
cisco Live!
Let's go

The bridge to possible

Simple VXLAN/EVPN Fabric Setup with Nexus Dashboard

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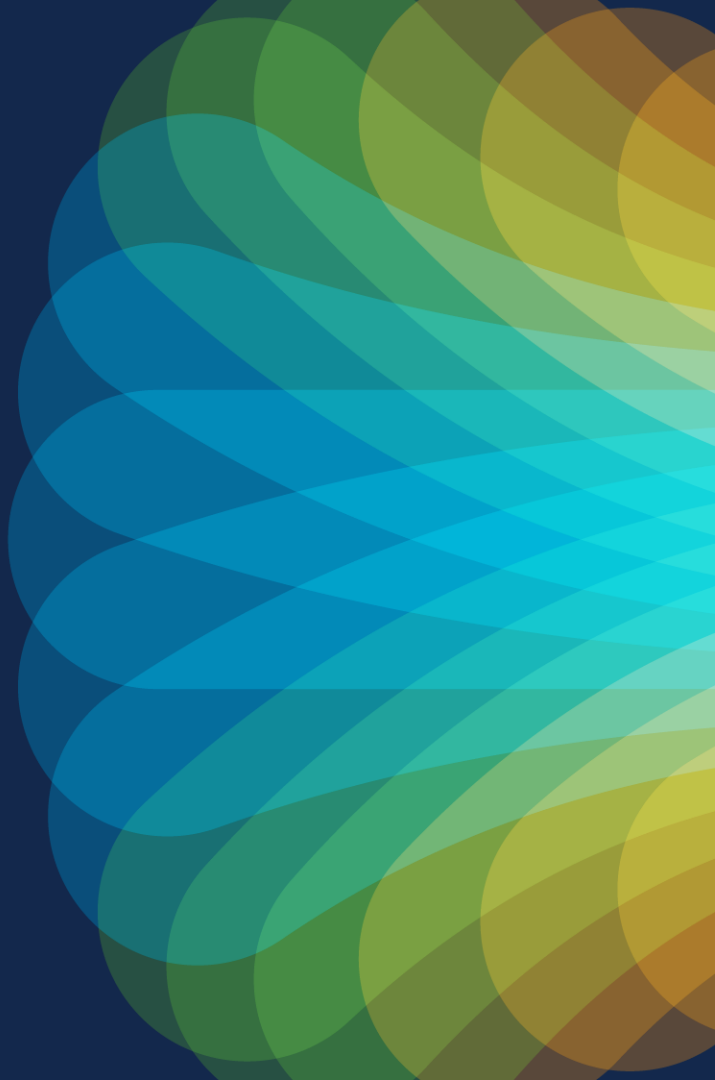
Agenda

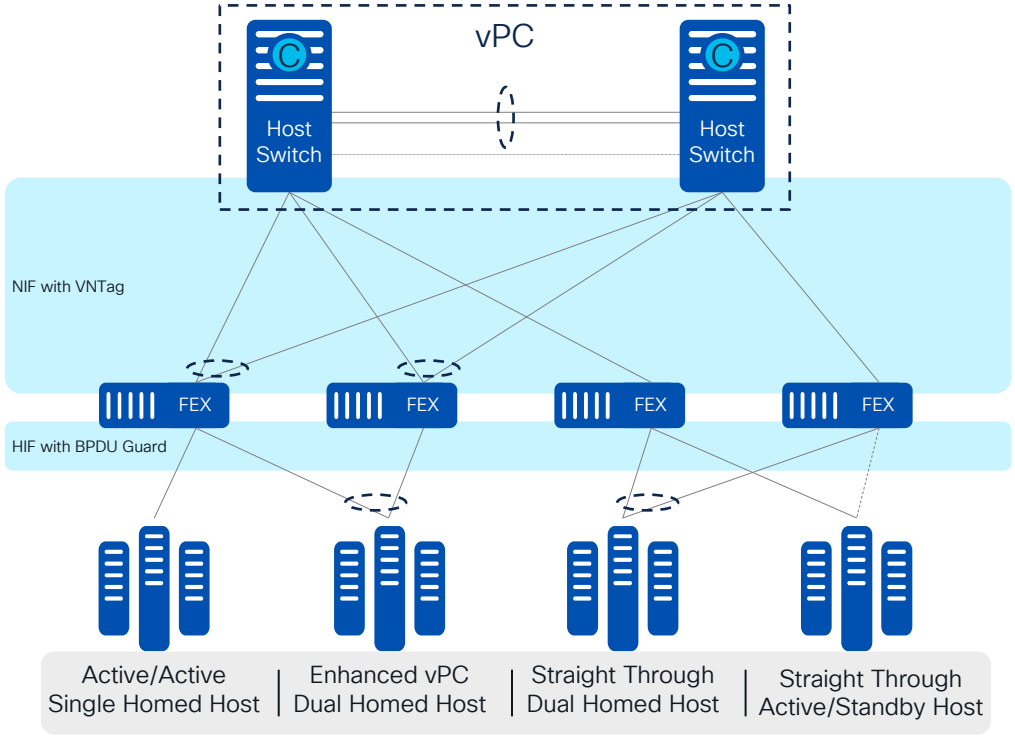
- Introduction
- Nexus Dashboard (ND)
- Nexus Dashboard Fabric Controller (NDFC)
  - NDFC Automation
    - ✓ MultiSite Domain
    - ✓ External Connectivity
    - ✓ L4-L7 Service Insertion
  - NDFC Management
  - NDFC Visibility and Monitoring
  - NDFC Licensing
- Nexus Dashboard Insights (NDI)
- NDFC Automation & Programmability
  - Infrastructure as Code (IaC)
- NDFC Demos

Introduction



A Data Center Fabric Prior to Data Center Fabrics

Typically, 2-Tier/3-Tier, vPC Based, No Overlay, Discreet L2/L3 Services

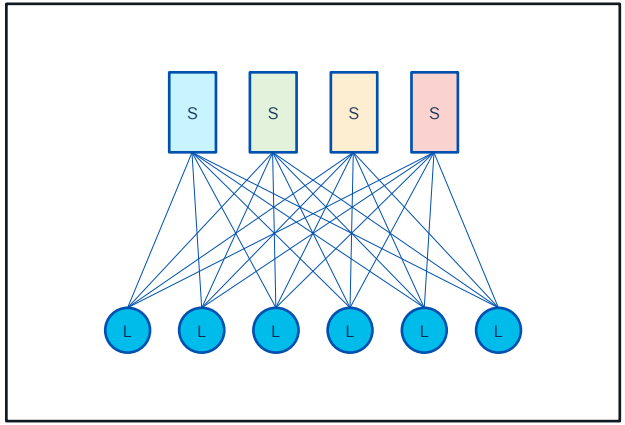


- Centralized Management
  - Co-located on the Switch
  - Limited to No Synchronization
  - Host Switch Operational Dependency
- Network Redundancy (NIF to NIF)
  - Uses VNTag (802.1BR / 802.1Qbh)
  - 1+1 Redundancy based on Layer-2 Port-Channel (vPC)
- Host Redundancy (Host to HIF)
  - Single Homed or Dual Homed Hosts (vPC, A/S)
  - Spanning-Tree BPDU Guard
  - Subset of HIF Capabilities (Dependent on Host Switch)

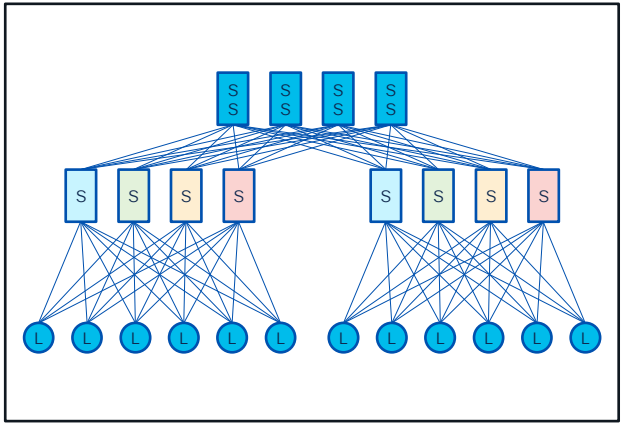
Customer Use Cases for Data Center Fabrics

Customer Needs	VXLAN Delivered
Any workload anywhere – VLANs limited by L3 boundaries	Any Workload anywhere- across Layer 3 boundaries
VM Mobility	Seamless VM Mobility
Scale above 4k Segments (VLAN limitation)	Scale up to 16M segments
Simplification of L2/L3 Services	Integrated L2/L3 Services, no STP
Efficient utilization of bandwidth	Leverages ECMP for optimal path usage over the transport network
Secure Multi-tenancy	Traffic & Address Isolation

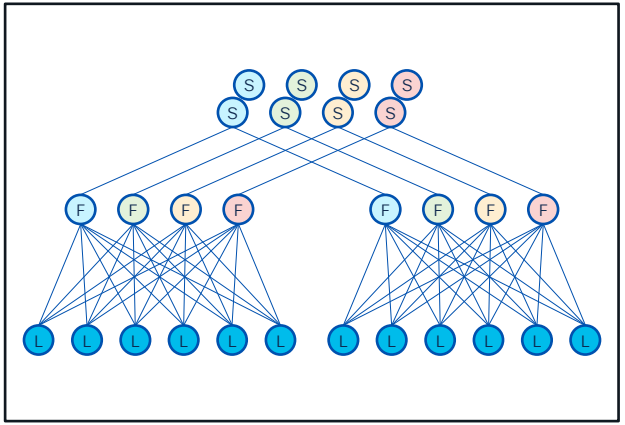
The Journey to Build Better and Further



2 Tier Leaf Spine



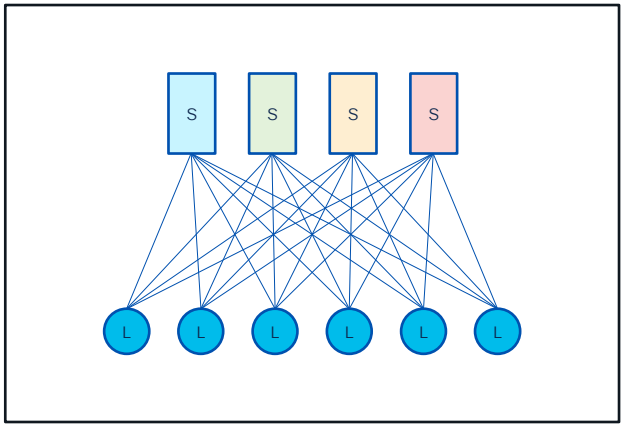
3 Tier Leaf-Spine-SuperSpine



3 Tier Leaf-Fabric-Spine

Standard Design
2 Tier Leaf Spine

- A perfectly valid way
- Tends to have “Finite Scale”
  - Maximum Chassis capacity
  - Maximum Speed per Port
- Many Locations of Redundancy
  - Redundant Chassis Components
- Condensed Link and Bandwidth Presence
  - Aggregated within a Chassis

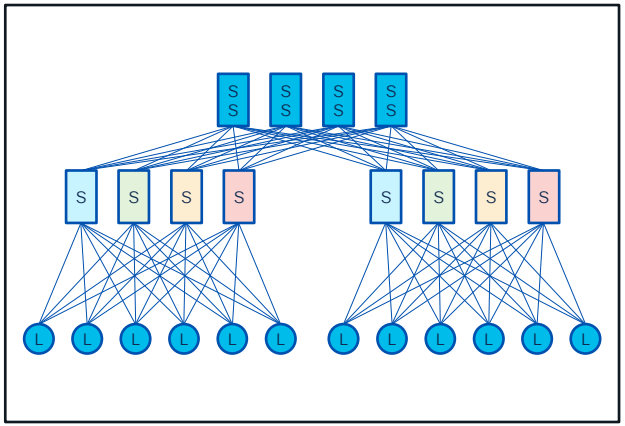


2 Tier Leaf Spine

- Use Modular Chassis at Spine
- Use Higher Density Linecards
- Use Higher Bandwidth per Port

Expanding Scale
3-Tier Multi-Site

- Avoiding Scale-Up with another Tier
- Distributed Link and Bandwidth Presence
  - Disaggregated across Tiers
- Increases the “Finite Scale”
  - No Dependency on Chassis capacity or Speed per Port
- Many Locations of Redundancy
  - Redundant Chassis Components
- Allows for Cost Optimization

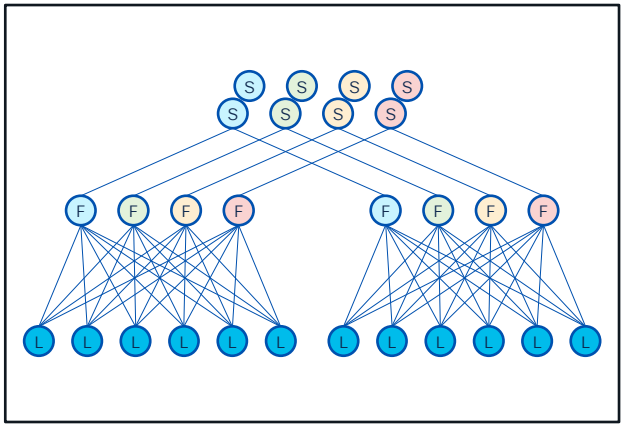


3 Tier Leaf-Spine-SuperSpine

- Scale-Out; Introduce a 3rd Tier
- Interconnect multiple 2 Tier “PODs”
- Use Modular or Fixed Spine & SuperSpine
- Use High Port Density
- Use High Bandwidth per Port

Increasing Resiliency
Multiplanar Architecture

- Increasing Scale-Out in all Tiers
- Reduce to the Max
  - Simple Design Principles
- Increases the “Finite Scale”
  - Scale as You Go
- Disaggregated Redundancy
- Flexible Link and Bandwidth Distribution
- Further Possibility for Cost Optimization



