



# Cisco TechAdvantage Webinars

## *Closer Look into Dynamic Fabric Automation (DFA): Part II*

Patrick Warichet and John Ng

*We'll get started a few minutes past the top of the hour.*

*Note: you may not hear any audio until we get started.*

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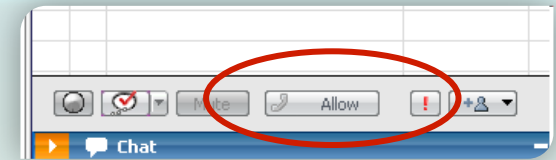
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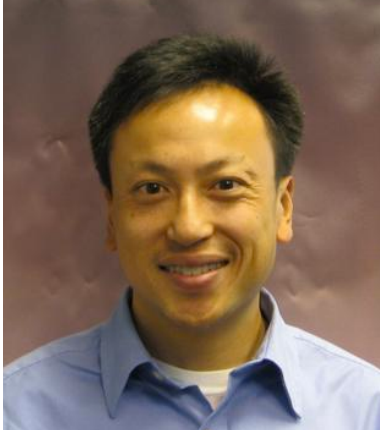
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# Speakers & Panelists Introduction

## Speakers



**John Ng**  
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## Panelists



**Sudhir Modali**  
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# Dynamic Fabric Automation

## Overview: Benefits and Use cases

# Agenda

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➤ [DC Trends Summary](#)

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➤ [Customer Challenges](#)

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➤ [Customer Usecase and DFA Benefits](#)

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➤ [Licenses, Products and Roadmap](#)

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➤ [Conclusion](#)

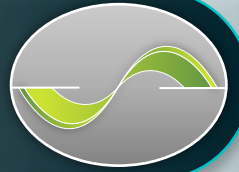
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# Customer and Industry Challenges

## ARCHITECTURE STRESS POINTS

## NG INFRASTRUCTURE

**App Workload Implications**  
Sandy Bridge, Big Data, Virtualization



- Network Efficiency, Topology Extensibility and Rapid scalability, Configuration instantiation automation

**xxx As a Service**  
Highly Integrated, resource Instantiation



- Compute, network and storage Instantiation, Integrated Orchestration & Multi-tenancy

**Operational Simplicity**  
Lower Cost of Operation



- Automation, Normalization, Ease of Management
- Visibility and programmatic instrumentation

**Virtual and Physical Integration**  
Consistent Process Automation



- Common Orchestration, Provisioning Uniformity and Configuration consistency

**Distributed Workloads**  
Extending DC Boundaries



- Distributed Physical resources– blurred server farm boundaries, Optimal Utilization, localization

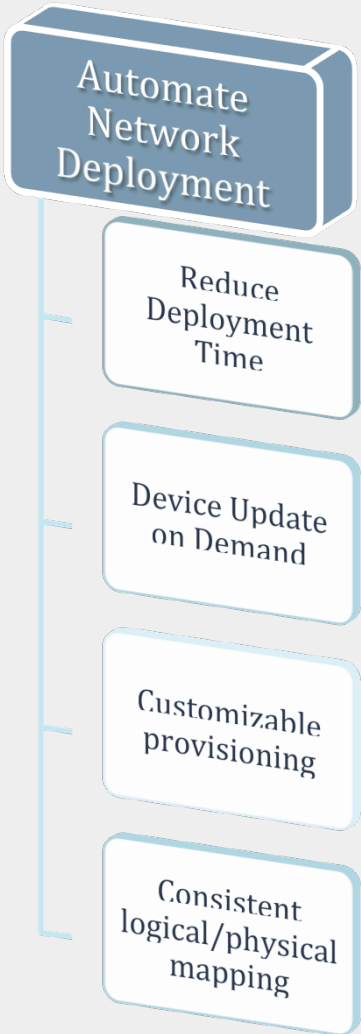


# Use Cases Covered

- Automate Network Deployment
- Fabric Visibility
- Scalable and Resilient Network
- Workload Automation



# Use case: Automate Network Deployment

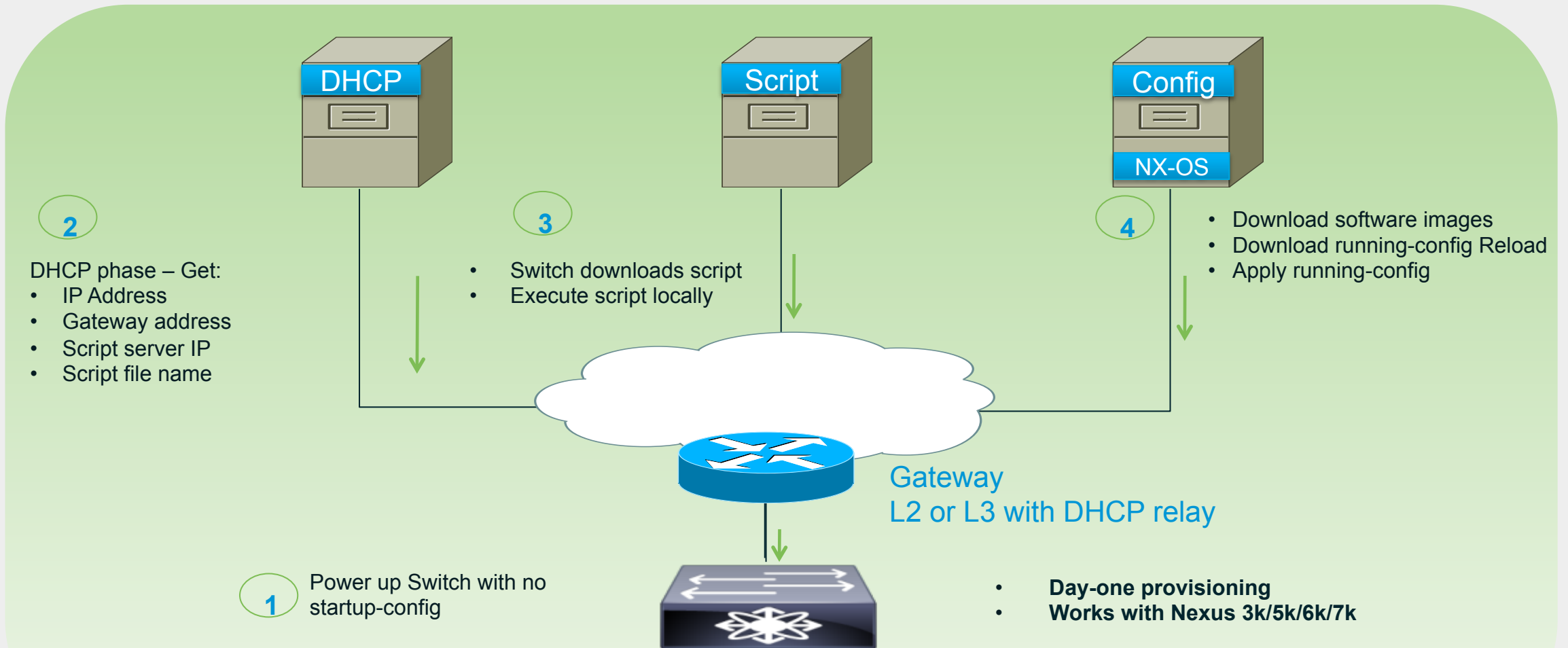


Problem: Customers are spending too much effort on device provisioning. Manual process are error prone.

