and simplify deployments



### Management

---

In depth Management  
and control for all  
network deployments



### Visibility

---

Get Centralized Visibility  
and Monitoring views

# NDFC Summary



Streamlined lifecycle management



Automate and configure your networks with ease



Maintain compliance and detect errors



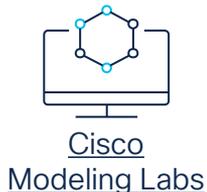
Extensive visibility, monitoring and modernized topology views



Expand your network with integrations with NDI

# Related 'DCN' Sessions – This Week -> On Demand

- PSODCN-1870 – A Unified Nexus Dashboard Experience  
(Wednesday Feb. 12 | 930am-1030am)
- BRKDCN-1619 – Introduction to NDFC: Simplifying Management of Your Data Center  
(Tuesday Feb. 11 | 8am-9am)
- BRKDCN-2974 – Architecting Layer 4-7 Network Services in a Multi-Tenant Data Center with VXLAN EVPN  
(Wednesday Feb. 12 | 930am-1030am)
- IBODCN-1011 – An Interactive Conversation on Micro-Segmentation Using VXLAN GPO for NX-OS VXLAN EVPN Fabrics  
(Thursday Feb. 13 | 130pm – 230pm)
- BRKDCN-2933 – Deployment of Micro-Segmentation in Cisco NX-OS VXLAN EVPN Fabrics with VXLAN Group Policy Option (GPO)  
(Wednesday Feb. 12 | 1pm -230pm)
- BRKDCN-2913 – VXLAN BGP EVPN Multi-Site  
(Thursday Feb. 13 | 1030am -1130am)
- BRKDCN-3738 – Overlay Multicast in VXLAN EVPN (Tenant Routed Multicast – TRM)  
(Thursday Feb. 13 | 5pm – 6pm)



# Cisco Modeling Labs

## The Simulation is Your Network

<https://developer.cisco.com/modeling-labs>



Labs = Isolated virtual networks

Configurable network connectivity

Console multiplexing

Breakout client utility



Live topology modification – drag, drop, and wire networks in a running simulation

Device persistence – just like shutting down a real router

Admin control of all labs

Clustering for horizontal scaling\*

Ability to support Kernel-based Virtual Machine hypervisor



Server-side labs with an easy-to-use HTML5 front end

{ REST:API }

API First Design

Swagger interface

Python client library



**Network operations, management, and design**

- Test and validate your network, management tools, and deployments
- Design new router configurations virtually



**Network security**

- Design and test security configurations on a virtual network
- Simulate attacks, find fail points



**Learning**

- Build and share labs for yourself and your team
- Using supplied Cisco® images, build configurations to prepare for certification exams

# Nexus 9K | EVPN VXLAN | NDFC Reference Links

## EVPN VXLAN – Ciscolive.com OnDemand

*CiscoLive OnDemand Content is accessible for all with a Ciscolive.com account (separate than your Cisco.com account)*

Introduction to VXLAN: The Future Path of Your Datacenter – BRKDCN-1621

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1686177757990001VnsV>

How to Talk to the Rest of the World – External Connectivity for VXLAN EVPN Fabrics – BRKDCN-2267

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424224206001QF9P>

A Day in the Life of a VXLAN EVPN Packet – BRKDCN-2563

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424225334001QqkI>

VXLAN BGP EVPN Multi-Site – BRKDCN-2913

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1686177761247001VE7O>

## N9K / EVPN VXLAN White Papers

<https://www.cisco.com/c/en/us/products/switches/nexus-9000-series-switches/white-paper-listing.html>

## Nexus 9K Platform

Main CCO Nexus 9K Landing Page (Data Sheets, Config Guides etc..)

<https://www.cisco.com/c/en/us/support/switches/nexus-9000-series-switches/tsd-products-support-series-home.html>

Nexus 9K Cisco.com White Paper List

<https://www.cisco.com/c/en/us/products/switches/nexus-9000-series-switches/white-paper-listing.html>

## NDFC – Ciscolive.com OnDemand

Introduction to NDFC: Simplifying Management of Your Data Center – BRKDCN-1619

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1686177757715001VQns>

Automating Highly Available Data Center Architecture with NDO and NDFC – BRKDCN-2931

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1686177761986001VhBr>

## NDFC YouTube Videos

NDFC / DCNM YouTube Playlist

<https://www.youtube.com/playlist?list=PLFT-9JpKjRTAZC7YSciYcPNFymCrJHbO>

Nexus Dashboard Fabric Controller – A Quick Overview

[https://www.youtube.com/watch?v=Ka-Nju48\\_vo](https://www.youtube.com/watch?v=Ka-Nju48_vo)

## NDFC Cisco.com Links and White Papers

Main NDFC Cisco.com Landing Page

<https://www.cisco.com/c/en/us/products/cloud-systems-management/prime-data-center-network-manager/index.html>

NDFC Support Landing Page (Data Sheets, Config Guides etc..)

<https://www.cisco.com/c/en/us/support/cloud-systems-management/nexus-dashboard-fabric-controller-12/model.html>

# Webex App

## Questions?

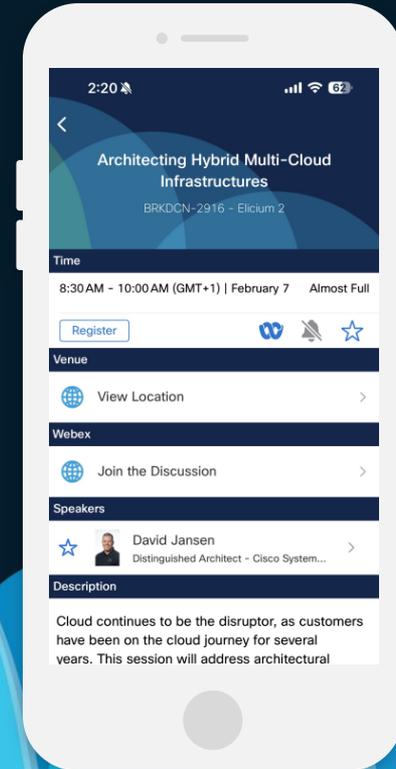
Use the Webex app to chat with the speaker after the session

## How

- 1 Find this session in the Cisco Events mobile app
- 2 Click “Join the Discussion”
- 3 Install the Webex app or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until February 28, 2025.

**CISCO** *Live!*



# Fill Out Your Session Surveys



Participants who fill out a minimum of 4 session surveys and the overall event survey will get a unique Cisco Live t-shirt.

(from 11:30 on Thursday, while supplies last)



All surveys can be taken in the Cisco Events mobile app or by logging in to the Session Catalog and clicking the 'Participant Dashboard'



Content Catalog

# Continue your education

- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at [ciscolive.com/on-demand](https://ciscolive.com/on-demand). Sessions from this event will be available from March 3



Thank you

CISCO *Live!*

CISCO *Live!*

GO BEYOND

A series of overlapping, vertically-oriented ovals in various shades of blue, ranging from light to dark, positioned on the right side of the image.