

The background is a vibrant, abstract graphic. It features a central bright white light source from which numerous colorful rays emanate, creating a sunburst or starburst effect. The rays transition through a spectrum of colors including yellow, orange, red, and various shades of blue and green. Overlaid on this are large, flowing, wavy shapes in similar colors, giving the overall impression of energy, movement, and a digital or network theme.

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The bridge to possible

Building NextGen Out-of-Band Data Center Management Networks with NDFC

Marc Belle-Isle | Technical Solutions Architect

BRKDCN-1638



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Session Objectives and Educational Goals



NextGen OOB Data Center
Management Network

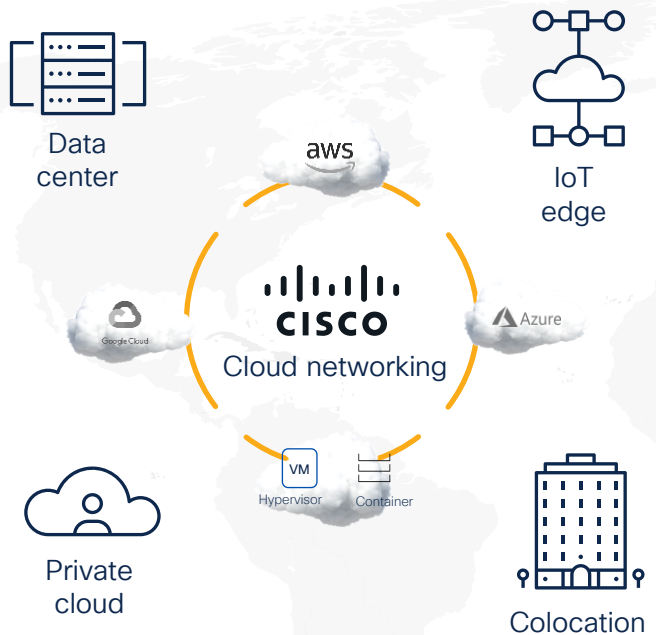
- To **empower Data Center operations and engineering staff with new and demonstrable ways their OOB network can be designed as an asset** – lowering the operational cost of ownership while simultaneously delivering new functionality to support / enable business direction.
- Attendees should leave the session with a solid understanding of the importance of out-of-band network design, and how the demonstrated design possibilities, and **resulting operational and outcome focused benefits, can be applied and realized within their environment.**

Agenda

- OOB Network Fundamentals
- Design, Deployment and Operational Considerations
- Real World Use-Case Scenarios
- Conclusion
- Parting Notes

OOB Network Fundamentals

Highly Diverse and Distributed Network Infrastructure



Connect across on-premise, colocation and or public cloud



Operate and troubleshoot heterogeneous multi-cloud networks



Maintain consistent security posture across hybrid cloud environments (physical, virtual, container, cloud services)



Maintain consistent management policy regardless of floor tile

What is an Out-of-Band (OOB) Network?

An Out-of-Band network is a **physically separate network** that is used to **decouple the control and management** of the data center network infrastructure from production workload traffic

Why Out-of-Band Network Design Is Important?

In addition to the numerous design related benefits we will discuss, there are **costly downsides to a poorly designed, or lack of an out-of-band DC network**

October 2021

Social Media Platform Outage

“said **its own out-of-band network failed** during the October 2021 outage but didn't explain why”

Outage Duration: ~6 hours

Outage Breadth: Included primary and subsidiary platforms

Outage Cause: Misconfiguration | Human Error

Outage Cost: 4.9% drop in share price

June 2019

Public Cloud Provider Outage

"Furthermore, **the scope and scale of the outage, and collateral damage to tooling as a result of network congestion**, made it initially difficult to precisely identify impact and communicate accurately with customers"

Outage Duration: ~3-4 hours

Outage Breadth: Cloud and non-cloud services primarily in US regions

Outage Cause: Misconfigured maintenance tasks and a software defect

Outage Cost: Undisclosed

Inband | Out-of-Band | External Console

An Out-of-Band network is a **physically separate network** that is used to decouple the control and management of the data center network infrastructure from production workload traffic

Inband Management

- **Logically separate** network integrated within physical production network infrastructure
- Continuously utilized
- IP based connectivity
- **Impacted with production network** service disruption / congestion
- Can be used to host network services and operational tooling

Out-of-Band Management

- **Physically separate** network
- Continuously utilized
- IP based connectivity
- Used to host network services and operational tooling
- **Many design and usage options** (reachability, throughput, segmentation etc..)

External Console Access

- Used only when there is **no IP network connectivity**
- Often referred to as Async or Serial connectivity
- Used only to reach an individual node / element
- Often designed with separate external **cellular connectivity**

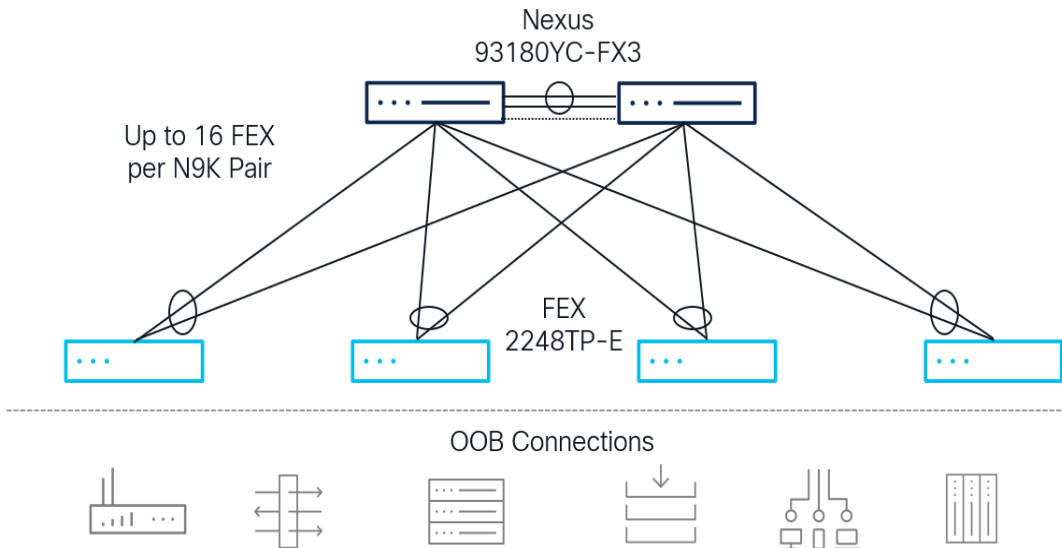
Common OOB Network Design with N2K | FEX

Pros

- Small to mid-level scale
- Redundant
- Low cost
- Operable / learning curve

Limitations

- Large scale
- Current and forward-looking functionality
- Segmentation
- Visibility
- Platform (N2K FEX) longevity



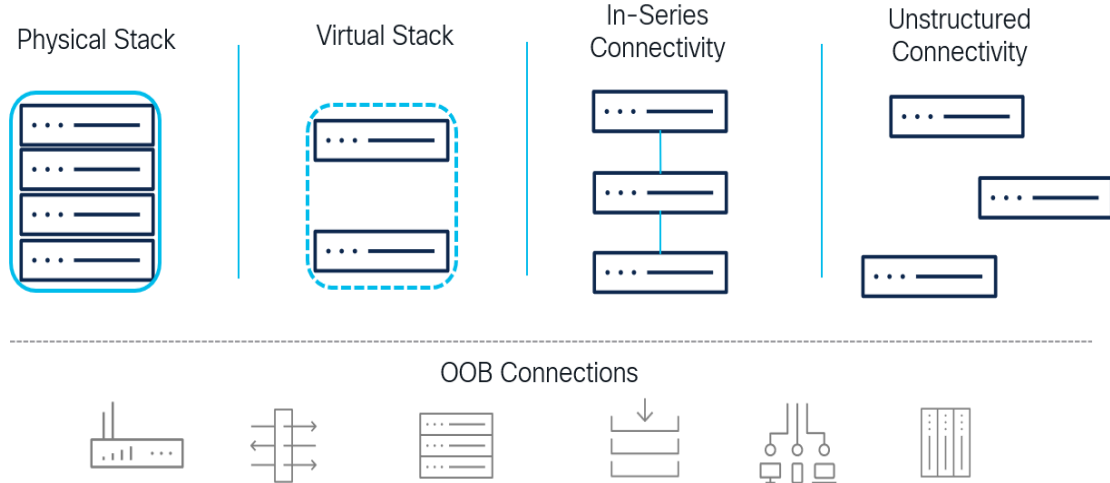
Common OOB Network Design with Catalyst

Pros

- Lower cost (potentially)
- Operable / learning curve

Limitations

- Standardization and consolidation
- Unified operation and management
- Segmentation
- Visibility

