Nexus Dashboard Fabric Controller for IP Fabric for Media

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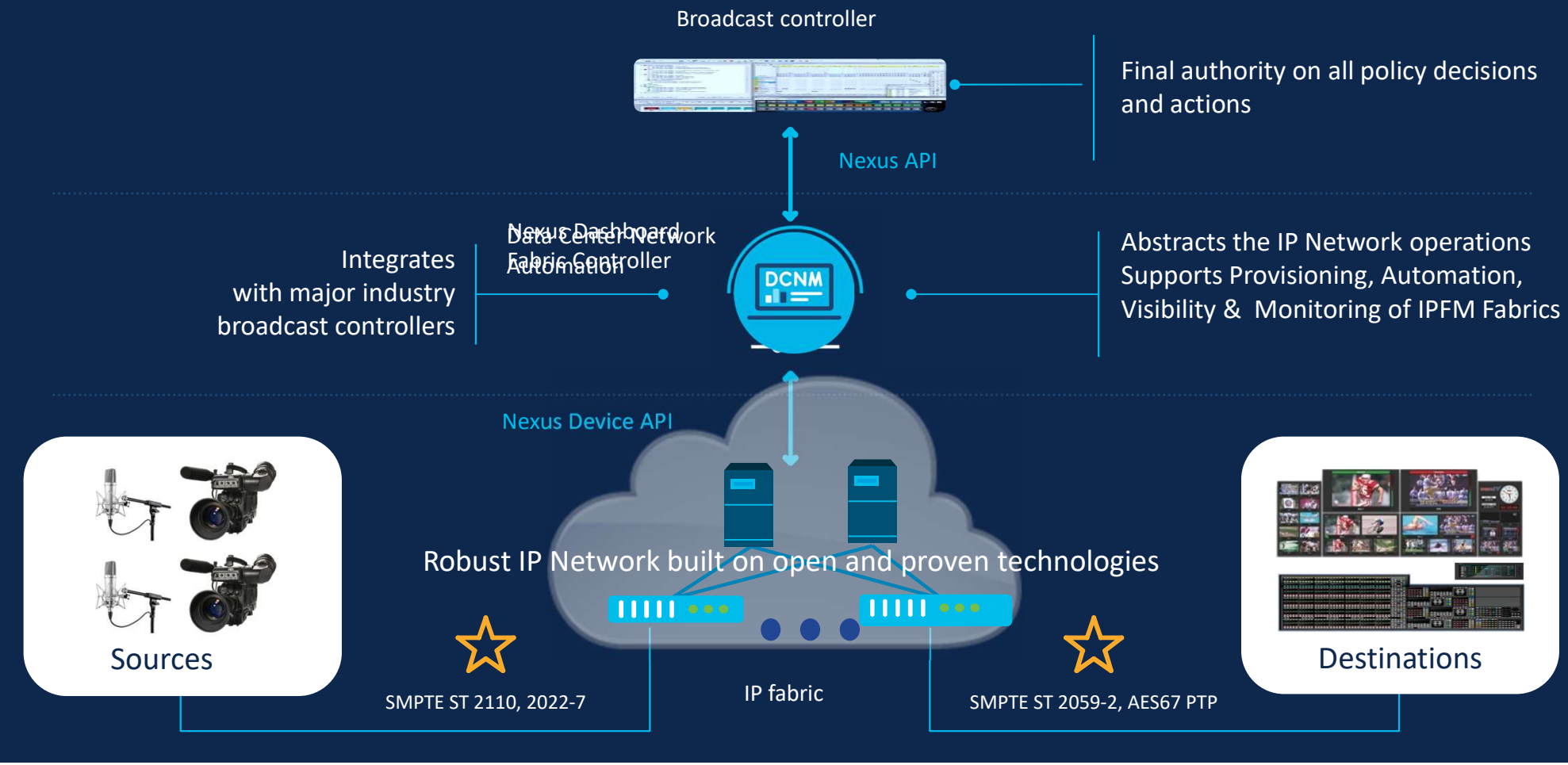
Agenda

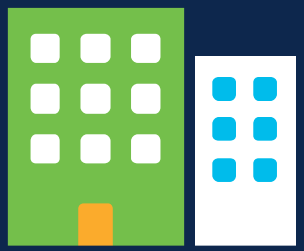
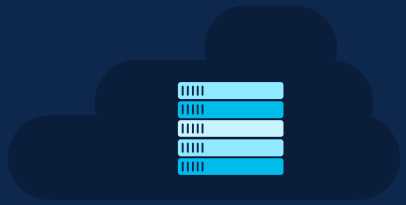
- IPFM Architecture
- Nexus Dashboard Fabric Controller
- IPFM Key Features & Benefits on NDFC
- Form Factors, Installation & Migration
- Demo

