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# Introduction to DCNM: Simplifying management of your Datacenter

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BRKDCN-1687

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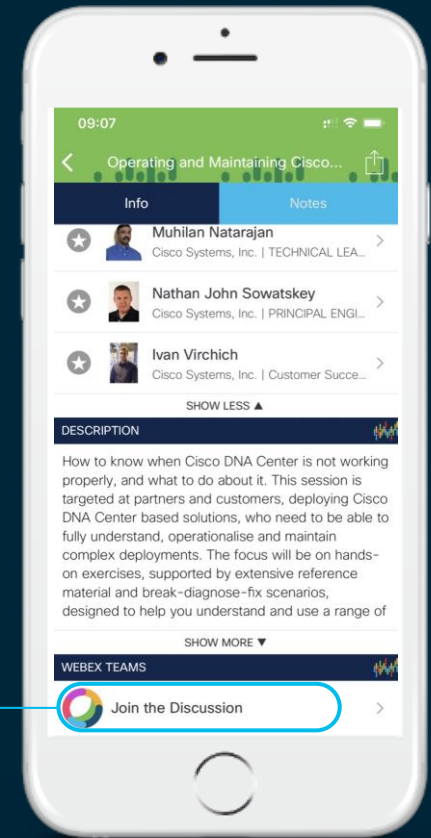
# Cisco Webex Teams

## Questions?

Use Cisco Webex Teams 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 Webex Teams or go directly to the team space
- 4 Enter messages/questions in the team space



# Session Abstract



Data Center Network Manager (DCNM) is the network management platform for all NX-OS (Nexus switching) enabled deployments, spanning LAN fabric and classic LAN architectures, IP Fabric for Media, and storage networking deployments for the Cisco Nexus-powered data center. This session will serve as an introduction to DCNM providing an overview of the product while highlighting the main features of the latest DCNM 11 release. Beginning with the available DCNM installation options, we will dive into a comparison between LAN Classic and LAN fabric modes. We will then move on to LAN fabric mode for VXLAN EVPN and routed fabric. The focus will be on best practice template-based provisioning capabilities with built-in Configuration Compliance and the myriad deployment scenarios. We will also walk through useful Day 2 features like Compute Visibility using Virtual Machine Manager (VMM) integration, the Switch Dashboard, real-time topology search, Endpoint locator, DCNM's application framework with computes for scale out, Network Insights applications, and finally close with the licensing structure. No prior knowledge of DCNM is necessary.

# Agenda

- Introduction to DCNM 11
- Greenfield VXLAN Deployment
- Brownfield - Revamp your VXLAN fabric
- DCNM Day-2 operations
- Install and Licensing
- Conclusion

# Data Center Network Manager (DCNM)

## Single Management Solution for

- VXLAN-EVPN Programmable Fabric
- Classic LAN Deployments
- IP Media Network Controller (PMN)
- SAN (MDS & Nexus)

## Helps in Day 2 Operations

- Real-Time Topology
- Integrated Compute Visibility
- Performance Monitoring
- Fault Management
- Configuration Compliance
- Image Management, Upgrades and RMA
- Network Insights Suite

## Addresses End-to-End Network Provisioning

- GUI/API-based provisioning
- Multi-Fabric & Multi-Site
- Network Configuration Backup & Restore

# Network Architecture Deployment Models ~ DCNM modes

## Fabric / Overlay Models

VXLAN + BGP-EVPN

- L2 over L3 overlay
- BGP-EVPN Control Plane
- VXLAN Data Plane

LAN Fabric Mode – Easy Fabric Template  
(Nexus 3k/9k)

## Traditional Models

Traditional L2 / L3

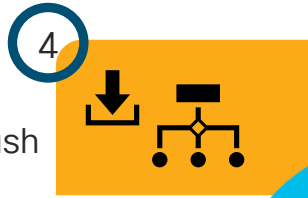
- L3 @ Aggregation & L2 @ Access
- L3 @ Access
- 3-tier or Spine-Leaf Model

LAN Fabric mode – External Fabric Template  
LAN Classic Mode  
(Nexus 2k-9k)

# Introducing LAN Fabric in DCNM 11

## Deploy

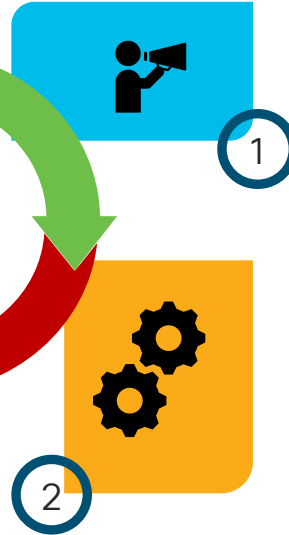
Centralized config push



## Define

Define Intent based on best practices

- Underlay
- Interfaces
- Overlay



## Preview

Side-by-side diff



## Save

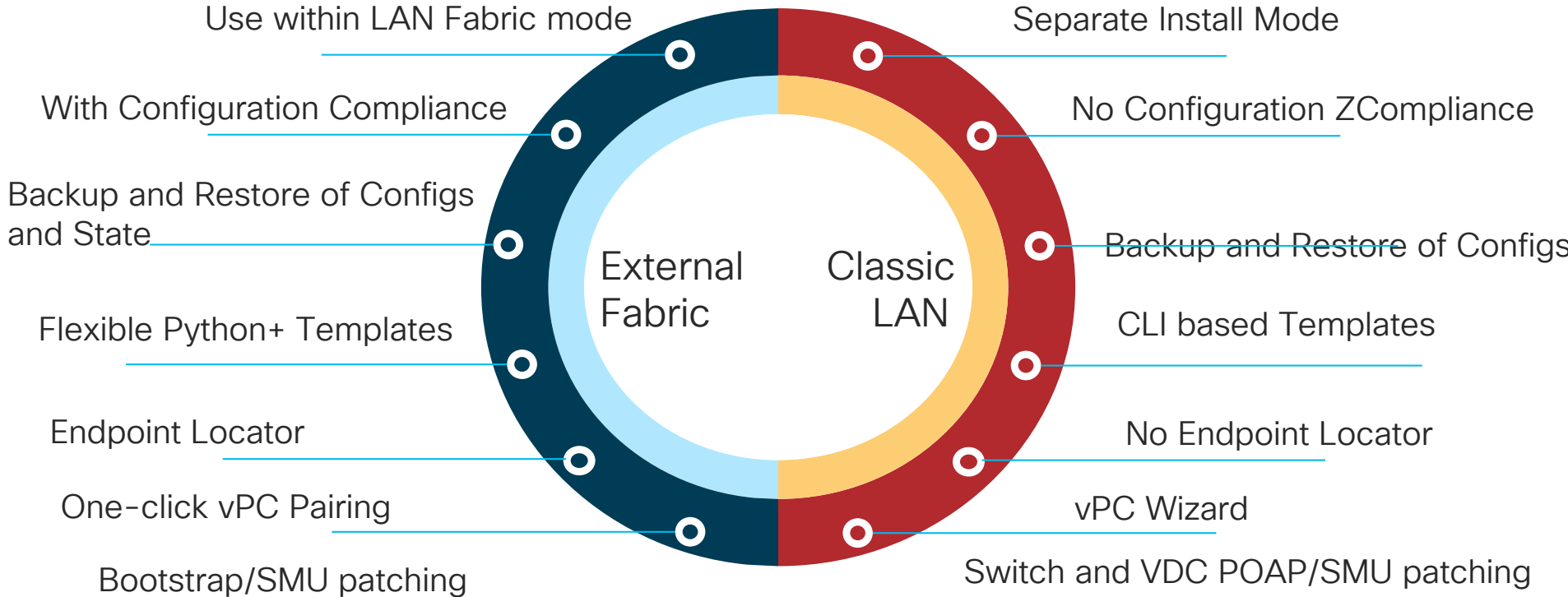
Generates configuration based on intent



Voila! Your fabric is ready in a few minutes



# Classic LAN and External Fabric - Nexus 2k-9k



# External Fabric – The Better LAN Classic

- External Fabrics can be Managed or Monitored
- Support for Nexus 2k – 9k for VXLAN/Traditional Deployments
- Non-Nexus Support
  - IOS-XE Devices: CSR1000v
  - IOS-XR Devices: ASR9000, NCS5500
  - 3rd Party

DCNM 11.3(1) is now on [cisco.com](https://www.cisco.com)!

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# Greenfield VXLAN Deployment



Not on VXLAN today?



DCNM LAN fabric  
mode



Build VXLAN fabric  
in few minutes

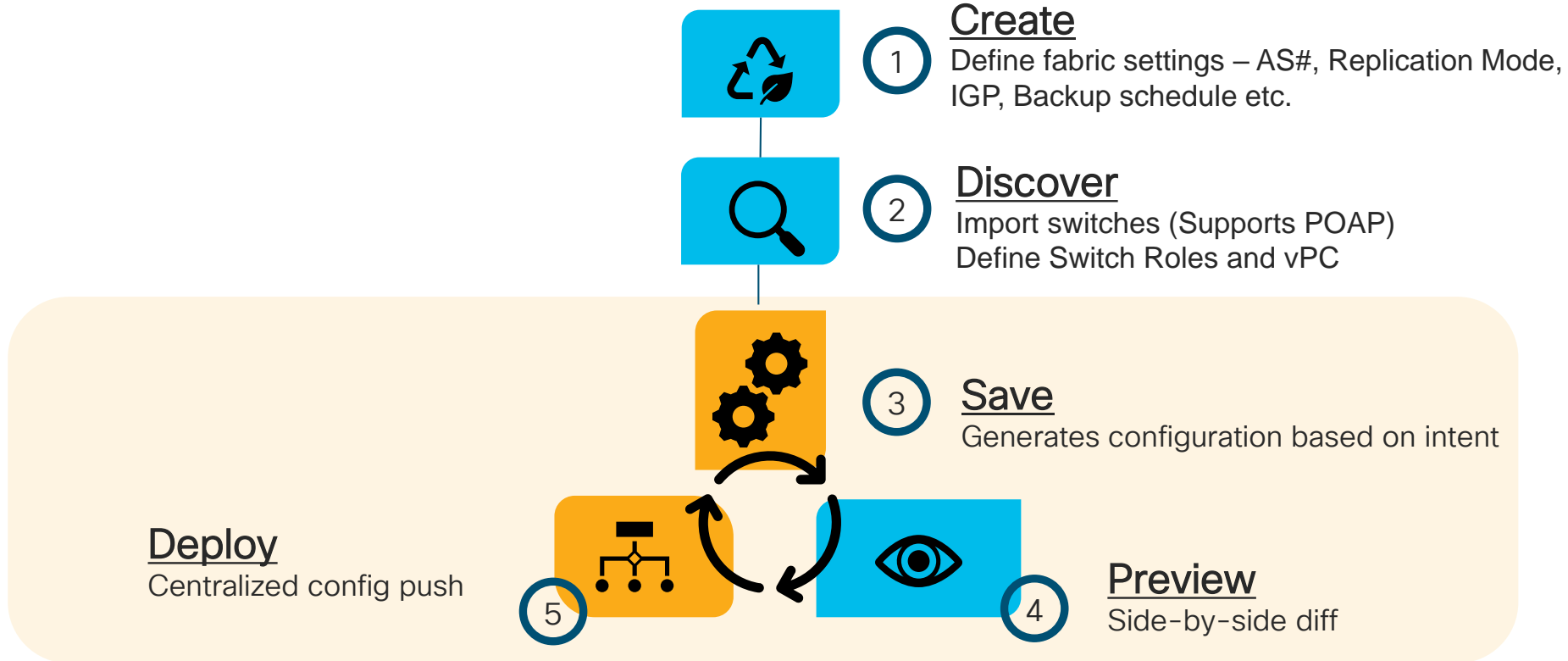


Templates already  
embed best  
practices



IP addresses,  
overlay pool, routing  
profiles, replication  
attributes – all taken  
care by DCNM

# Day in the life of DCNM – Underlay using Fabric Builder



# Step 1 – Create

**Add Fabric**

\* Fabric Name :

\* Fabric Template :

General | Replication | vPC | Advanced | Resources

\* BGP ASN :

Enable IPv6 Underlay  True if IPv6 is used in underlay

Enable Link-Local Address  True if IPv6 link-local address is used

\* Fabric Interface Numbering :

Underlay Subnet IP Mask :

Underlay Subnet IPv6 Mask :

\* Link-State Routing Protocol :

\* Route-Reflectors :

\* Anycast Gateway MAC :

NX-OS Software Image Version :

**Out-of-Box Best Practice Templates**

**Add Fabric**

\* Fabric Name :

\* Fabric Template :

General | Replication | vPC | Advanced | Resources | Manageability | Bootstrap | Config

Underlay Routing Loopback IP Range Typically Loopback0 IP Address Range

Underlay VTEP Loopback IP Range Typically Loopback1 IP Address Range

\* Underlay RP Loopback IP Range :  Anycast or Phantom RP IP Address Range

Underlay Subnet IP Range Address range to assign Numbered and Peer Link S

Underlay MPLS Loopback IP Range MPLS Loopback IP Address Range, used by VXLAN

\* Underlay Routing Loopback IPv6 Range :  Typically Loopback0 IPv6 Address Range

\* Underlay VTEP Loopback IPv6 Range :  Typically Loopback1 IPv6 Address Range

\* Underlay Anycast Loopback IPv6 Range :  Anycast Loopback IPv6 Address Range

Underlay Subnet IPv6 Range IPv6 Address range to assign Numbered and Peer L

\* Underlay BGP Router ID Range :  V6 Underlay only: Address range to assign BGP Ro