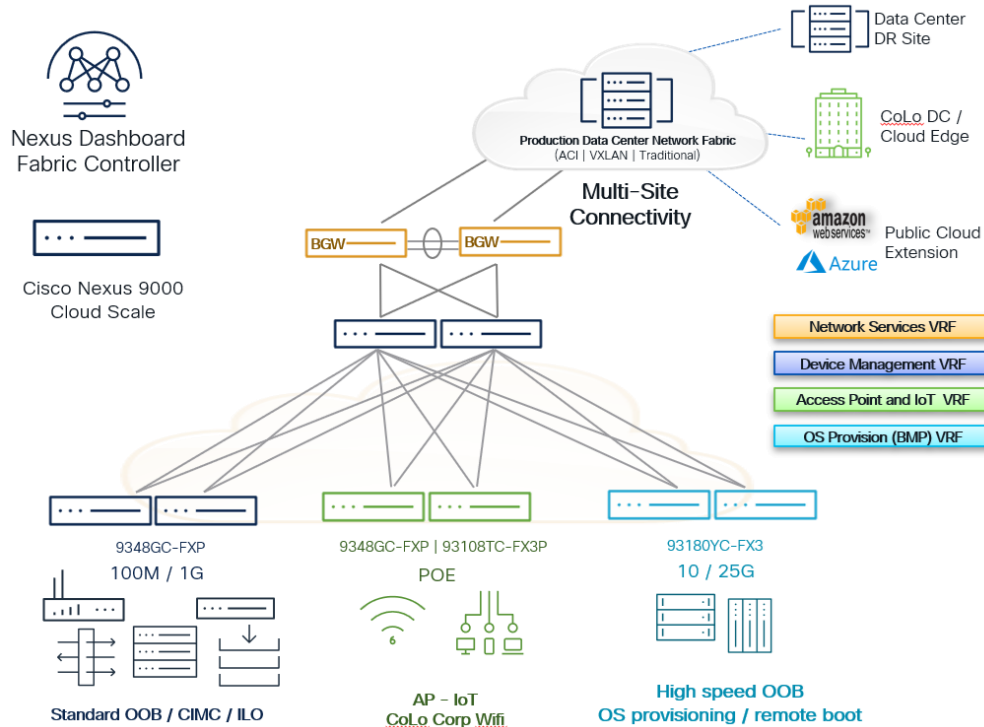


Next-Gen OOB Network Design with Nexus 9K and NDFC

Inherent Benefits

- Secure multitenancy*
- Inherent network layer segmentation*
- Granular (per port) east/west traffic segmentation
- Layer 3 multi-site OOB reachability*
- Management | Governance
- Visibility | OAM
- Automation | Programmability
- Standardized functional building blocks
- Cost-conscious (composable design | platform consolidation and sparing)

* VXLAN EVPN Deployment



Design, Deployment and Operational Considerations

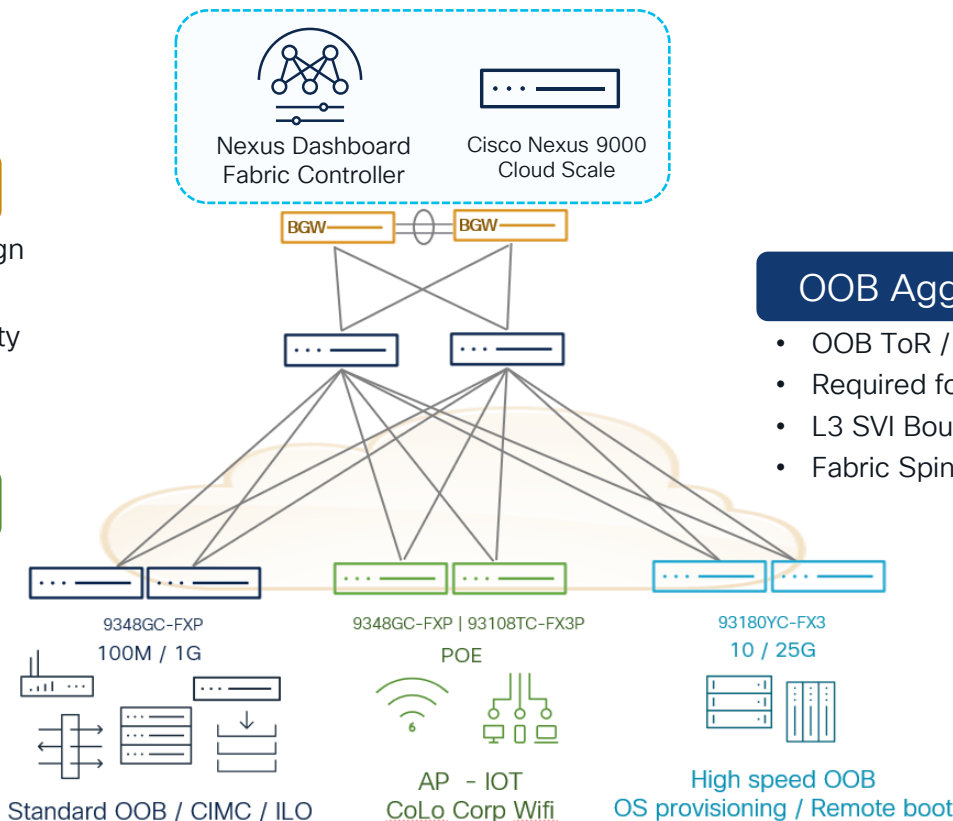
Next-Gen OOB Design Building Blocks

OOB vPC BGW Aggregation

- Only required for EVPN VXLAN Design
- Can also function as OOB ToR
- Allows for multi-site OOB connectivity

OOB Top of rack | End of Row

- OOB endpoint connectivity
- Map platform and port density to endpoint connection requirements and cable plant



OOB Aggregation | Spine

- OOB ToR / MoR Aggregation
- Required for both STP and VXLAN
- L3 SVI Boundary (SFP / FHRP)
- Fabric Spine (VXLAN EVPN)

Next-Gen OOB Design Components | Nexus 9K

Typical OOB Endpoint Connectivity



9348GC-FXP

48x 100M/1G | 4x 10/25G | 2x 40/100G
Supports Traditional STP, **VXLAN** and **UPoE**



92348GC-X

48x 100M/1G | 4x 10/25G | 2x 40/100G
Supports Traditional **STP ONLY**

Typical OOB Aggregation | vPC BGW



9336C-FX2

36x 1/10/25/40/100G
Supports Traditional STP, VXLAN and **CloudSec**



93180YC-FX3

48x 1/25G | 6x 40/100G
Supports Traditional STP, VXLAN

Specialized OOB Endpoint Connectivity



9348GC-FXP

48x 100M/1G | 4x 10/25G | 2x 40/100G
Supports Traditional STP, **VXLAN** and **UPoE**



93108TC-FX3P

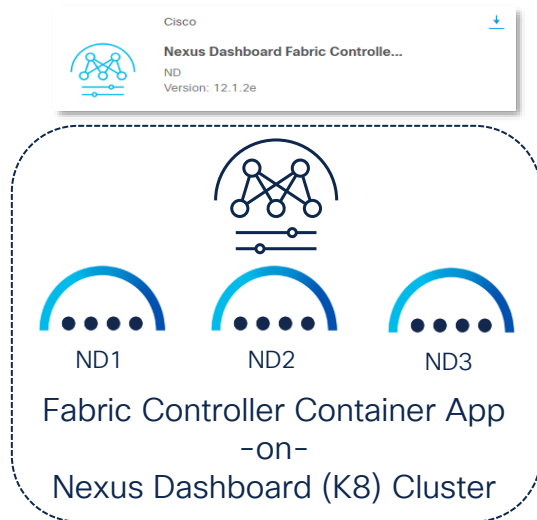
48x **1/10G** | 6x 40/100G
Supports Traditional STP, **VXLAN** and **UPoE**