IPFM High-level Architecture

NDFC provisions and monitors IP Fabrics for Media



IPFM deployment use cases

Studio (multiple rooms)	Entertainment venue	OB Van/truck
		
		
Spine-leaf	Spine-leaf	Single modular switch

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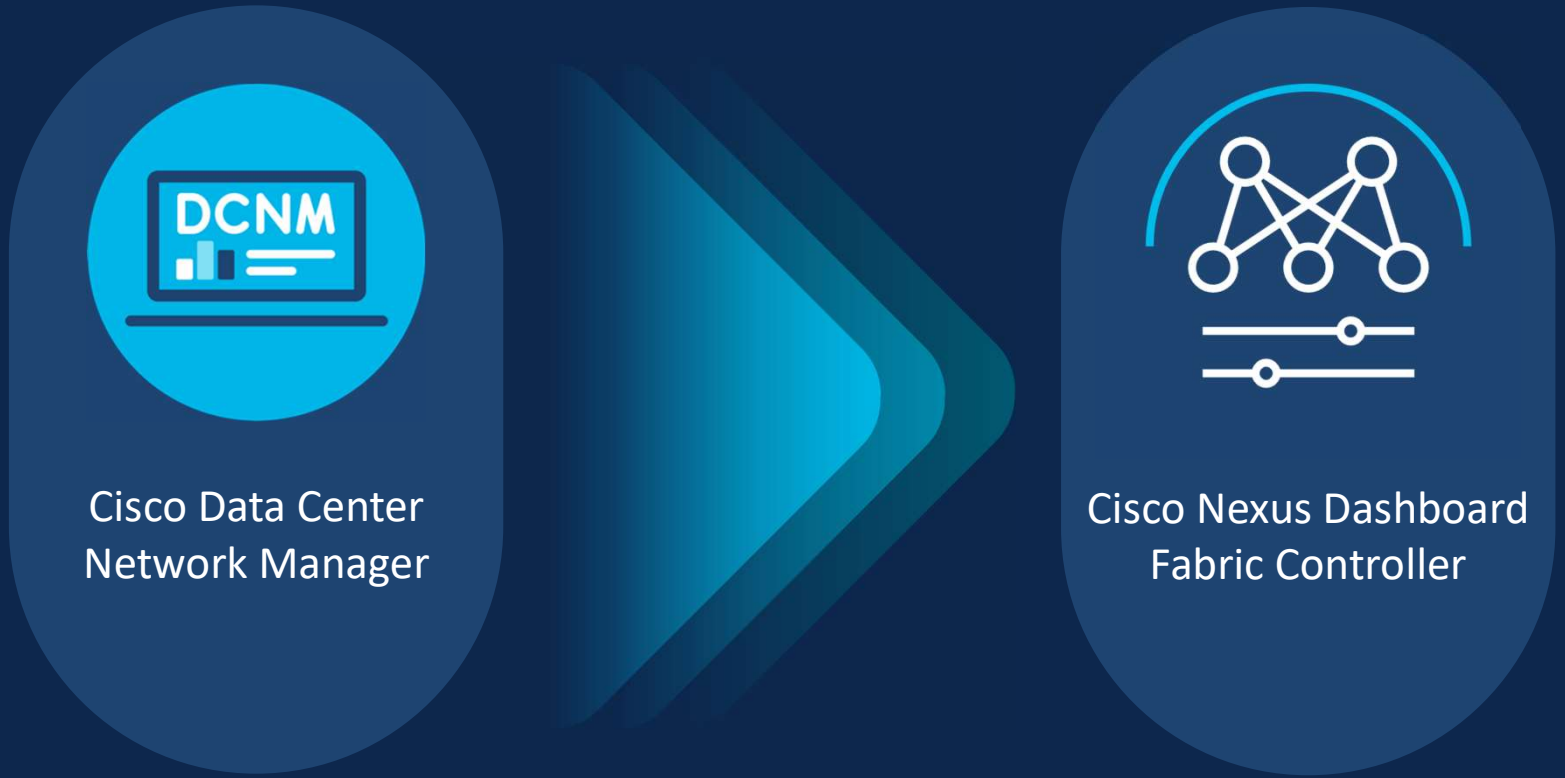
Cisco Data Center Network Manager

Has become Cisco Nexus Dashboard Fabric Controller (NDFC)



Cisco NDFC – Key Points

Cisco Nexus Dashboard
Fabric Controller

- Software application that runs on Cisco Nexus Dashboard cluster
- Micro-services architecture for scale out models
- 3-node cluster for HA
- Communicates with switch via Out-of-Band or In-Band
- Provides switch life-cycle management
- Web based GUI and published REST API