- ❖ Automate process to create scalable and repeatable process
- ❖ Provide mechanism to provision based on logical groupings
- ❖ Network deployment based on customized policy
- ❖ Admission control of network elements



# Power On Auto Provisioning (PoAP)



# DFA – DCNM PoAP Definition

Cisco Prime Data Center Network Manager





root | DCNM-SAN | DCNM-LAN | DM | CLI | About

Dashboard | Health | Performance | Inventory | Reports | Config | Admin

By Name

Return to Launchpad

### POAP Steps

-  DHCP Scope
-  Image and Config Servers
-  POAP Definitions
-  Cable Plan

### POAP Definitions

- Generate or Upload Config
- Select Switches**
- Template Parameters
- Generate Config

### Enter Switch Details

Enter Serial Number separated by comma. Specify VPC pairs with (). Example: 123456,123457,(456789,456790),456795

\* Switches: FOC1739R11E,FOC1734R0AC

[Import from CSV File...](#)

\* Switch Type: **N6K**

\* Image Server: Default\_SCP\_Repository

\* System Image: n6000-uk9.6.0.2.N3.0.337.bin

\* Kickstart Image: n6000-uk9-kickstart.6.0.2.N3.0.337.

\* Config Server: Default\_SCP\_Repository

Note: The username/password is used by DCNM only to manage the switch and DCNM will not create the entered username/password in the switch.

\* Add Switches to Group: Default\_LAN

\* Switch User Name: admin

\* Switch Password: \*\*\*\*\*

Show password in clear text

< Back    Next >    Cancel

# DFA – DCNM PoAP Summary

Cisco Prime Data Center Network Manager

root | DCNM-SAN | DCNM-LAN | DM | CLI | About |

Dashboard | Health | Performance | Inventory | Reports | Config | Admin

Return to Launchpad

**POAP Steps**

- DHCP Scope
- Image and Config Servers
- POAP Definitions**
- Cable Plan

**POAP Switch Definitions** Selected 2 | Total 10

+ Add / Edit / Delete / Publish / Reboot and Reload

Filter Columns

	Serial Number	Switch ID	Management IP	Status			Model	Template/Config File Name	Bootscript Last Updated Time
				Switch Status	Publish Status	Bootscript Status			
<input type="checkbox"/>	FOC1732R0X5	DFAVT1-SC-SW1	10.29.170.126	✔ ok	Published	POAP script is finishe	N6K	<a href="#">SW1SW2</a>	Wed Nov 13 18:26:25 GMT-
<input type="checkbox"/>	FOC1732R0WH	DFAVT1-SC-SW2	10.29.170.127	✔ ok	Published	POAP script is finishe	N6K	<a href="#">SW1SW2</a>	Wed Nov 13 15:08:28 GMT-
<input type="checkbox"/>	FOC1739R11G	DFAVT1-SPINE2	10.29.170.123	✔ ok	Published	POAP script is finishe	N6K	<a href="#">Spine</a>	Thu Nov 14 06:42:46 GMT-
<input type="checkbox"/>	FOC1734R0A9	DFAVT1-SPINE4	10.29.170.125	✔ ok	Published	POAP script is finishe	N6K	<a href="#">Spine</a>	Thu Nov 14 06:43:50 GMT-
<input type="checkbox"/>	FOC1734R09Z	DFAVT1-SPINE1	10.29.170.122	✔ ok	Published	POAP script is finishe	N6K	<a href="#">Spine</a>	Thu Nov 14 06:59:32 GMT-
<input type="checkbox"/>	FOC1739R0Z3	DFAVT1-SPINE3	10.29.170.124	✔ ok	Published	POAP script is finishe	N6K	<a href="#">Spine</a>	Thu Nov 14 07:00:27 GMT-
<input checked="" type="checkbox"/>	FOC1739R11D	DFAVT1-BL-GW2	10.29.170.131	✔ ok	Published	POAP script is finishe	N6K	<a href="#">PREVPCDL</a>	Mon Nov 18 09:08:27 GMT-
<input checked="" type="checkbox"/>	FOC1739R10Z	DFAVT1-BL-GW1	10.29.170.130	✔ ok	Published	POAP script is finishe	N6K	<a href="#">PREVPCDL</a>	Mon Nov 18 09:08:29 GMT-
<input type="checkbox"/>	FOC1739R11E	DFAVT1-SC-SW3	10.29.170.128	✔ ok	Published	POAP script is finishe	N6K	<a href="#">PREVPCDL</a>	Mon Nov 18 09:12:00 GMT-
<input type="checkbox"/>	FOC1734R0AC	DFAVT1-SC-SW4	10.29.170.129	✔ ok	Published	POAP script is finishe	N6K	<a href="#">PREVPCDL</a>	Mon Nov 18 09:12:07 GMT-

# Data Center Network Manager (7.0) Cable Plan Creation

The screenshot shows the Cisco Prime Data Center Network Manager interface. The top navigation bar includes 'Cisco Prime Data Center Network Manager', user 'root', and various menu items like 'Dashboard', 'Health', 'Performance', 'Inventory', 'Reports', 'Config', and 'Admin'. A search bar on the right is set to 'By Name'. The left sidebar contains 'POAP Steps' with icons for 'DHCP Scope', 'Image and Config Servers', 'POAP Definitions', and 'Cable Plan'. The main content area is titled 'Cable Plan Summary' and shows a 'File Name : cableplan.xml'. Below this, there are buttons for 'Create Cable Plan', 'View', and 'Delete from'. A 'Switches' table is visible with columns for 'Serial Number' and 'Switch ID'. A modal dialog box titled 'Create Cable Plan' is open in the center, featuring three radio button options: 'Generate Cable Plan from POAP Definition', 'Capture from existing deployment', and 'Import Cable Plan File'. At the bottom of the dialog are 'Create' and 'Close' buttons. In the background, a table with columns 'Enforcement Policy', 'Last Deployed', and 'Last Updated' is partially visible.

Serial Number	Switch ID
<input type="checkbox"/> FOC1739R11C	DFAVT2-BL-GW1
<input type="checkbox"/> FOC1739R11A	DFAVT2-BL-GW2
<input type="checkbox"/> FOC1732R0XE	DFAVT2-SC-SW1
<input type="checkbox"/> FOC1732R0X4	DFAVT2-SC-SW2
<input type="checkbox"/> FOC1739R0YR	DFAVT2-SC-SW3
<input type="checkbox"/> FOC1739R0Z9	DFAVT2-SC-SW4
<input type="checkbox"/> FOC1731R06B	DFAVT2-SP3NE1
<input type="checkbox"/> FOC1731R072	DFAVT2-SP3NE2
<input type="checkbox"/> FOC1731R071	DFAVT2-SP3NE3
<input type="checkbox"/> FOC1731R065	DFAVT2-SP3NE4

Enforcement Policy	Last Deployed	Last Updated
Enforce	2011-02-04 21:14:10	2013-11-17 01:50:55.493
Enforce	2011-02-04 21:12:36	2013-11-17 01:50:55.595
Enforce	2011-02-02 02:56:53	2013-11-17 01:50:56.012
Enforce	2011-02-01 05:00:15	2013-11-17 01:50:56.011
Enforce	2011-02-04 21:17:28	2013-11-17 01:50:56.01
Enforce	2011-02-04 21:18:12	2013-11-17 01:50:56.009
Enforce	2011-02-03 23:31:23	2013-11-17 01:50:56.008
Enforce	2011-02-03 22:48:11	2013-11-17 01:50:56.005
Enforce	2011-02-03 22:27:19	2013-11-17 01:50:56.012
Enforce	2011-02-03 21:25:44	2013-11-17 01:50:56.008