Next-Gen OOB Design Components | Reference

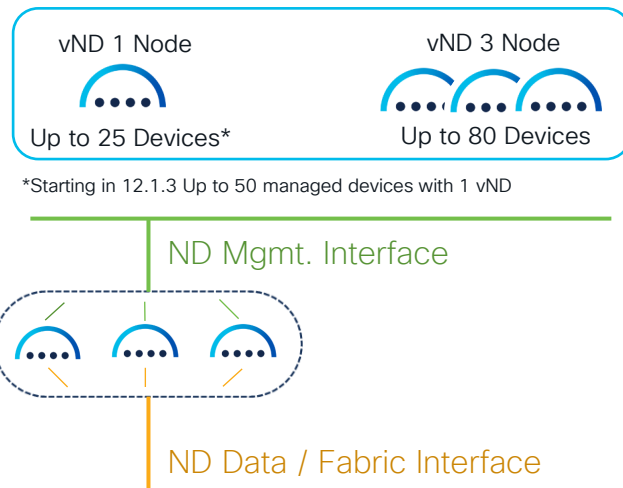
Nexus 9000 Series Switch Model	Connectivity/Front Facing Ports	OOB Function	OOB Features
92348GC-X (1RU)	48x 100M/1G Base-T (RJ-45)	Standard ToR Switch	Traditional networking only
	4x 10/25G SFP 2x 40/100G QSFP	Purpose-built, cost focused line rate switch meant for traditional RJ-45 OOB network connectivity	Does Not support EVPN VXLAN
9348GC-FXP (1RU)	48x 100M/1G Base-T (RJ-45)	Fabric Leaf/Standard ToR Switch	Supports EVPN VXLAN configuration
	4x 10/25G SFP 2x 40/100G QSFP	Purpose-built, cost focused line rate switch meant for traditional RJ-45 OOB network connectivity and UPoE capable	(secure tenancy or segmentation)
93108TC-FX3P (1RU)	48x 1/10G Base-T (RJ-45)	Fabric Leaf/Standard ToR Switch	Supports EVPN VXLAN configuration
	6x 40/100G QSFP	High speed (1/10G) line rate RJ-45 connections, UPoE, and MGig capable	(secure tenancy or segmentation)
93180YC-FX3 (1RU)	48x 1/10/25G SFP	Fabric Leaf/Fabric Border GW/Standard ToR Switch	Supports EVPN VXLAN configuration
	6x 40/100G QSFP	High-speed 1/10/25G line rate SFP connections Distributed port density – ToR cable plant design	(secure tenancy or segmentation) Does NOT support CloudSEC
93360YC-FX2 (2RU)	96x 1/10/25G SFP	Fabric Leaf/Standard ToR Switch	Supports EVPN VXLAN configuration
	12x 40/100G QSFP	High-speed 1/10/25G line rate SFP connections Centralized port density – EoR/MoR cable plant design	(secure tenancy or segmentation)
93216TC-FX2 (2RU)	96x 1/10G Base-T	Fabric Leaf/Standard ToR Switch	Supports EVPN VXLAN configuration
	12x 40/100G QSFP	High speed (1/10G) line rate RJ-45 connections Centralized port density – EoR/MoR cable plant design	(secure tenancy or segmentation)
9336C-FX2 (1RU)	36x 1/10/25/40/100G QSFP	OOB Aggregation/Fabric Border GW/Fabric Spine	Supports EVPN VXLAN configuration
	Breakout and QSA support on all ports	Highly customizable line rate QSFP/QSA-SFP connections	(secure tenancy or segmentation) Supports CloudSec (line rate inter-site encryption – multi-site OOB)

Next-Gen OOB Design Components | NDFC

Cisco DC App Center



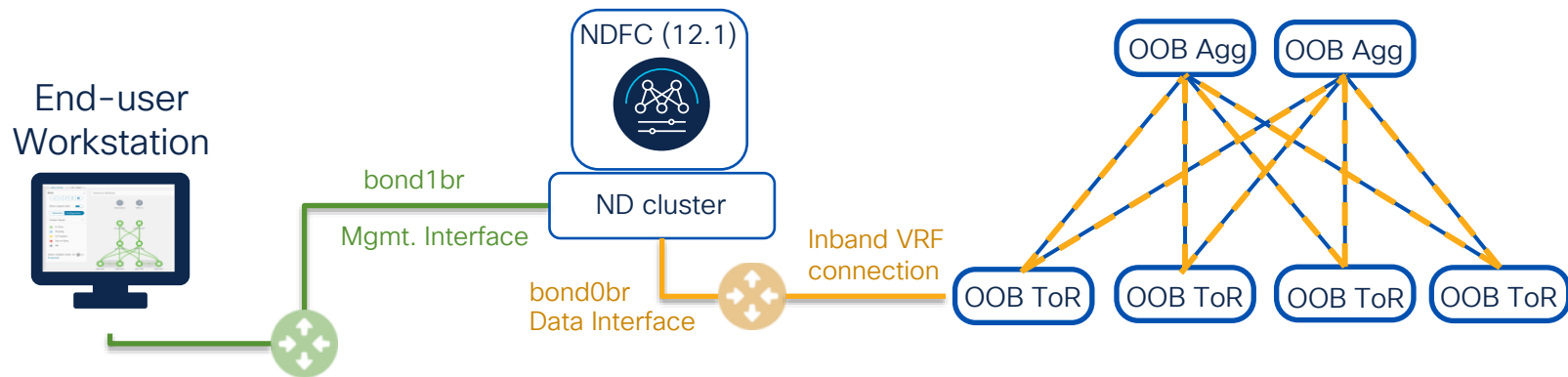
Sizing Guide | Capacity Planning



1. Install Nexus Dashboard cluster Platform | Either Virtual ND OVA/KVM or Physical ND
2. Install the NDFC service from Cisco DC App Center on top of the Nexus Dashboard Cluster

Next-Gen OOB Design Components | NDFC

Managing the OOB Network with NDFC In-Band Connectivity



ND Mgmt. Interface is dedicated to ND Cluster Mgmt (HTTPs/SSH access, NTP, DNS, Web Proxy)

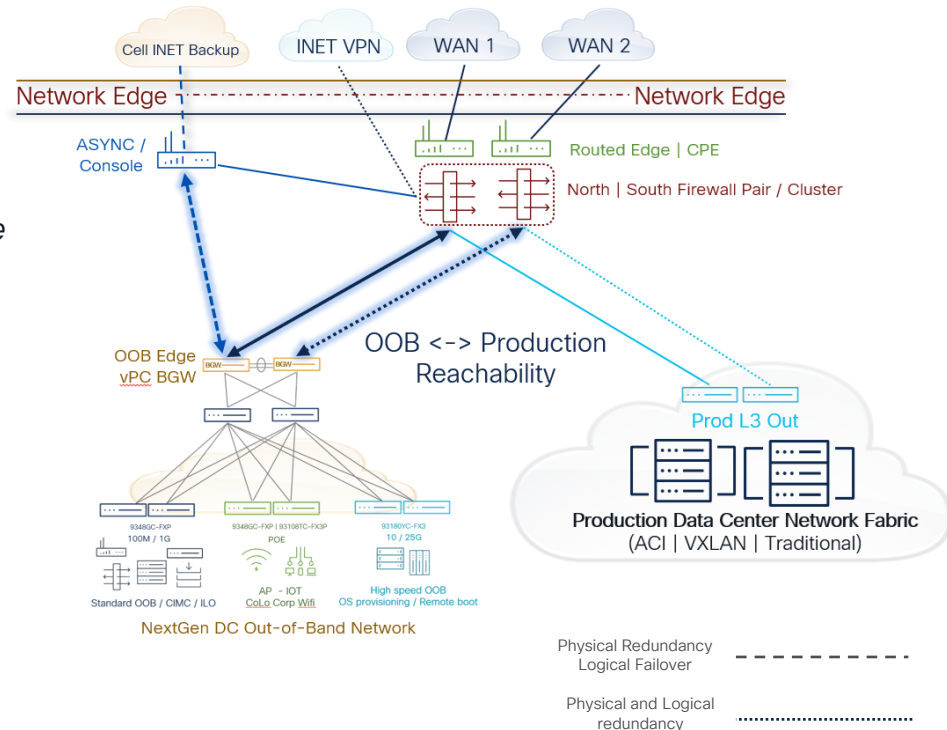


ND Data/Fabric Interface is used for Inband Mgmt. (Discovery, Deploy, Monitor, Image Mgmt, POAP)

Next-Gen OOB Design Considerations

Connecting OOB to Production

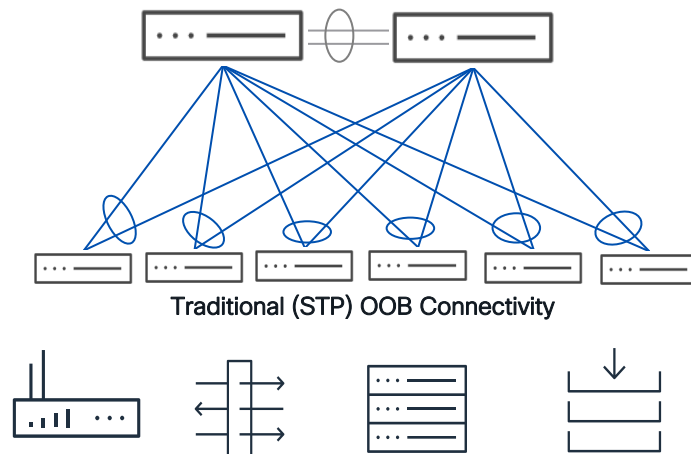
- Cisco recommends physically connecting the DC OOB network to production **close to the north south edge** (WAN router / Switch block / Edge firewall)
- The OOB network should **not be physically connected within the production fabric** (VXLAN EVPN | ACI | STP / FHRP)
- Connecting the OOB network with a separate physical connection and logical failover configuration (ex. *floating static*) **to the ASYNC / Console router** increases the overall resiliency of the design