\* Layer 2 VXLAN VNI Range :  Overlay Network Identifier Range (Min:1, Max:16777

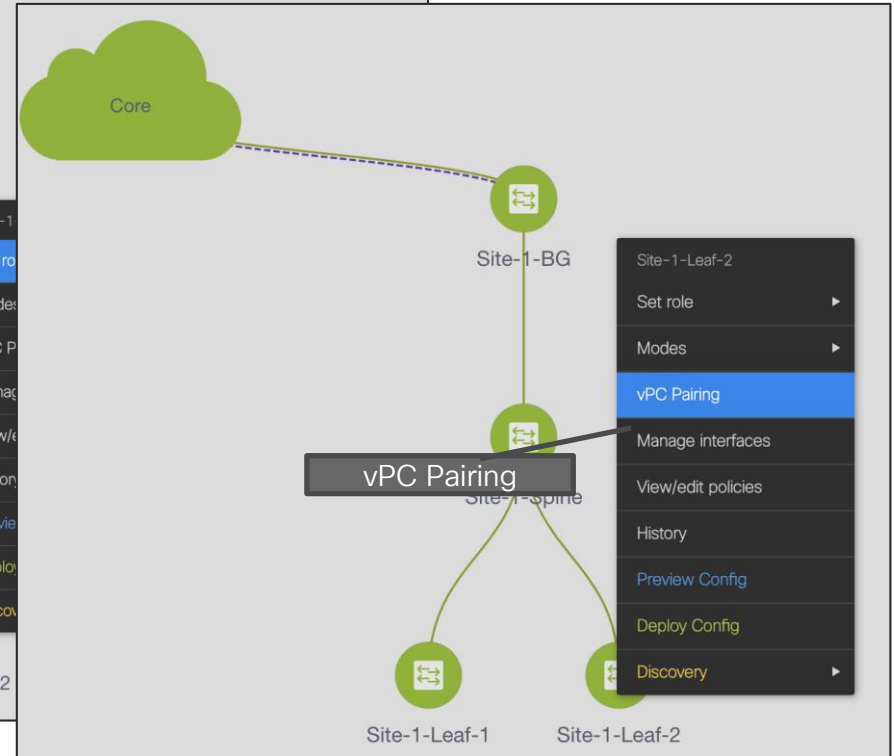
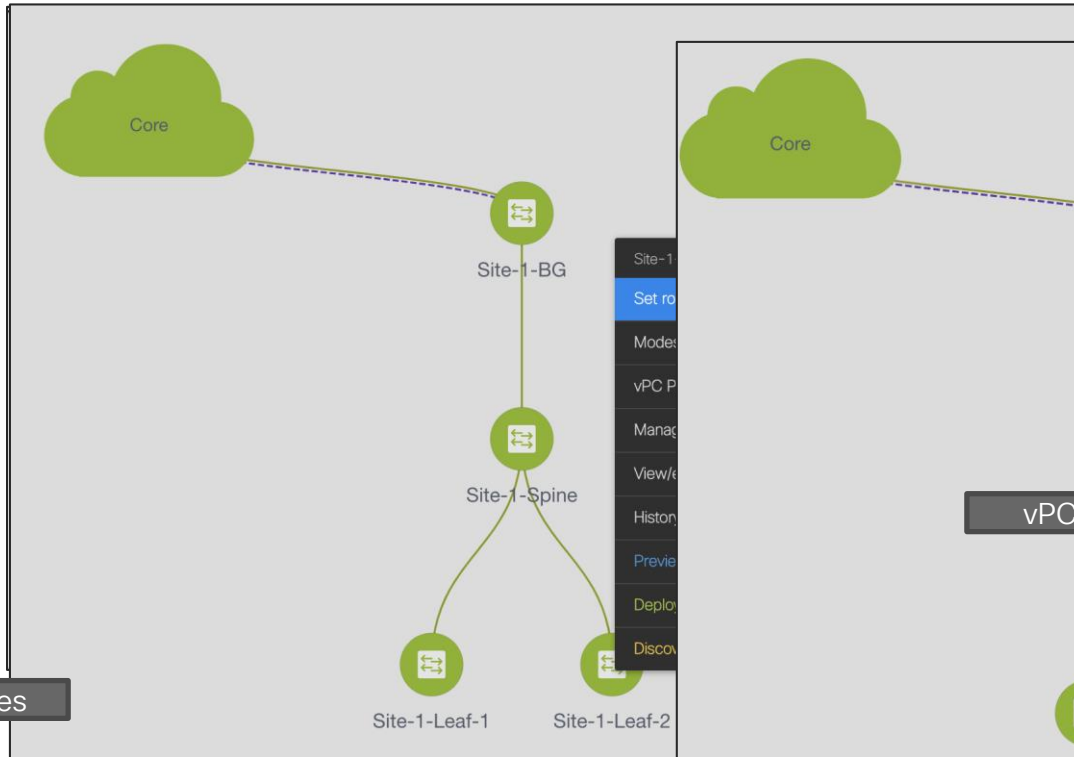
\* Layer 3 VXLAN VNI Range :  Overlay VRF Identifier Range (Min:1, Max:1677721

\* Network VLAN Range :  Per Switch Overlay Network VLAN Range (Min:2, M

# Step 2 - Discover

Actions

- + - [Refresh] [Save]
- Tabular view
- Refresh topology
- Save layout
- Delete saved layout
- Custom saved layout
- Restore Fabric
- Backup Now
- Re-sync Fabric
- + Add switches
- Fabric Settings



Add Switches





# Step 3 - Save

Save intent to generate configuration

← Fabric Builder: VXLAN-EVPN-Site1 Save & Deploy

Actions

- + - [Refresh] [Undo]
- Tabular view
- Refresh topology
- Save layout
- Delete saved layout
- Custom saved layout ▼
- Restore Fabric
- Backup Now
- Re-sync Fabric
- + Add switches
- Fabric Settings

Site1-BG1 Site1-BG2

Site1-Spine1 Site1-Spine2

Site1-Leaf1 Site1-Leaf2 Site1-Leaf3

■ Pending ■ In Sync/Success ■ Out-of-Sync/Failed ■ In Progress ■ Unknown/NA

Changes are saved and express intent to push all configuration to the fabric.

# Step 4 - Preview

## Config Deployment

Step 1. Configuration Preview > Step 2. Configuration Deployment Status

Switch Name	IP Address	Switch Serial	Preview Config	Status	Re-sync	Progress
Site1-Leaf1	1.57.52.10	SAL1935NH8U	466 lines	Out of sync		100%
Site1-BG1	1.57.52.11	FDO21341FPK	291 lines			
Site1-BG2	1.57.52.14	FDO22130VL2	291 lines			
Site1-Leaf3	1.57.52.6	SAL1936NJ6J	444 lines			
Site1-Spine1	1.57.52.3	SAL1931L92P	311 lines			
Site1-Spine2	1.57.52.4	SAL1935NH8Y	311 lines			
Site1-Leaf2	1.57.52.8	SAL1935NHA1	466 lines			

### Preview configuration

### DCNM running Configuration Compliance

### Config Preview - Switch 1.57.52.10

Pending Config | Side-by-side Comparison

To re-compute the *running config*, please click the Re-sync button on the previous screen. Lastly, to resolve unexpected diffs, please review the leading spaces and edit the appropriate policies to match show run outputs.

Running config	Expected config
1 !Command: show running-config	
2	!Command: Intent from DCNM Fabric Builder. Any Intent not captured in Pending Config are defaults
3 !Time: Sat May 25 17:57:39 2019	
4	aaa group server radius radius
5 boot nxos bootflash:/nxos.7.0.3.I7.2.bin	
6	use-vrf default
7	cfs eth distribute
8 copp profile strict	copp profile strict
9	fabric forwarding anycast-gateway-mac 2020.0000.00aa
10	feature bgp
11	feature dhcp
12	feature interface-vlan
13	feature lacp
14	feature lldp
15	feature ngoam
16	feature nv overlay
17	feature nvoam

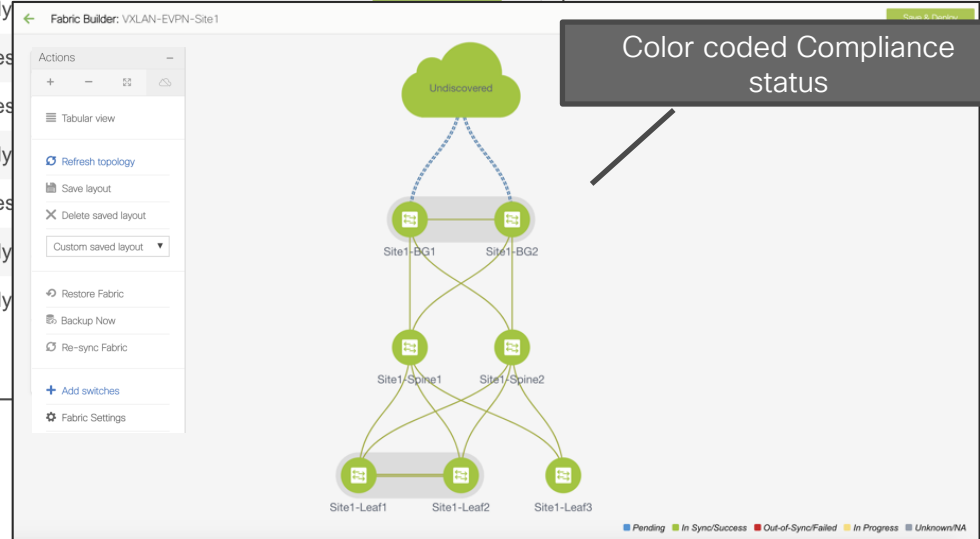
# Step 5 - Deploy

## Config Deployment

Step 1. Configuration Preview > Step 2. Configuration Deployment Status >

Switch Name	IP Address	Status	Status Description	Progress
Site1-Spine2	1.57.52.4	COMPLETED	Deployed successfully	
Site1-Leaf1	1.57.52.10	STARTED	Deployment in progress	
Site1-Leaf3	1.57.52.6	STARTED	Deployment in progress	
Site1-Spine1	1.57.52.3	COMPLETED	Deployed successfully	
Site1-Leaf2	1.57.52.8	STARTED	Deployment in progress	
Site1-BG2	1.57.52.14	COMPLETED	Deployed successfully	
Site1-BG1	1.57.52.11	COMPLETED	Deployed successfully	

Parallel deployment of configurations once approved by user



Color coded Compliance status

# Day in the life of DCNM – Interface Management

**Control / Fabrics / Interfaces**

Interfaces

Selected 2 / Total 414

Device Name	Name	Admin	Oper	Reason	Policy	Overlay Network	Status	PC	vPC ID
Leaf-1	mgmt0	↑	↑	ok	NA	NA	✓		
Leaf-1	Vlan1	↓	↓	Administratively down	NA	NA	✗		
Leaf-1	Vlan3600	↑	↑	ok	int_fabric_vlan	NA	✗		
Leaf-1	Loopback0	↑	↑	ok	int_fabric_loopback	NA	✓		
Leaf-1	Loopback1	↑	↑	ok	int_fabric_loopback	NA	✓		
Leaf-1	Port-channel500	↑	↑	ok	vpc_peer_link	NA	✓		
Leaf-1	Ethernet1/1	↑	↑	ok	int_fabric_p2p	NA	✓		
Leaf-1	Ethernet1/2	↑	↑	ok	int_fabric_p2p	NA	✓		
Leaf-1	Ethernet1/3	↑	↑	ok	trunk_host	NA	✓		
Leaf-1	Ethernet1/4	↑	↑	ok	trunk_host	NA	✓		
Leaf-1	Ethernet1/5	↑	↑	ok	vpc_peer_link_po_m...	NA	✓		
Leaf-1	Ethernet1/6	↑	↑	ok	vpc_peer_link_po_m...	NA	✓	500	
Leaf-1	Ethernet1/7	↑	↓	Link not connected	trunk_host	NA	✓		

**Controls**

24hrs Performance Stats

Add I/F

Edit

Shut / No Shut

Show

Rediscover

Policy History

Search Bar

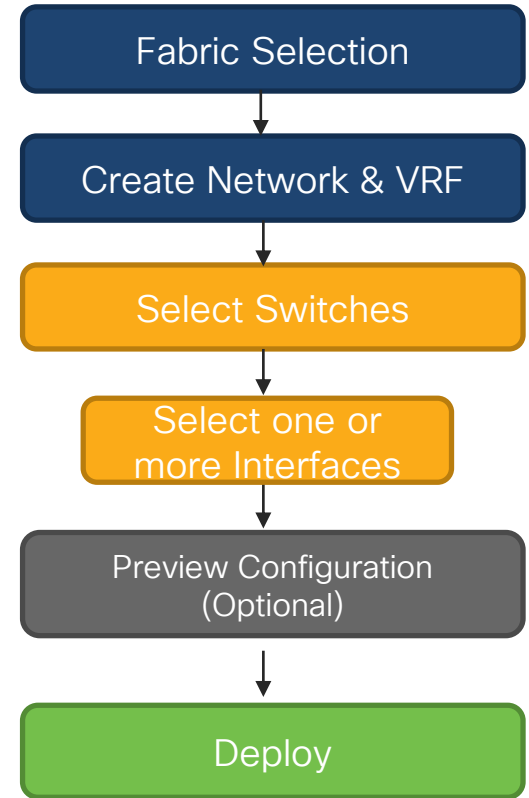
Config Compliance Status

Flexible customizable Policies

Link Status

# Day in the life of DCNM – Overlay Management

- Top-Down deployment via GUI or REST APIs
- Network/VRF Creation with custom Overlay Policies
- Deployment to Switches and/or Interfaces
- Per Network/Per Switch deployment History
- Overlay Resource Manager Tracking for VNIs, VLANs etc.
- Centralized tracking of all deployment including Overlays in Fabric Builder



# VXLAN-EVPN External Connectivity Deployment

## VRF Lite and Multi-Site

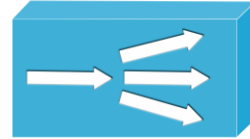
- Provisions external connectivity from Borders to WAN
  - VRF Lite using sub-interfaces
  - Devices in External fabrics can be any Nexus, Neighbor, or Meta
- Provisions Layer-2 and Layer-3 DCI Connectivity with EVPN Multi-Site via Border Gateways
  - Workflow for Multi-Site Underlay and Overlay external connection peering using a Multi-Site Domain (MSD)
  - MSD is a fabric of fabrics
    - One-time definition for Networks & VRFs
    - Tenant Routed Multicast supported

# DCNM L4-7 Services Integration

## What is it?

- Network orchestration of L4-7 Service Appliances attached to a VXLAN EVPN Fabric
- Service Appliance Attachment
- Service Policy Definition
- Topology Visualization
- Monitoring Service Appliance Health
  - How much traffic is traversing Service Nodes?
- No configuration will be done on the service appliances themselves

# Supported Use-cases



Virtual & Physical Form Factor  
Static & Dynamic Peering  
vPC/Non-vPC Attachments

## Intra-Tenant/Inter-Tenant

- PBR Use-cases
- Tenant-Edge Firewall

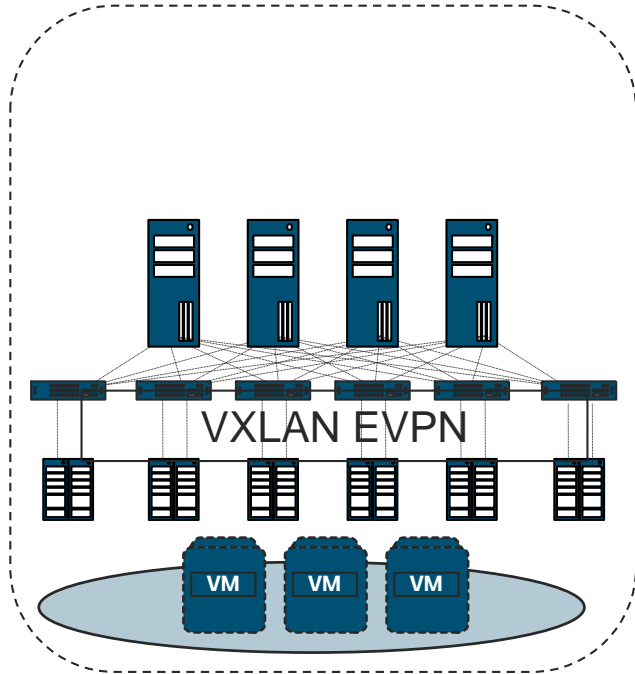
## One-Armed/Two-Armed

- PBR Use-case (No SNAT)



# Interconnecting On-Premises To Public Cloud

## On-Premises



## Public Cloud



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# Brownfield VXLAN Deployment



Already using VXLAN?  
Want to use DCNM for managing your existing Fabrics?