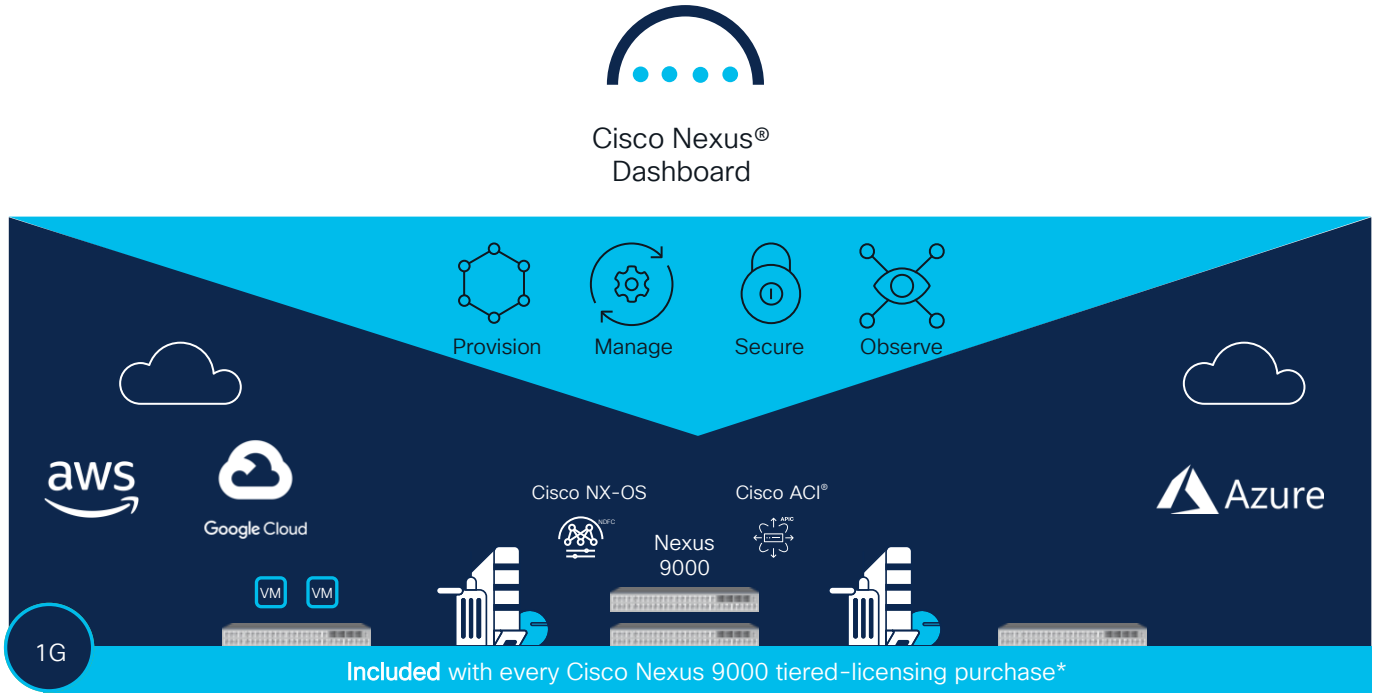
3 Tier Leaf-Fabric-Spine

- To Infinity and the Beyond

Nexus Dashboard

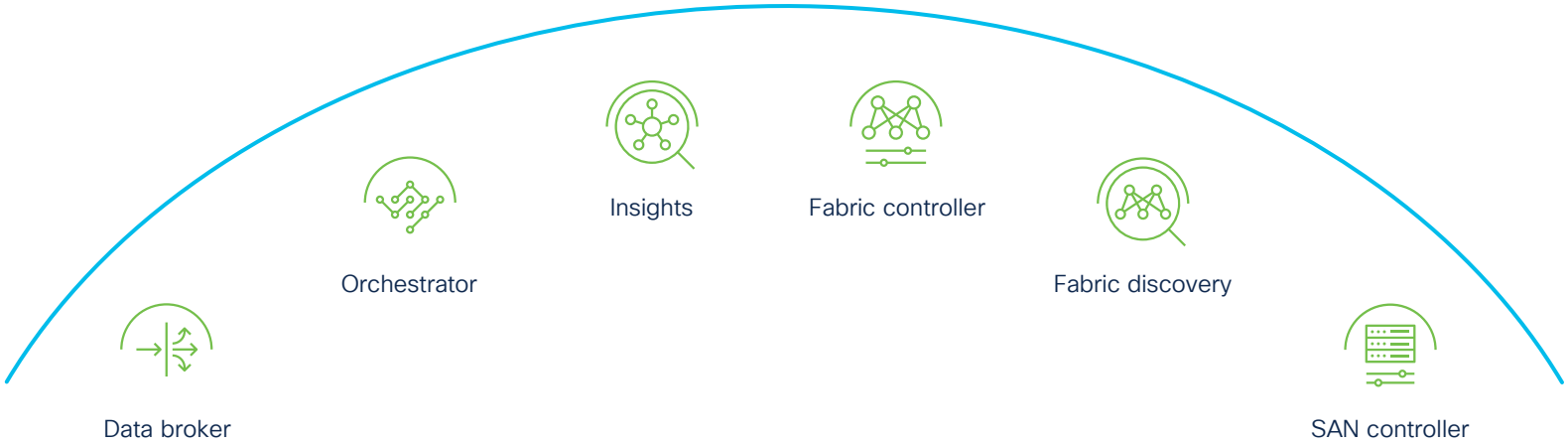
Cloudify Your Network

Unified and Resilient Data Center and Cloud Network Operations



Cisco Nexus Dashboard

Simple to Automate, Simple to Consume



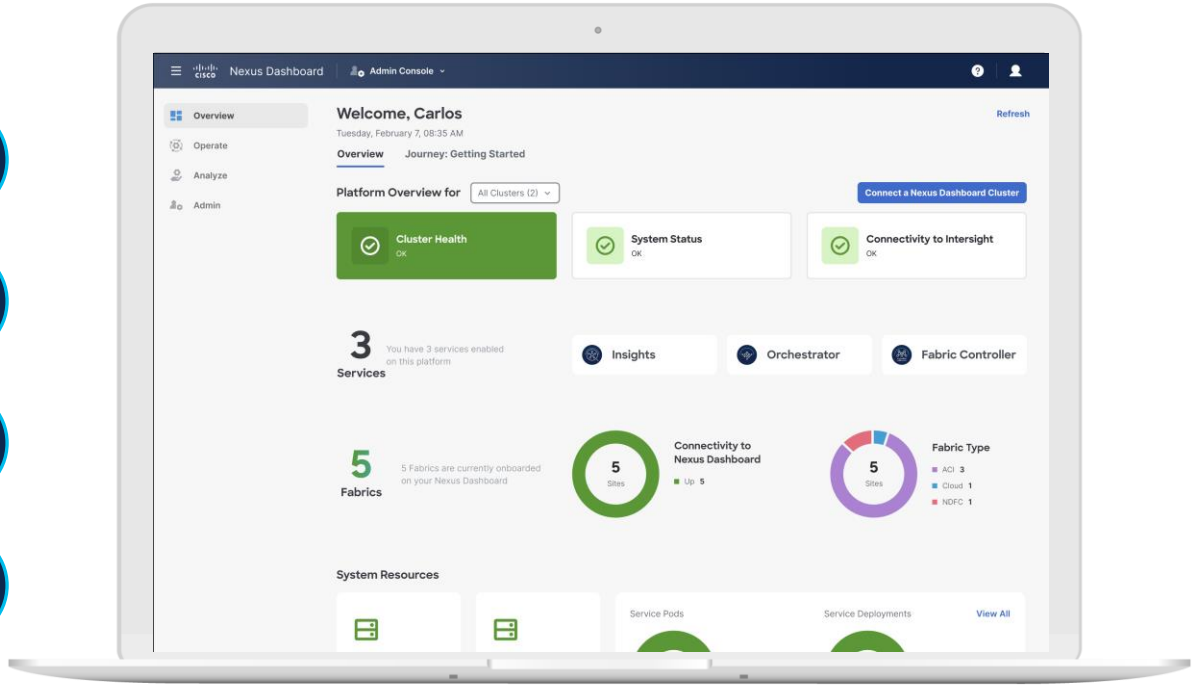
Private cloud | Third-party apps | Public cloud

Cisco Nexus Dashboard Platform

Overall Strategic Direction

Highlights

- Reduce footprint, increase scale
- Enhance licensing model and UI
- Support SMB & standalone NX-OS
- Unify upgrade, product & services



Nexus Dashboard Fabric Controller

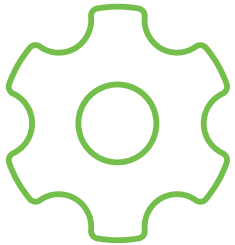
Cisco Nexus Dashboard Fabric Controller

NDFC Primary Focus Areas

Connectivity	Network automation of your data center environment
Operations	Single point of management and control for daily operations
Enhanced app experience	End-to-end discovery, visibility and monitoring

Cisco Nexus Dashboard Fabric Controller

NDFC Key Technology Pillars

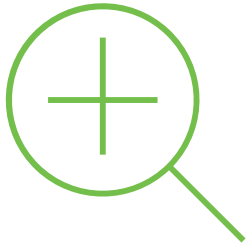


Automation

Accelerate provisioning and simplify deployments

Management

In depth Management and control for all network deployments



Visibility

Get Centralized Visibility and Monitoring views

Cisco Nexus Dashboard Fabric Controller

Operational Modes

Fabric discovery for LAN Deployments

Fabric controller for LAN and IPFM Deployments

SAN controller for MDS Fibre Channel Deployments

Why NDFC?

Multi-Architecture

3-stage & 5-stage CLOS, 3-Tier Hierarchical, Collapsed Core, Routed Access

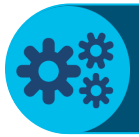
Multi-Topology, Multi-Protocol

For example – In Legacy networks, choose from 3 Tier or Collapsed Core, choose to run IGP or BGP

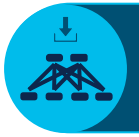
Multi-Domain, Multi-Platform

LAN,SAN,IPFM
Nexus 2k/5k/6k/7k/9k, MDS, IOS-XE, IOS-XR, Non-Cisco

Benefits of NDFC



Complete Cloud-Native Micro-services architecture on ND with Active Active HA Cluster



Joins the ecosystem of services that runs natively on top of Nexus Dashboard

Simple download and installation from the Cisco App Store

Single Experience with a common Web GUI which simplifies adoption across the entire Cloud Networking Product Portfolio

Easier implementation of various personas namely LAN, SAN, IPFM controller

Easier scalability with adding extra nodes to the cluster dynamically

NDFC Automation

Automation

Accelerate provisioning from days to minutes

Easy to understand approach to auto-bootstrapping of entire fabric

Rapid deployment with Fabric Builder best practice templates for VXLAN-EVPN

DevOps friendly

Enhanced programmability

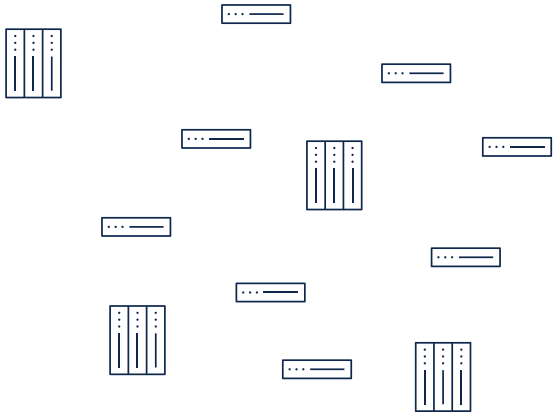
Scale within and across data centers with Nexus Dashboard Orchestrator

Benefits

Simplify Fabric Deployments	Developer Agility	Multi-Site

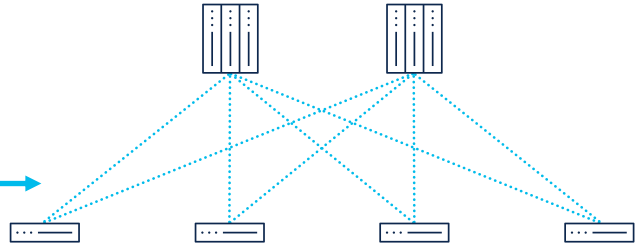
Provision a New Fabric in Minutes

Un-provisioned switches



Within NDFC
select fabric builder

Cisco best practice implemented

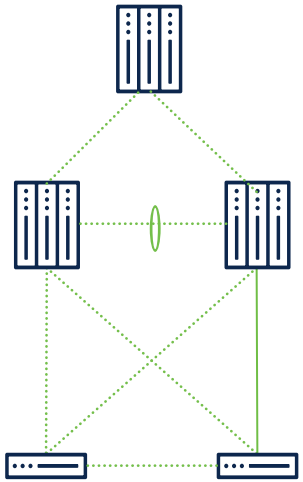


Fast, automated process

Benefits

Accelerate Fabric Deployments	Automated Consistency	Minimize Risk

Enhanced Classic LAN



Classic LAN Fabric

- Fully automated fabric - Enhanced Classic LAN
- Support for greenfield and brownfield deployments
- Provisioning of 3tier architecture/ L2/L3 Networks and VRFs
- VRF-Lite Between Agg and Core