Next-Gen OOB Design Considerations

STP / FHRP

- Traditional STP / FHRP network
- L3 / SVI gateway boundary at aggregation layer
- vPC used for path redundancy / failover
- Subnet / L3 boundary segmentation
- Limited / single site deployment
- Provisioned, managed* and monitored by NDFC

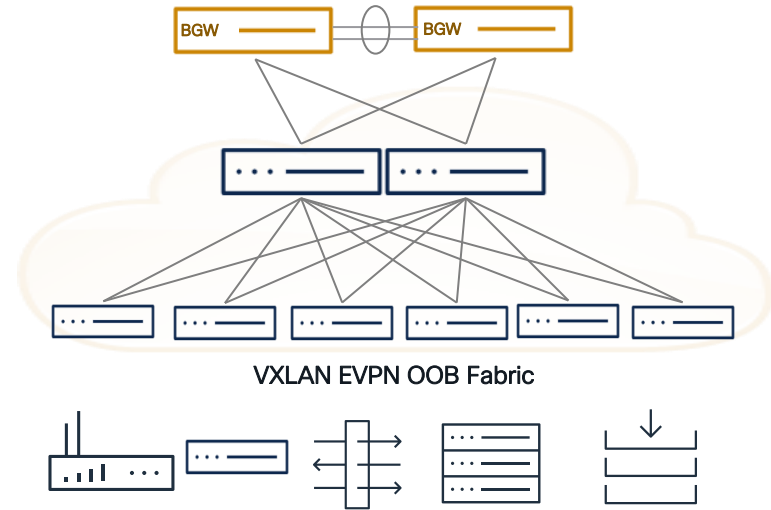


**Enhanced Classic LAN in preview | FCS Target 12.1(4)*

Next-Gen OOB Design Considerations

VXLAN EVPN

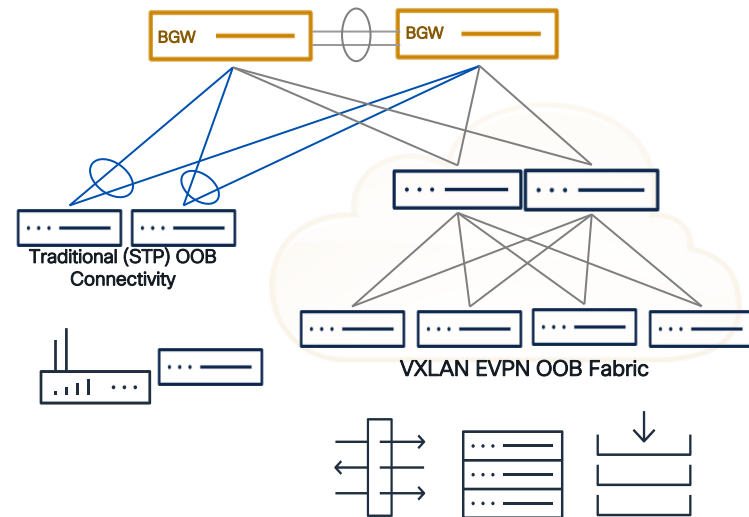
- Endpoint **host routed** network
- Anycast gateway at access layer
- ECMP fabric with built-in path failover
- **No STP, vPC or FHRP**
- Inherent **multi-tenant and segmentation**
- Flexible deployment including **multi-site**
- Provisioned, managed and monitored by NDFC (VXLAN EVPN Fabric)



Next-Gen OOB Design Considerations

HYBRID

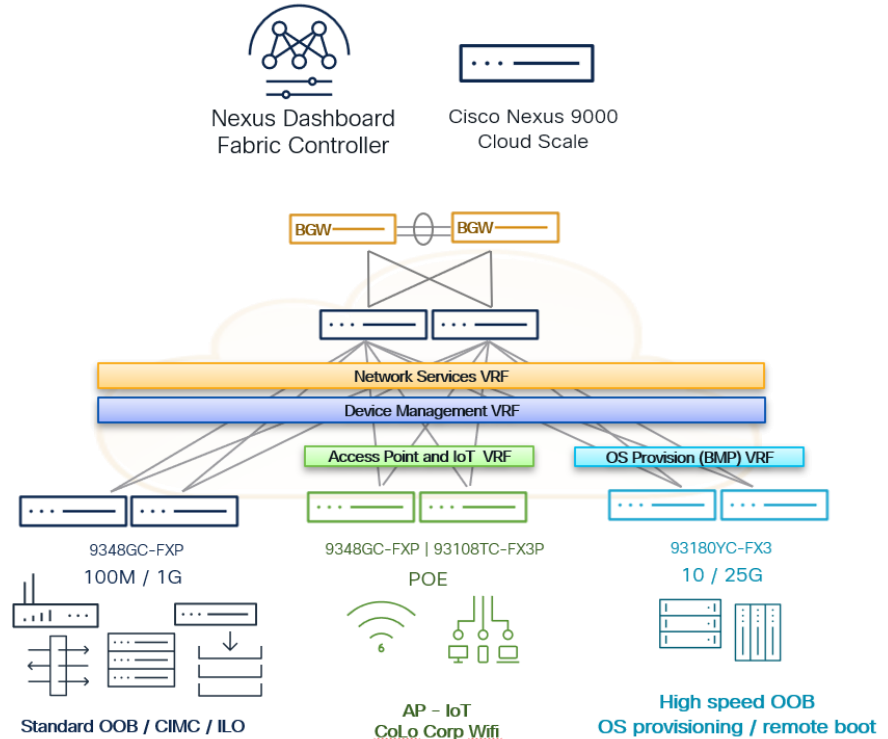
- Combination of EVPN VXLAN and STP / FHRP design
- **Highly flexibly** deployment options using vPC BGW (including multi-site)
- Additional platform diversity
- Often used during **design refresh / migration**
- Provisioned, managed and monitored by NDFC



Next-Gen OOB Deployment Segmentation

OOB Segmentation

- **EVPN VXLAN design required for logical (VRF) segmentation | multi-tenancy**
- Provides enhanced level of segmentation and security in comparison to STP / FHRP design
- Logical network segments (VRFs) mapped to end point security and function requirements
- VRFs are provisioned only to OOB switches that have an endpoint that resides within that logical segment
- Additional, per port / port group, segmentation granularity available with VXLAN Private VLANs

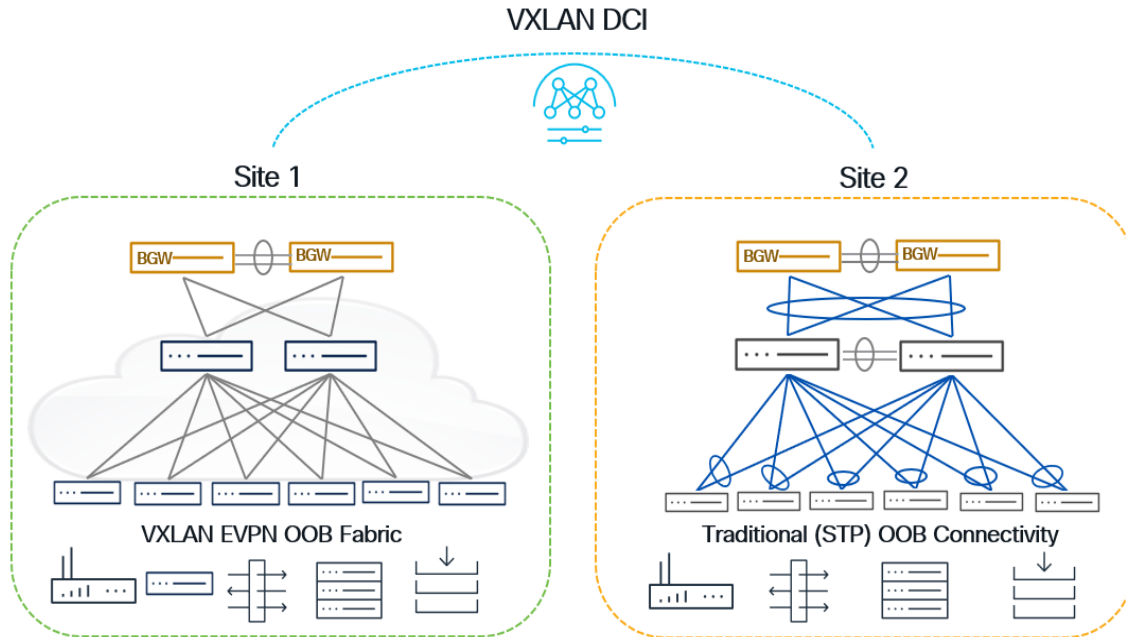


Next-Gen OOB Multi-Site Deployment | NDFC

OOB Multi-Site | NDFC

- Requires vPC BGW edge at each site
- Flexible design options allowing for EVPN VXLAN, STP / FHRP and Hybrid deployments at any site
- Provides ability to **safely extend L2/L3 OOB network reachability** across multiple sites
- Allows **OOB management reachability from any site**
- Provisioned, managed and monitored by NDFC using MSD Fabric*

* NDFC cluster located at single site – requires 50ms latency between sites



Next-Gen OOB Multi-Site Deployment | NDFC + NDO

OOB Multi-Site | NDO

- Requires vPC BGW edge at each site
- Flexible design options allowing for EVPN VXLAN, STP / FHRP and Hybrid deployments at any site
- Provides ability to safely extend L2/L3 OOB network reachability across multiple sites
- Highly scalable multi-site design using NDO to manage inter-site connectivity
- Considered when there are three or more individual sites, or when sites are physically remote (+50ms latency)
- Inter-site connectivity provisioned, managed and monitored by NDO



The image displays the Cisco Nexus Dashboard interface for NDO deployment. It includes two main panels: 'Add Sites To Stretch OOB Mgmt VRF' and 'Deploy To Sites'.