DCNM fully supports  
Brownfield



Non-disruptive  
import of existing  
VXLAN EVPN  
deployments

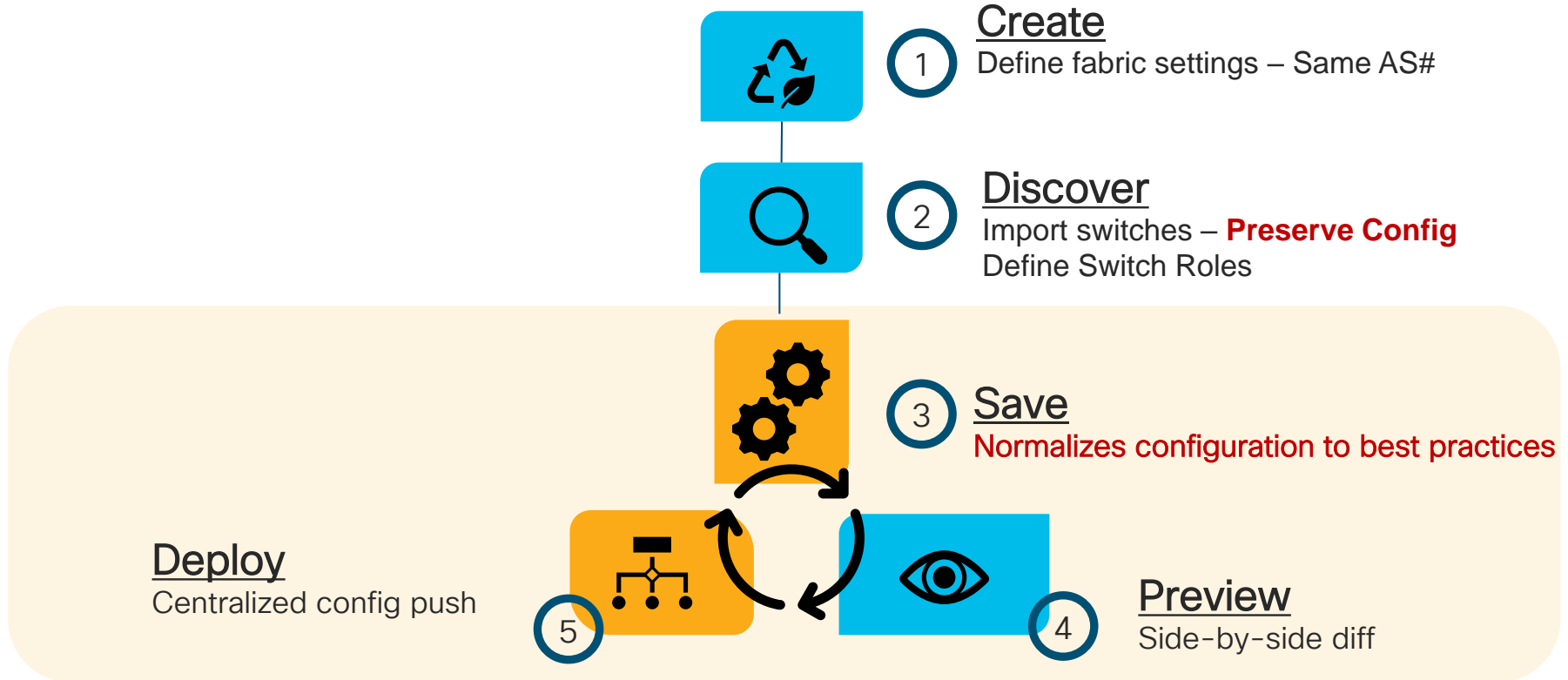


Manage fabric as if  
provisioned from  
DCNM



Learns topology, all  
configuration,  
associated resources,  
IP subnets, VNIs,  
VLANs etc.

# Day in the life of DCNM – Underlay using Fabric Builder



Voila! You just imported your existing VXLAN fabric

# Import Switches – Preserve Config

Inventory Management

Discover Existing Switches | PowerOn Auto Provisioning (POAP)

Discovery Information > Scan Details >

Seed IP: 1.57.52.6  
*Ex: "2.2.2.20"; \*10.10.10.40-60\*; "2.2.2.20, 2.2.2.21"*

Authentication Protocol: MD5

Username: admin

Password: .....

Max Hops: 2 hop(s)

Preserve Config: no  yes  
*Selecting 'no' will clean up the configuration on switch(es)*

Start discovery

1 Add Switches

2 Device Discovery: Provide IP Address & Numbers of Hops OR Range of IPs

3 Brownfield: Preserve Config = 'Yes'

Import Existing VXLAN-EVPN Fabric

# Migration Mode – Inference from Existing Configs

Fabric Builder: VXLAN-EVPN-Site1 Save & Deploy

Actions

- Tabular view
- Refresh topology
- Save layout
- Delete saved layout
- Custom saved layout
- Restore Fabric
- Backup Now
- Re-sync Fabric
- Add switches
- Fabric Settings

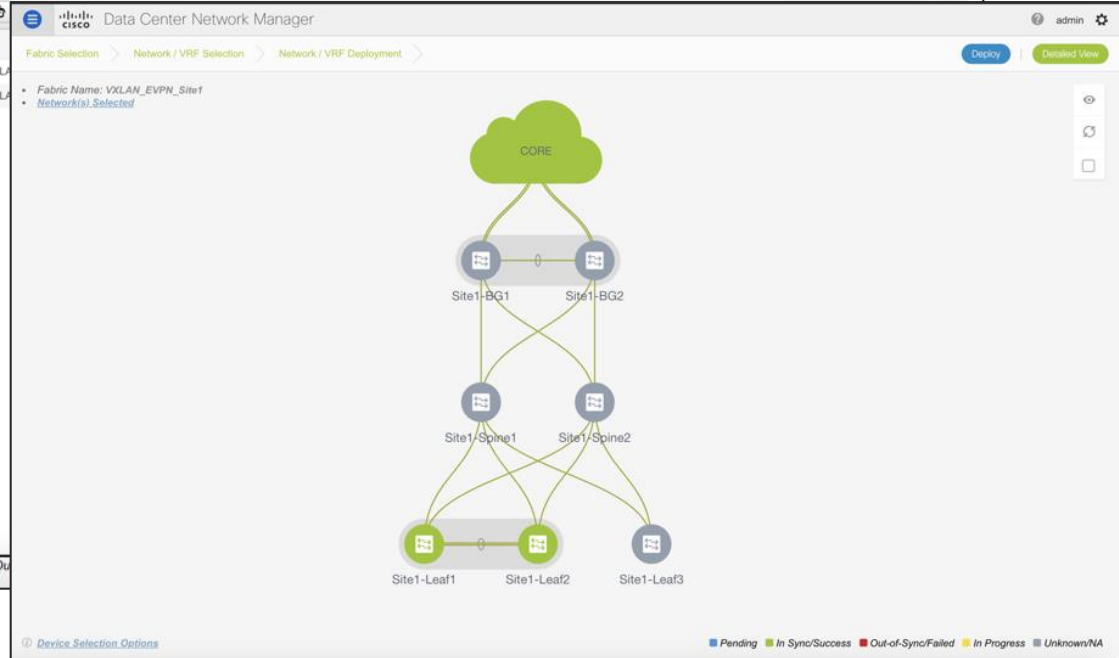
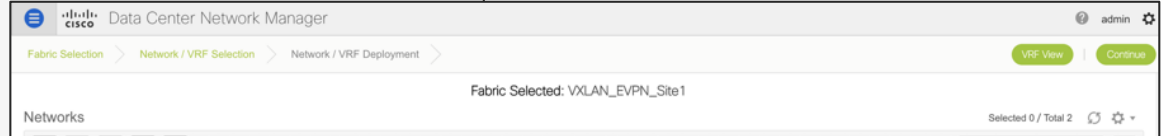
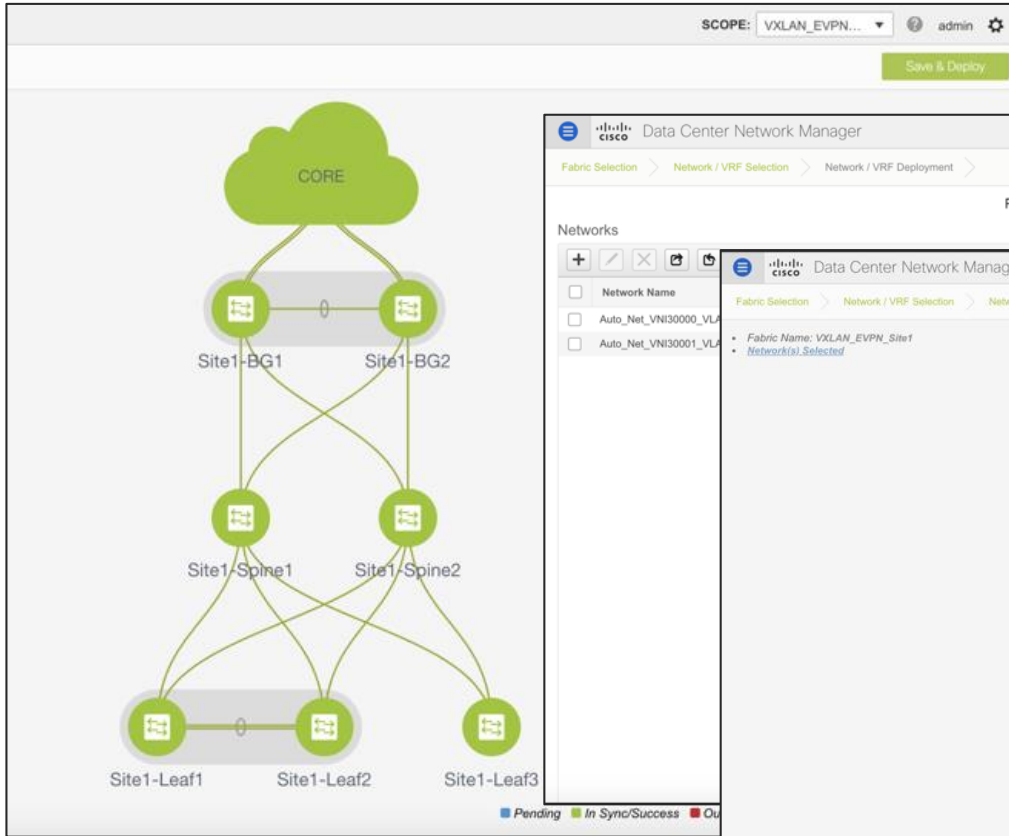
Config Deployment

Step 1. Configuration Preview > Step 2. Configuration Deployment Status >

Switch Name	IP Address	Switch Serial	Preview Config	Status	Re-sync	Progress
Site1-Leaf1	1.57.52.10	SAL1935NH8U	57 lines	Out-of-sync		<div style="width: 100%;"></div> 100%
Site1-BG1	1.57.52.11	FDO21341FPK	0 lines	In-sync		<div style="width: 100%;"></div> 100%
Site1-Leaf3	1.57.52.6	SAL1936NJ6J	55 lines	Out-of-sync		<div style="width: 100%;"></div> 100%
Site1-Spine1	1.57.52.3	SAL1931L92P	0 lines	In-sync		<div style="width: 100%;"></div> 100%
Site1-Spine2	1.57.52.4	SAL1935NH8Y	0 lines	In-sync		<div style="width: 100%;"></div> 100%
Site1-Leaf2	1.57.52.8	SAL1935NHA1	57 lines	Out-of-sync		<div style="width: 100%;"></div> 100%
Site1-BG2	1.57.52.14	FDO22130VL2	0 lines	In-Sync		<div style="width: 100%;"></div> 100%

Deploy Config

# Verification of Overlays



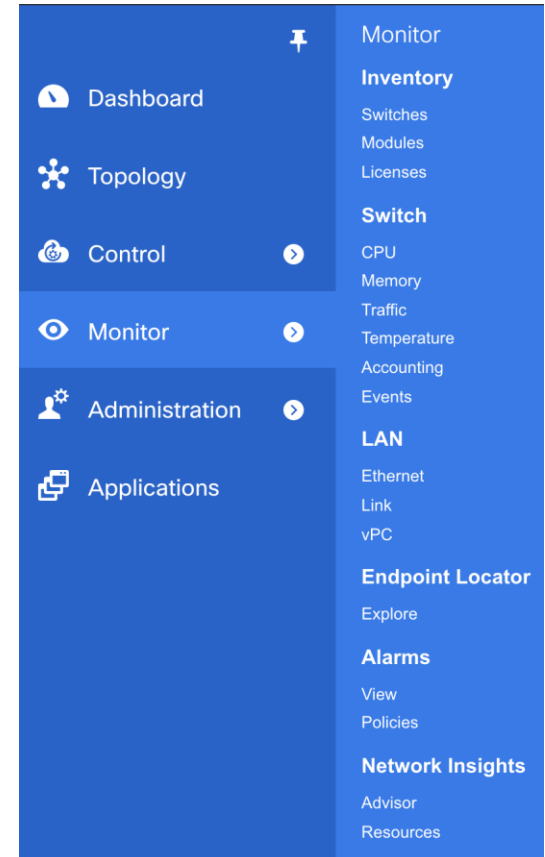
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# We got your Day 2 needs covered!