Benefits

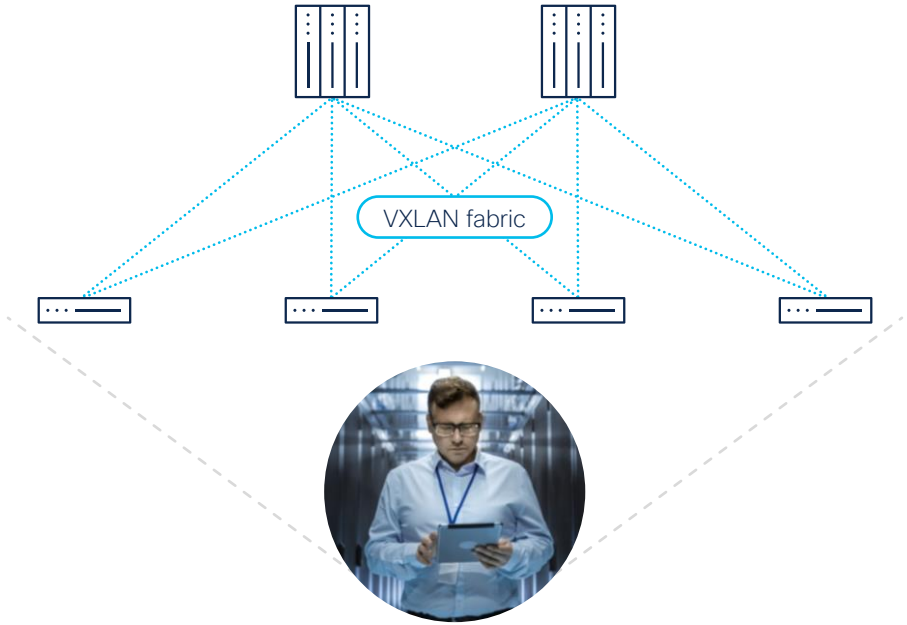
Best Practice Templates	Simplified Workflows	Flexibility Based on Customer Needs

Automate VXLAN EVPN Deployments

Cisco best practice templates for VXLAN EVPN templates

Fabric builder

Support for both brownfield and greenfield deployments

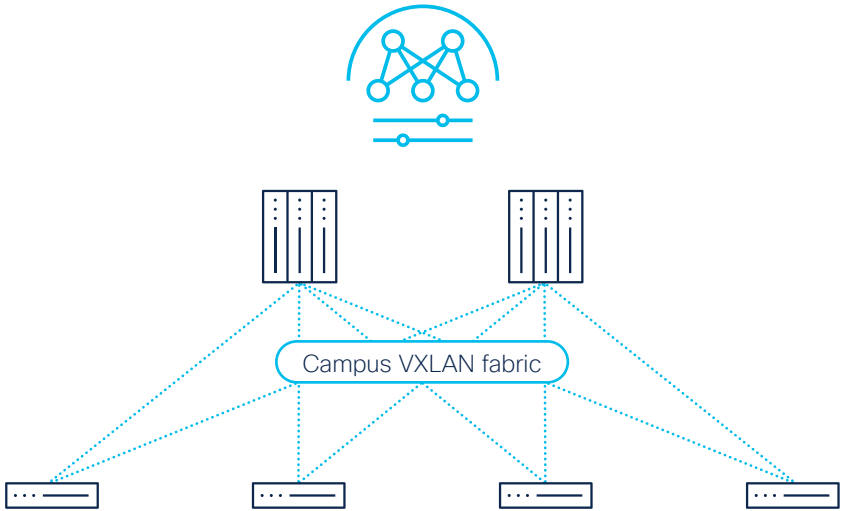


Benefit

Simplify Deployment Time, Reduce Chances of Errors

Campus VXLAN EVPN Management

- Manage Catalyst VXLAN EVPN Deployments with NDFC
- Support for configuration automation via Fabric Builder
- Single Point of automation and provisioning for all VXLAN EVPN deployments



Benefit

Unified and Seamless Management Across Various Platforms

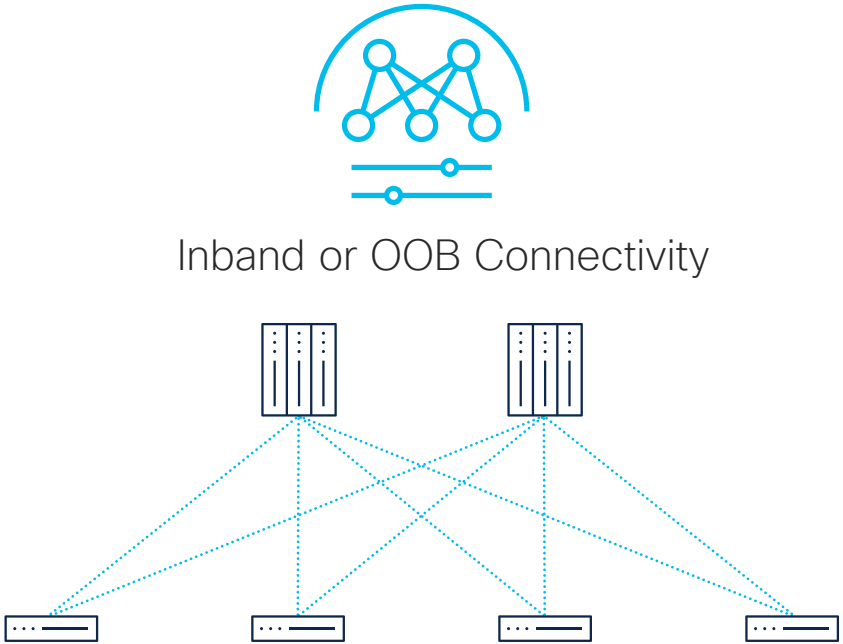
Zero Touch Deployment

POAP – Power On Auto Provisioning

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

Supports VXLAN EVPN, classic LAN fabrics

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



Benefit

Zero Touch Fabric Onboarding and Management

Increase Developer Agility with NDFC DevOps

DevOps

RED HAT ANSIBLE

HashiCorp Terraform

REST : API

Utilize GUI or automation through APIs

Integrations with Ansible and Terraform

Benefits

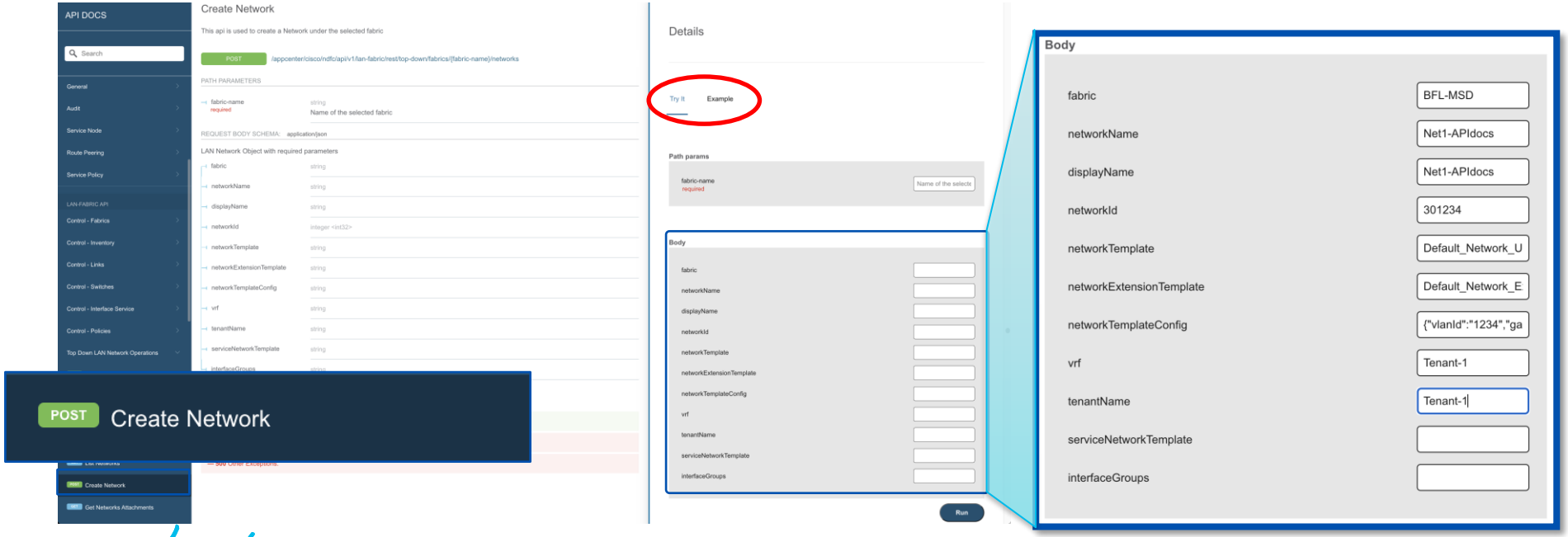
Accelerate Deployments	Increase Consistency	Minimize Risk

NDFC REST API

Embedded API Docs

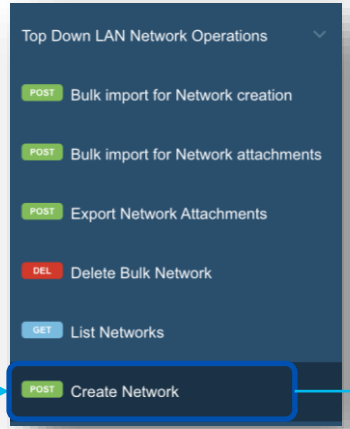
Select the definition of interest and Expand it

"Try it out" And fill-up the variables with the desired values



NDFC and REST API

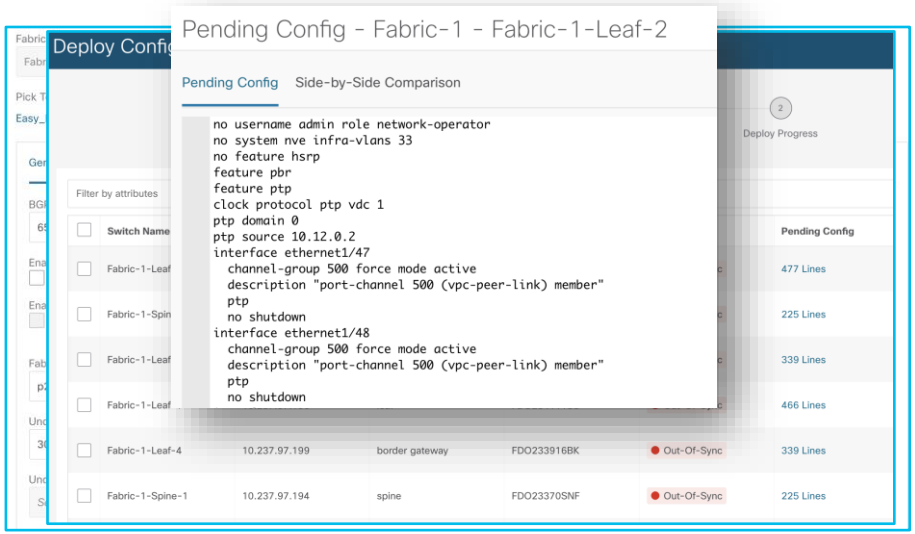
NDFC API-Docs



- Leverage NDFC API-Docs
- Select the POST operation you want to execute
- Typically, given examples provide the JSON script
- Copy the example to reuse it by a REST API 3rd party tool

Day in the Life of NDFC

Underlay Using Fabric Builder



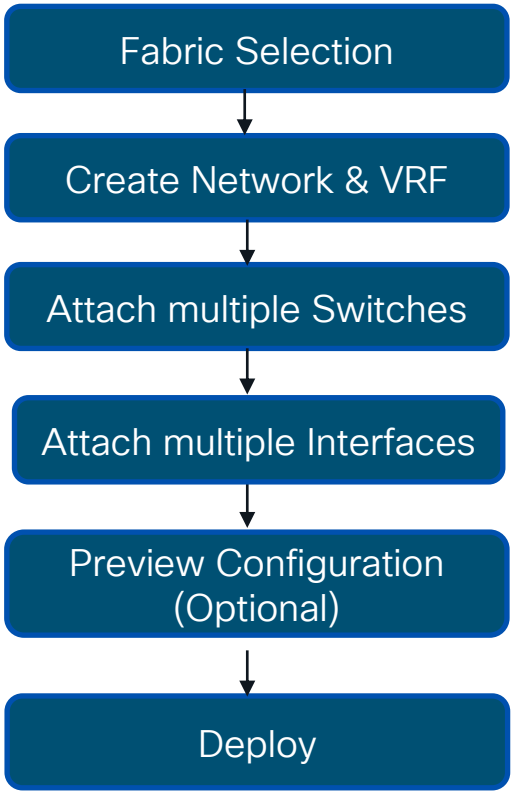
1. Create Define Fabric Settings
2. Discover and Import Switches
3. Recalculate the Configurations
4. Preview (Optional)
5. Deploy Configurations

Your VXLAN EVPN Underlay/Routed fabric is ready in a few minutes

Day in the Life of NDFC

Overlay Network Management

- Top-Down deployment via GUI or REST APIs
- Network/VRF Creation with custom Overlay Policies
- Attach Network to Switches and Interfaces
- Per Network/Per Switch deployment History
- Centralized Overlay Resource Manager Tracking for VNIs, VLANs etc.