# Data Center Network Manager (7.0) Cable Plan mapping

Cisco Prime Data Center Network Manager

root | DCNM-SAN | DCNM-LAN | DM | CLI | About | By Name

**Cable Plan - Existing\_Deployment**

Source Switch	Source Type	Source Port	Destination Switch	Destination Type	Destination Port
DFAVT2-SPINE4	n6k	Eth1/2	DFAVT2-BL-GW2	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/7	DFAVT2-SC-SW1	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/9	DFAVT2-SC-SW3	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/10	DFAVT2-SC-SW4	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/8	DFAVT2-SC-SW2	n6k	Eth2/4
DFAVT2-SPINE4	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/4
DFAVT2-SPINE3	n6k	Eth1/8	DFAVT2-SC-SW2	n6k	Eth2/3
DFAVT2-SPINE3	n6k	Eth1/10	DFAVT2-SC-SW4	n6k	Eth2/3
DFAVT2-SPINE3	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/2
DFAVT2-SPINE3	n6k	Eth1/7	DFAVT2-SC-SW1	n6k	Eth2/3
DFAVT2-SPINE3	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/2
DFAVT2-SPINE3	n6k	Eth1/2	DFAVT2-BL-GW2	n6k	Eth2/2
DFAVT2-SPINE3	n6k	Eth1/9	DFAVT2-SC-SW3	n6k	Eth2/3
DFAVT2-SPINE2	n6k	Eth1/8	DFAVT2-SC-SW2	n6k	Eth2/2
DFAVT2-SPINE2	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/3
DFAVT2-SPINE2	n6k	Eth1/7	DFAVT2-SC-SW1	n6k	Eth2/2
DFAVT2-SPINE2	n6k	Eth1/1	DFAVT2-BL-GW1	n6k	Eth2/3
DFAVT2-SPINE2	n6k	Eth1/2	DFAVT2-BL-GW2	n6k	Eth2/2

Close

Selected 0 | Total 10

Updated

11-17 02:10:55.478

11-17 02:10:55.479

11-17 02:10:56.018

11-17 02:10:56.017

11-17 02:10:55.48

11-17 02:10:55.476

11-17 02:10:56.019

11-17 02:10:56.014

11-17 02:10:56.016

11-17 02:10:56.017

# DCNM – Cable Plan Visual Display

Cisco Prime  
Data Center  
Network Manager

Scope: Default\_LAN root DCNM-SAN | DCNM-LAN | DM | CLI | About By Name

Dashboard Health Performance Inventory Reports Config Admin

Dashboard > Dynamic Fabric Automation

Inter Switch Links Edge Ports

Search for Switch / VM / PM By Name

Show Links Select Org:Partition All Override Switch Role DFA Health

Nodes

- All Links OK
- Some Links Down
- One Link Left
- All Links Down
- Unreachable

Links

- Normal
- Down
- Tier/Cable Mismatch
- Mis-Configured

Click on a switch to see details

4 Spines

- DFAVT1-SPINE1
- DFAVT1-SPINE2
- DFAVT1-SPINE3
- DFAVT1-SPINE4

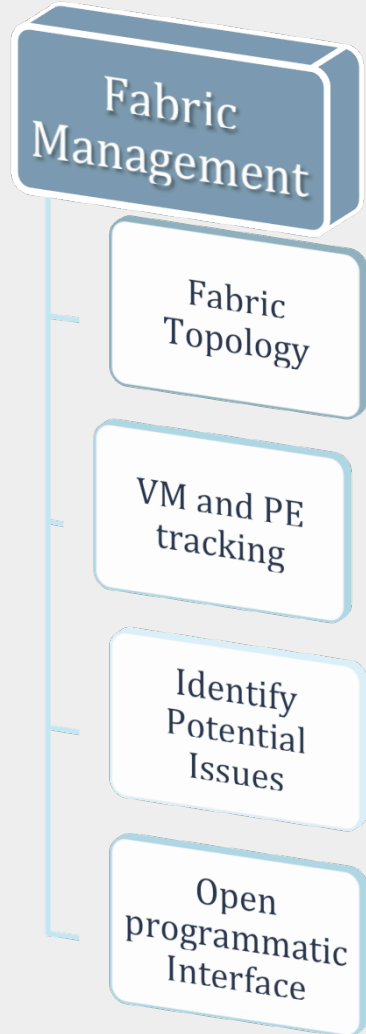
6 Leaves

- DFAVT1-BL-GW1
- DFAVT1-BL-GW2
- DFAVT1-SC-SW1
- DFAVT1-SC-SW2
- DFAVT1-SC-SW3
- DFAVT1-SC-SW4

- DCNM Cable Plan detected problem with a pair of leaf switches
- Port/Interface disabled to prevent any risk to the network infrastructure



# Fabric Visibility



Customers: Need visibility into Fabric to understand performance and bottleneck of network.

- ❖ Need view of entire network and elements
- ❖ Ability to track VM and Physical Elements in network
- ❖ Proactive Response – to eliminate and isolate trouble spots
- ❖ Programmatic interface to enable MMI to network devices

# DFA – DCNM Fabric Visibility

Cisco Prime Data Center Network Manager

Scope: **Default\_LAN** root DCNM-SAN | DCNM-LAN | DM | CLI | About

Dashboard Health Performance Inventory Reports Config Admin

### Health

**Problems**

Unmanaged Switches	0
Switch Warnings	0

**Events Last 24hrs**

Emergency	0
Alert	0
Critical	0
Error	0
Warning	0
Notice	0
Info	0
Debug	0

### Inventory

Sources	1 LANs
Switches	7
ISLs	12
Virtual	12 VLANs

Switch Ethernet Ports:

131 Used	877 Free
----------	----------

### Topology

Layout Restored.

ISL 24hr Peak Rx/Tx

- 0%+
- 50%+
- 80%+

### Top ISLs/Trunks (24 Hours)

No information available to display. Please turn on Performance Manager to start collecting data.

### Top CPU (24 Hours)

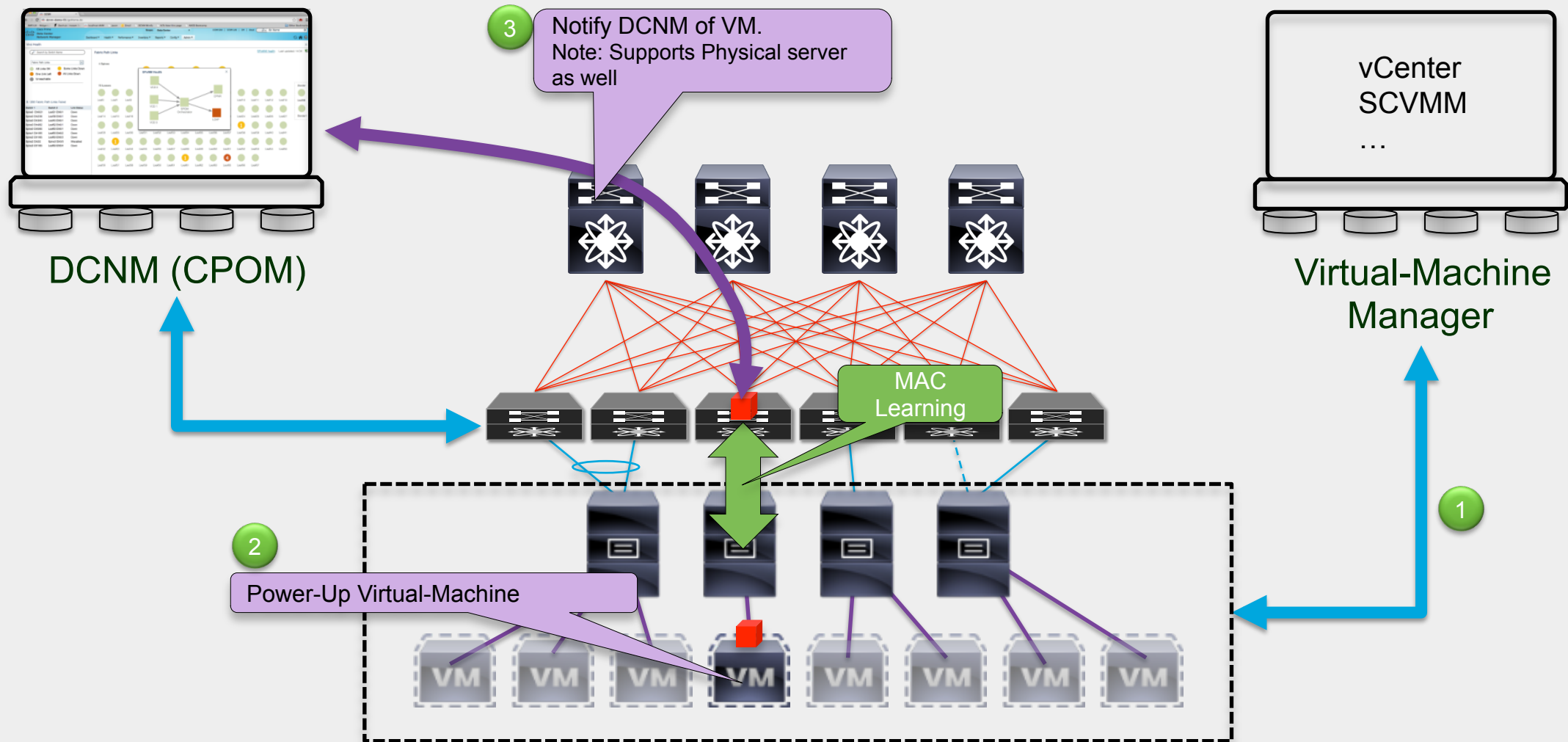
Switch	Utiliz%
leaf3	2
leaf4	2
leaf2	2
leaf1	2
spine0	2
leaf0	2
spine1	1