- Real-Time Network View
- Common Operations
  - Update Credentials, Policies, etc.
- Configuration Compliance
- Resync Fabric
- Backup and Restore
- Endpoint Locator
- Virtual Machine Manager (VMM) / Kubernetes Cluster Visualization
- VXLAN OAM
- Software Upgrades/RMA
- Network Insights



**CISCO** *Live!*

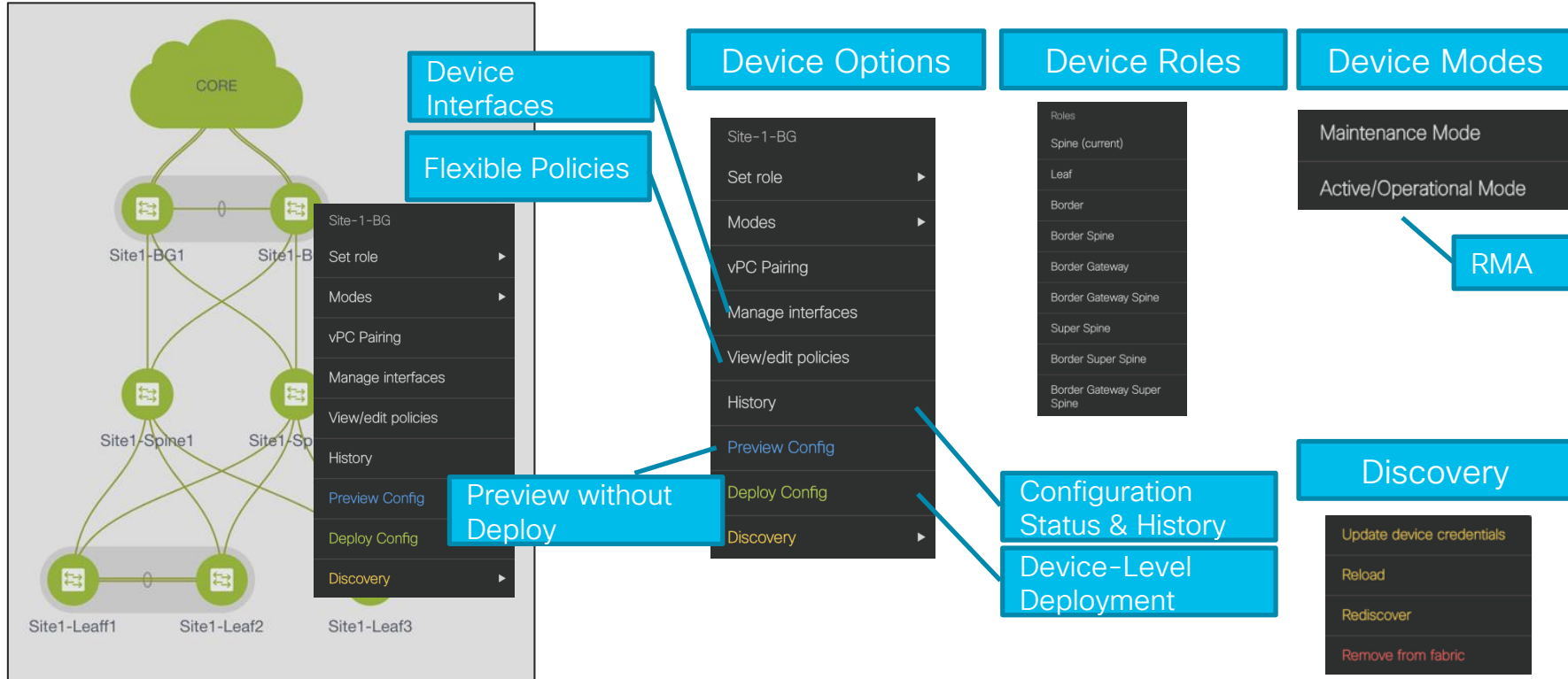
# Real Time Topology View

The screenshot displays the Cisco Data Center Real Time Topology View interface. On the left is a navigation sidebar with sections: Dashboard, Topology, Control, Monitor, Administration, and Applications. The main area shows a network topology with three fabric views: CORE, Site1 (VXLAN-EVPN-Site1), and Site2 (VXLAN-EVPN-Site2). A search bar at the top left is labeled "Real-Time Search". A "Health Score (color)" callout points to a green node. A "Link Pop-Up" callout points to a link between Site1 and Site2. A "Layout Options" callout points to zoom and pan controls. On the right, a "Pop-Up Switch Dashboard" for Site2-Leaf2 shows a summary of status (ok), serial number (SAL1936NJ52), CPU (1%), and memory (43%). Below the summary is a "24 Hour Traffic" table and two bar charts for Rx and Tx traffic.

	Avg	Max	Min
Rx	32.3 Bytes	46 Bytes	4 Bytes
Tx	32.8 Bytes	50 Bytes	4 Bytes

## Multilayer Topology Views

# Device Options



Fabric Builder Day 2 Topology Views

# View Operational Status

Fabric Builder -> Fabric ->  
Tabular View -> Operational  
View

Switches		Links		Operational View		
				Selected 0 / Total 8		
				Show All		
	<input type="checkbox"/>	Fabric Name	Name	isPresent?	Link State	Link Type
1	<input type="checkbox"/>	shyam-fx2<->terry-fx2	leaf1~Ethernet1/48 --- terry-spine~Ethernet1/47	true	✓ FULL	OSPF
2	<input type="checkbox"/>	shyam-fx2	bg~Loopback0 --- spine~Loopback0	true	i Established	BGP
3	<input type="checkbox"/>	shyam-fx2	bg~Ethernet1/45 --- spine~Ethernet1/45	true	✓ FULL	OSPF
4	<input type="checkbox"/>	shyam-fx2	spine~Loopback0 --- leaf3~Loopback0	true	i Established	BGP
5	<input type="checkbox"/>	shyam-fx2	spine~Loopback0 --- leaf1~Loopback0	true	i Established	BGP
6	<input type="checkbox"/>	shyam-fx2	leaf1~mgmt0 --- leaf2~mgmt0	true	✓ peer-alive	VPC_KEEPALIVE
7	<input type="checkbox"/>	shyam-fx2	spine~Loopback0 --- leaf2~Loopback0	true	i Established	BGP
8	<input type="checkbox"/>	shyam-fx2<->terry-fx2	leaf1~Vlan3600 --- terry-leaf2~Vlan3600	true	✓ FULL	OSPF

# Template Library – Customize or Create New

The screenshot displays the Cisco Data Center Network Manager interface. The left sidebar contains navigation options: Dashboard, Topology, Control, Monitor, Administration, and Applications. The main area is titled 'Control / Template Library' and shows a list of templates. The 'Easy\_Fabric\_11\_1' template is selected, and its content is displayed in a large text area. The content is a Python script defining variables for fabric configuration, including fabric type, name, BGP ASN, interface numbering, and subnet target mask. Two callout boxes highlight the 'Content Type: Python Template' and the 'Template Content'.

Content Type: Python Template

Template Content

Fabric Templates

Policy Templates

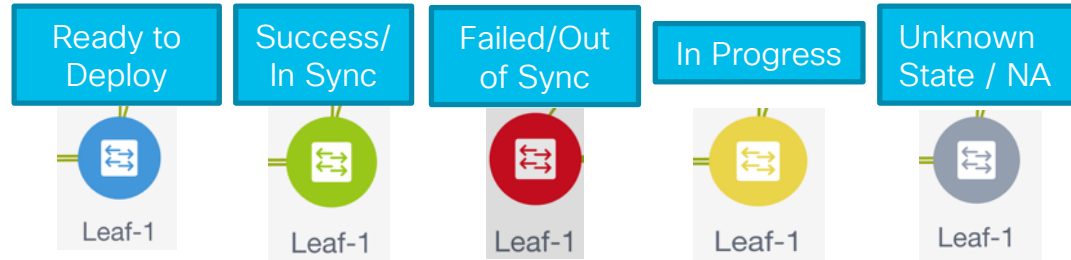
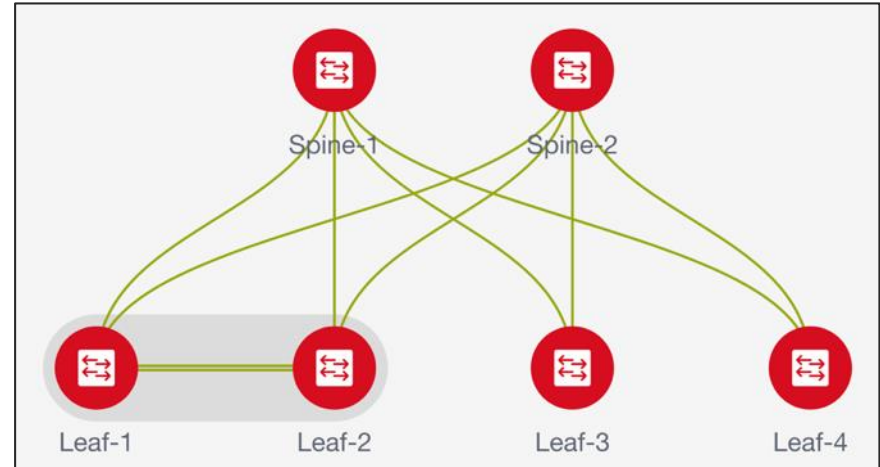
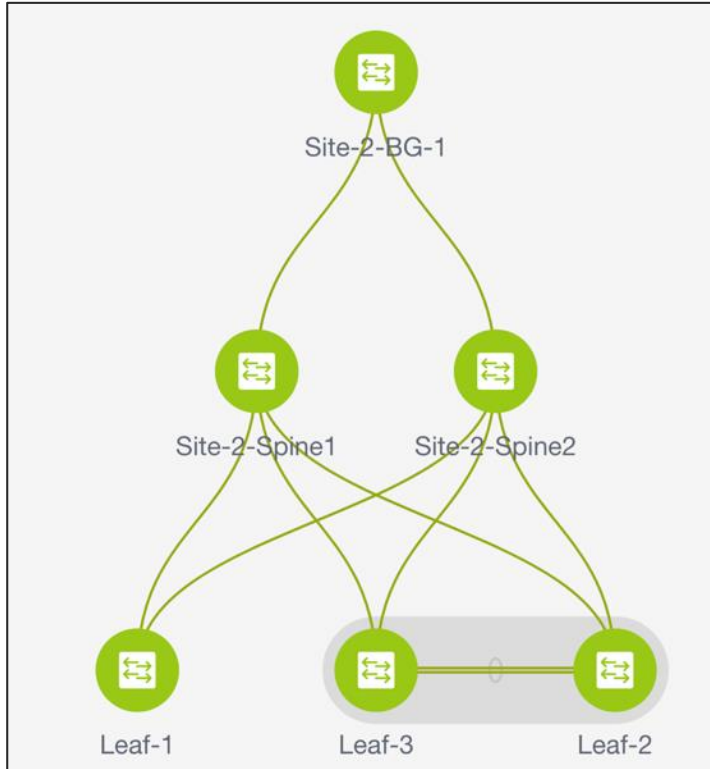
Interface Templates

Profile Templates

Show Templates

**CISCO** *Live!*

# Configuration Compliance



# Network Backup and Restore

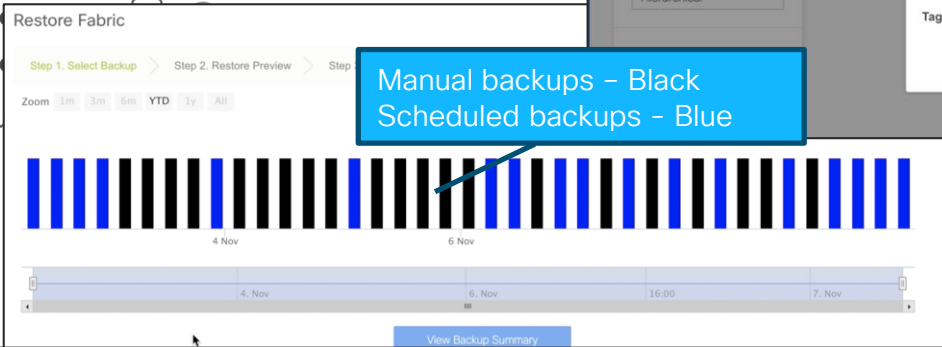
Actions

- Tabular view
- Refresh topology
- Save layout
- Delete saved layout
- Custom saved layout
- Restore Fabric
- Backup Now
- Re-sync Fabric
- Add switches
- Fabric Settings

Template : Easy\_Fabric\_11\_1

Protocols   Advanced   Resources   Manageability

Hourly Fabric  
Scheduled Fabric  
\* Schedu



Fabric Builder: EasyFab

Actions

- Tabular view
- Refresh topology
- Save layout
- Delete saved layout
- Hierarchical

Backup Now

Tag : before\_maintenance

OK Cancel

Backup now

Manual backups – Black  
Scheduled backups – Blue

Tag backups

View Delta Config

Restore Fabric

Step 1. Select Backup > Step 2. Restore Preview > Step 3. Restore Status > Step 4. Configuration > Step 5. Restore Status >

Switch Name	Switch Serial	Ip Address	Delta Config
N9K-44	FOX2203PE0S	10.127.117.44	3 lines
N9K-40	FDO222419B7	10.127.117.40	20 lines
N9K_41	FDO222425SE	10.127.117.41	<a href="#">65 lines</a>
N9K_42	FDO22240HJP	10.127.117.42	54 lines

# DCNM keeps track – Resource Manager

The screenshot displays the Cisco Data Center Network Manager (DCNM) interface, specifically the Resource Allocation section. The interface is divided into a left-hand navigation menu and a main content area. The navigation menu includes options for Dashboard, Topology, Control, Monitor, Administration, and Applications. The main content area shows a table of Resource Allocation for a specific scope (MSD-1). The table has columns for Scope Type, Scope, Allocated Resource, Allocated To, Resource Type, Is Allocated?, and Allocated On. A callout box labeled 'MSD' points to the 'SCOPE: MSD-1' dropdown menu. Another callout box labeled 'L2/L3 VNI' points to the 'Resource Type' column in the first row of the table. A third callout box labeled 'FABRIC' points to the 'Scope Type' column in the first row. A fourth callout box labeled 'Devices' points to the 'Device' column in the second table. A fifth callout box labeled 'Serial Number' points to the 'Serial Number' column in the second table. A sixth callout box labeled 'Deployment Type' points to the 'Deployment Type' column in the second table. The second table shows a list of devices with their serial numbers, allocated to various network resources, and their deployment dates and times.