VXLAN Multi Site

Different Roles for Border Gateway (BGW)

Border Gateway

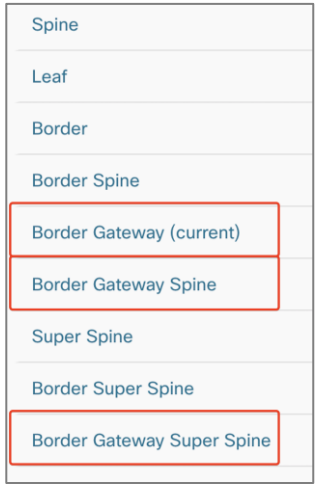
Layer 3 based Anycast BGW deployed at the leaf Layer

vPC Border Gateway

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

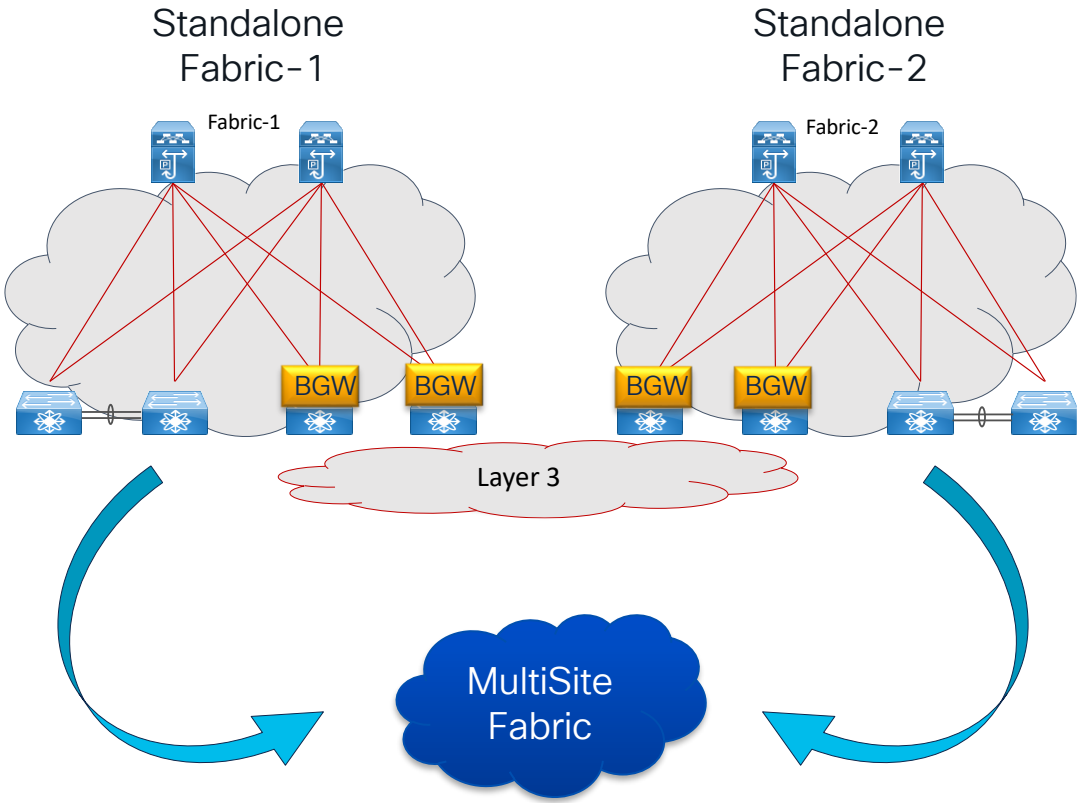
Border Gateway Spine

Layer 3 based Anycast BGW deployed at the Spine Layer



Interconnect Multiple VXLAN EVPN Fabrics

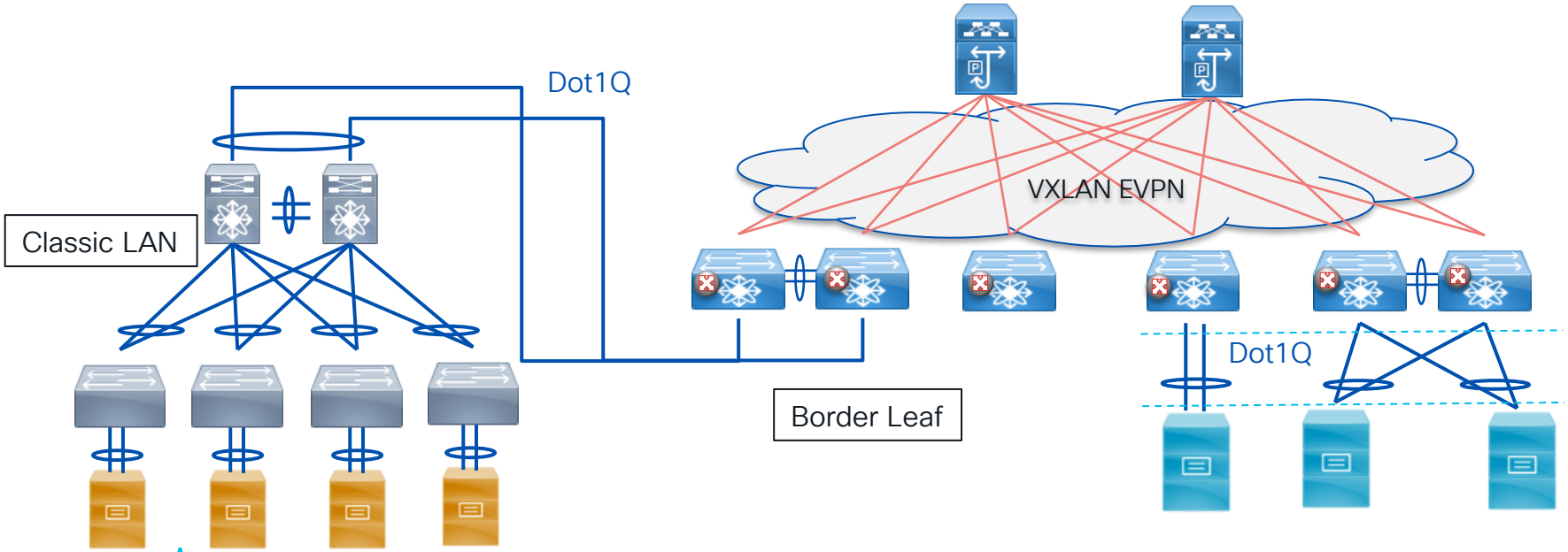
VXLAN EVPN Multi Site Domain (MSD)



VXLAN EVPN

External Layer 2 Connectivity

1. Endpoints locally attached at Layer 2 (e.g. Servers, IPS, Service Node in Bridge mode)
2. Classic LAN to Border Leaf nodes at Layer 2 (Hot live Motion, Migration, Ops simplicity)



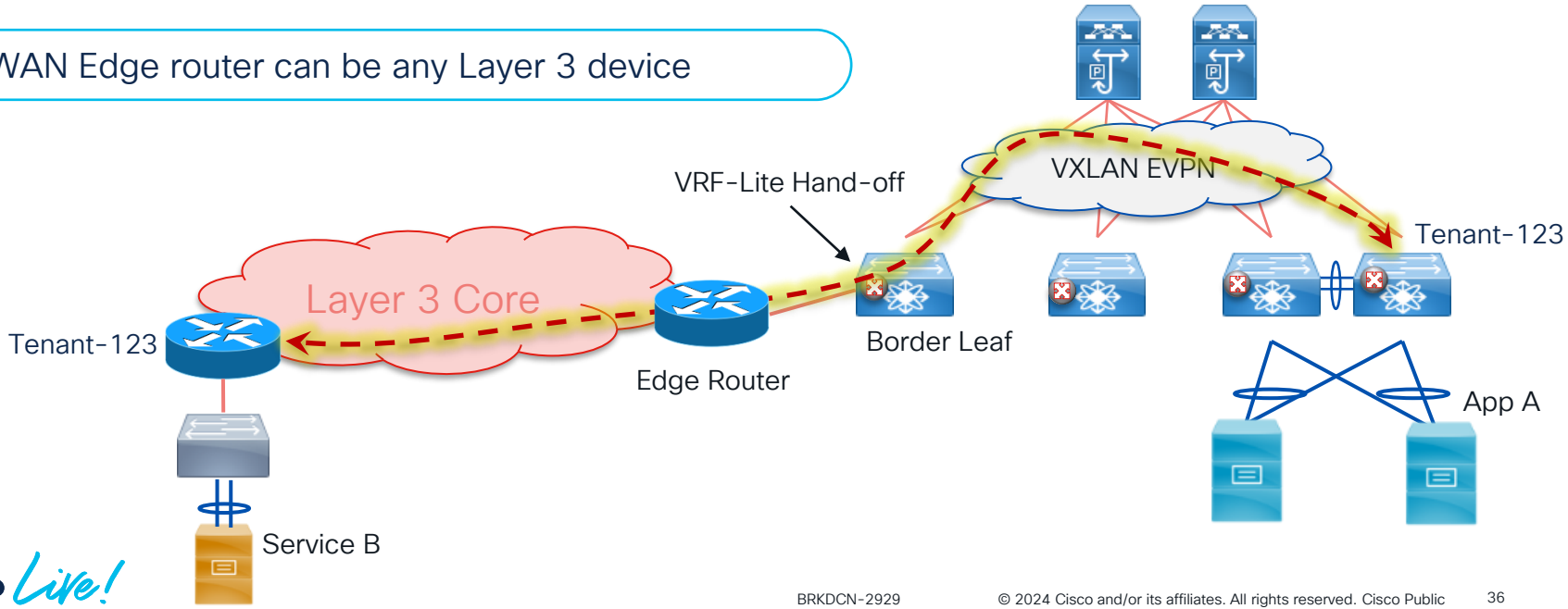
VXLAN EVPN

External Layer 3 Connectivity

VRF Lite is used for connecting the fabric to an external Layer 3 domain (N-S)

Each Tenants (VRF) can connect outside the Fabric via a Borders Leaf Node

The WAN Edge router can be any Layer 3 device

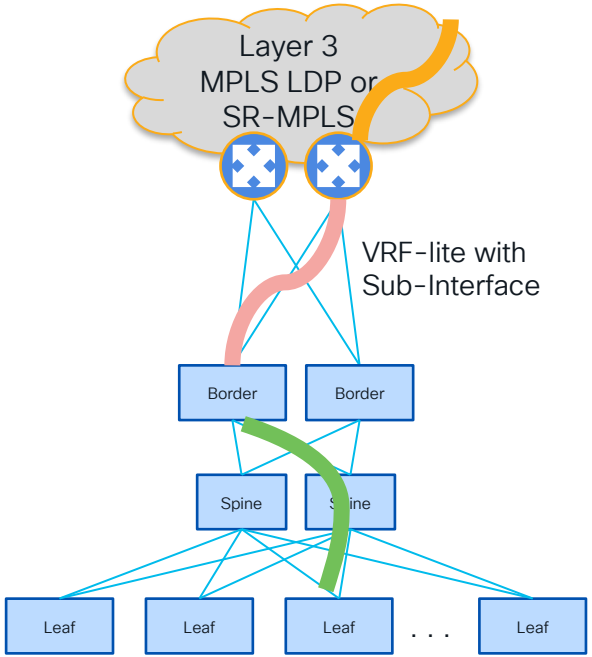


Seamless Protocol Gateway

Various Models

Separated Border + PE

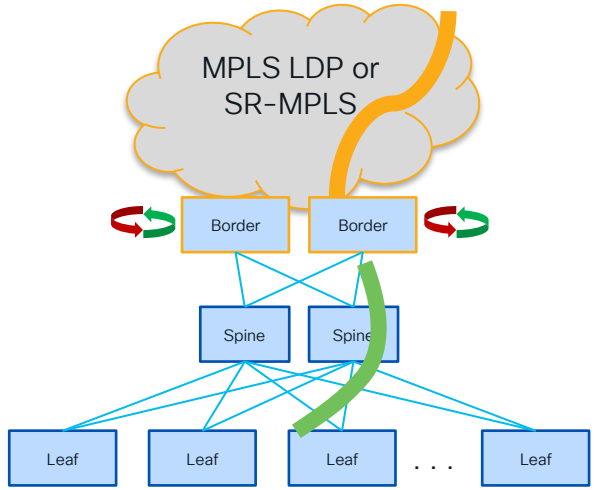
(Inter-AS Option A)



Intra Site
MPLS/IPVPN
IP/VRF-lite

Seamless Data-Plane Stitching between VXLAN, MPLS and Segment Routing

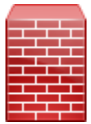
Collapsed Border + PE

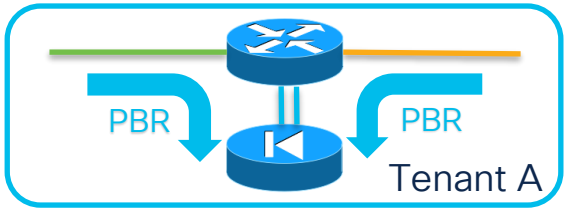


L4-L7 Service Insertion Use Cases

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

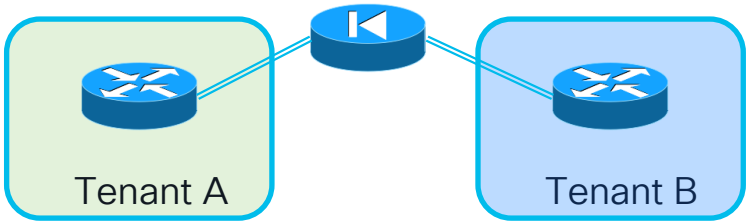
Intra-Tenant





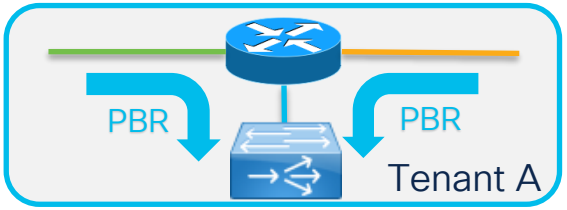
PBR Use-Cases

Inter-Tenant

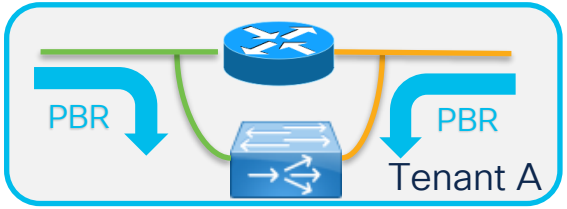


Tenant-Edge Firewall

One-Arm



Two-Arms



PBR Use-Cases (no SNAT)