Cisco DCNM rebranded as NDFC | **Media Controller is introduced for IPFM**

Cisco Nexus Dashboard

Simple to automate, simple to consume

Cisco Nexus Dashboard

Powering automation
Unified agile platform

Consume all services in one place

APIC Private cloud | Third-party apps | Public cloud APIC Google Cloud

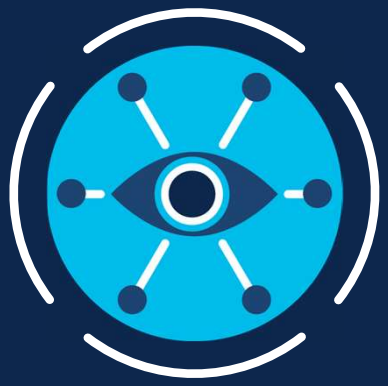
Cisco NDFC

Automation

Accelerate provisioning
and simplify deployments

Management

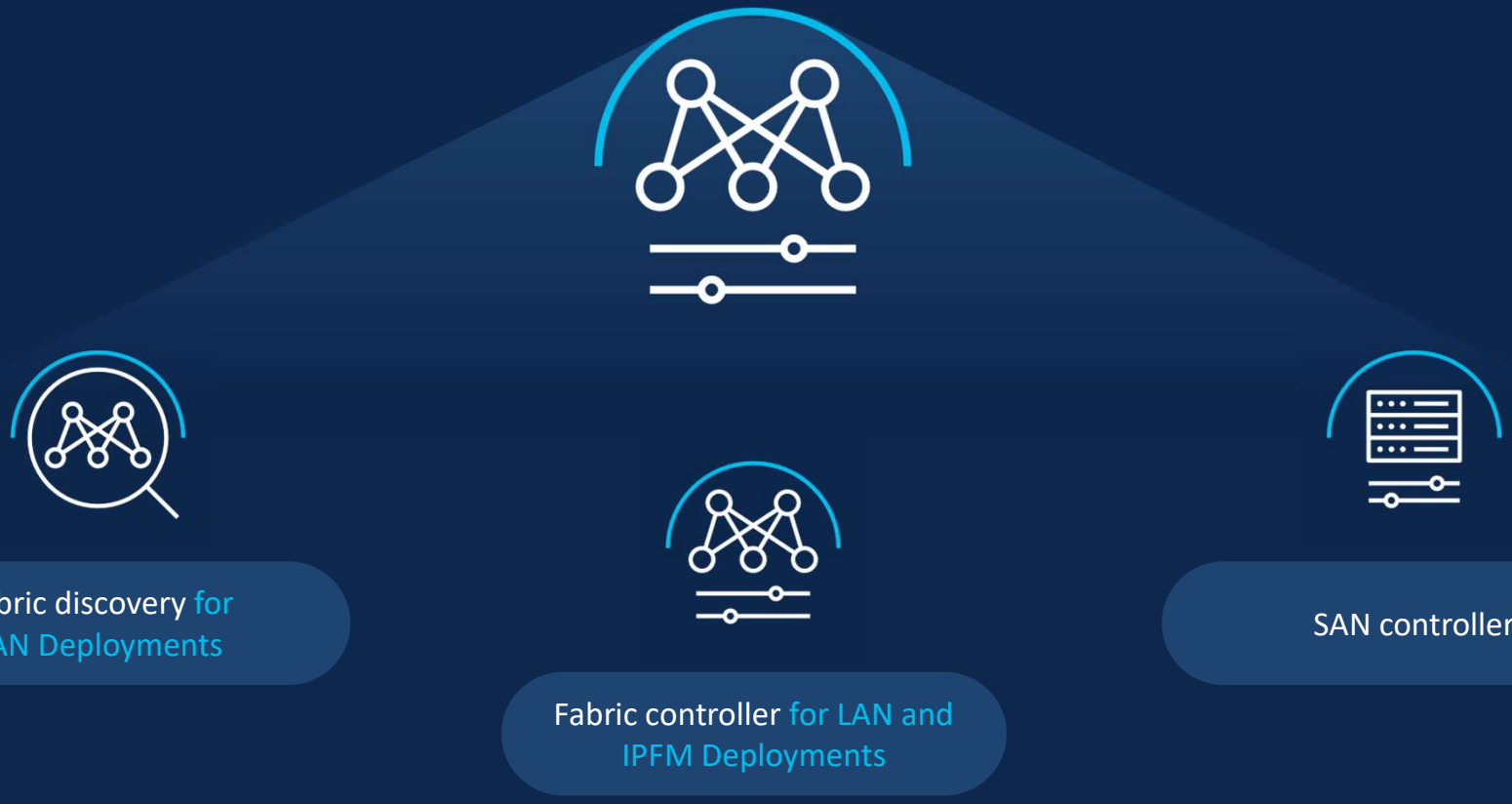
In depth Management
and control for all
network deployments