### Top Access Ports (24 Hours)

Name	Rx Util%	Tx Ut...
leaf4 Ethernet2/17	0	0
leaf4 Ethernet2/10	0	0
leaf4 Ethernet2/13	0	0
leaf4 Ethernet2/12	0	0
leaf4 Ethernet2/22	0	0
leaf4 Ethernet2/16	0	0
leaf4 Ethernet2/14	0	0
leaf4 Ethernet2/21	0	0



# DFA - DCNM Host Visibility

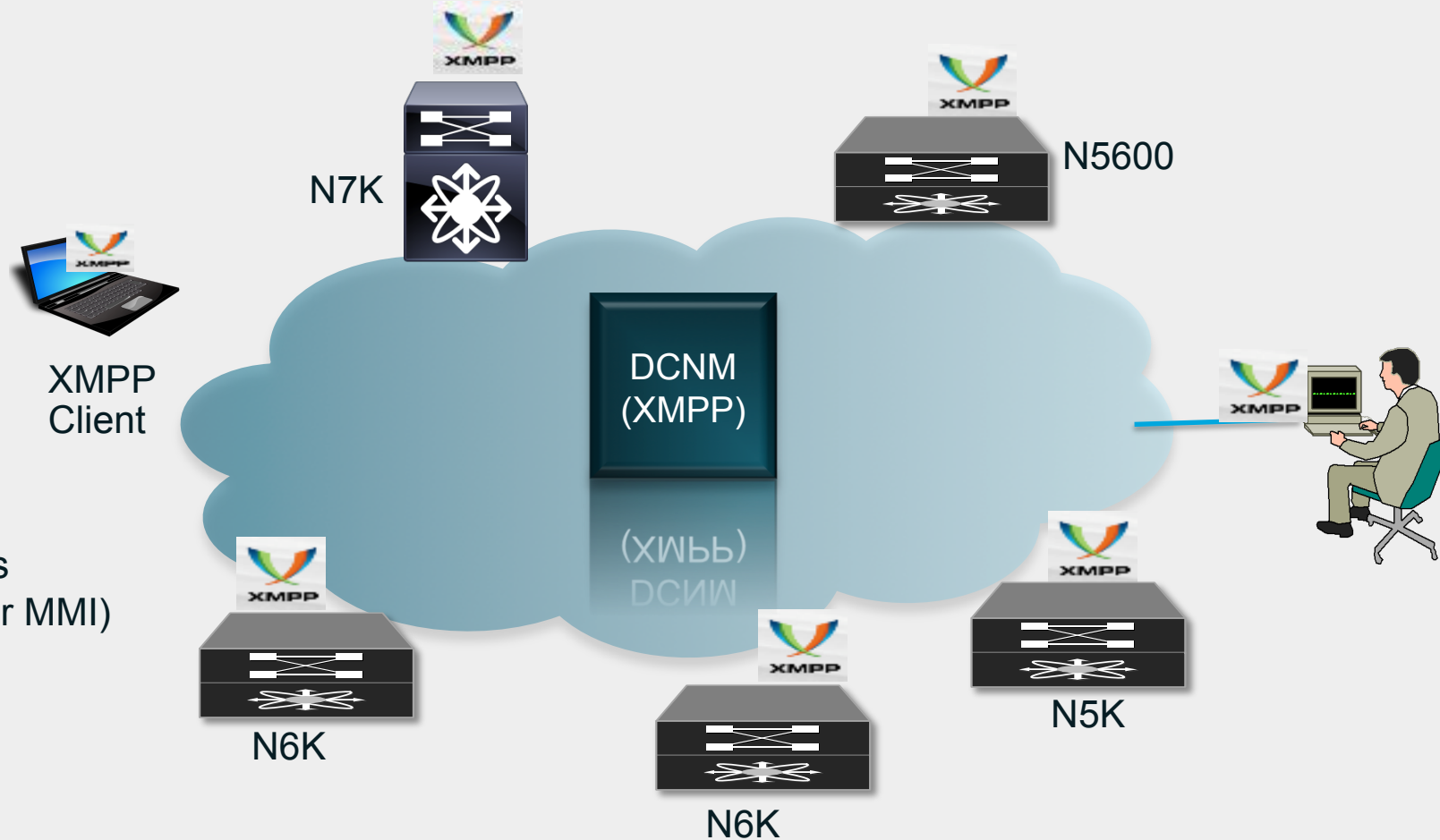


# DFA – DCNM Host/Network Relationship

The screenshot displays the Cisco Prime Data Center Network Manager interface. The top navigation bar includes 'Cisco Prime Data Center Network Manager' and various menu options like 'Dashboard', 'Health', 'Performance', 'Inventory', 'Reports', 'Config', and 'Admin'. The main content area is divided into four panels:

- Host Enclosures (18 items):** A table listing host enclosures with columns for Name, IP Address, #Macs, Mac Address(es), #WWNs, and Port WWN(s). The entry for IP 10.29.169.222 is highlighted.
- Events - 10.29.169.222 (0 items):** An empty table with columns for Last-First Seen, Count, Host Port, Type, Severity, and Description.
- Topology - 10.29.169.222:** A network diagram showing a host 'Linux.31.102-222' connected to a switch '10.29.169.222', which is further connected to two leaf switches, 'n6k-leaf-2018' and 'n6k-leaf-2017'.
- Traffic -- 10.29.169.222:** A line graph showing traffic volume over a 24-hour period. The Y-axis represents traffic in MB (1.7MB to 1.8MB), and the X-axis shows time from 18:00 on Jan 15 to 12:00. The graph shows periodic spikes in traffic.