Add Sites To Stretch OOB Mgmt VRF

Name
<input checked="" type="checkbox"/> site-1 (DCNM) 11.5(1)
<input checked="" type="checkbox"/> site-2 (DCNM) 11.5(1)
<input checked="" type="checkbox"/> site-3 (DCNM) 11.5(1)

Deploy To Sites

Object Type: VRF, Name: OOB_Mgmt_VRF

Object Type	Name	site-1 (DCNM) 11.5(1)	site-2 (DCNM) 11.5(1)	site-3 (DCNM) 11.5(1)
VRF	OOB_Mgmt_VRF	<input checked="" type="checkbox"/> Created	<input checked="" type="checkbox"/> Created	<input checked="" type="checkbox"/> Created

Buttons: + Created, Modified, Deleted, Config Drift, Deploy

Next-Gen OOB Visibility and Operation | NDFC

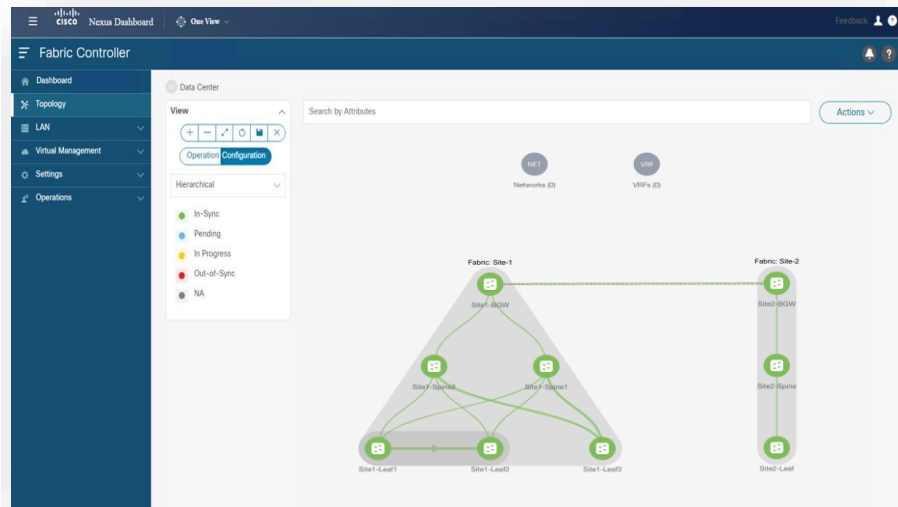
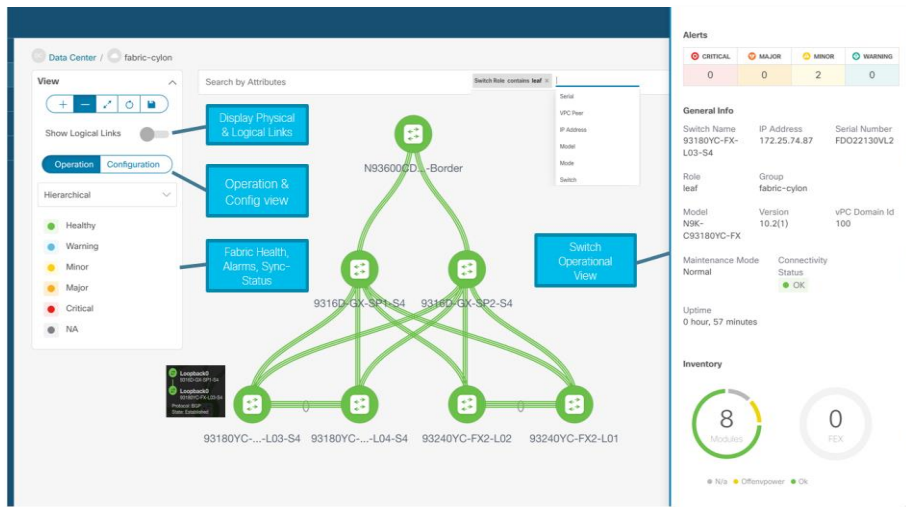
Realtime Multi-Layer Fabric and Multi-Site Topology with Operational and Performance Overlay

Physical and Logical Links

Fabric Health | Alarms

Operational and Config Views

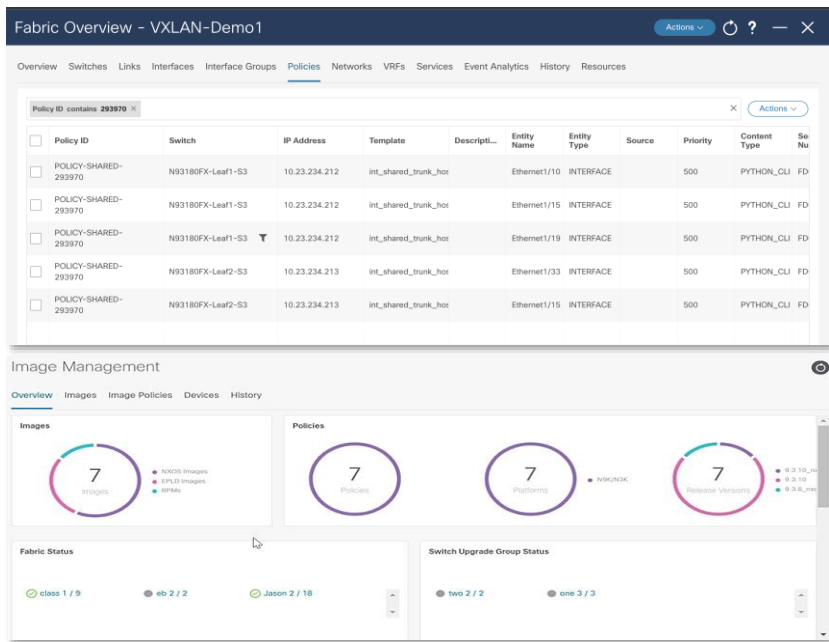
Switch Operational Information



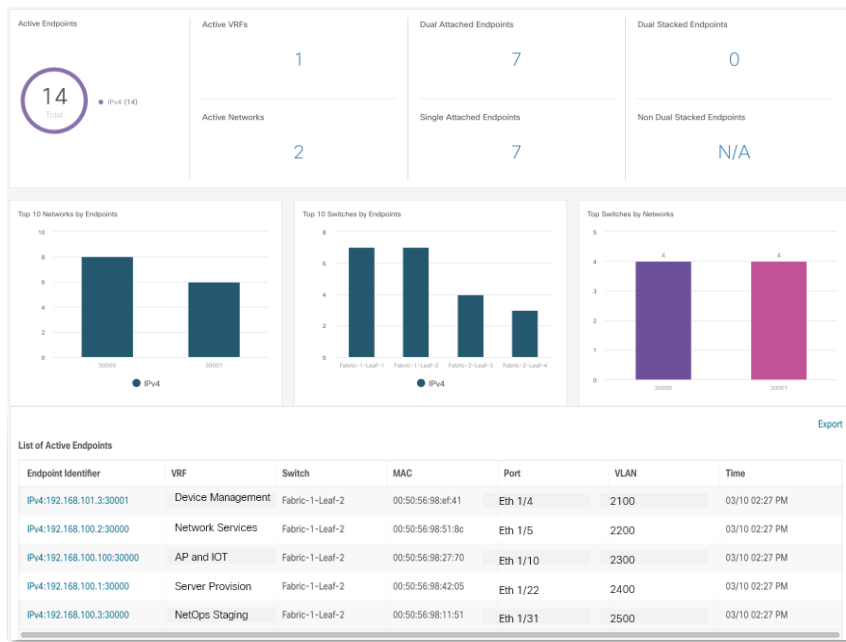
Next-Gen OOB Visibility and Operation | NDFC

Operational Design – Visibility | Automation | Policy Compliance | IaC

Fabric Configuration and Policy Overview
Software Lifecycle Management



Realtime Fabric Endpoint Location
for OOB connections (VXLAN EVPN Deployments)



Real World Use-Case Scenarios

Use-Case | “Better” OOB Network

Customer Requirement(s) | Outcome(s)