Visibility

Get Centralized Visibility
and Monitoring views

Cisco NDFC modes



Fabric discovery for LAN Deployments

Fabric controller for LAN and IPFM Deployments

SAN controller

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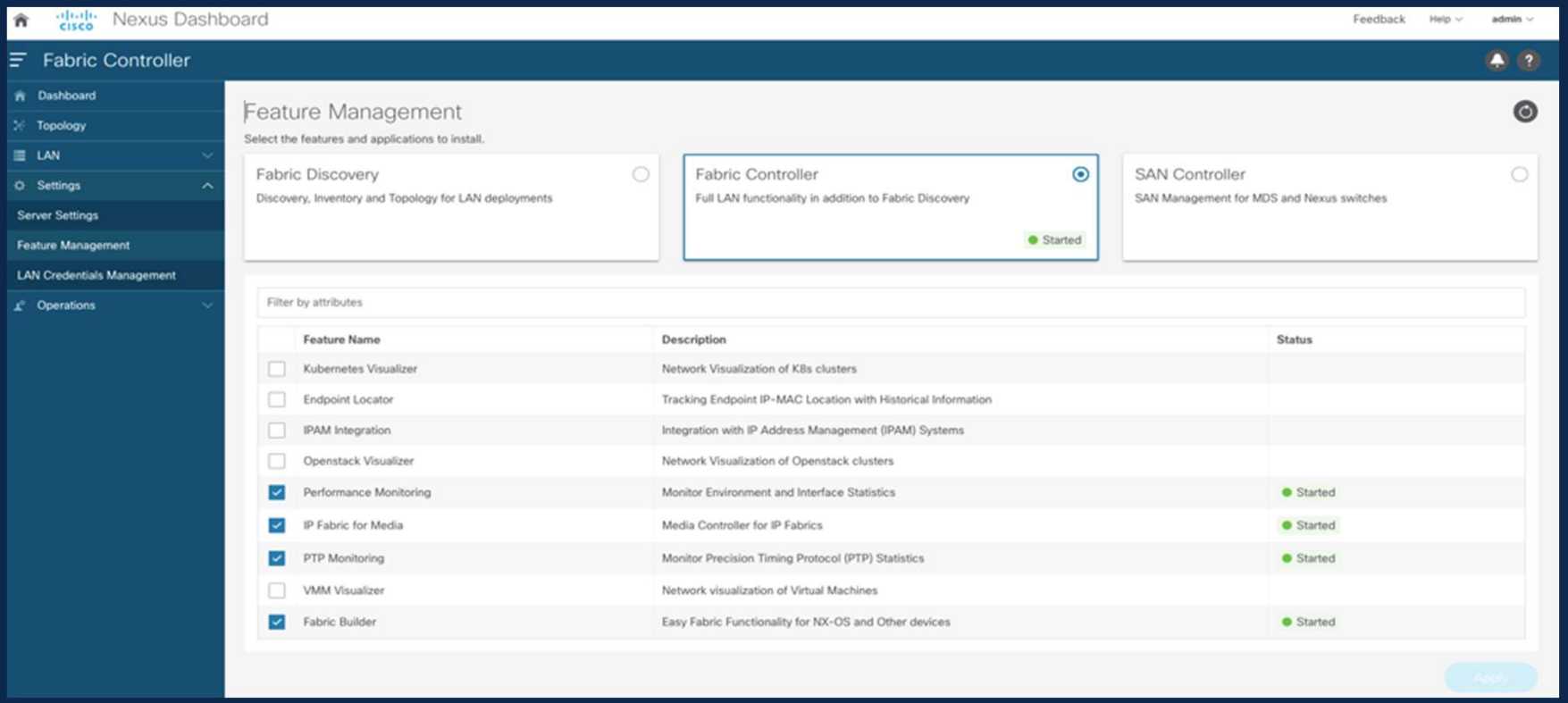
IPFM key features with NDFC