L4-L7 Service Node Guidelines

- Supported on VXLAN EVPN with the Easy_Fabric Template
- Enabled on CloudScale based Switches (Cisco Nexus 9300-EX/-FX)
- Leaf, Border Leaf, Border Spine, Border Super Spine, Border Gateway
- L4-L7 Service node automation using NDFC UI or NDFC REST API
- L4-L7 Services generate Kafka Notification for Real-Time Interaction
- Display Cumulative statistics From the Service Policy and Redirected Flows

NDFC Management

Management

Single point for management for data center operations

Optimized for both large deployments and traditional deployment models

Ensure consistency and reliability of data center fabrics

License management

Role based access control (RBAC) to reduce administrative workflows

Management for non-Nexus platforms

Benefits

Reliability	Compliance	Secure

Optimize Your Deployments with NDFC

Large deployment

Small deployment

Multi-site

Benefits

Lower Operating Expenses	Customizable	Secure

NDFC Supported Scale

Data Center VXLAN EVPN (Managed Mode)	**500 Switches -> 3 node pND**
External Connectivity	**1000 Switches**
Fabric Discovery (Monitored Mode)	**1000 Switches**

Benefit

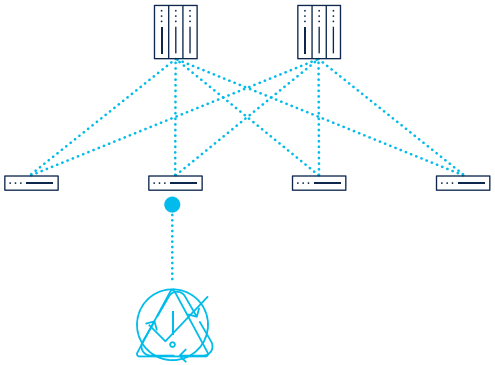
Seamless Data Center Expansion

Configuration Compliance

Ensure fabric consistency

Continuously monitors if configuration is compliant with user intent

Error detection, flag drifts for remediation



Benefits

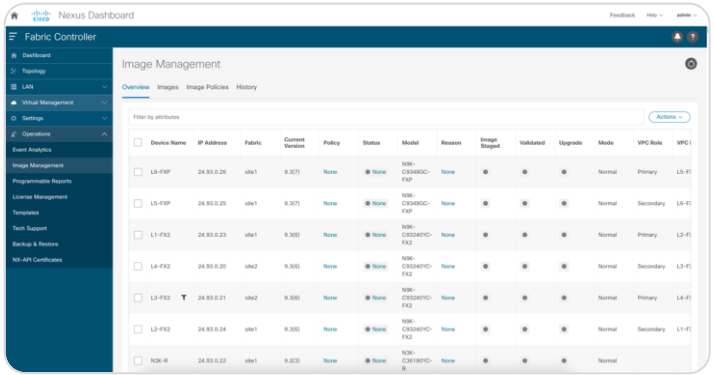
Fabric Reliability and Visibility

Operations Confidence

Streamlined Image and Patch Management

Maintenance mode

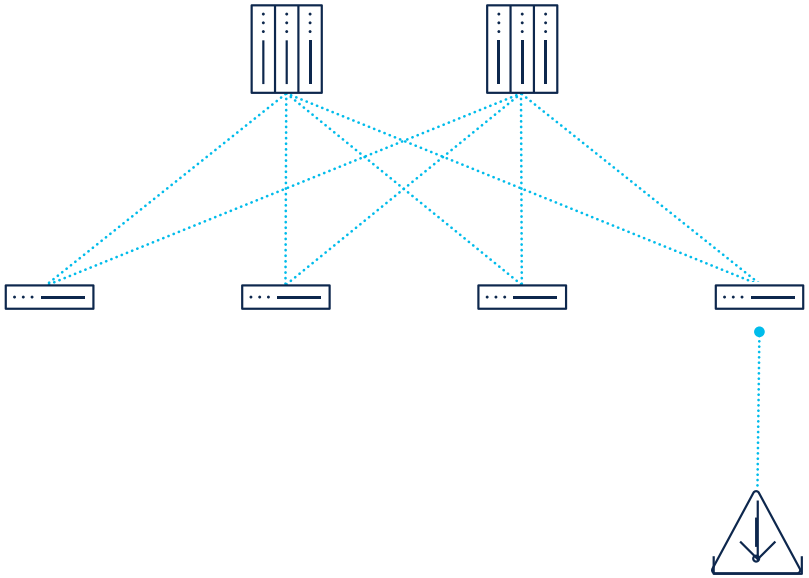
- Guided workflows
- Image upgrades, EPLD upgrades and downgrades, SMU



Benefits

Simplified	Intuitive	Customizable

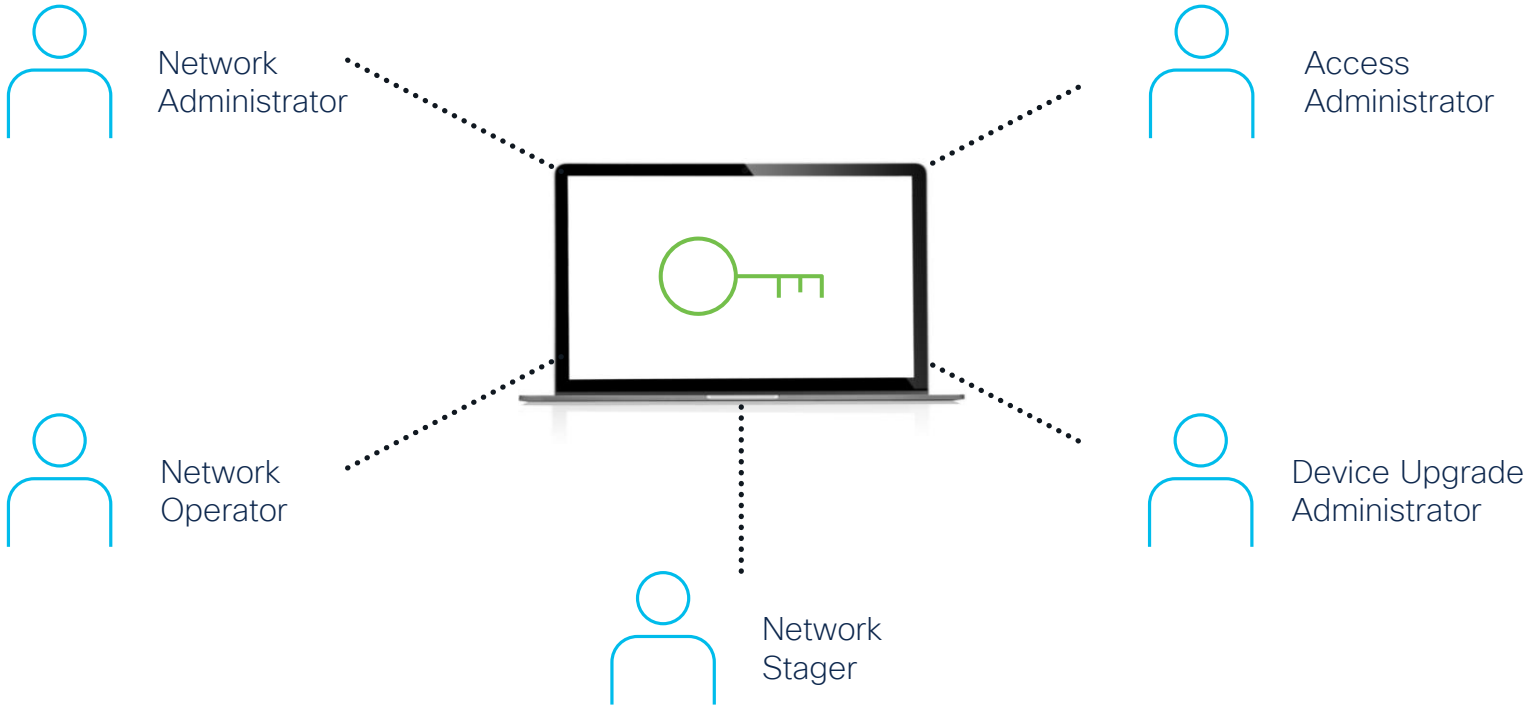
RMA Replacement



RMA for defective switch is required

Easily Perform RMAs from NDFC UI

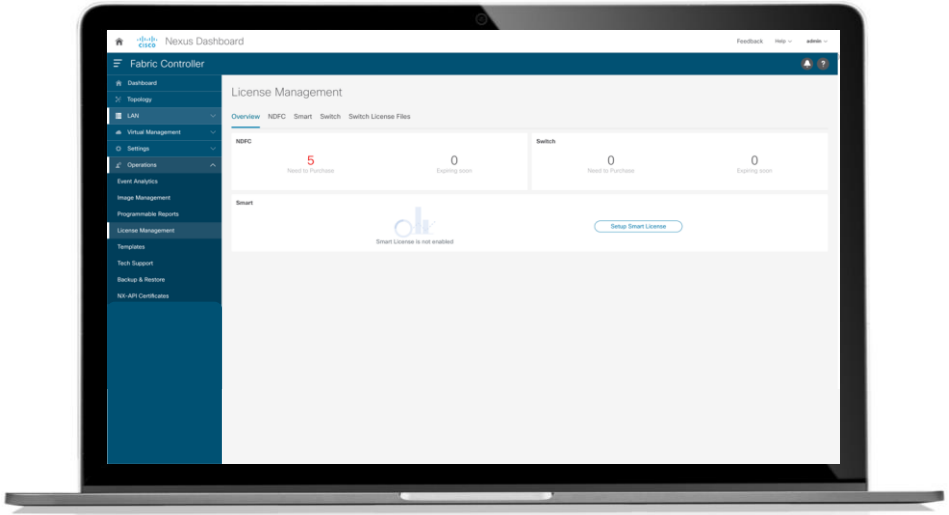
Role-Based Access Control (RBAC)



Increase Efficiency and Productivity with Granular Roles Orchestrated from Nexus Dashboard

License Management

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



Easily activate and configure Smart Licensing from NDFC UI

Benefits

Easily License your Devices	Monitor License Usage	Ensure Compliance

Management for Non-Nexus Platforms

Configuration management for Cisco IOS-XR devices

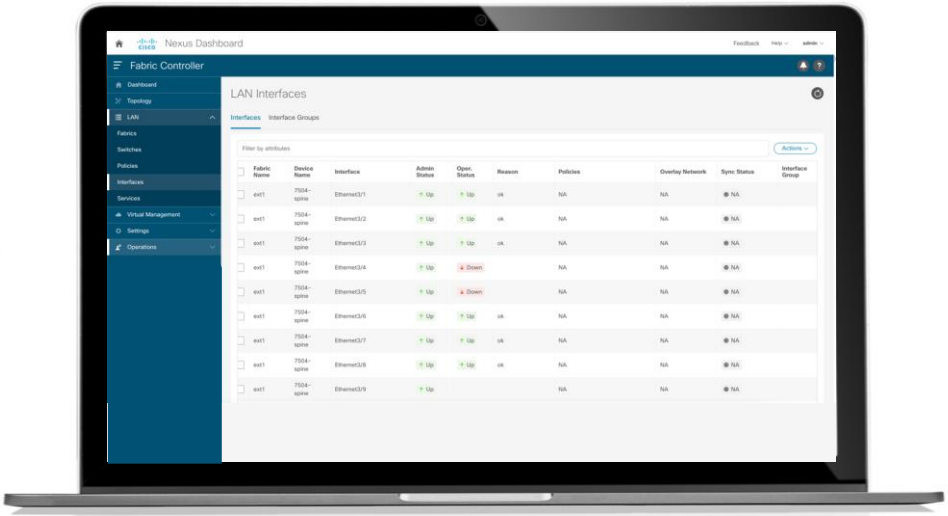
VXLAN EVPN management for Cisco IOS-XE Catalyst devices

Discovery and basic monitoring for third-party devices

ARISTA

Interface Groups

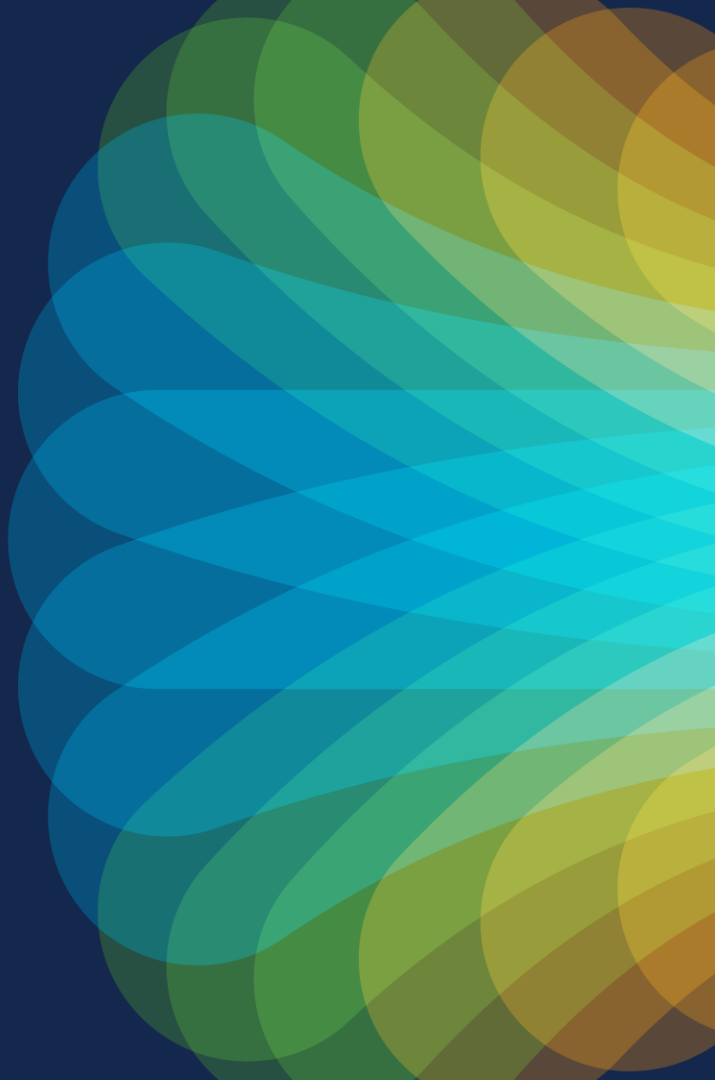
Create interface groups and attach overlay networks to these groups in one go