- Decrease broadcast domain / blast radius size
- OOB network and device health / performance monitoring / reporting
- Forward looking capability to extend OOB network to planned CoLo / CNF extension
- Approved switch platforms and no additional tooling if possible
- Logical segmentation and automated provisioning not required, but are desired

Design Context

- Current production DC network design recently migrated / evolved from STP / FHRP to VXLAN EVPN
- Current OOB has 20 ToR platforms which map to cable plant / patch panel connections | All OOB connections are 1G RJ45/Base-T
- ND Orchestrator is not currently utilized



OOB Design Solution



- EVPN VXLAN | Hybrid OOB Design
- 9348GC-FXP ToR/vPC BGW | 9336C-FX2 Spine
- Managed by NDFC | ND One View



Operational Benefits



- Network and platform health, performance and compliance governance
- Single operational vantage with ND One View
- Best practice configuration provisioning and automated Moves | Adds | Changes



Business Enablement



- Little to no engineering / operational learning curve
- Inherent security and segmentation
- Flexible design allowing for stepwise migration and forward looking CoLo extension needs

Use-Case | Access Point and IoT Connectivity

Customer Requirement(s) | Outcome(s)

- Segmented management connectivity for CoLo IoT sensors | Granular, per-port segmentation desired
- Segmented management connectivity for CoLo IP Cameras and Wireless AP
- PoE for both wireless AP(s) and IoT sensors if possible
- Solution should account for future logical design changes which will break up current flat /23 OOB subnet

Design Context

- Current production DC network design is ACI, in a Co-Location facility
- Current OOB network design is STP / FHRP with 12 MoR 100M/1G RJ45/Base-T connecting to two OOB aggregation boxes
- Current OOB network is not managed and visibility is based on SNMP | Syslog data
- Currently in the process of installing a number of IoT devices to keep an eye on their DCN as well as track temperature and humidity



OOB Design Solution



- Hybrid OOB design | Add EVPN VXLAN building blocks
- Logical segmentation with PVLAN for IoT
- 9348GC-FXP ToR/vPC BGW | 9336C-FX2 Spine
- Managed by NDFC | ND One View



Operational Benefits



- Network and platform health, performance and compliance governance (including brownfield)
- Single operational vantage with ND One View
- Up to 60W (UPoE) provided from 9348GC-FXP to IoT and WiFi end points



Business Enablement



- Flexible, cost-conscious design that meets current requirements while setting the stage for future logical design evolution
- Assurance that CoLo is meeting contractual agreement with regard to physical security and environmental conditions (sustainability metrics)

Use-Case | Bare Metal OS Provisioning (BMP)

Customer Requirement(s) | Outcome(s)

- Provide high speed (10/25G) network connectivity between image repo and rack mount servers for bare metal provisioning
- Must be able to access network services including DHCP, DNS, NTP
- Requirement to be able to pre-provision, and/or rapidly re-provision access ports while adhering to corporate standards during moves adds and changes (MAC)

Design Context

- Current production DC network is multi-site ACI | Bare metal provisioning effort is specific to a single site with planned multi-site implementation providing a successful PoC
- Bare metal provision connectivity via server side 10/25G SFP – cable plant allows for higher density MoR deployment
- Current OOB design is un-managed EVPN VXLAN with a single mgmt VRF | OOB spines recently refreshed to 9364C-GX
- Network services reside within, or are reachable from OOB mgmt VRF



OOB Design Solution



- Introduce NDFC | ND One View to brownfield OOB
- Add 93360YC-FX2 OOB ToR with dual rate 10/25G optics to identified physical row / rack locations
- Logical (VRF) segmentation and network service route leaking for BMP connections



Operational Benefits



- Network and platform health, performance and compliance governance (including brownfield)
- Automated port configuration provisioning using pre-defined port group templates for rapid deployment
- Network provisioning workflow integration with BMP orchestration pipeline



Business Enablement



- Quantifiable cost savings with from BMP time savings | Instant ROI
- Qualitative and quantitative operational benefits attributed to NDFC managed OOB network
- Design and platform flexibility allowing for seamless integration into brownfield network

Use-Case | Multi-Site OOB Connectivity

Customer Requirement(s) | Outcome(s)

- Extend OOB management network reachability to secondary data center location within same geographic region
- OOB extension / inter-site reachability needs to be secure and accomplished with as little risk as possible
- Solution design needs to account for OOB management extension to a third DC site (location TBD – still in the planning phase)
- Management network extension into public cloud deployments has been discussed and while not required, is desirable if possible

Design Context

- Current production DC network consists of three global regions, each with two DC sites – a TBD third site planned for AMER
- Connectivity and governance is regional | AMER site run multi-site ACI with inter-connectivity accomplished using NDO
- AMER region is primary focus | both AMER sites have an STP / FHRP OOB design with 20+ OOB ToR and redundant aggregation managed by DCNM



OOB Design Solution

- Hybrid OOB design | Add 9336C-FX2 vPC BGW pair per site
- Migrate (Backup -> Restore) DCNM to NDFC
- Extend management subnet reachability (L3 only translation) between sites using NDO
- Extend management connectivity to public cloud(s) with cloud network controller (NDFC <-> Cloud VRF via NDO)



Operational Benefits

- Network and platform health, performance and compliance governance
- Single operational vantage with ND One View
- NDO (ND One View) single point of reference for all inter-site connectivity, including public cloud



Business Enablement

- Little to no engineering / operational learning curve
- Build-in security | CloudSec line rate encrypted DCI
- Flexible, cost-conscious design allowing for secure L3 OOB multi-site connectivity without disruptive re-design / re-platform

Use-Case | Engineering / Operational Staging

Customer Requirement(s) | Outcome(s)

- Provide a malleable production ready staging environment with little risk to production workload
- Ability to work on business lead, network facilitated projects / initiatives without production level of change control governance
- Ability to work through seasonal change freeze periods for initiatives that require an operational network (i.e. more than a lab)
- Provide physically and/or logically segmented network access for use as a network engineering and operations beachhead

Design Context

- Current production DC network design is VXLAN EVPN in a company owned (on-prem) data center | Current OOB design includes ~20 ToR leafs
- Network engineering and operations allotted two racks in primary data center for testing and certification purposes
- Network engineering and operations team responsible for platform certification and runbook creation and upkeep



OOB Design Solution



- Add separate VRF / virtual segmentation used for staging / onboarding
- Add HCI Network Operations Cluster (NOC) providing engineering and operations a landing zone for new tooling, operational platform and IaC testing
- *Optional* - Add 93180YC-FX3 leaf pair for additional physical segmentation mapped to staging VRF



Operational Benefits



- Change request reduction and potential to work through seasonal change freeze periods
- Dedicated environment and fabric controller instance that can be used for new employee onboarding / training
- Ability to stage and test new network software and tooling | platform certification and operational process and runbook creation within an operational network



Business Enablement



- Lower operational risk | Faster time to market
- Employee onboarding and development
- Operational process and runbook continuity
- Lower operating cost / COGS allowing for an increase in net profit margin while maintaining, or lowering consumer cost