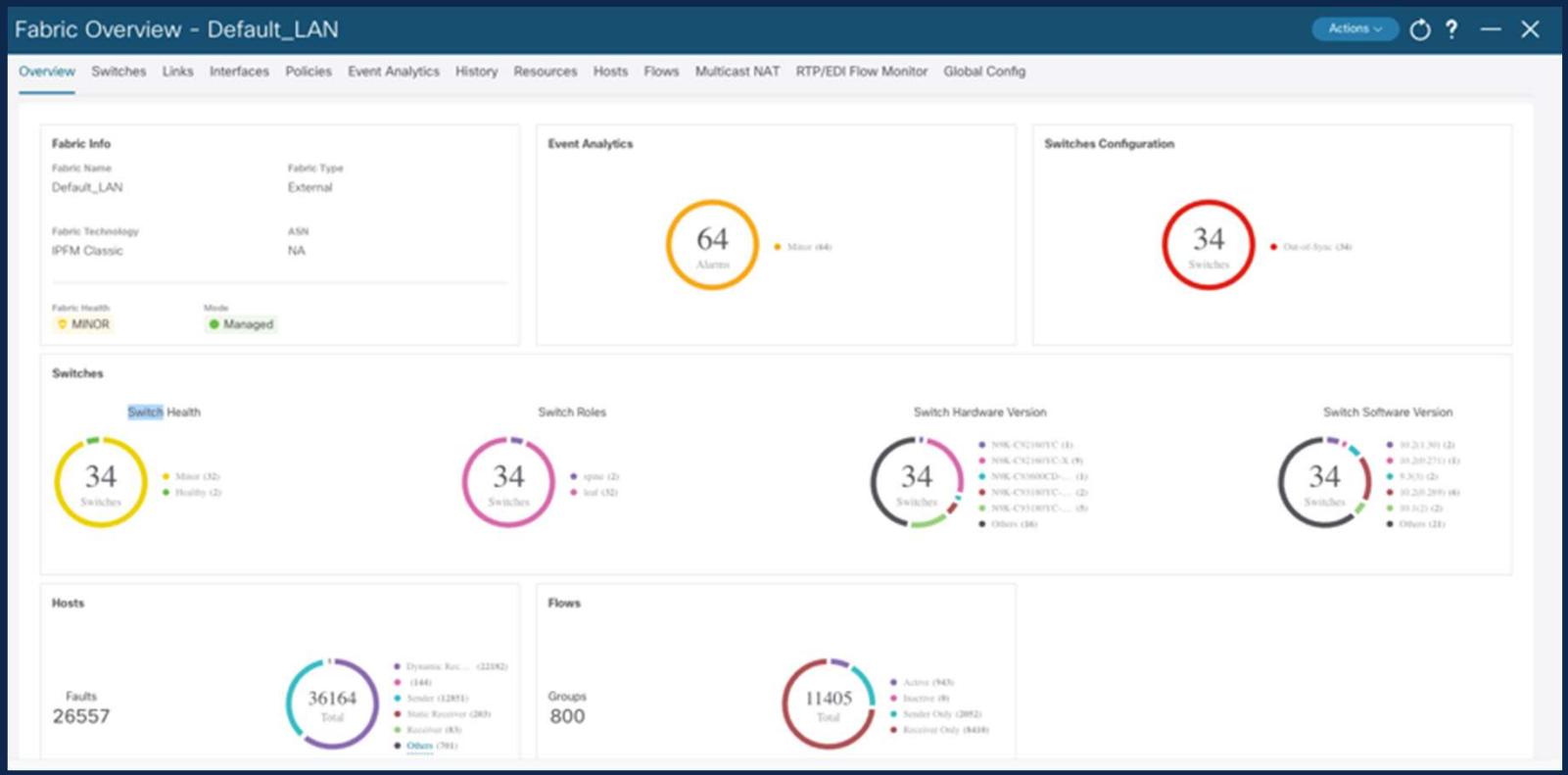
- Runtime configurable feature in LAN installation
- Easy Fabric Builder
- Per fabric RBAC
- Backup and restore
- Kafka notifications for real time events
- IPFM dashboard new look and feel
- Host and Flow Policies
- Host and Flow Visibility
- PTP and RTP flow monitoring
- Multi-tenancy & Multicast NAT