Benefit

Simplify Overlay Provisioning

NDFC Visibility and Monitoring



Visibility and Monitoring

Get comprehensive monitoring

Enhanced topology views

Compute and endpoint visibility

OAM support with NDFC

Obtain detailed inventory, health, resource consumption information on devices

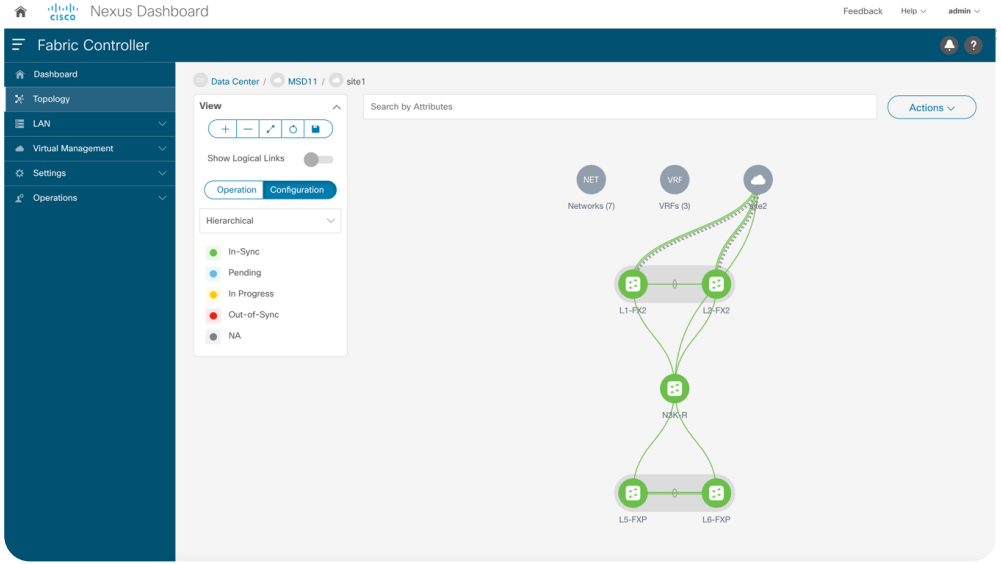
End-to-end visibility, monitoring and troubleshooting

Integrate with Day 2 operations

Benefits

Intuitive	Deep Visibility	Enhanced Monitoring

Visualize Multiple Fabrics with Topology Views



Benefit

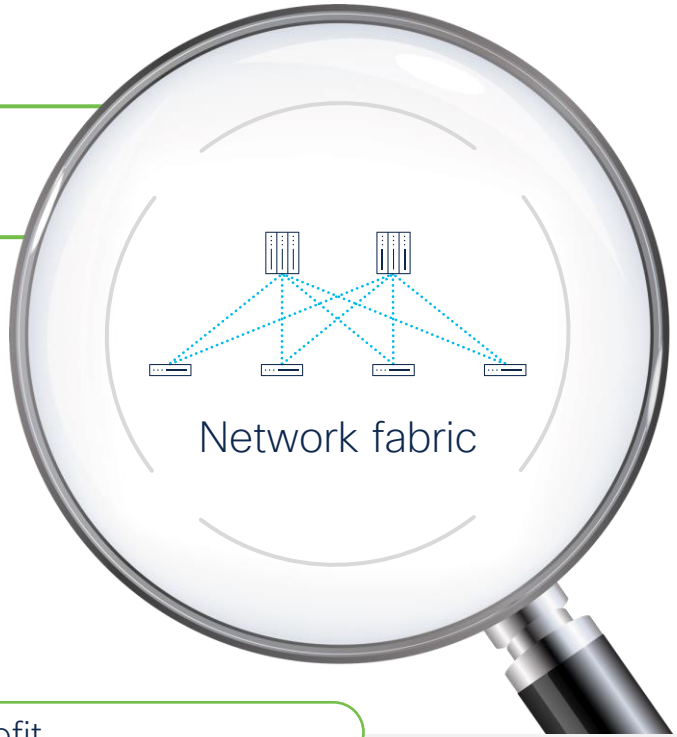
Dynamic and Intuitive, Superior App Experience

Compute Visibility

Dynamic fabric topology views

Visibility from Network Fabric and Infrastructure

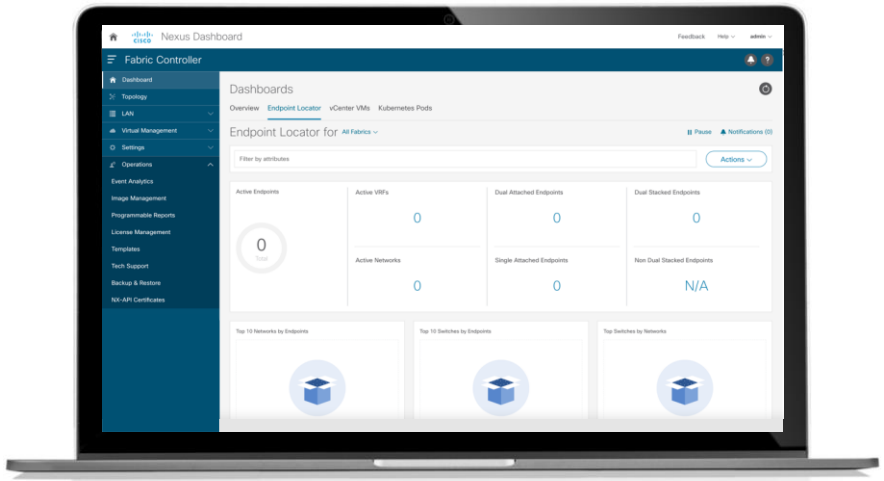
Kubernetes and VM level visibility



Benefit

Single Point of Management Providing In Depth Visibility and Information

Endpoint Visibility



Almost real-time data on active endpoints

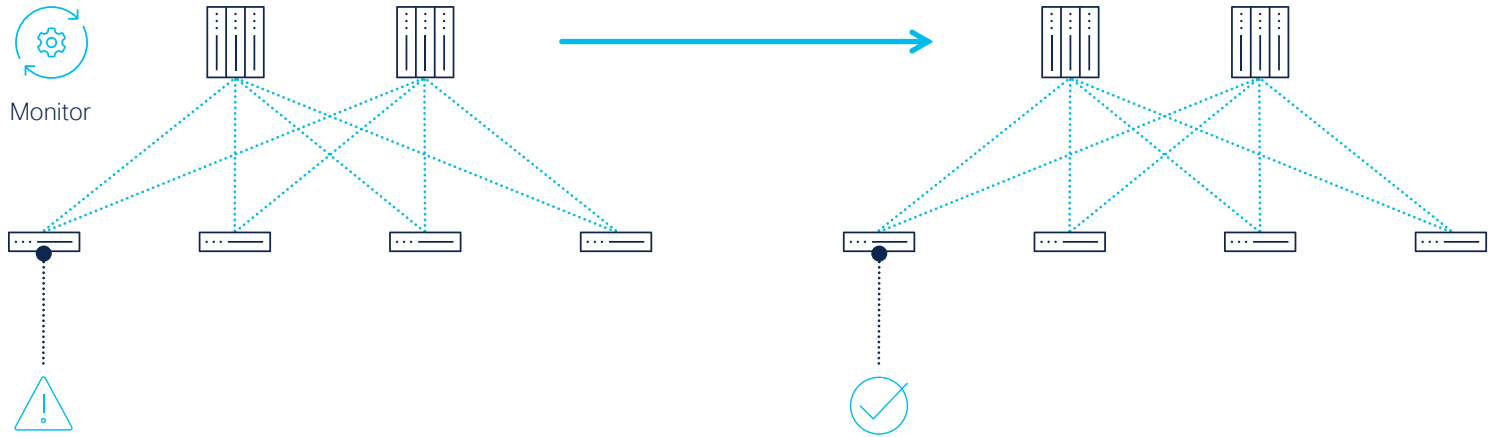
Consolidated in single view with endpoint locator dashboard

Obtain information on:

- Endpoint life and history
- Active VRFs
- Active networks

Operations, Administration and Maintenance

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



Benefits

Enhance management

Monitoring and troubleshooting capabilities

NDFC with Day 2 Operations

Seamless Integration with Day 2 Operations App NDI for In Depth Telemetry Analytics

Management

+

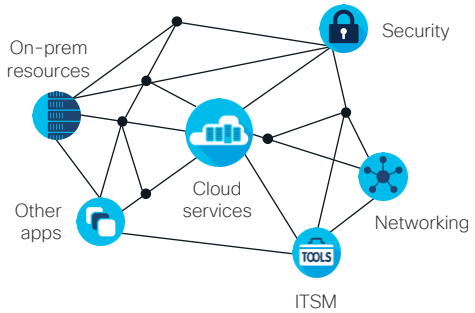
Real-time insights

Benefit

Advanced Monitoring and Troubleshooting Capabilities

Cisco Nexus Dashboard Insights (NDI)

360-Degree Visibility



Network, applications, integrations

Analytics

Digitization, telemetry, correlation

Integrate with NDFC

Unprecedented visibility into data center environments

Nexus Dashboard Fabric Discovery

Run fabric discovery for LAN deployments:
Enable inventory, discovery, monitoring only

Enable Cisco Nexus Dashboard's Day 2 operations capabilities without deploying fabric controller