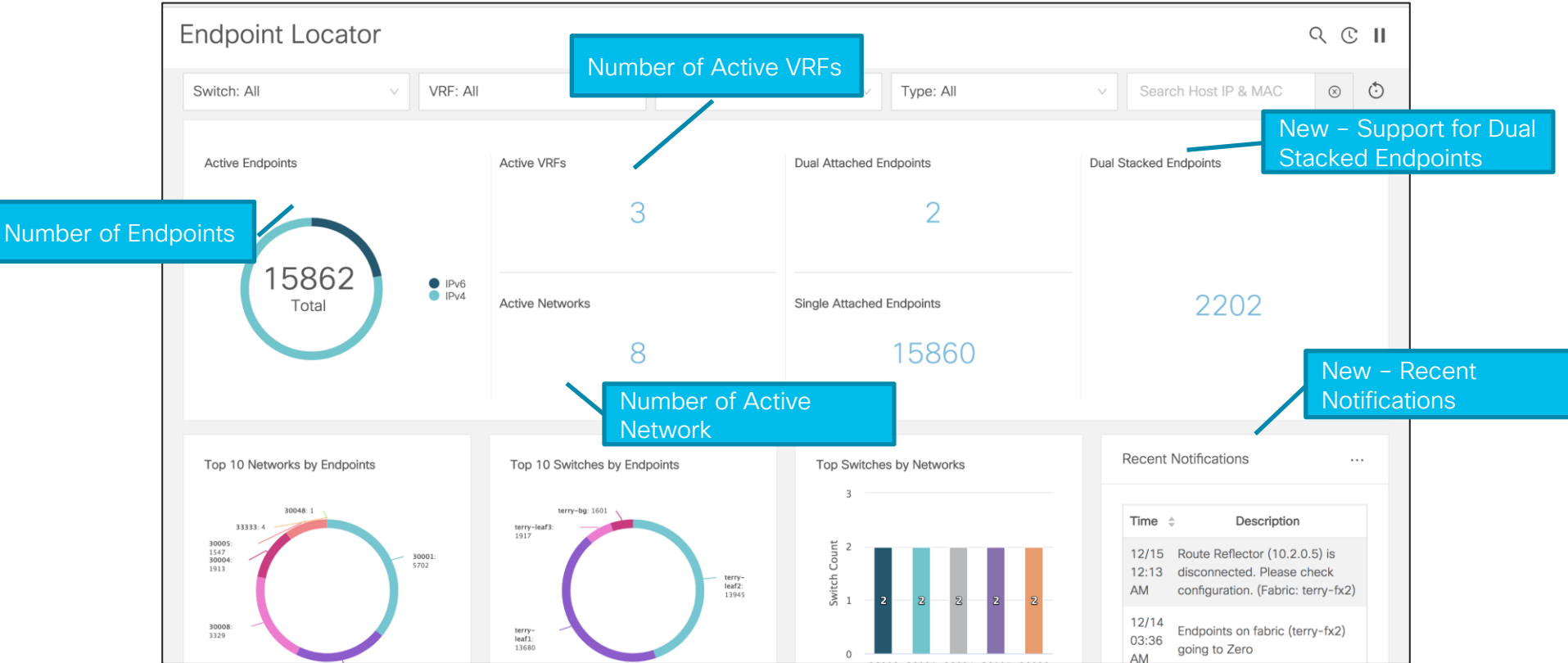
Scope Type	Scope	Allocated Resource	Allocated To	Resource Type	Is Allocated?	Allocated On
Fabric	MSD-1	30000	MyNetwork_30000	L2_VNI	Yes	6/10/2018, 9:58:24 PM

Device	Serial Number	Allocated To	Resource Type	Is Allocated?	Allocated On
Device	SAL18432P4S-2003	Beer_Corona	TOP_DOWN_VRF_VLAN	Yes	6/12/2018, 8:51:52 AM
Device	SAL18432P4X-10	MyNetwork_30003	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:12 PM
Device	SAL18432P4X-301	MyNetwork_30002	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 10:20:05 PM
Device	SAL18432P4X-400	MyNetwork_30006	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:29 PM
Device	SAL18432P4X-401	MyNetwork_30007	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:37 PM
Device	SAL18432P4X-500	MyNetwork_30008	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:46 PM
Device	SAL18432P4X-500	port-channel500	PORT_CHANNEL_ID	Yes	6/2/2018, 2:14:21 PM
Device	SAL18432P4X-501	MyNetwork_30009	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:46 PM
Device	SAL18432P4X-600	MyNetwork_30000	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:21 PM
Device	SAL18432P4X-601	MyNetwork_30001	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 11:30:29 PM
Device	SAL18432P4X-3000	MyVRF_50000	TOP_DOWN_VRF_VLAN	Yes	6/3/2018, 11:30:21 PM
Device	SAL18432P4X-2001	foo	TOP_DOWN_VRF_VLAN	Yes	6/3/2018, 11:30:21 PM
Device	SAL18432P4X-2002	foo	TOP_DOWN_VRF_VLAN	Yes	6/3/2018, 11:30:21 PM
Device	SAL18432P4X-2003	foo	TOP_DOWN_VRF_VLAN	Yes	6/3/2018, 11:30:29 PM
Device	SAL18432P4X-2004	foo	TOP_DOWN_VRF_VLAN	Yes	6/3/2018, 11:30:46 PM
Device	SAL18432P4X-2005	foo	TOP_DOWN_VRF_VLAN	Yes	6/4/2018, 4:07:05 PM
Device	SAL18432P4S-114	MyNetwork_30014	TOP_DOWN_NETWORK_VLAN	Yes	6/9/2018, 10:37:52 AM
Device	SAL18432P4S-115	MyNetwork_30015	TOP_DOWN_NETWORK_VLAN	Yes	6/9/2018, 11:05:57 AM
Device	SAL18432P4S-301	MyNetwork_30002	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 10:20:05 PM
Device	SAL18432P4S-600	MyNetwork_30000	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 10:10:48 PM
Device	SAL18432P4S-601	MyNetwork_30001	TOP_DOWN_NETWORK_VLAN	Yes	6/3/2018, 10:18:51 PM



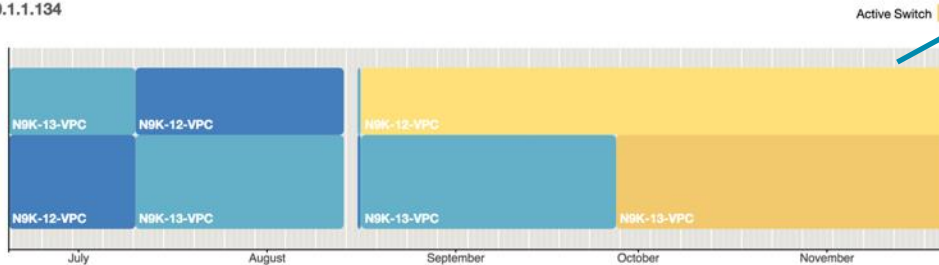
# Endpoint Locator (EPL)



# Endpoint Locator (EPL)

- How many hosts on vlan 10 on eth1/1 on Leaf10 at 11/01/2020 between 2am - 3am?
- How many networks and VRFs are active on leafs 1-10?

IP: 60.1.1.134

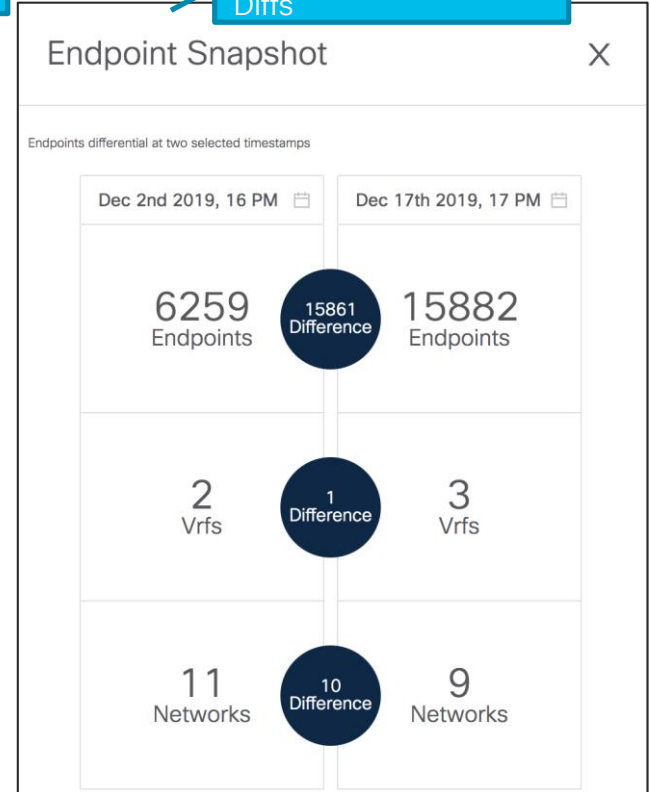
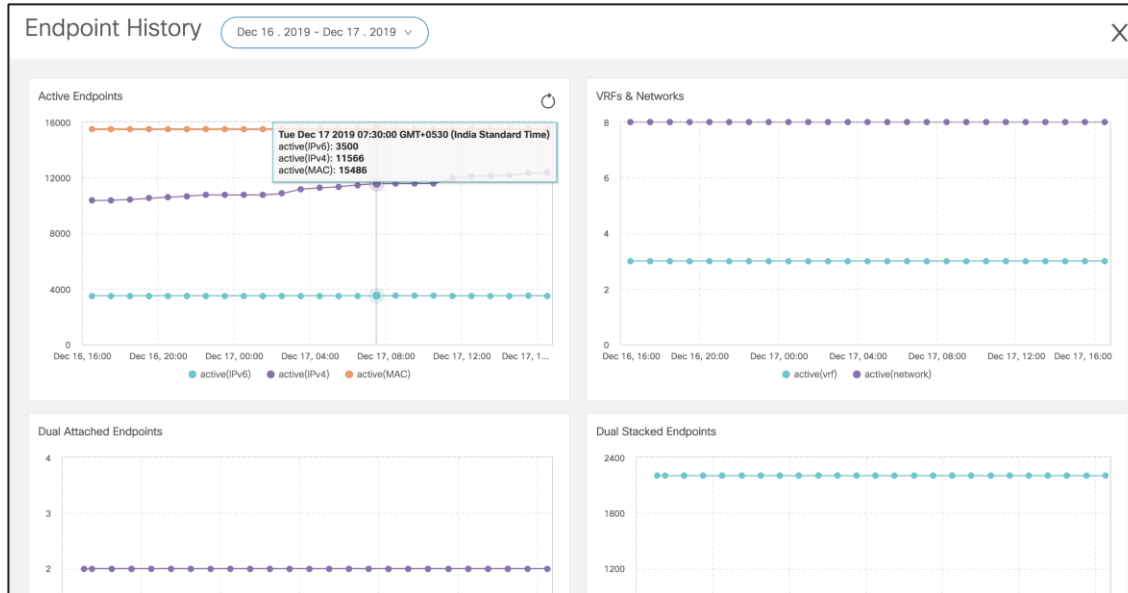


Graphical view of host life-cycle on the network

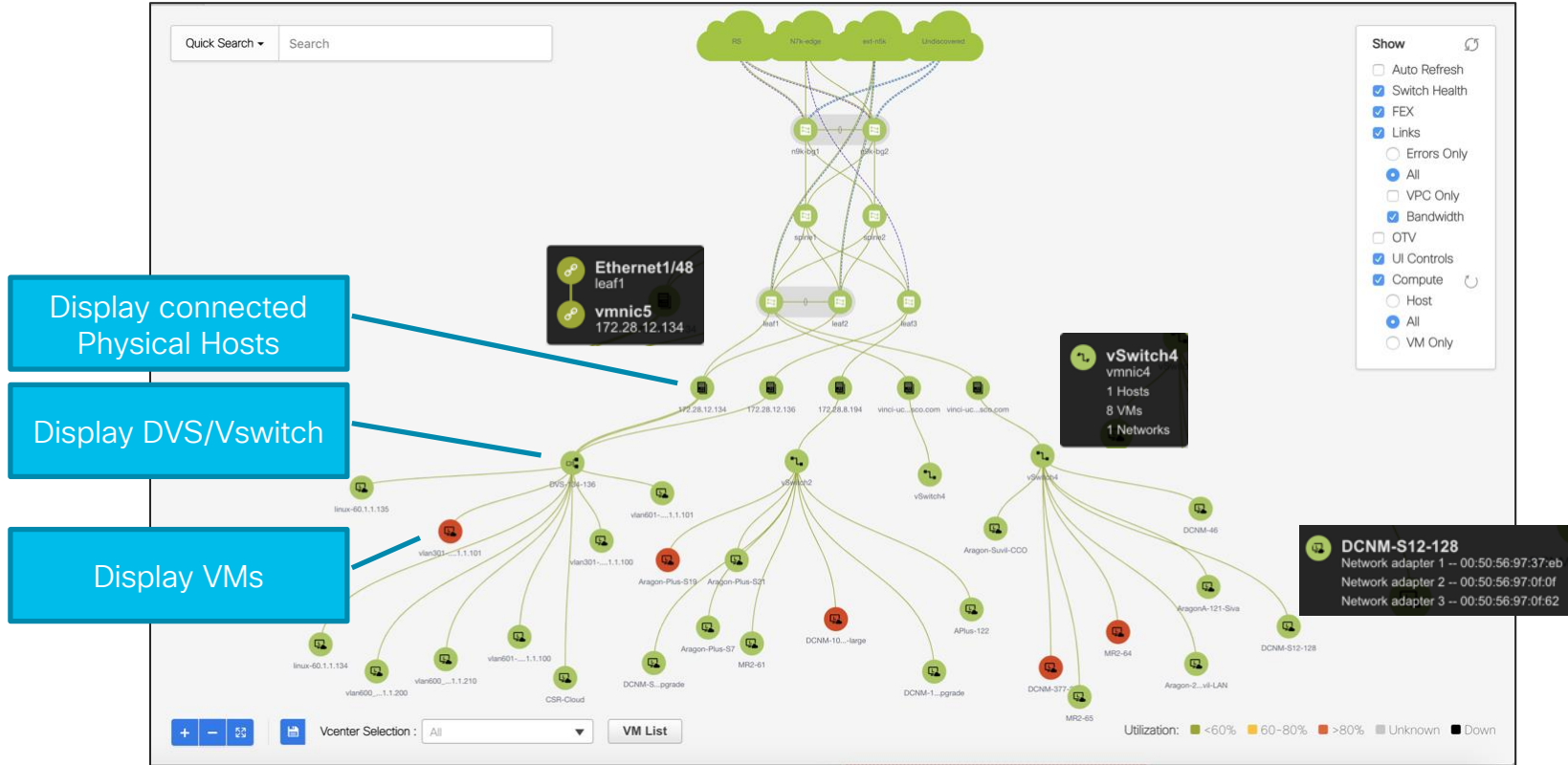
# Endpoint Locator (EPL)