IPFM Feature in LAN Installation



IPFM is a Runtime Configurable feature in LAN installation

IPFM Fabric & Dashboard Enhancements



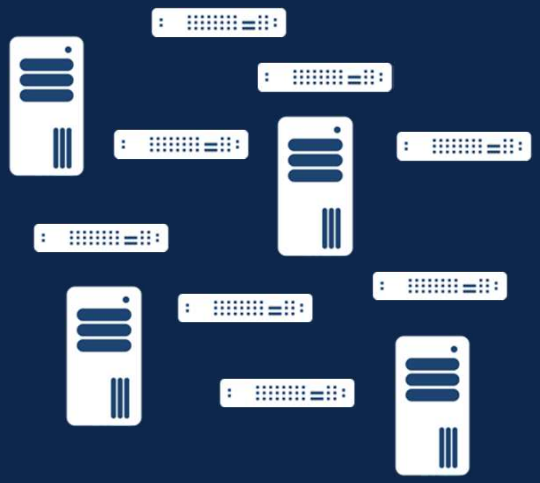
IPFM Dashboard : New look and feel

Provision a new fabric in minutes

Easy Fabric builder for IPFM

NEW

Un-provisioned switches



Within NDFC
select fabric builder

Cisco best practice implemented

Fast, automated process

Benefits

Accelerate fabric deployments	Automated consistency	Minimize risk

IPFM Fabric Templates

IPFM_Classic

Fabric Template to manage existing switches in IPFM

Read-only (monitor)/Read-write (managed)

Brownfield deployment

Greenfield deployment

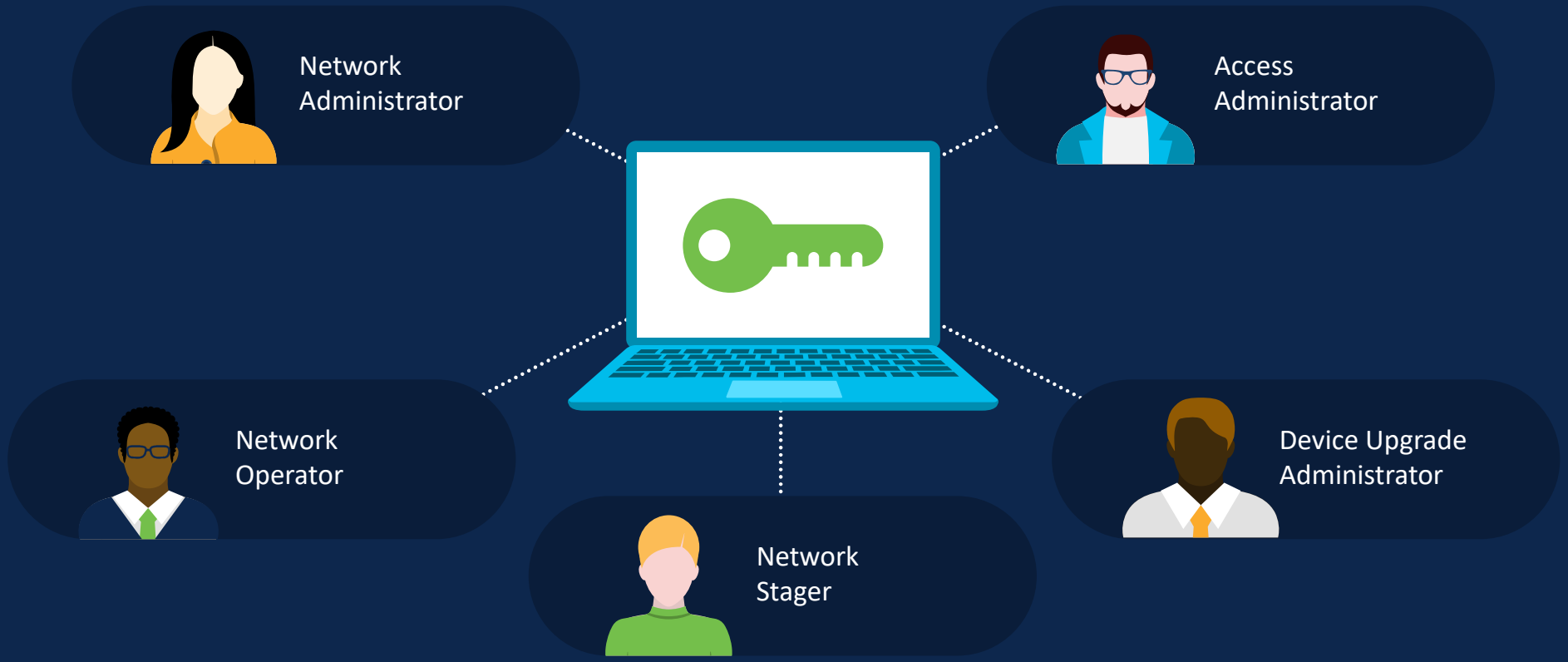
Greenfield deployment

Easy_Fabric_IPFM

Fabric Template for IPFM

Pre-configured best practice policy template to build your IPFM underlay in minutes

Role-based access control (RBAC)