# Fabric Access (XMPP) Overview

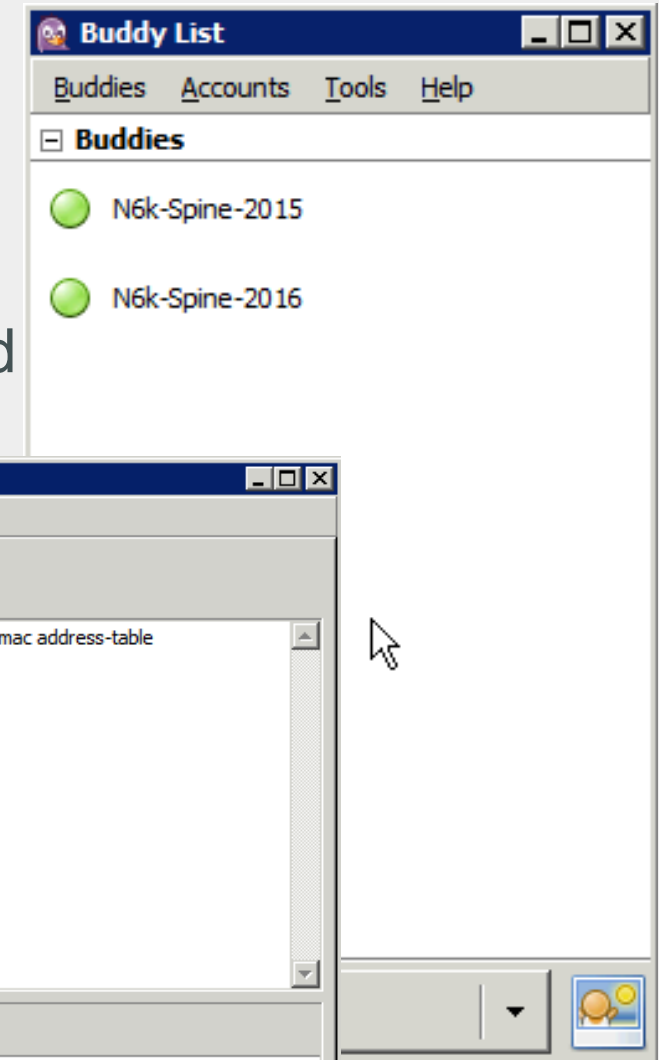


## Benefits:

- Create logical groups
- Retrieve data (HMI or MMI)
- Event based (future)

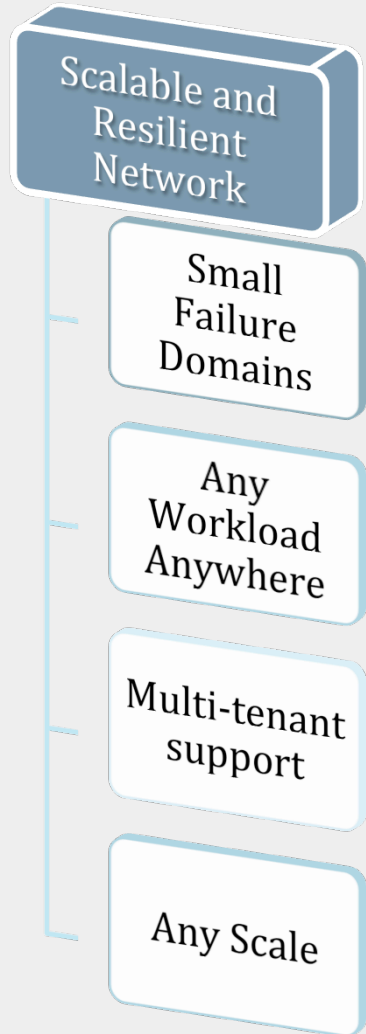
# XMPP Chat Demo with Pidgin

- Switches will appear as Buddies
- The Status of the Switches will be shown
- You can now IM to a Switch sending NX-OS CLI command  
Double-click the Buddy Name to open a Instant Message session





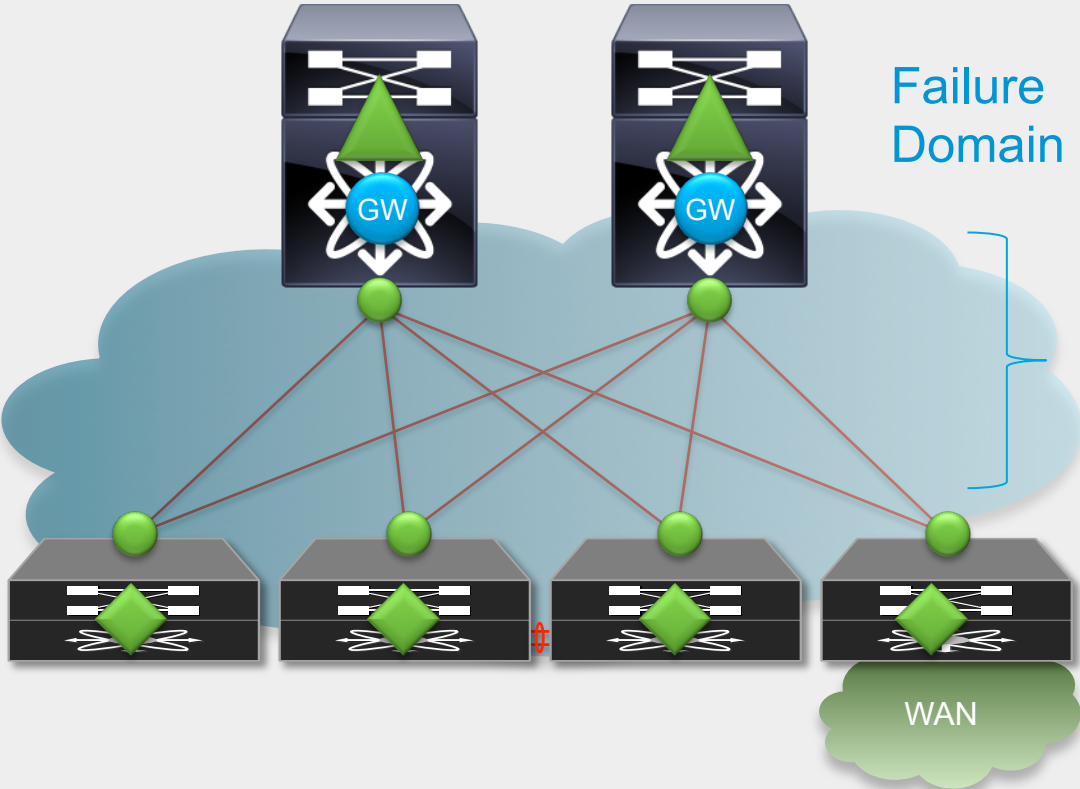
# Scalable and Resilient Network



Customer: Need flexible architecture to reduce network down time, ability to support multi-tenant and grow network on demand.

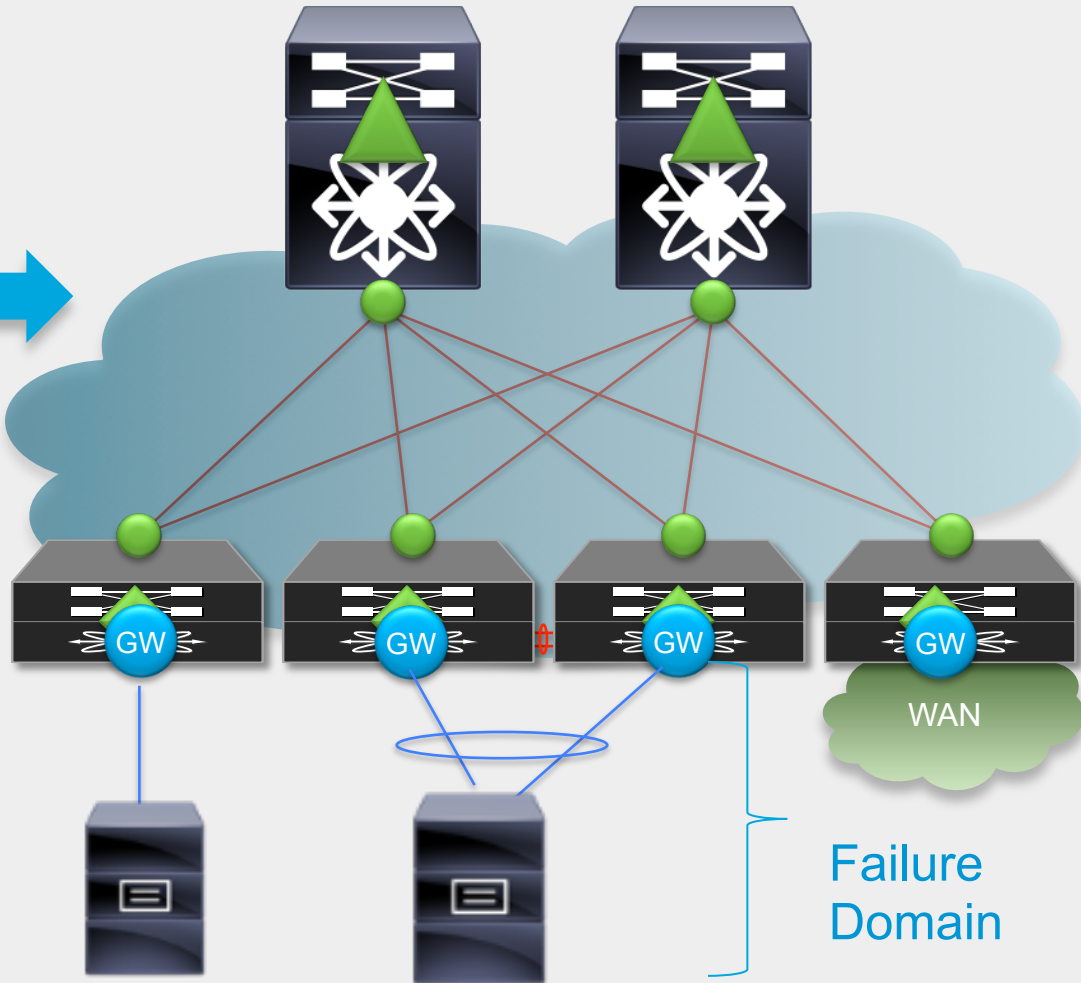
- ❖ Reduce Failure Domain and bottleneck
- ❖ Seamless support for any workload anywhere
- ❖ Provide network flexibility and scalability
- ❖ From the very small to the very large: physical or virtual