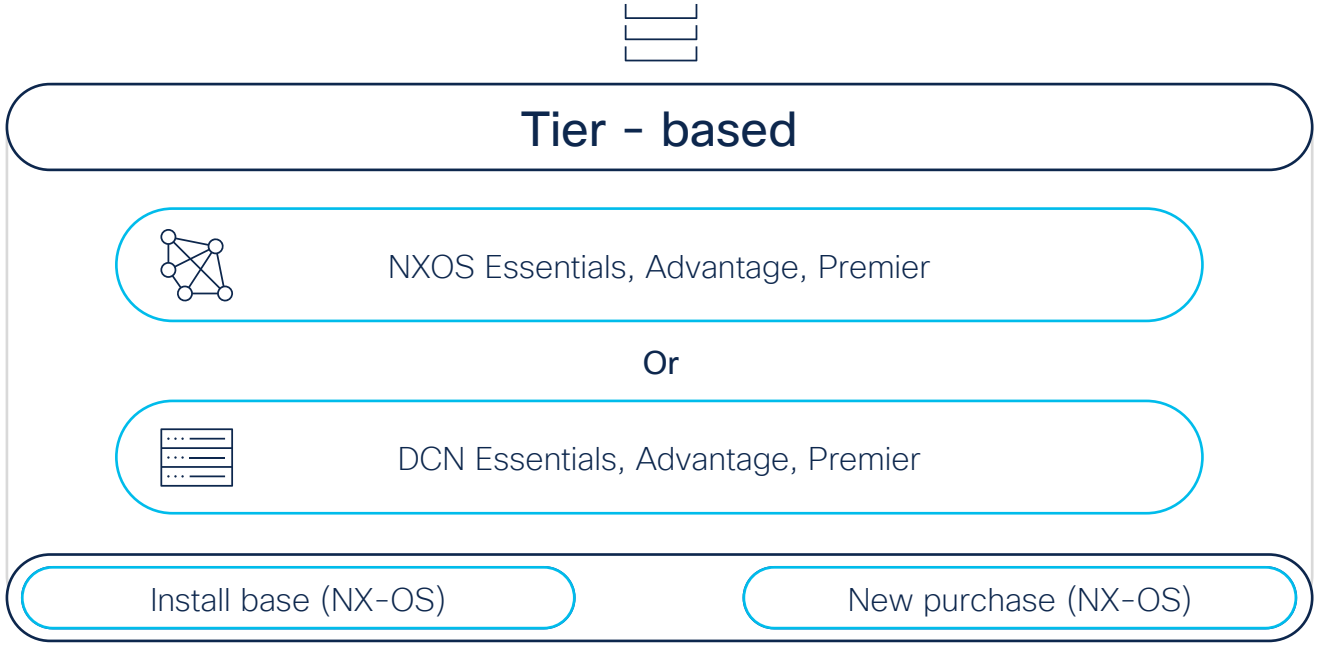
Benefit

Deep Visibility into Deployments

NDFC Licensing

Easily License Your NDFC

Software Included with Switch Subscription Licenses



Smart Licensing

Increased ease of use and efficient consumption

Less restrictions with flexible reporting

Reduced overall licensing friction for users

NDFC 12.0 is Transitioning to a Smart Licensing Only Release

NDFC Demos

NDFC Demo

NDFC Dashboard Walkthrough

NDFC VXLAN Fabric

NDFC Ansible

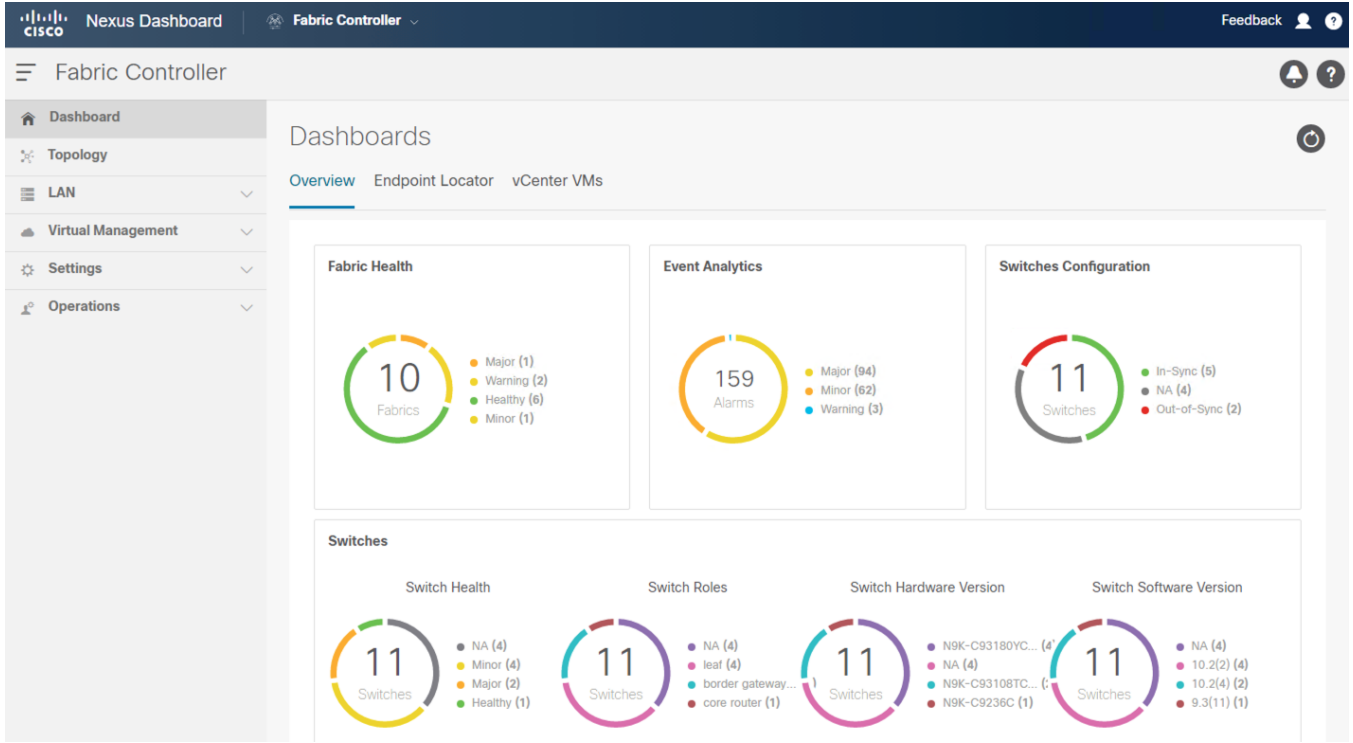
Bonus - NDFC and NDI

NDFC Dashboard Walkthrough

New Redesign

Enhanced End Point Capabilities

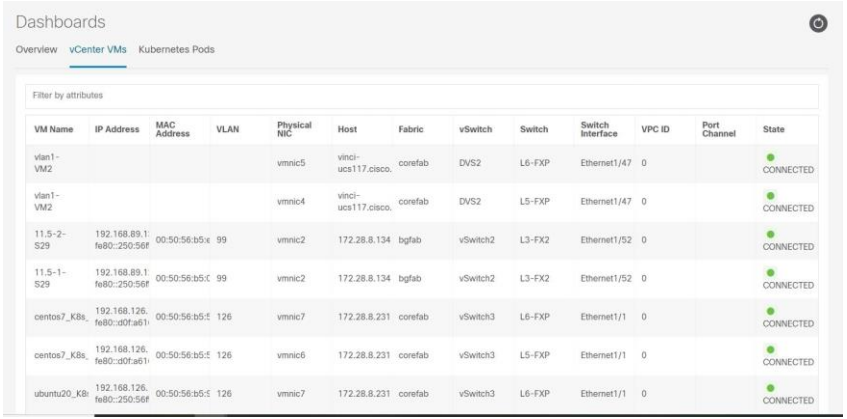
24-hour Snapshots



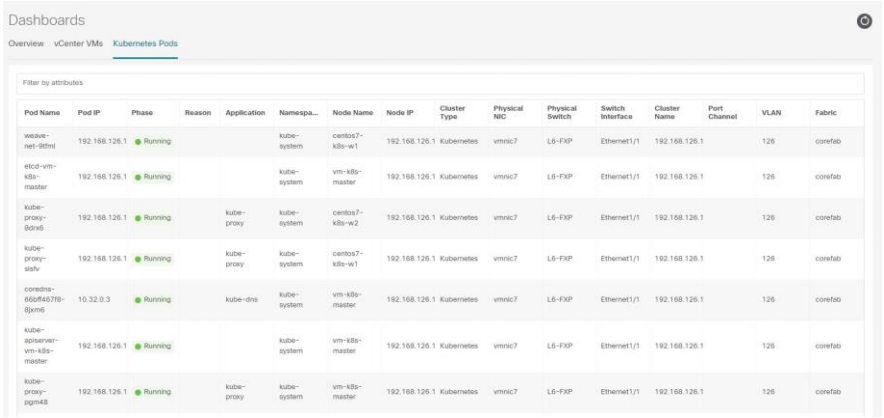
The intent of the **Dashboard** is to enable network and storage administrators to focus on areas of concern around the health and performance of data center switching.