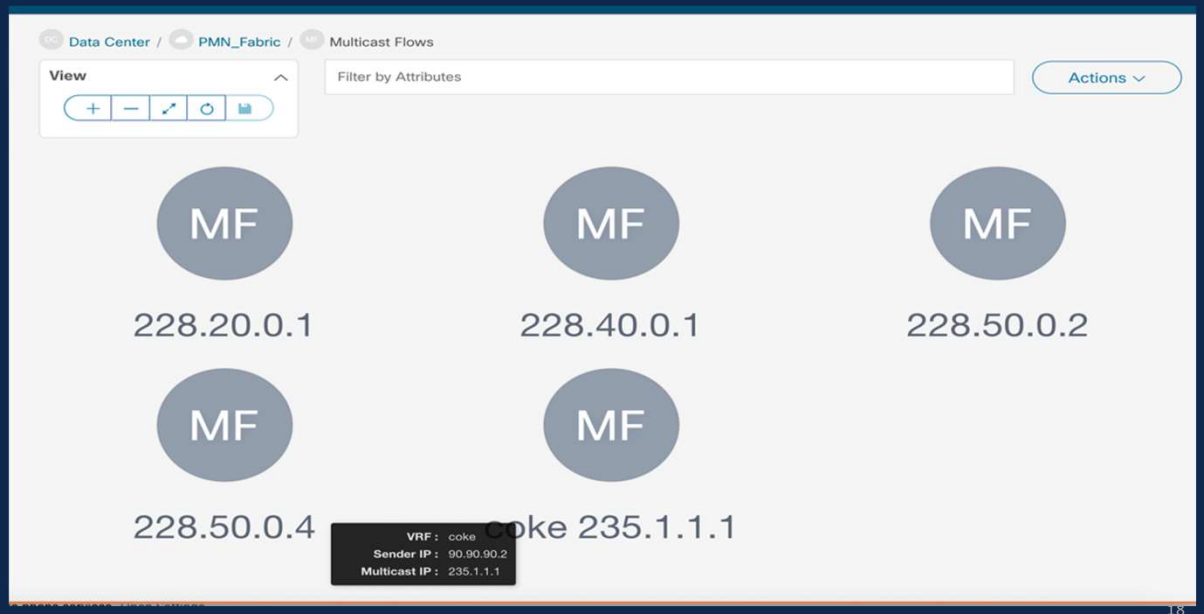


Increase efficiency and productivity with granular roles orchestrated from Nexus Dashboard

IPFM Multi-tenancy VRF

Description: VRF support for NBM deployments.
Multiple vrfs can be enabled in NBM active mode from NDFC.

Benefit: Logical isolation of multiple customers



Security

Host Policies

Authorize endpoints to send and receive traffic

Fabric Overview - IPFM

Actions

Overview | Switches | Links | Interfaces | Policies | Event Analytics | History | Resources | Hosts | Flows | Multicast NAT | RTP/EDI Flow Monitor | Global Config

- Discovered Hosts Summary
- Discovered Hosts
- Host Policies
- Host Alias
- Applied Host Policies

Filter by attributes

Telemetry Sync Status: 4/4

VRF	Policy Name	Host Role	Switch	Interface	Active	Timestamp
default	Default-Sender	SENDER	LEAF1	ALL	YES	Tue, Apr 19 2022 22:17:00 (UTC)
default	Default-Sender	SENDER	SPINE2	ALL	YES	Tue, Apr 19 2022 22:16:50 (UTC)
default	Default-Sender	SENDER	SPINE1	ALL	YES	Tue, Apr 19 2022 22:16:42 (UTC)
default	Default-Sender	SENDER	LEAF2	ALL	YES	Tue, Apr 19 2022 22:16:42 (UTC)
default	Default-Receiver-Local	RECEIVER	LEAF1	ALL	YES	Tue, Apr 19 2022 22:17:00 (UTC)
default	Default-Receiver-Local	RECEIVER	SPINE2	ALL	YES	Tue, Apr 19 2022 22:16:50 (UTC)
default	Default-Receiver-Local	RECEIVER	SPINE1	ALL	YES	Tue, Apr 19 2022 22:16:42 (UTC)
default	Default-Receiver-Local	RECEIVER	LEAF2	ALL	YES	Tue, Apr 19 2022 22:16:42 (UTC)
default	Default-Receiver-External	PIM	LEAF1	ALL	YES	Tue, Apr 19 2022 22:17:00 (UTC)
default	Default-Receiver-External	PIM	SPINE2	ALL	YES	Tue, Apr 19 2022 22:16:50 (UTC)

Ability to restrict a sender to send to certain flows, and receiver to subscribe to certain flows

Security

Flow Policies

Reserve and secure network bandwidth

Overview | Switches | Links | Interfaces | Policies | Event Analytics | History | Resources | Hosts | Flows | Multicast NAT | RTP/EDI Flow Monitor | Global Config