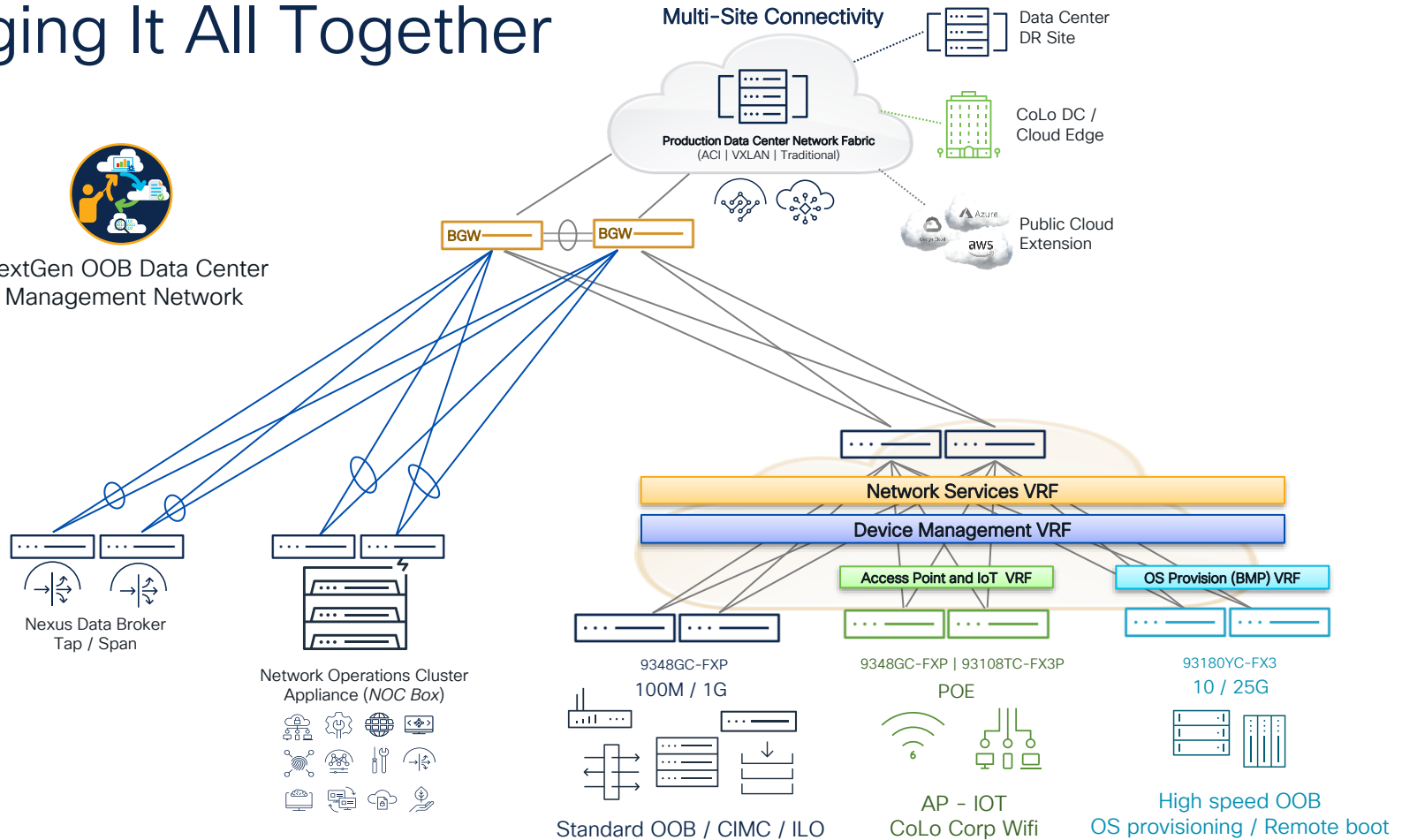
Conclusion



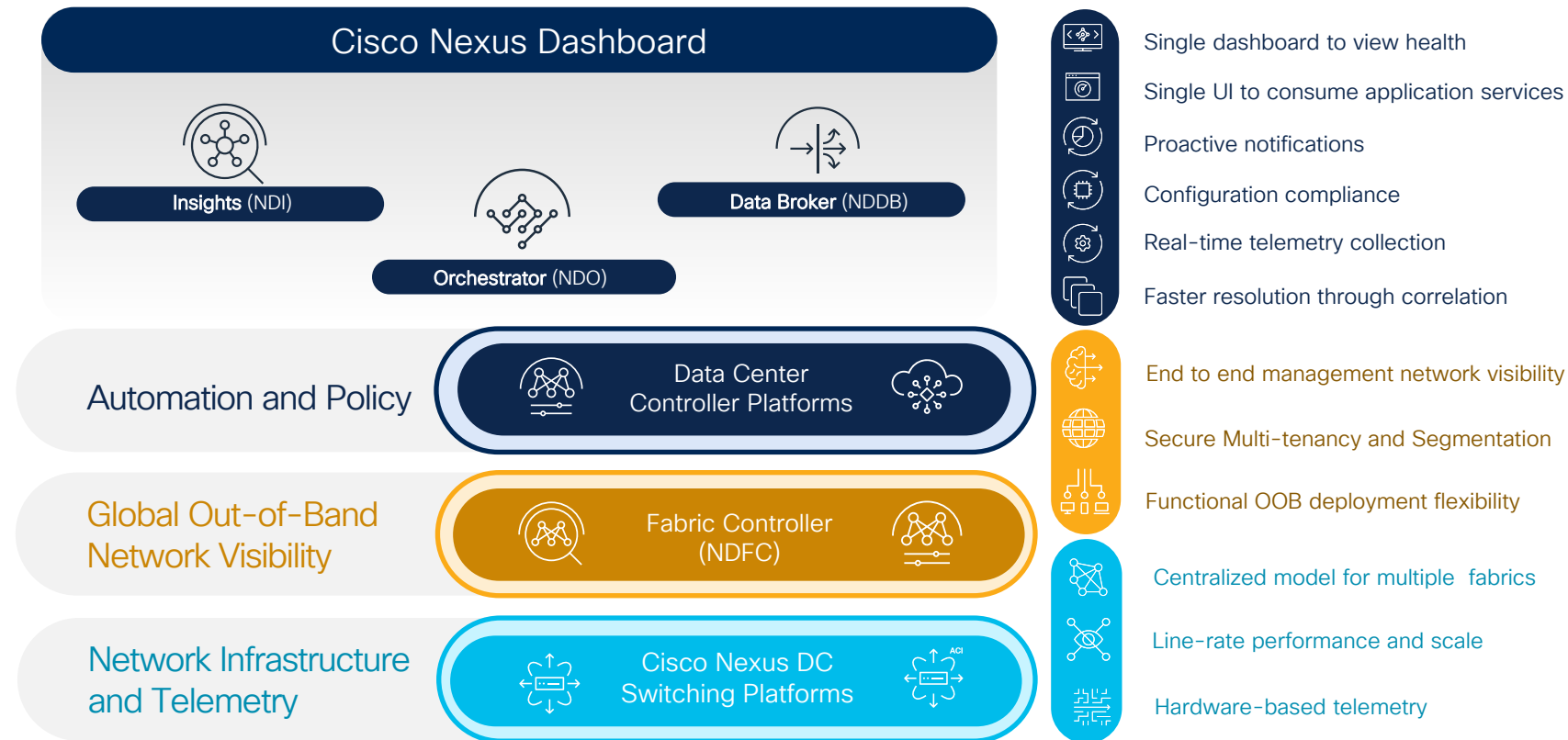
Bringing It All Together



NextGen OOB Data Center
Management Network



Bringing It All Together



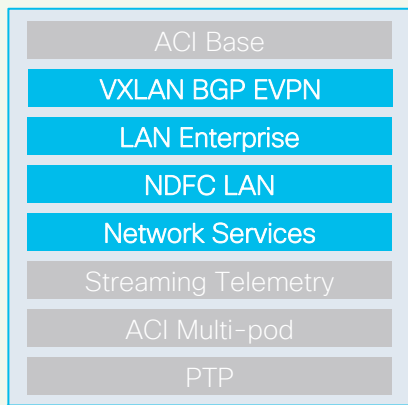
Parting Notes


- Licensing
- Network Modeling
- Reference Links
- Related Sessions

Licensing

OOB ToR and Agg

DCN Essentials

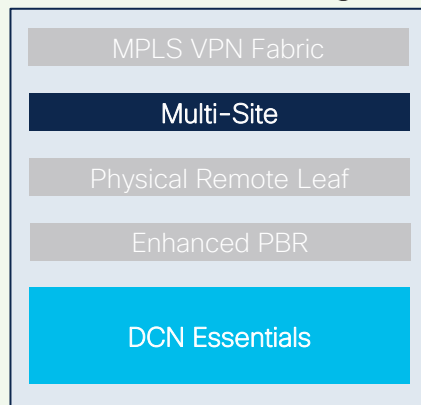


 **Individual** data center

OOB MSite – BGW Only

DCN Advantage

Enterprise Agreement



 **Multiple** data center and/or clouds

Not Applicable for OOB

DCN Premier

Day 2 Operations:
Nexus Insights
(Analytics and Assurance)