# Traditional Fabric



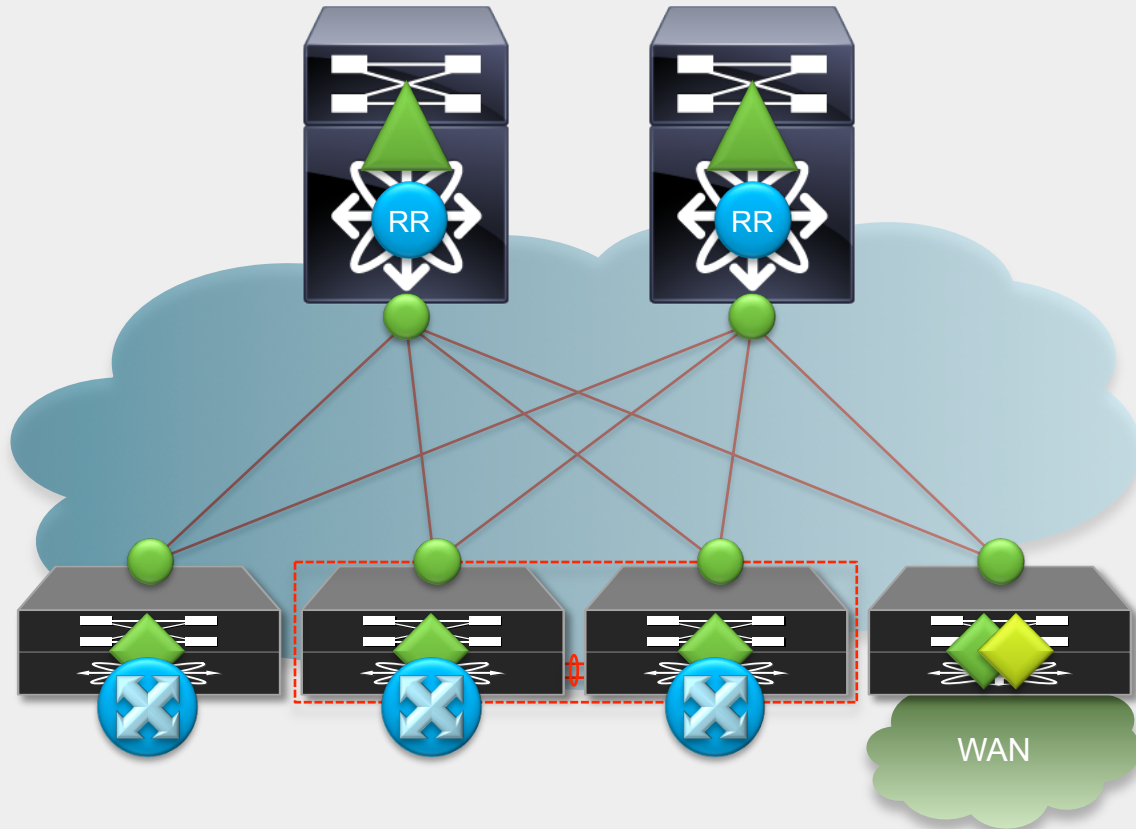
- Gateway functionalities are traditionally located at the Aggregation layer.
  - Failure domain extends between the entire L2 to L3
- ▲ = Spine (Agg)    ◆ = Leaf (Access)    ● = Fabric Interface