History of Endpoints and VRFs/Networks

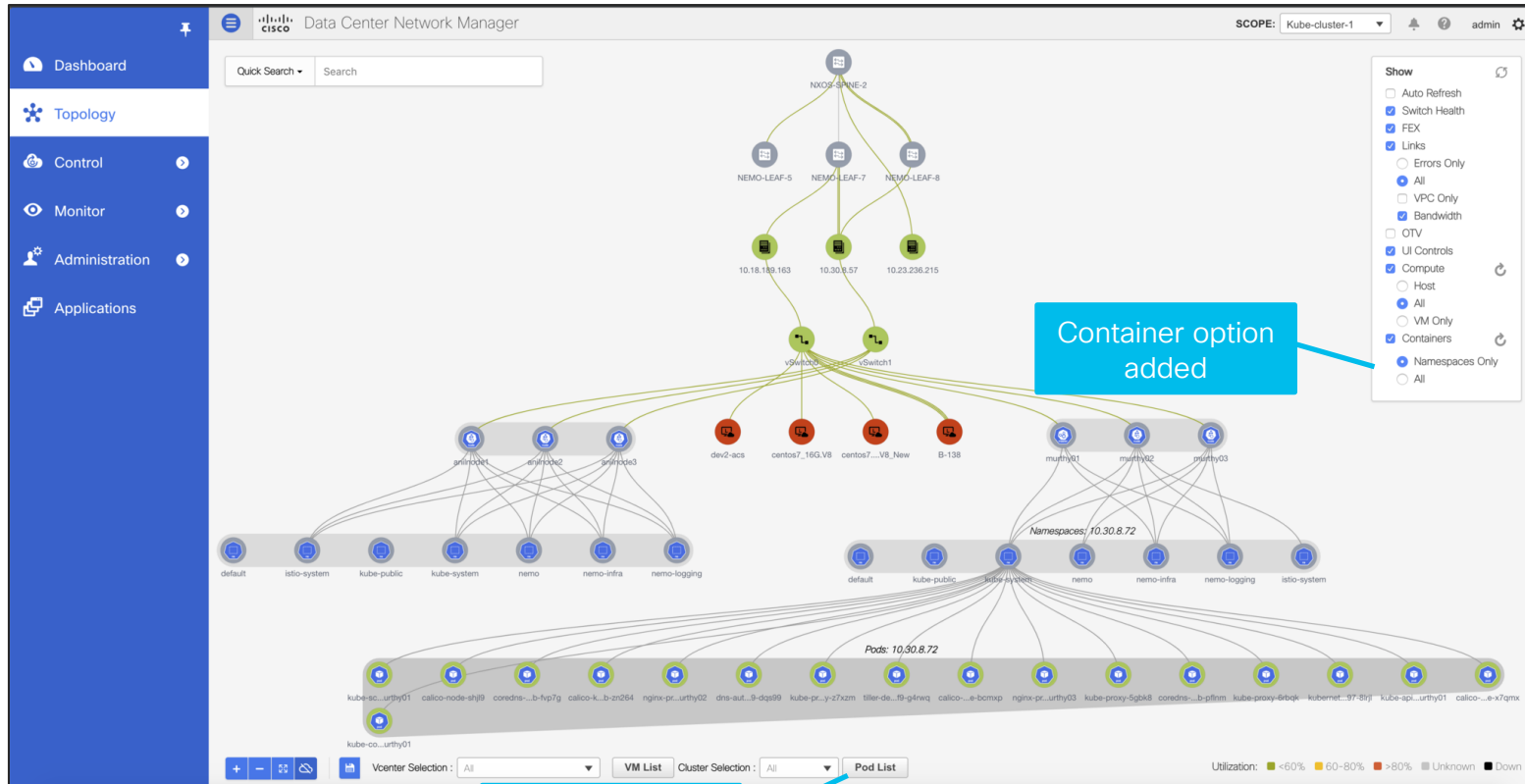
Ability to Generate Diffs



# Virtual Machine Manager – Compute Visibility



# Kubernetes Cluster Visualization in Topology



# VXLAN OAM

The screenshot displays the Cisco Data Center Network Manager interface. On the left is a navigation sidebar with options: Dashboard, Topology, Control, Monitor, Administration, and Applications. The main panel shows the 'VXLAN OAM' configuration window. A red box highlights the configuration fields, with red arrows pointing to labels: 'Source IP' (60.1.1.200), 'Destination IP' (61.1.1.100), 'VRF' (myvrf\_50000), and 'Payload Information (Optional)' (Source Port: 5000, Destination Port: Http 80, Protocol: TCP 6). The network topology shows a cloud labeled 'site2' connected to spine1 and spine2, which are in turn connected to leaf1, leaf2, and leaf3. A legend at the bottom right indicates utilization levels: <60% (green), 60-80% (yellow), >80% (red), Unknown (grey), and Down (black).

Source IP

Destination IP

VRF

Payload Information (Optional)

# VXLAN OAM

The screenshot displays the Cisco Data Center Network Manager interface. On the left is a navigation sidebar with options: Dashboard, Topology, Control, Monitor, Administration, and Applications. The main area shows the 'VXLAN OAM' configuration for a 'Host to host' switch. A modal window titled 'Host to Host OAM Details' is open, showing performance metrics for 'spine1'.

**Host to Host OAM Details**

Index	1
Switch Name	spine1
IP address	11.4.0.29
<b>Ingress Interface</b>	
if_name	Eth1/45
if_state	UP
rx_len	84
rx_bytes	174011548
rx_pkt_rate	0
rx_byte_rate	104
rx_load	10
rx_ucast	533211
rx_mcast	1194326
rx_bcast	3
rx_discards	0
rx_errors	0
rx_unknown	0
rx_bandwidth	10000000
tx_len	76
tx_bytes	133952753
tx_pkt_rate	0
tx_byte_rate	60
tx_load	10
tx_ucast	533207
tx_mcast	801855
tx_bcast	2
tx_discards	0
tx_errors	0
tx_bandwidth	10000000
<b>Egress Interface</b>	
if_name	Eth1/43
if_state	UP
rx_len	84
rx_bytes	165781024
rx_pkt_rate	0
rx_byte_rate	44
rx_load	10
rx_ucast	635682
rx_mcast	905918
rx_bcast	1
rx_discards	0
rx_errors	0
rx_unknown	0
rx_bandwidth	10000000

The background network diagram shows a cloud labeled 'site2' connected to a spine switch 'spine2', which is in turn connected to three leaf switches: 'leaf1', 'leaf2', and 'leaf3'. A legend at the bottom right indicates utilization levels: <60% (green), 60-80% (yellow), >80% (red), Unknown (grey), and Down (black).

# Install RPM/SMU

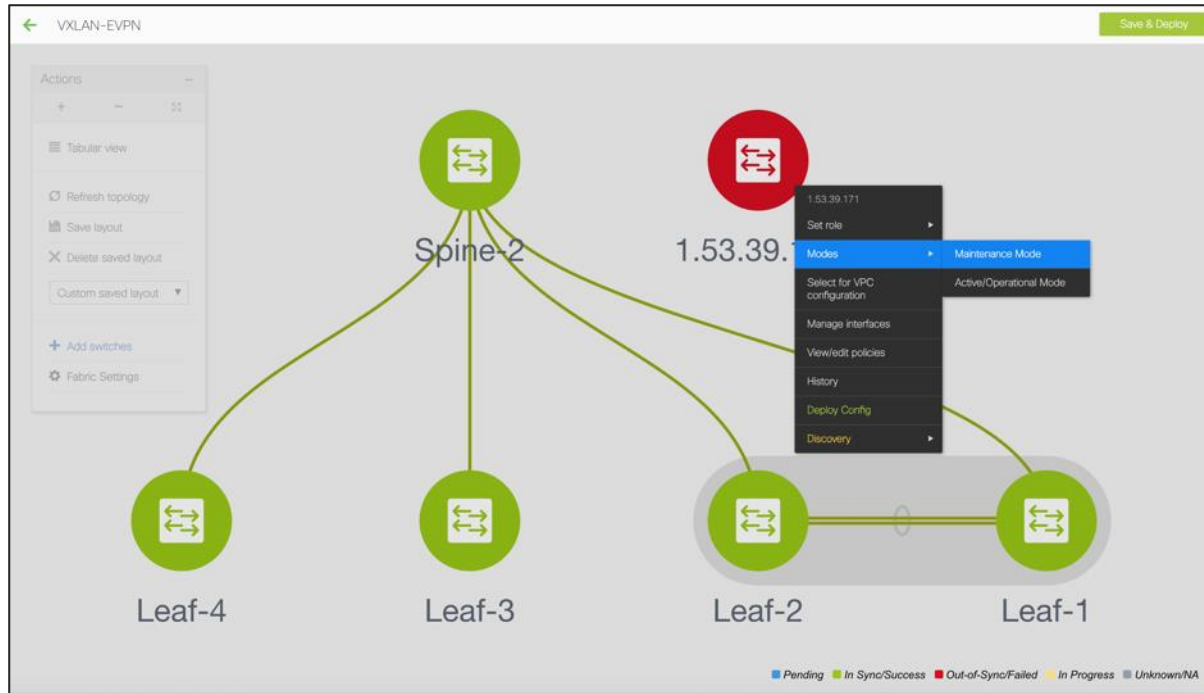
The screenshot shows the Cisco Data Center Network Manager interface for installing RPM/SMU. The main window is titled "Control / Image Management / Package [SMU/RPM]". A sidebar on the left contains navigation options: Dashboard, Topology, Control, Monitor, Administration, and Applications. The "Control" section is active, showing a list of switches under "Selected Switches": leaf2, terry-leaf1, epl-leaf1, epl-spine1, terry-bg, epl-spine2, epl-leaf2, terry-leaf3, terry-spine, spine, bg, bg1, leaf3, and leaf1. Each switch has a "Select Packages" link. A "Packages/Patches Browser" dialog is open, showing "1 Select Devices" and "2 Specify Packages" steps. The "Specify Packages" step shows a table of selected packages:

Switch Name	Packages/Patches	IP Address	Version
leaf2	/var/lib/dcnm/upload/N9K/mxos.CSCvq6193...	192.168.126.157	9.3(1)

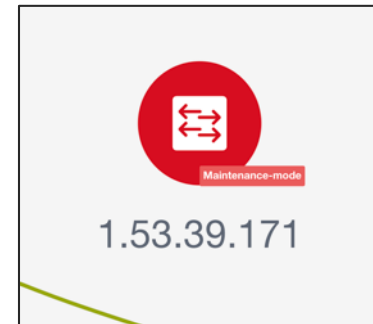
Callouts in blue boxes provide instructions: "Click + to start install" points to the plus icon in the top left; "Select devices to install RPM/SMU on" points to the switch list; "Select packages from default repository or external system" points to the "Specify Packages" step; "Select packages" points to the package table; and "Finish install" points to the "Finish" button at the bottom of the dialog.



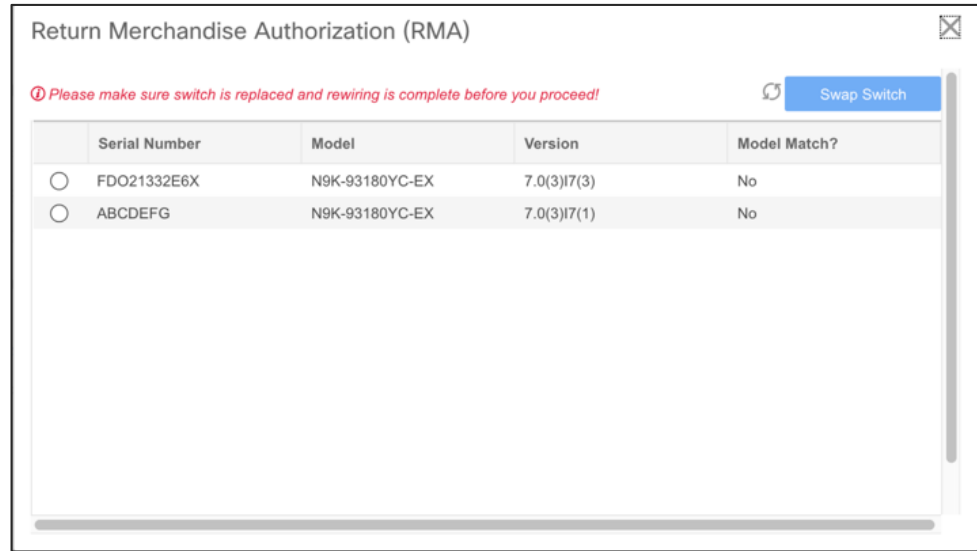
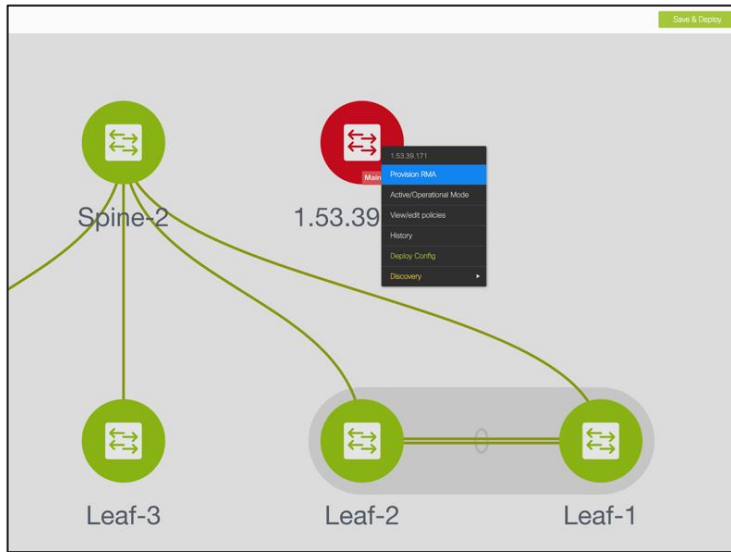
# Switch Maintenance Mode