Enhanced End Point Capabilities

Viewing vCenter VMs

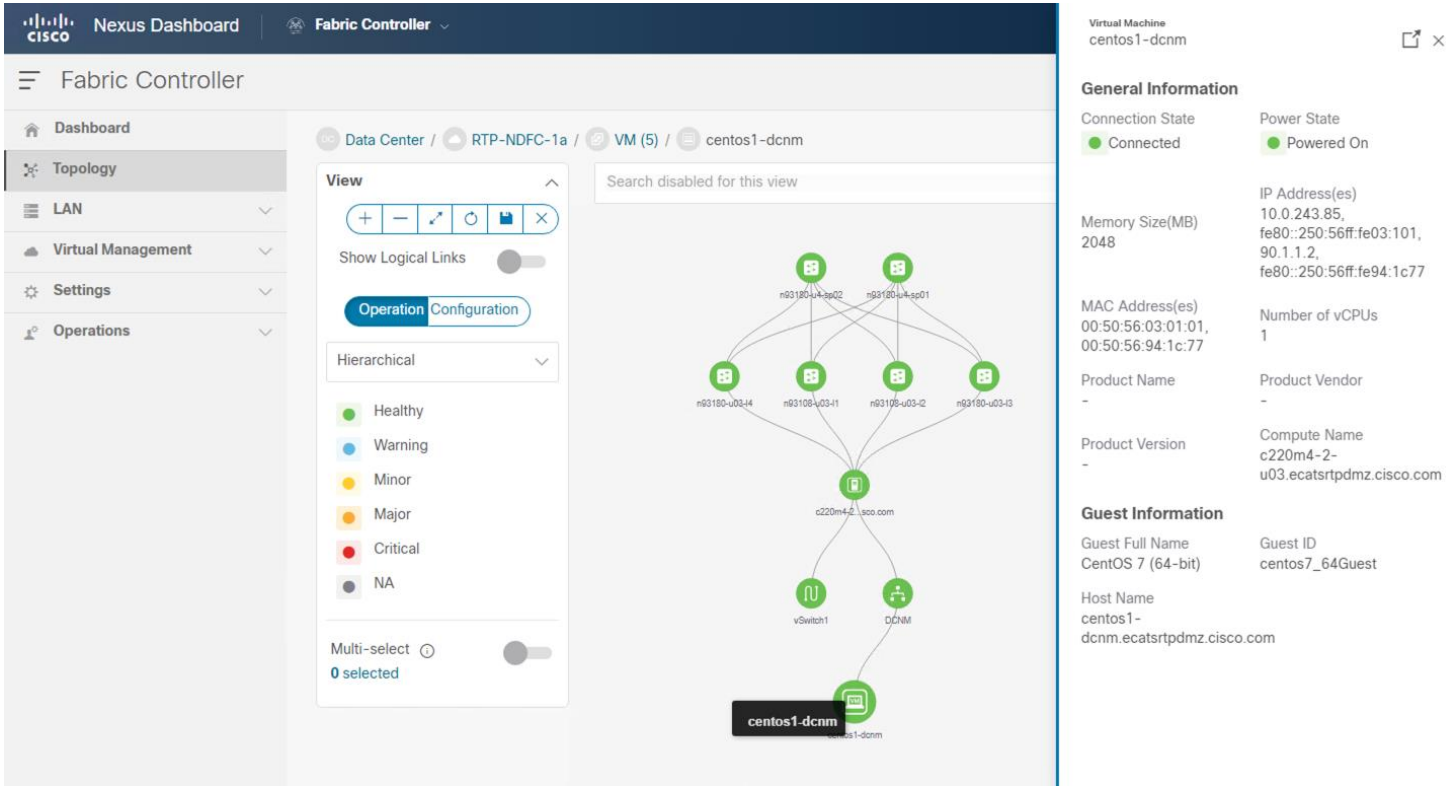


Viewing Kubernetes Pods

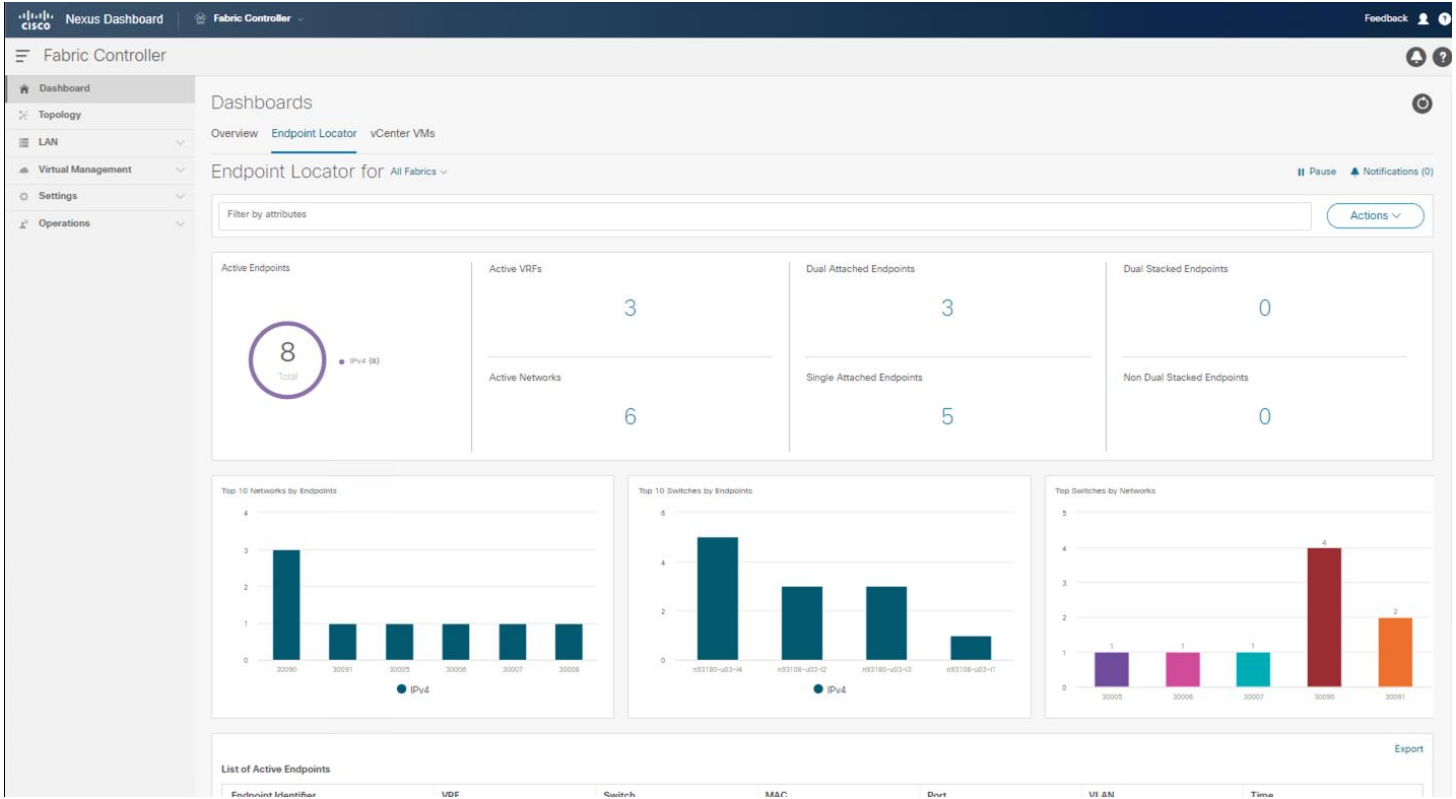


NDFC Provides Superior Visibility to the End Points

Enhanced End Point Visualization



Enhanced Endpoint Locator



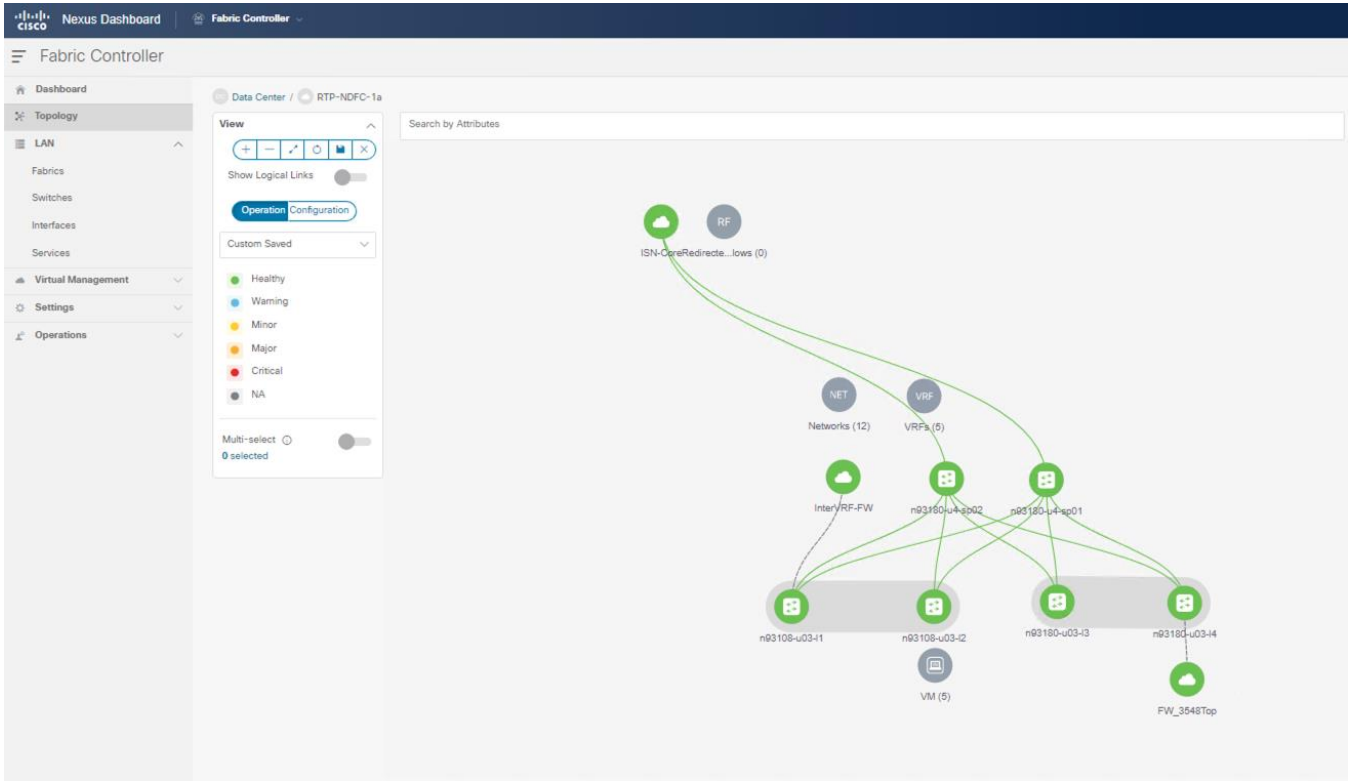
NDFC VXLAN

Easy to Implement

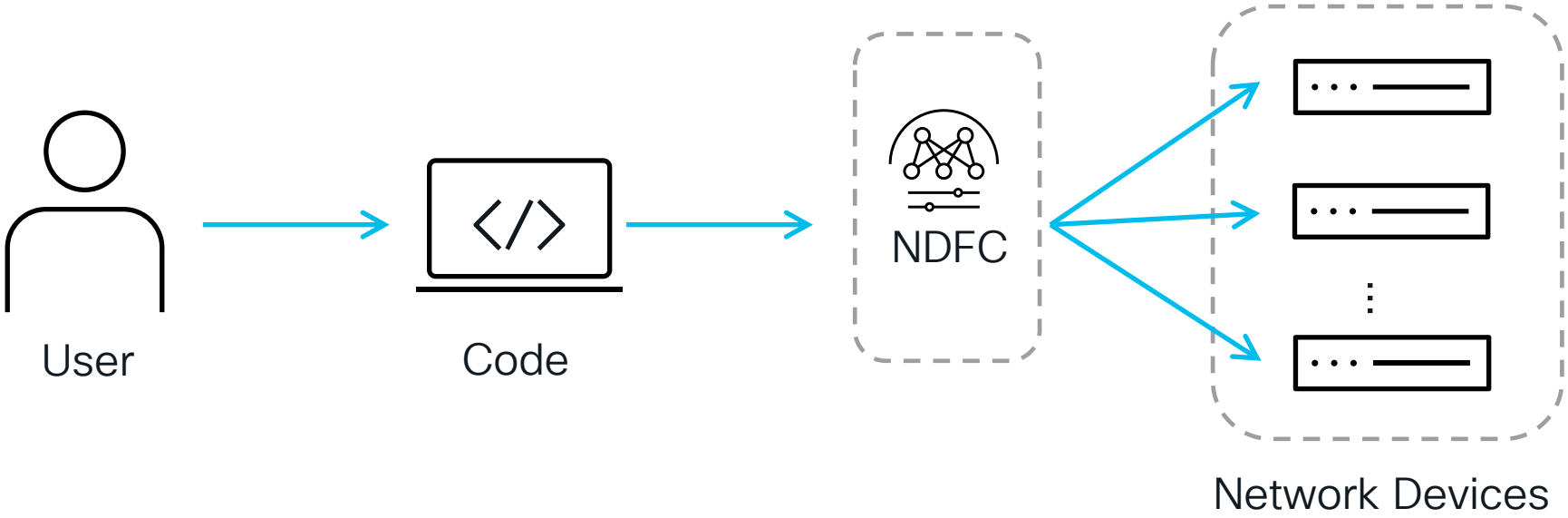
End-to-End Visibility

Follow Best Practices

NDFC VXLAN Fabric

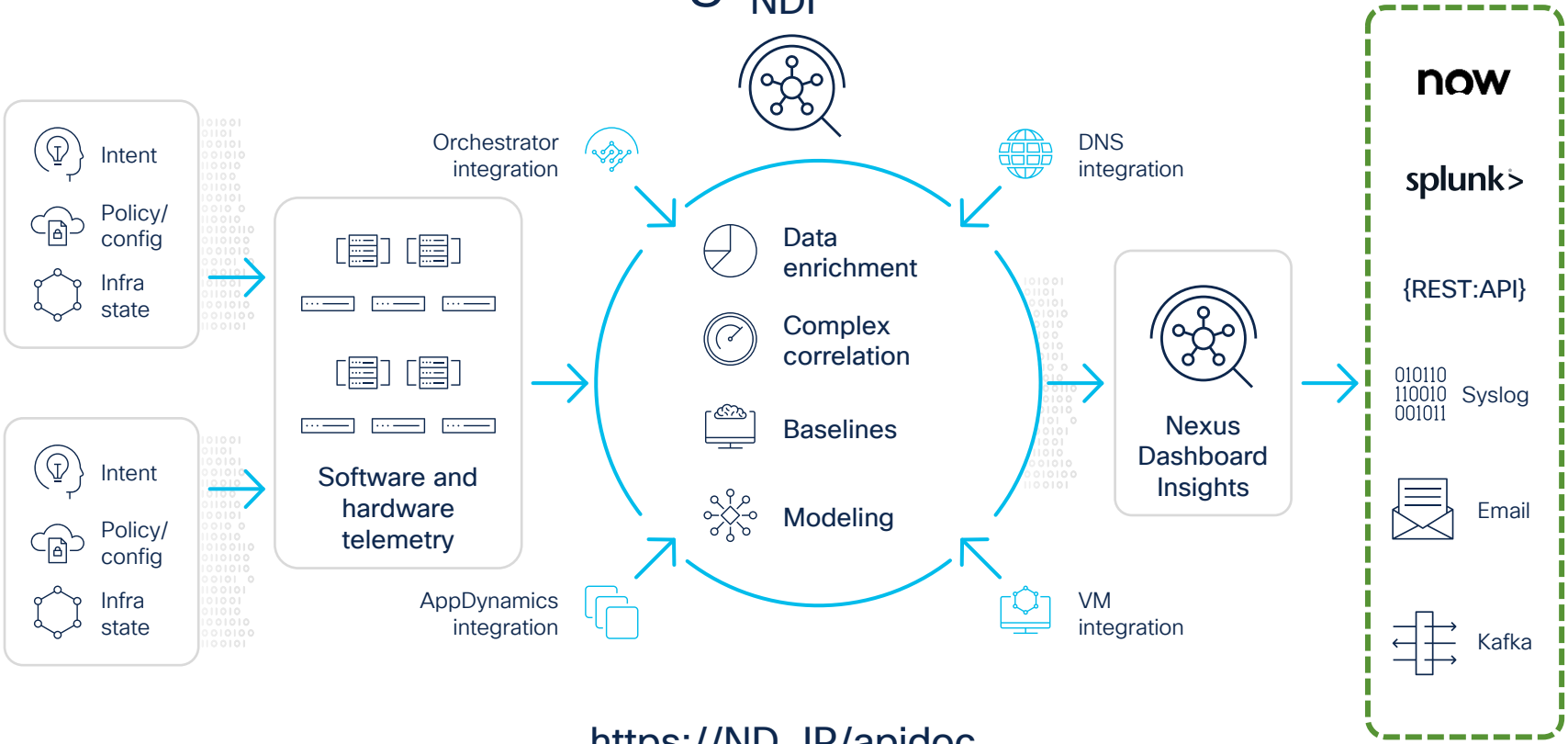


Ansible and NDFC



Network Engineers

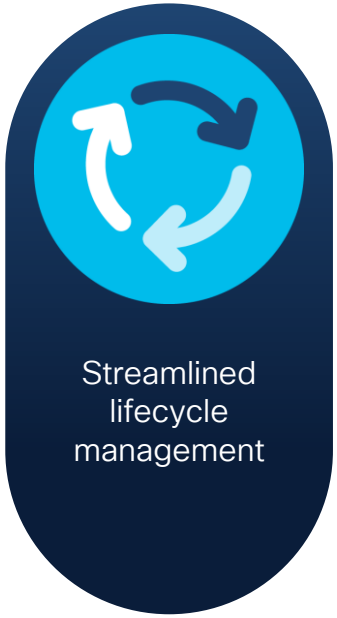
Nexus Dashboard Insights



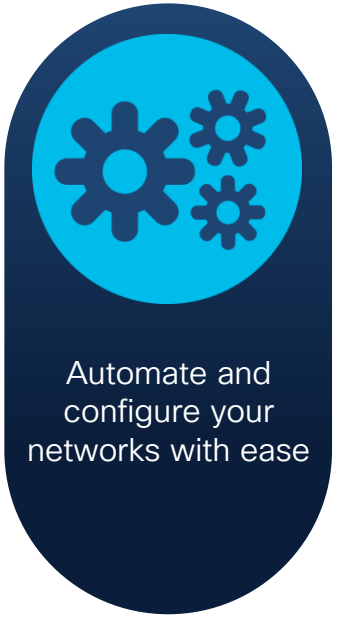
https://ND_IP/apidoc

Conclusion

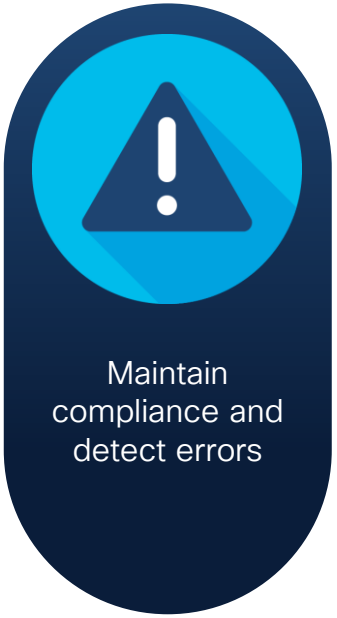
NDFC Summary



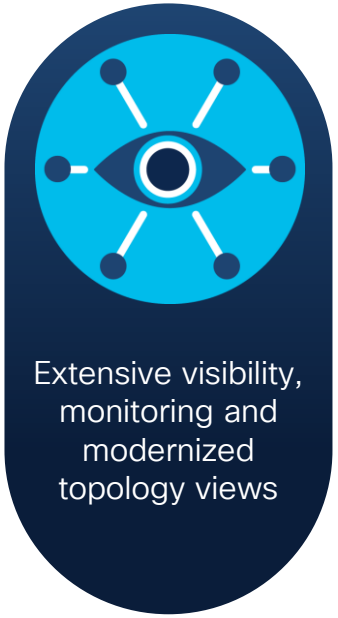
Streamlined lifecycle management



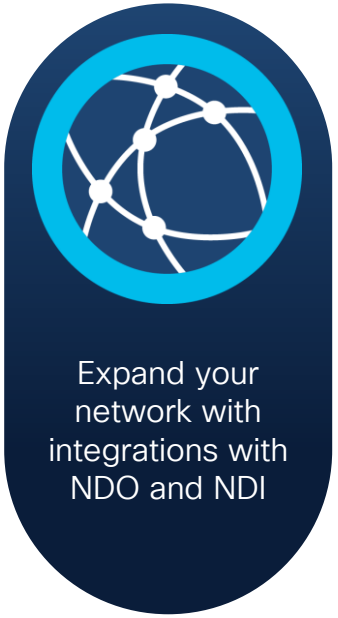
Automate and configure your networks with ease



Maintain compliance and detect errors



Extensive visibility, monitoring and modernized topology views



Expand your network with integrations with NDO and NDI


cisco
The bridge to possible
Thank you
cisco Live!


cisco Live!
Let's go