# DFA Fabric



- Distributed Gateway at leaf reduces failure domain

# Connecting Switches for DFA

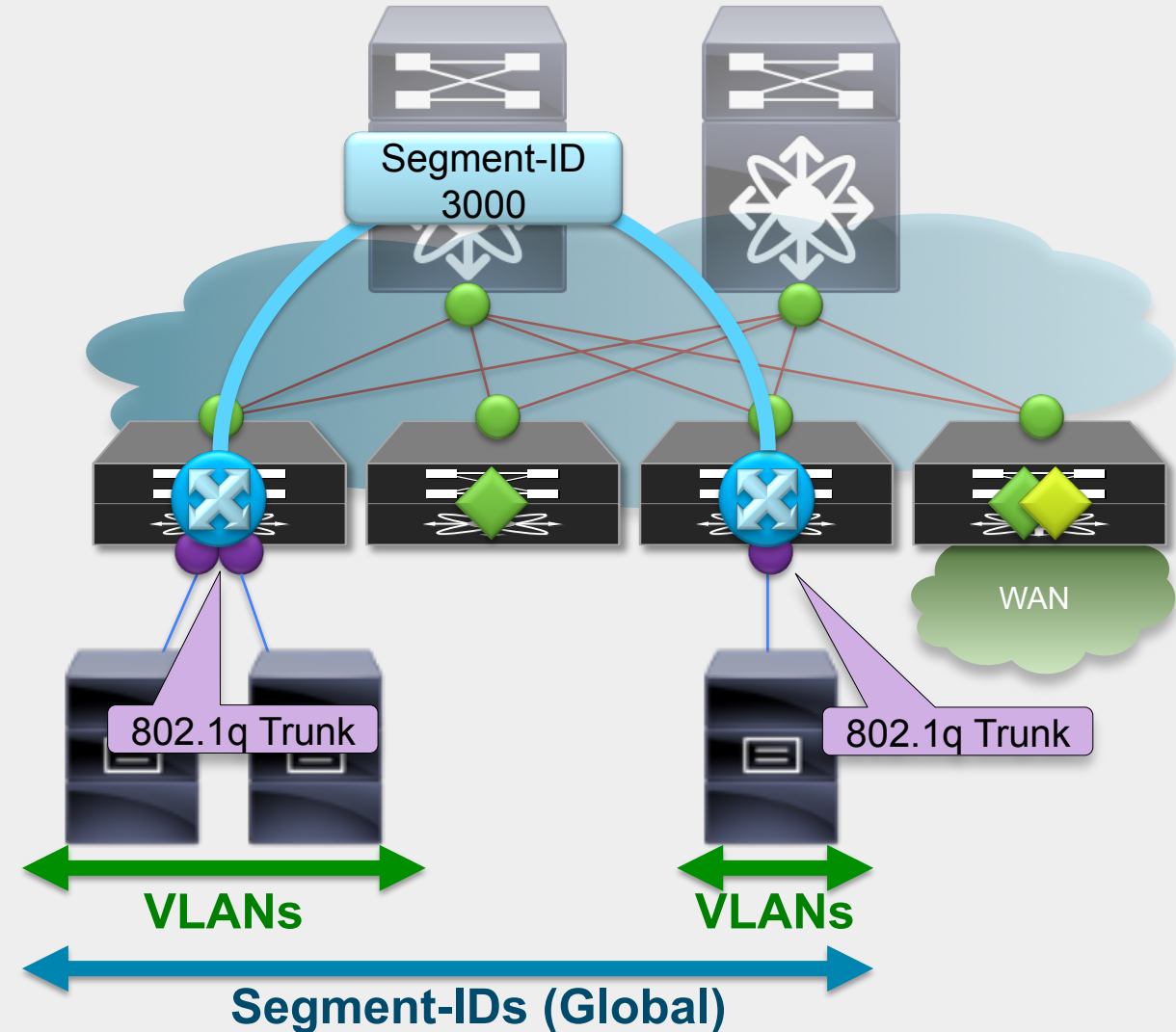


- Distributed Gateway exists on all DFA-Leaf where VLAN/Segment-ID is active
- There are different DFA Forwarding Modes for the Distributed Gateway:
- Proxy-Gateway (Enhanced Forwarding)
  - Leverages proxy-ARP
  - Intra- and Inter-Subnet forwarding based on Routing
  - Contain floods and failure domains to the Leaf
- Anycast-Gateway (Traditional Forwarding)
  - Intra-Subnet forwarding based on FabricPath
  - Layer-2 lookup is performed at the leaf
  - Data-plane based conversational learning for endpoints MAC addresses
  - ARP is flooded across the fabric

▲ = DFA-Spine    ◆ = DFA-Leaf    ◆ = DFA-BorderLeaf    ● = Fabric Interface    RR = DFA Route-Reflector    X = Distributed Gateway

# DFA Enhancement to support Multi-tenant (Segment-ID)

- Segment-IDs are utilized for providing isolation at Layer-2 and Layer-3 across the DFA Fabric
- 802.1Q tagged frames received at the Leaf nodes from edge devices must be mapped to specific Segments
- The VLAN-Segment mapping can be performed on a Leaf device level
- VLANs become locally significant on the Leaf node and 1:1 mapped to a Segment-ID
- Segment-IDs are globally significant, VLAN IDs are locally significant
- Note: The “system fabric dynamic-vlans” range will be used for the VDP dynamic derived VLANs to Segment-Id mapping







# Workload Automation

## Workload Automation

Reduce VM & PM Rollout Time

Dynamically Configure Network

Orchestrate Associated Services

Dynamic Resource Management

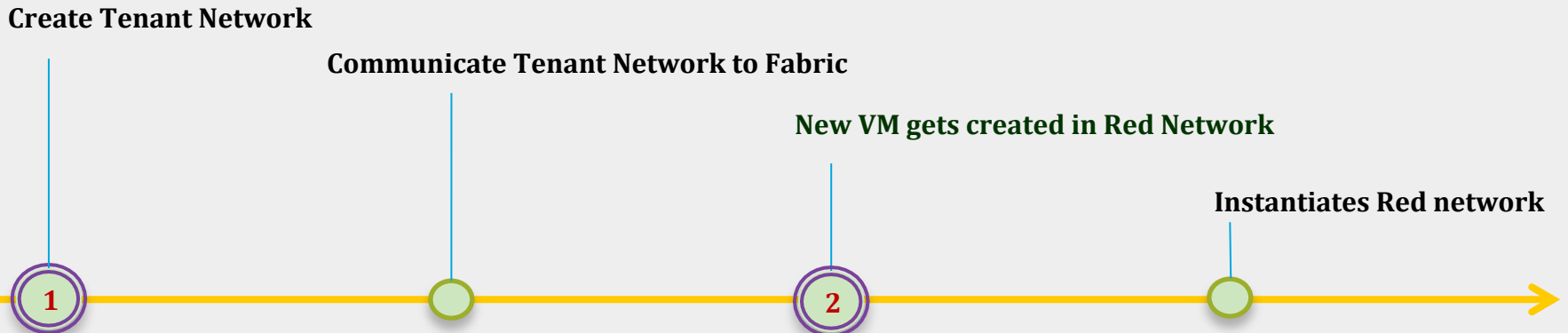
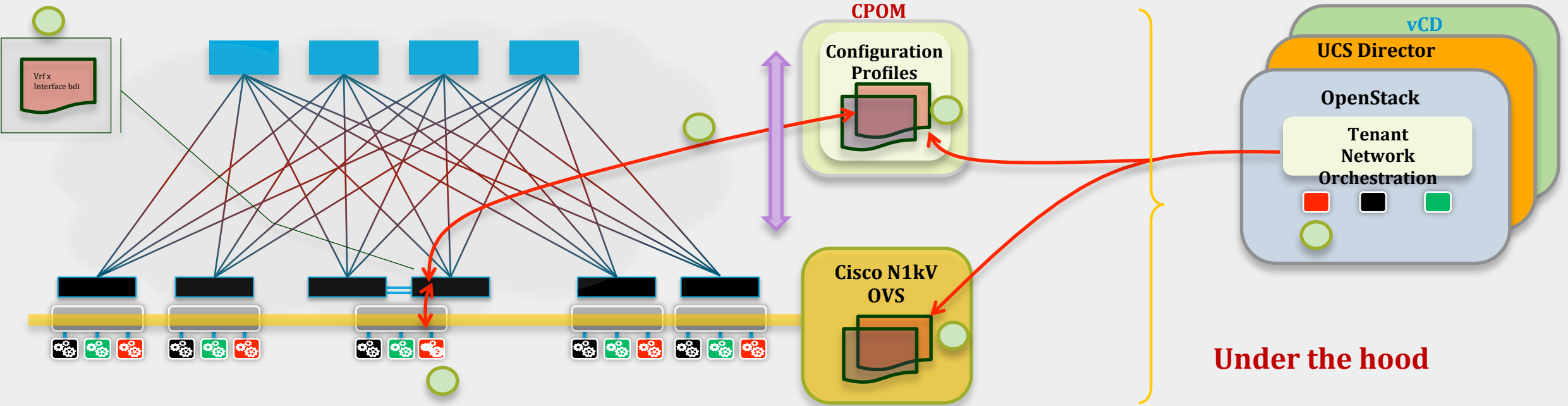
Customer: Application roll out takes days due to disjointed and manual provisioning. Pollution of stale configuration. Need consistent way to roll out VM/PM.

- ❖ Improve Workload Rollout Timing: Days to minutes
- ❖ Network Configuration automatically applied: VM/PM event triggered
- ❖ VM/PM orchestration alongside service orchestration
- ❖ Resource creation/removal based on usage



# DFA: Workload Automation

## ...Provisioning Simplicity





# License and Roadmap

- Licensing Requirements:  
N5600, N6k & N7k
  - LAN Base
  - LAN Enterprise
  - Enhanced Layer-2
- N5k
  - Enhanced Layer-2
- N1kv
  - Essentials Edition

stay tuned for Bundles  
(also including DCNM  
Advanced Edition)



Licensing:  
CPOM with all its functionality is  
**FREE!**

Including DCNM Essential Edition



Resolution 4000 x 3200 px - free download - [www.psdgraphics.com](http://www.psdgraphics.com)