- Put the device in maintenance mode
- Physically replace the device in the network



# Provision RMA



1 Choose the Provision RMA option and select the replacement device

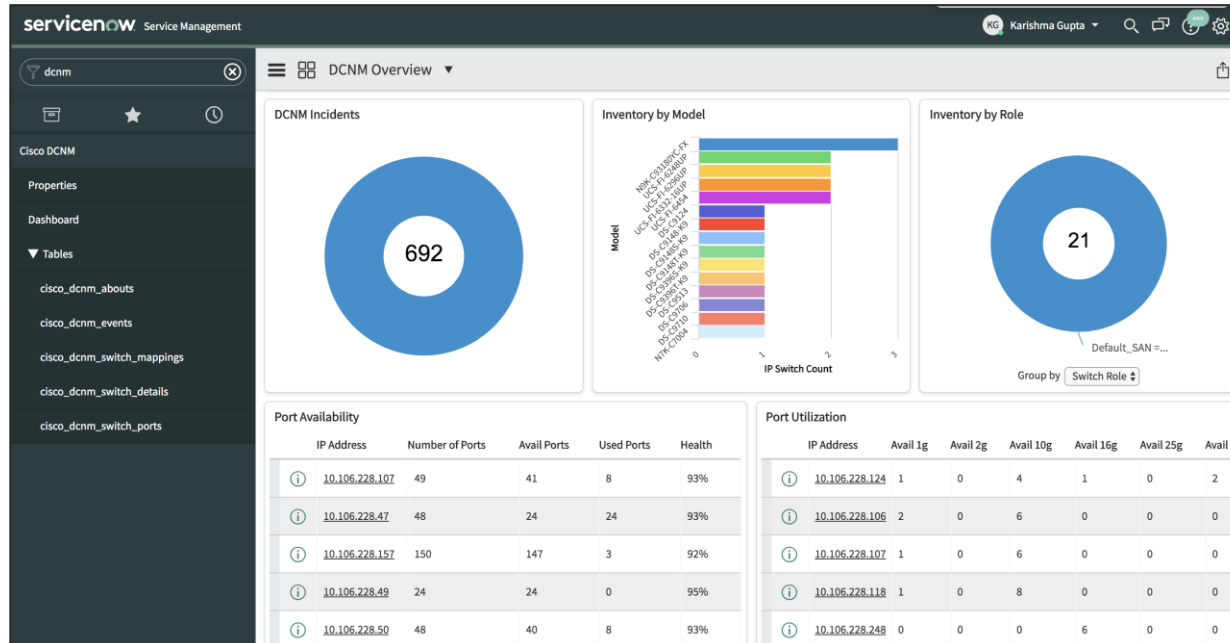
2 DCNM will provision the device using POAP with the expected configuration for the node

3 Once the new device is online move the device back into Normal Mode

**CISCO** Live!

# DCNM Integration with ServiceNow

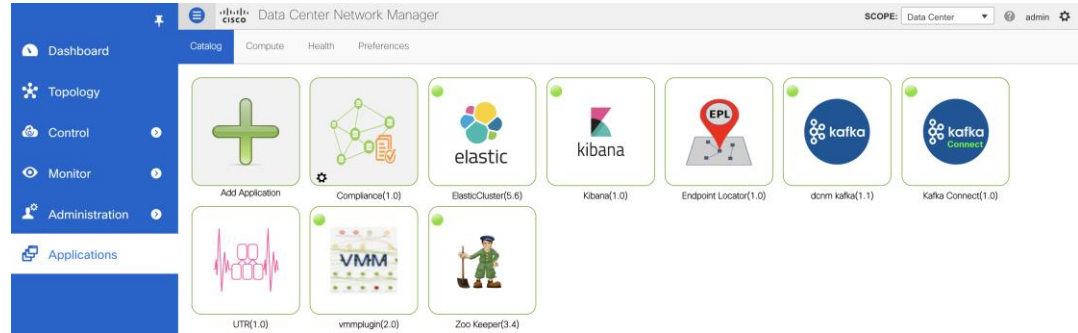
- Inventory imported on DCNM Instance Import
- Alarms collected periodically
- Auto creation of Incidents supported for each critical Alarm



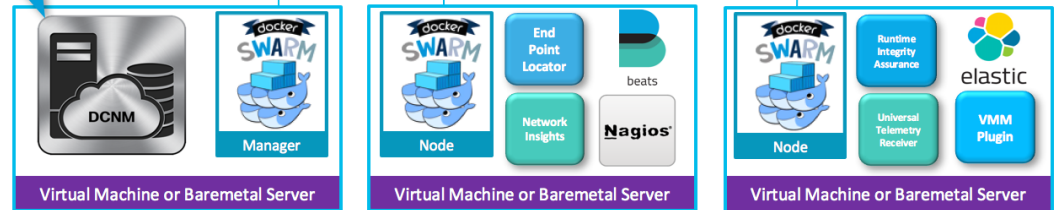
# DCNM Application Hosting Framework

- Extensible Framework
- Applications can run on the framework instead of core S/W
  - “Future Proof” – new apps on existing framework
  - Separation between apps
  - Extensible
- Examples: Telemetry, Analytics Apps, Reporting, Automation
- Uses Worker-Nodes for expansion

## Make All the Apps into Containers



## Expand Compute Nodes as Necessary



# Network Insights Applications



## Visibility

Learn from your network and recognize anomalies



## Insights

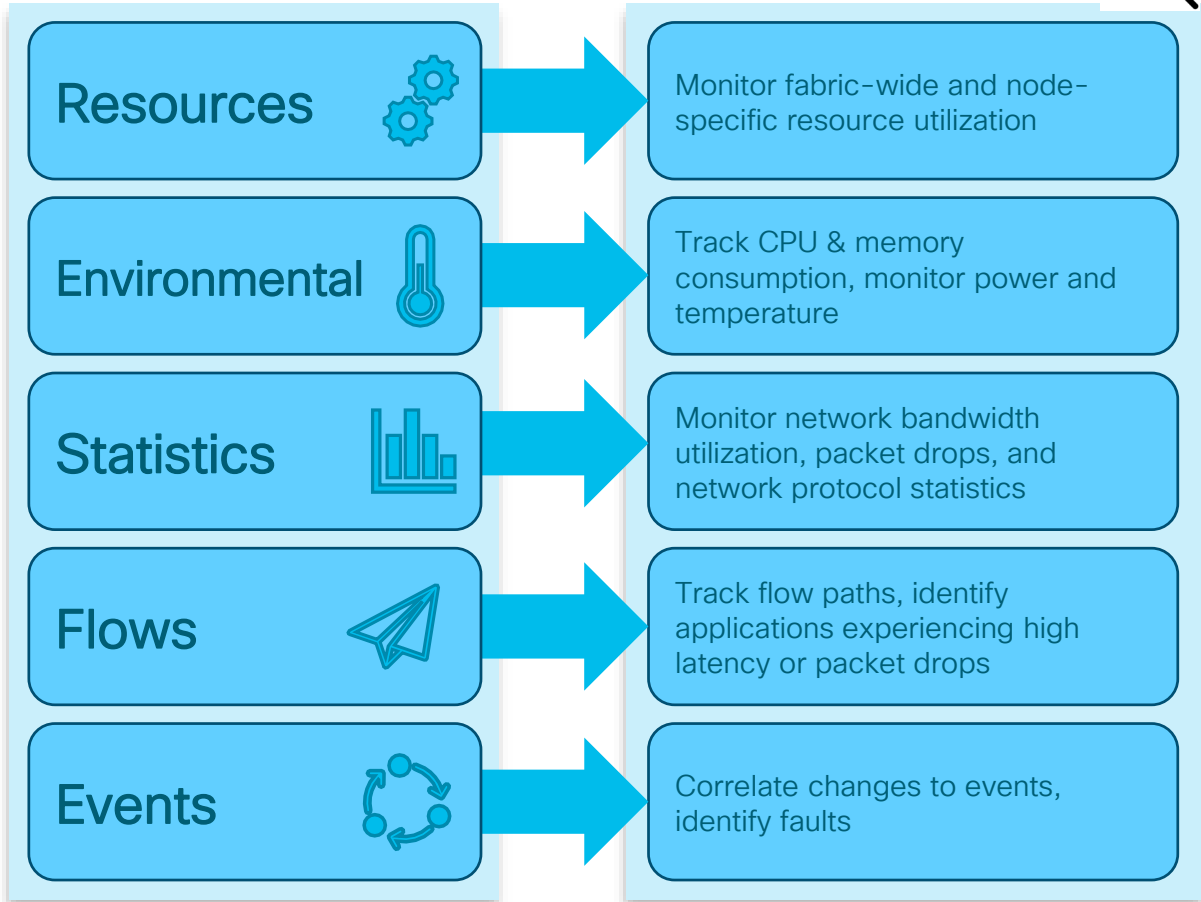
See problems before your end users do



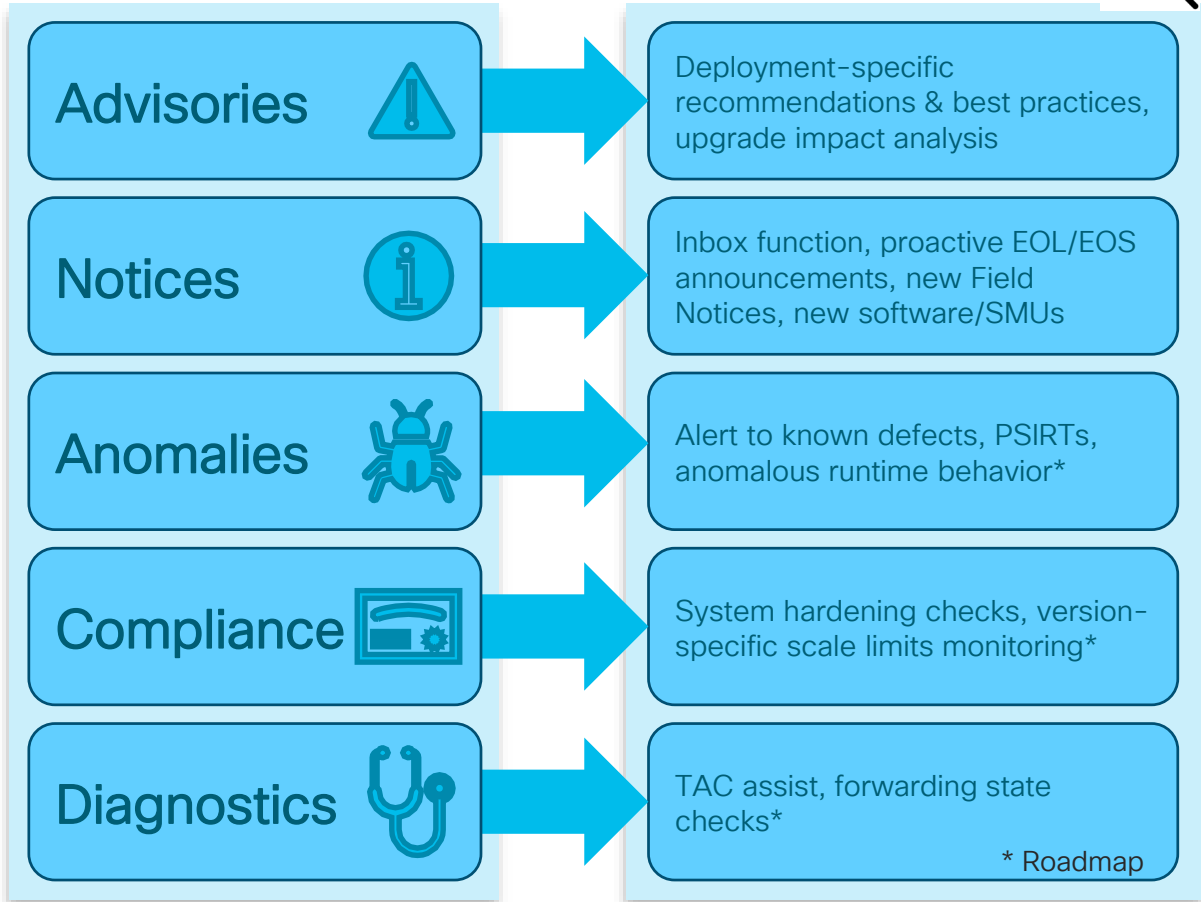
## Proactive Troubleshooting

Find root cause faster with granular details

# How Can NIR Help with Day 2 Operations?



# How Can NIA Help with Day 2 Operations?



\* Roadmap

# Want to automate or deploy at bulk? REST away!

DCNM RestFul API Documentation			
Alarms	Show/Hide	List Operations	Expand Operations
Cloud Extension	Show/Hide	List Operations	Expand Operations
Control - DCNM Tracker	Show/Hide	List Operations	Expand Operations
Control - Fabrics	Show/Hide	List Operations	Expand Operations
Control - Interface Service	Show/Hide	List Operations	Expand Operations
Control - Inventory	Show/Hide	List Operations	Expand Operations
Control - Links	Show/Hide	List Operations	Expand Operations
Control - Policies	Show/Hide	List Operations	Expand Operations
Control - Switches	Show/Hide	List Operations	Expand Operations
Customization	Show/Hide	List Operations	Expand Operations
DCNM Image Policy Management	Show/Hide	List Operations	Expand Operations
DCNM Package Management	Show/Hide	List Operations	Expand Operations
DCNM session management	Show/Hide	List Operations	Expand Operations
Image Management	Show/Hide	List Operations	Expand Operations
Progress Tracker	Show/Hide	List Operations	Expand Operations
Resource Manager operations	Show/Hide	List Operations	Expand Operations
Service Network Operations	Show/Hide	List Operations	Expand Operations
Top Down LAN Network Operations	Show/Hide	List Operations	Expand Operations
Top Down LAN VRF Operations	Show/Hide	List Operations	Expand Operations

DCNM GUI uses  
REST APIs

1:1 parity with UI

Automate

Deploy at Bulk

Interface with 3<sup>rd</sup>  
party tools

<https://<dcnm-server-IP>/api-docs>



# API Inspector

The screenshot displays the Cisco Data Center Network Manager (DCNM) interface. On the left, a user is logged in as 'admin'. A dropdown menu is open, showing options: 'Logged in as admin', 'Change Password...', 'About', 'REST API Tool', and 'Log out'. A blue callout box points to the 'REST API Tool' option with the text: 'To access API tool, on Each Page of DCNM UI'. The main interface shows a network topology diagram with various nodes like 'Fabric: shyam-fc2', 'Fabric: karthik-fab', and 'Fabric: Non-Nexus'. A blue callout box points to the 'REST API Tool' option with the text: 'Opens another window with corresponding API calls'. In the foreground, an 'API Inspector' window is open, displaying a list of API calls and their responses. The API calls include GET requests for virtual centers, dcm-elasticsearch-api, and integrated/http\_33500/dcm-elasticsearch-api, and POST requests for topology tags. The responses show status codes (200) and various data fields.