DCN Advantage

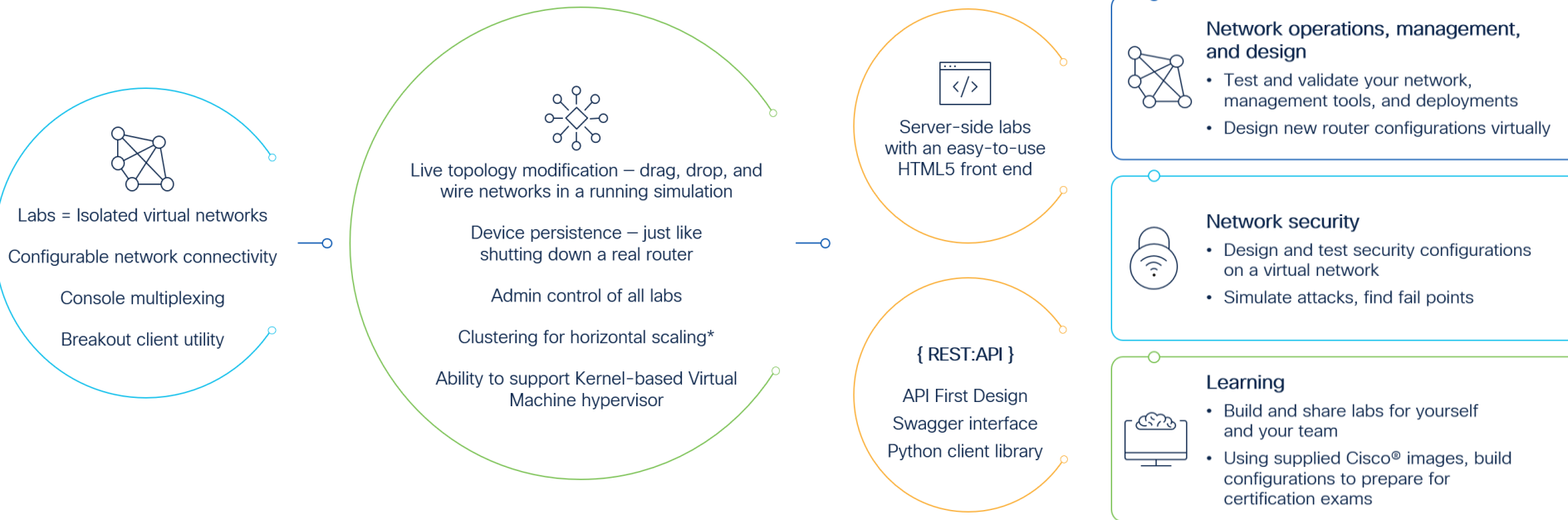
DCN Essentials

Multiple data center and/or clouds
with Day 2 Operations SW Suite

Cisco Modeling Labs

The Simulation is Your Network

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



Reference Links and Resources

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-1999

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424223486001QI6T>

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>

VXLAN BGP EVPN Multi-Site – BRKDCN-2913

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424226883001Q6Pt>

N9K / EVPN VXLAN White Papers

VXLAN EVPN Multi-Site Design | NextGen DCI with VXLAN EVPN
Layer 4 to 7 Service Redirection | Next-Gen DC OOB with VXLAN EVPN

Cisco DCN White Paper Landing Page

<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 / DCNM – Ciscolive.com OnDemand

Introduction to NDFC: Simplifying Management of Your Data Center
BRKDCN-1119

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424222870001Q0lw>

Automating Highly Available Data Center Architecture with NDO and NDFC
BRKDCN-2731

<https://www.ciscolive.com/on-demand/on-demand-library.html?#/session/1655424226040001Q6oO>

NDFC YouTube Videos

NDFC / DCNM YouTube Playlist

<https://www.youtube.com/playlist?list=PLFT-9JpKjRTAZC7YSciYcPNFyimCrJHb0>

Nexus Dashboard Fabric Controller – A Quick Overview

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>

Cisco Dcloud Demos / Lab Sandbox

- Cisco DCloud (Demo Cloud) provides demo access to many different product/solutions and has recently been opened up for customers
- Throughout the technology specific sections below there will be links to specific demo instances where that the team can use for training / product familiarity.
- The primary link to DCloud is <https://dcloud.cisco.com> – access is linked to CCO (cisco.com) login
 - List of NDFC related labs and demos (sort by date) – <https://dcloud2-rtp.cisco.com/content/catalogue?filters=l2-customer&search=ndfc>

NDFC / EVPN VXLAN

- [Cisco NDFC for NX-OS v1](#)
- [Cisco NDFC for VXLAN EVPN Super-Spine Deployments Lab v1](#)
- [Cisco Nexus Dashboard Insights with NDFC v1 - Instant Demo](#)



Come Experience Cisco

Related Sessions (On Demand)

Breakout Sessions

- PSODCN-1864: Managing Data Center Networks with Cisco Nexus Dashboard Fabric Controller (NDFC)
- BRKDCN-1619: Introduction to NDFC: Simplifying Management of Your Data Center
- BRKDCN-1959: Management of Traditional 3-Tier Hierarchical Data Center Architectures using Nexus Dashboard Fabric Controller (NDFC)
- BRKDCN-1621: Introduction to VXLAN: The Future Path of Your Datacenter
- BRKDCN-2918: Design, Automate, and Manage Next-Gen Data Center VXLAN BGP EVPN Fabric with NDFC
- BRKDCN-2670: Day2 operations for Datacenter VXLAN EVPN fabrics

Fill out your session surveys!



Attendees who fill out a minimum of four session surveys and the overall event survey will get **Cisco Live-branded socks** (while supplies last)!



Attendees will also earn 100 points in the **Cisco Live Challenge** for every survey completed.



These points help you get on the leaderboard and increase your chances of winning daily and grand prizes

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 www.CiscoLive.com/on-demand

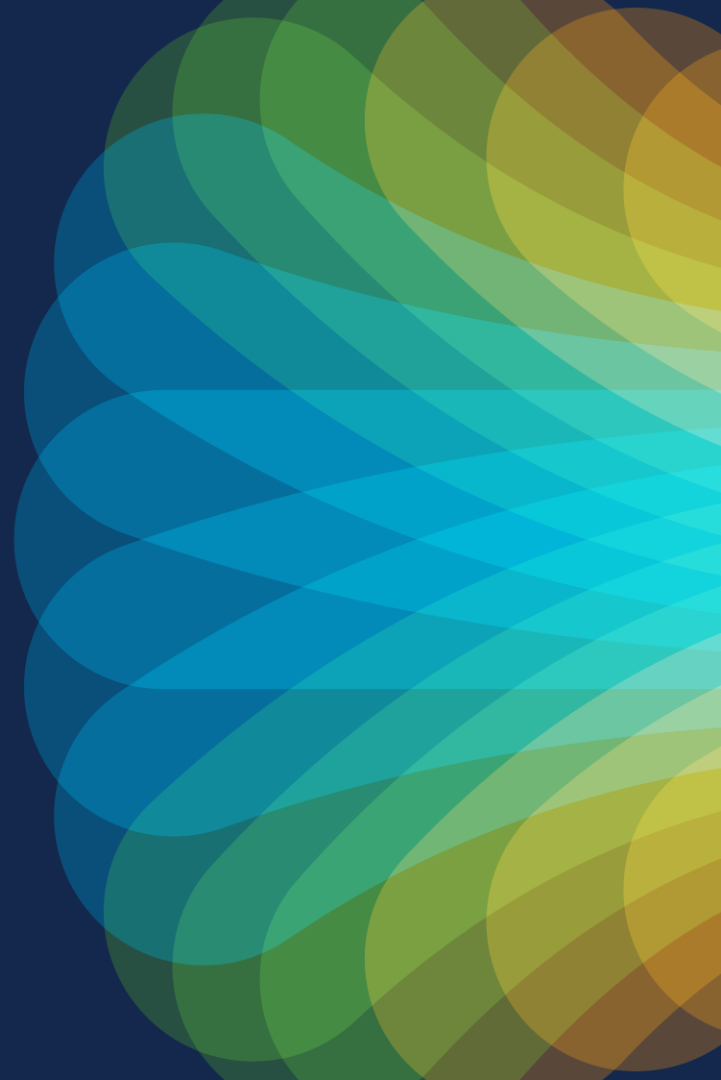


The bridge to possible

Thank you

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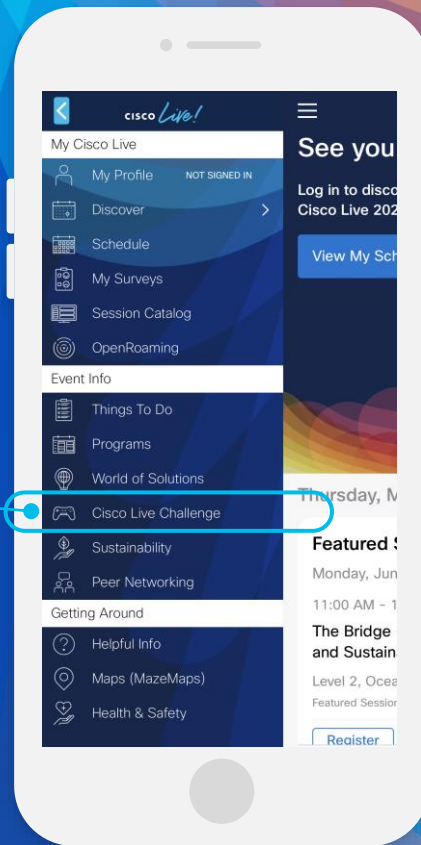
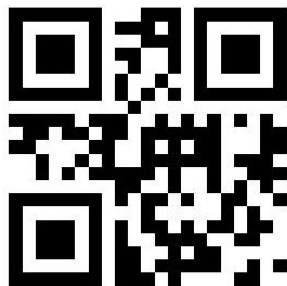


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- 1 Open the Cisco Events App.
- 2 Click on 'Cisco Live Challenge' in the side menu.
- 3 Click on View Your Badges at the top.
- 4 Click the + at the bottom of the screen and scan the QR code:



The background of the slide is a vibrant, abstract graphic. It features a series of overlapping, wavy bands of color in shades of red, orange, yellow, green, and blue, creating a sense of movement and energy. On the right side, there is a bright, multi-colored sunburst or starburst effect that radiates outwards, adding to the dynamic feel of the design.

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