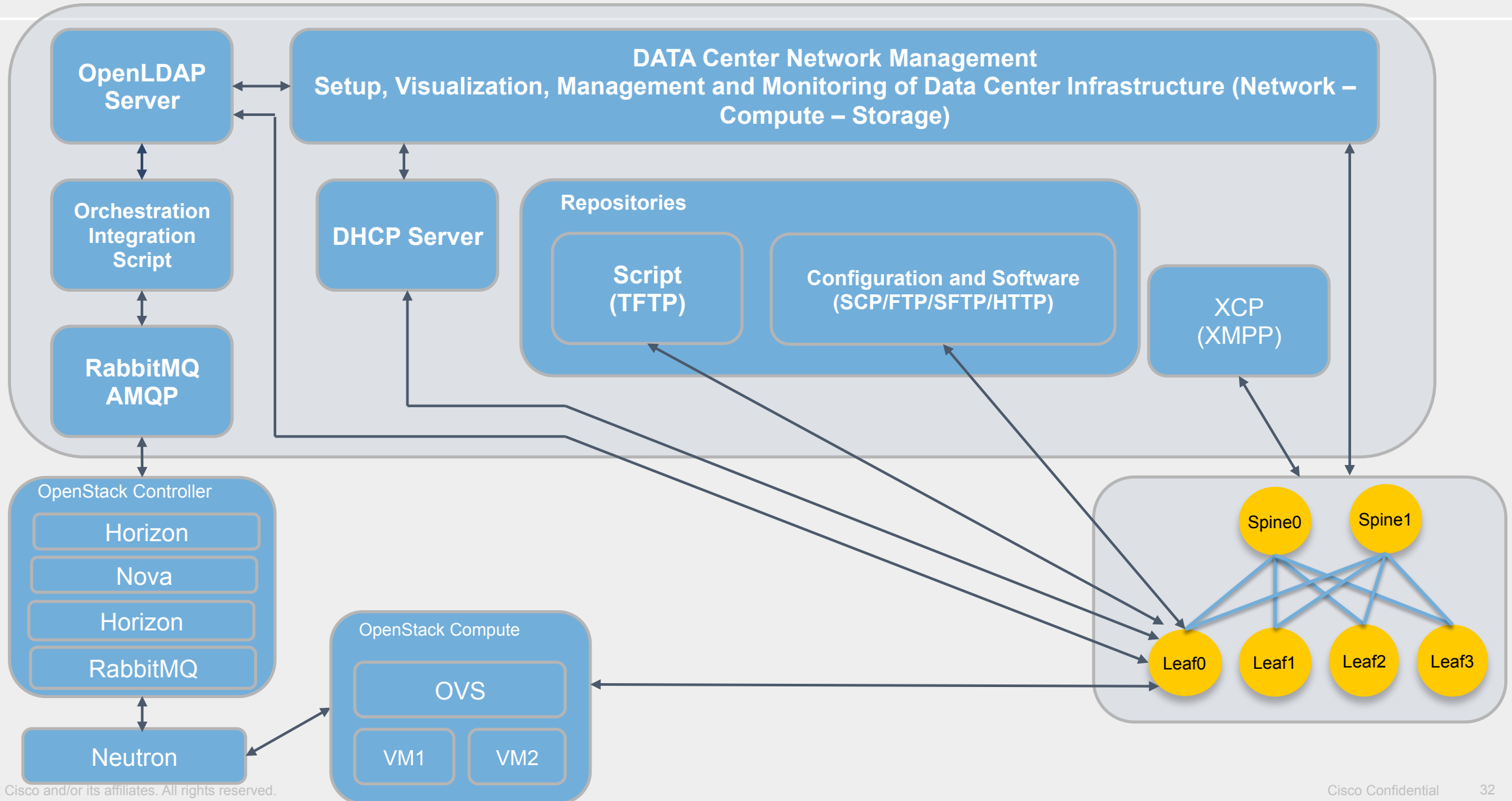
# Dynamic Fabric Automation

## Hands On Demo

# Agenda

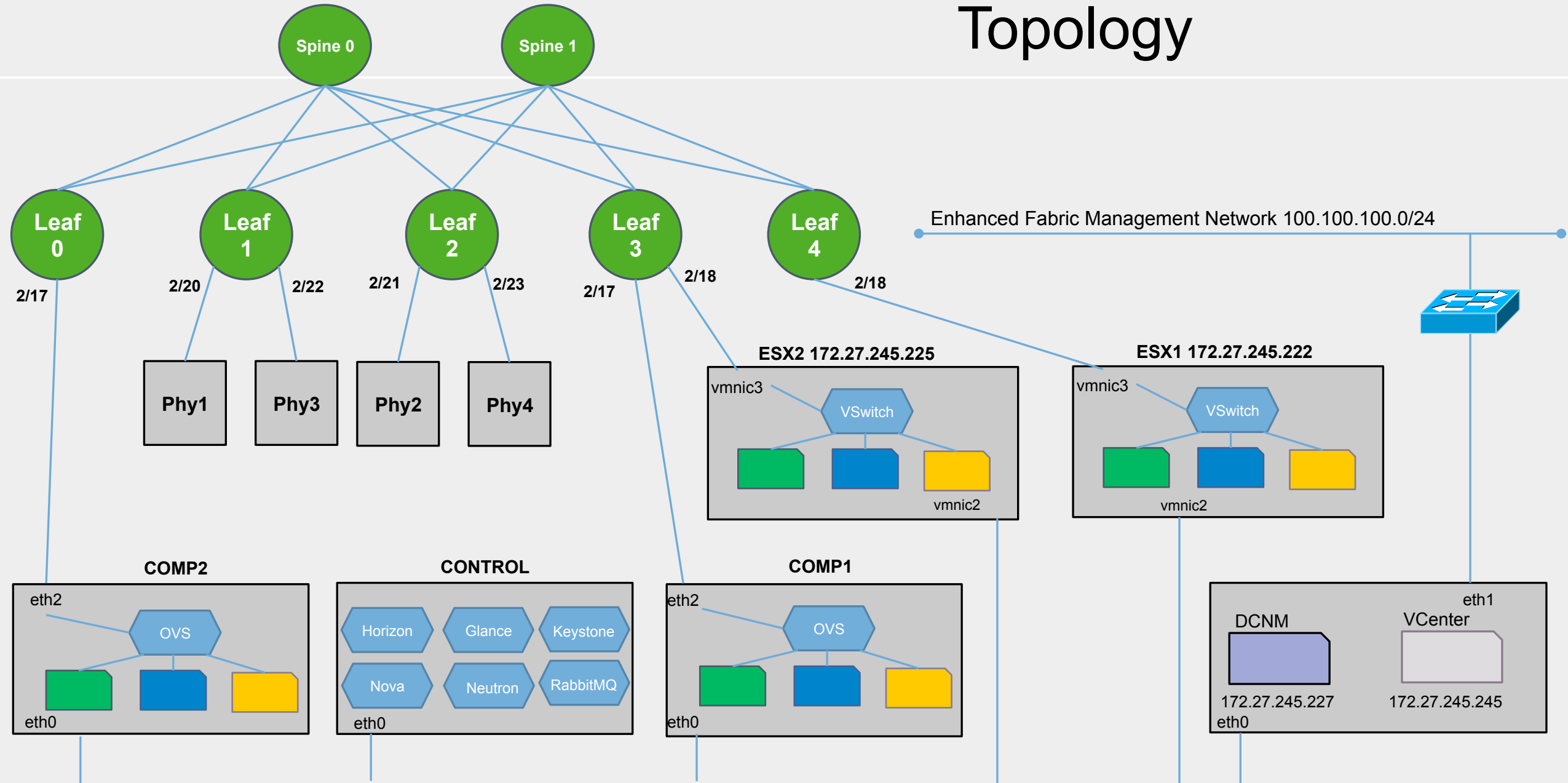
- DCNM Overview
- Fabric Bring up with POAP
  - Cable Plan Verification
- Managing the Fabric with DCNM
- Managing the DFA Nodes with XMPP
- Manual Provisioning
  - Physical Hosts
- Semi Automatic Provisioning
  - Physical Hosts
  - VMware vCenter Hosts
  - VMware vMotion across the fabric
- Fully Automatic Provisioning with OpenStack

# DCNM Functional Details





# Topology



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