# DCNM Monitor Mode

- External Fabrics can be in Monitor mode
  - DCNM still generates configs to be pushed to the switches
    - Available via APIs
- Day 2 Operations
  - Network Insights (NIR/NIA)
  - Monitoring Environmental data
  - Events, Alarms
  - Real time Topology View, VMM, K8s viewer
  - EPL

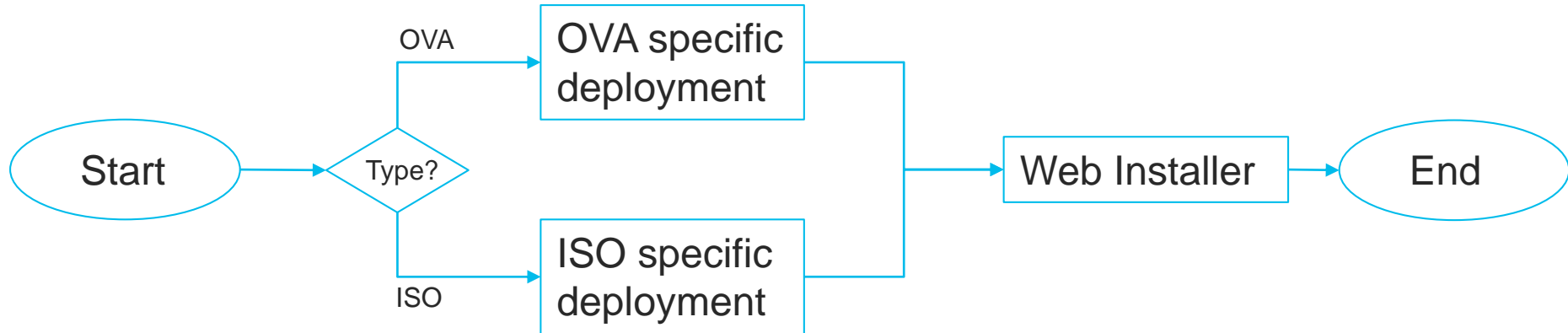
The screenshot shows the configuration page for an external fabric. At the top, there are two fields: '\* Fabric Name' with the value 'ext1' and '\* Fabric Template' with a dropdown menu showing 'External\_Fabric\_11\_1'. Below these is a tabbed interface with five tabs: 'General' (selected), 'Advanced', 'Resources', 'Configuration Backup', and 'Bootstrap'. Under the 'General' tab, there is a field for '\* BGP AS #' with the value '65002' and a help icon followed by the text '1-4294967295 | 1-65535[0-65535]'. At the bottom, there is a checkbox for 'Fabric Monitor Mode' which is checked, followed by a help icon and the text 'If enabled, fabric is only monitored. No configuration will be deployed'.

# Agenda

- Introduction to DCNM 11
- Greenfield VXLAN Deployment
- Brownfield - Revamp your VXLAN fabric
- DCNM Day-2 operations
- **Install and Licensing**
- Conclusion

# DCNM11 Installation - New Installation Mechanism

Full support for DCNM HA nodes

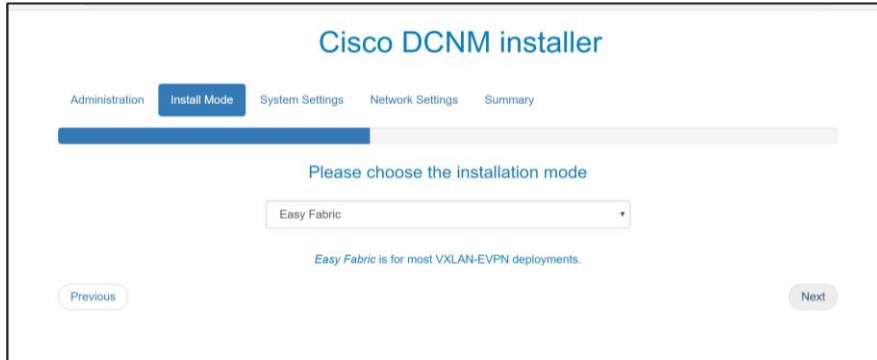


# DCNM11 Installation -

## DCNM11 Web Installer (common to OVA and ISO)



Fresh Installation if it's the first time DCNM is installed (e.g. new user installation)



Select mode when installing:

- Easy Fabric/LAN fabric
- Classic LAN
- IP Fabric for Media
- Compute

# DCNM 11.3(1) Verified Scale

## LAN Fabric Installation Mode



Feature	Scale
Physical Interfaces	30,000
Switch Scale	350 – In Managed Mode 750 – In Monitor Mode
L3 Scenario: Networks and VRFs per Fabric	1000 Networks/500 VRFs
L2 Scenario: Networks per Fabric	1500 Networks
Endpoint Locator	100K Endpoints across 4 Fabrics
Virtual Machine Manager End Points	5k
Maximum vCenter Instances per DCNM	4

# DCNM 11.3 LAN Deployment

## Without Network Insights

### Up to 80 Switches

Node	Deployment Mode	CPU	Memory	Storage	Network
DCNM	OVA/ISO	16 vCPUs	32G	500G HDD	3xNIC
Computes	NA				

### 81-350 Switches

Node	Deployment Mode	CPU	Memory	Storage	Network
DCNM	OVA/ISO	16 vCPUs	32G	500G HDD	3xNIC
Computes x 3	OVA/ISO	16 vCPUs	64G	500G HDD	3xNIC

# DCNM/NX-OS Compute Requirements for Network Insights

## Hardware Recommendations for Deployments up to 80 Switches and 2000 Flows

Node	Deployment Mode	CPU	Memory	Storage	Network
Cisco DCNM	OVA/ISO	16 vCPUs	32G	500G HDD	3x NIC
Computes (x3)	OVA/ISO	32 vCPUs	64G	500G HDD	3x NIC

## Hardware Recommendations for Deployments from 81 to 250 Switches and 10000 Flows

Node	Deployment Mode	CPU	Memory	Storage	Network
Cisco DCNM	OVA/ISO	16 vCPUs	32G	500G HDD	3x NIC
Computes (x3)	ISO	40 vCPUs	256G	2.4TB HDD	3x NIC*

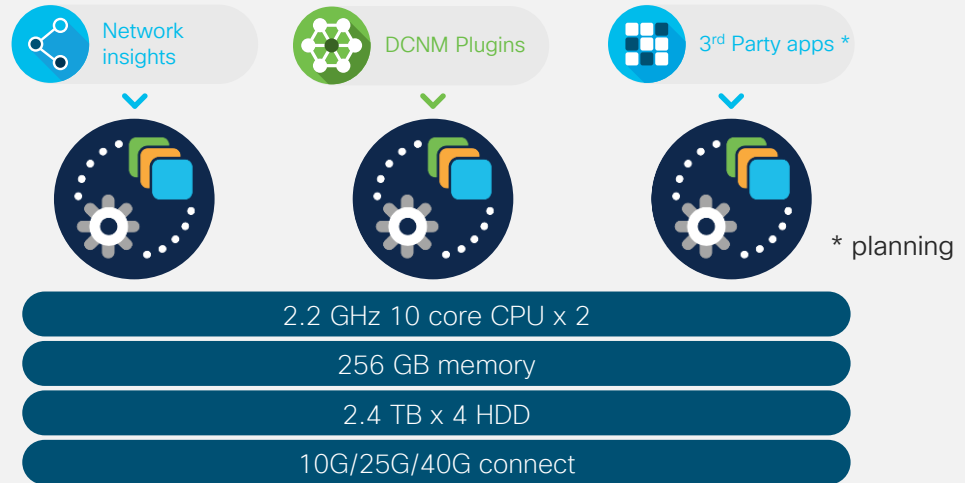
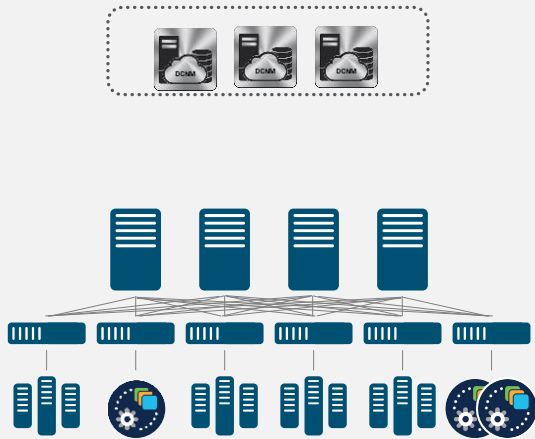
\* Network card: Quad-port 10/25G





# Cisco Application Services Engine

Modern Scale-out Application Services stack to host Day-2 Operations applications



Network automation

Scale-out cluster

SE-CL-L3

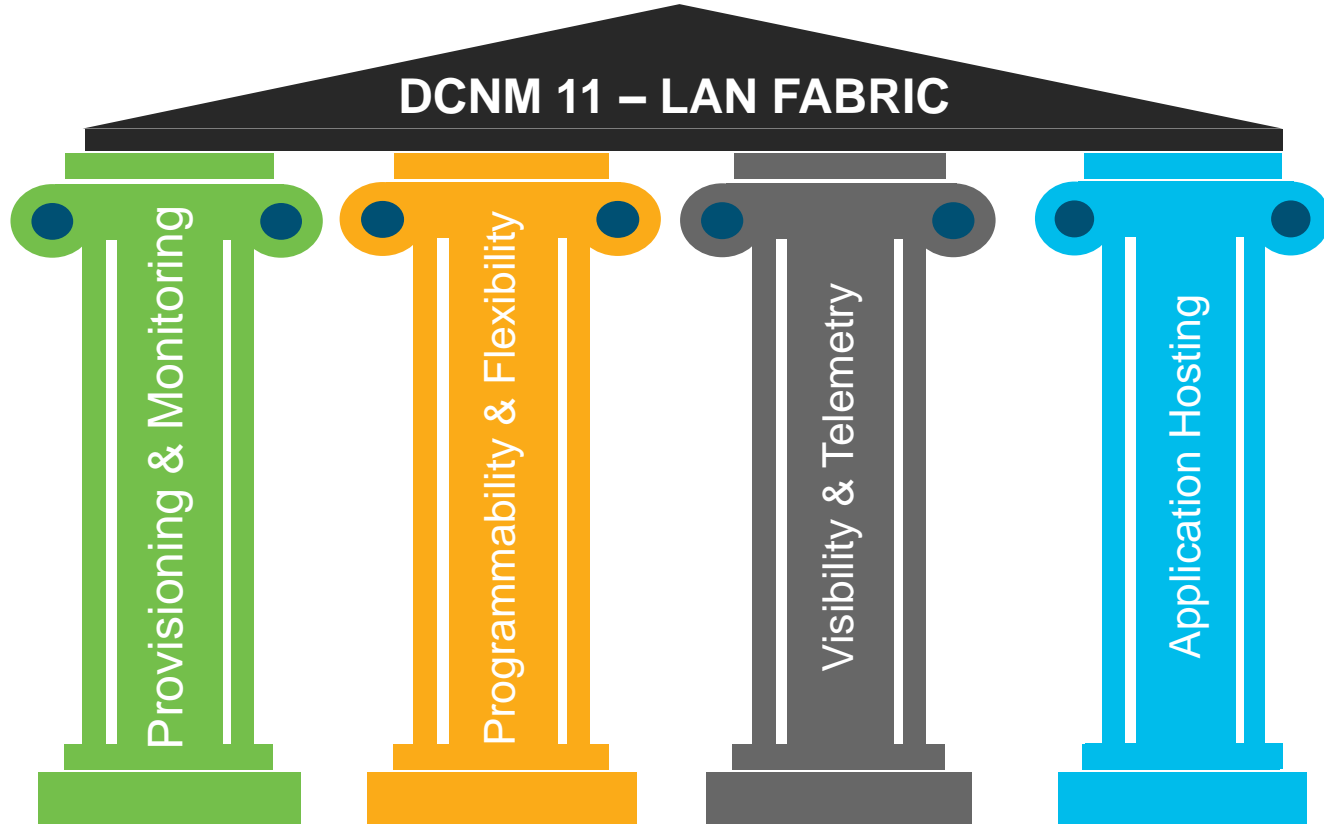
# Licensing (Trial now for 60 days, Honor Based)

Feature	Data Center Network Manager (DCNM)
DCNM-SVR-11-K9 DCNM-SVR-11-K9=	DCNM Server License per server instance
Switch Licenses	
DCNM LAN for Fixed Switch: e.g. DCNM-LAN-N93-K9= DCNM-LAN-N3K-K9=	Perpetual Fixed Chassis RTM Advanced feature license License for DCNM for one Switch
DCNM LAN for Modular Switch: e.g. DCNM-LAN-N95-K9=	Perpetual Modular Chassis RTM Advanced feature license License for DCNM for one Switch
OR	
NX-OS Essentials, Advantage, Premier Licenses include DCNM Right-to-Manage (RTM) licenses for LAN / LAN Fabric	

# Agenda

- Introduction to DCNM 11
- Greenfield VXLAN Deployment
- Brownfield - Revamp your VXLAN fabric
- DCNM Day-2 operations
- Install and licensing
- **Conclusion**

# Conclusion



# Reference Sessions

## Part 2 of this session -

Easy deployment and management of NXOS Fabrics ( VXLAN ) with DCNM -  
BRKDCN-2939

Tuesday, Jan 28th, 5:00 PM - 06:30 PM

## Related sessions -

- Day-2 Telemetry better - Network Insights for ACI/NX-OS - BRKDCN-2712
- Overlay Management and Visibility with VXLAN - BRKDCN-2125
- Building DataCenter Networks with VXLAN BGP EVPN - BRKDCN-3378
- Introduction to VXLAN: The future path of your datacenter - BRKDCN-1645

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- Complete a minimum of 4 session surveys and the Overall Conference survey (starting on Thursday) to receive your Cisco Live t-shirt.
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Cisco campus



Walk-in labs



Meet the engineer  
1:1 meetings



Related sessions



Thank you







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