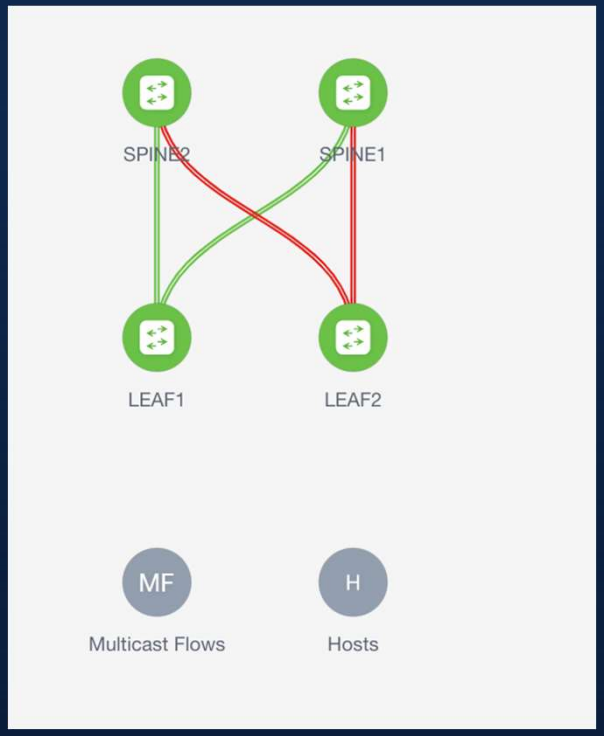
- Flow Status
- Flow Policies
- Flow Alias
- Static Flow

Filter by attributes

VRF	Policy Name	Multicast IP Range	Bandwidth	QoS/DSCP	Deployment Action	Deployment Status	In Use	Policer	Last Updated
default	Ancillary	view	500 Kbps	Best Effort	Create	Success (4/4	No	Enabled	Wed, Apr 13 2022 23:26:58 (UTC)
default	Audio	view	100 Mbps	AF21 Low Drop	Create	Success (4/4	Yes	Enabled	Wed, Apr 13 2022 23:26:58 (UTC)
default	Default	*	0 Gbps	Best Effort	Create	Success (4/4	Yes	Enabled	Wed, Apr 13 2022 23:14:50 (UTC)
default	NAT_flows	view	1.3 Gbps	Best Effort	Create	Success (4/4	Yes	Disabled	Wed, Apr 13 2022 23:26:58 (UTC)
default	Video	view	1.5 Gbps	AF11 Low Drop	Create	Success (4/4	Yes	Enabled	Wed, Apr 13 2022 23:26:58 (UTC)

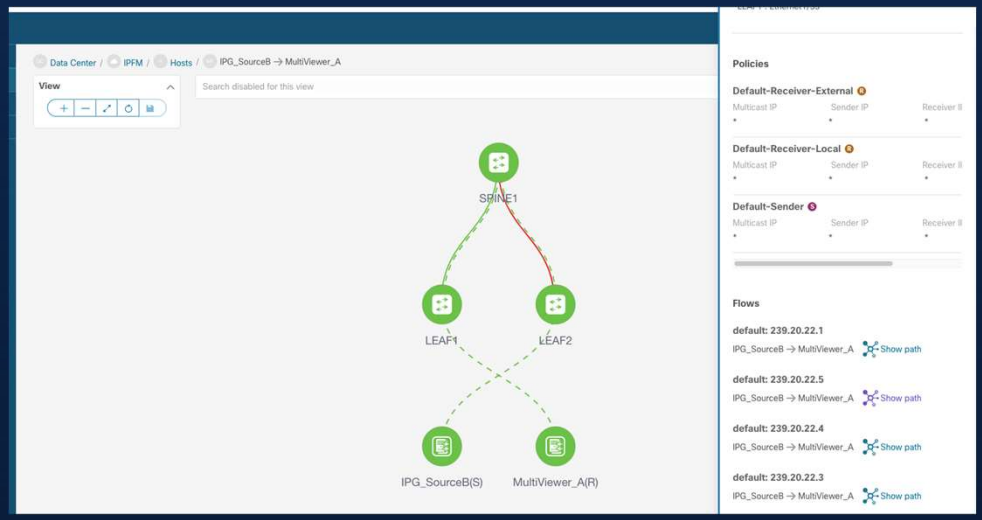
Policer to ensure traffic from endpoints does not exceed allowed bandwidth

IPFM visibility and analytics



Host and flow path visualization

NDFC provides a view of the discovered hosts and end-end flows populated through telemetry both pictorially and statistically



Benefits

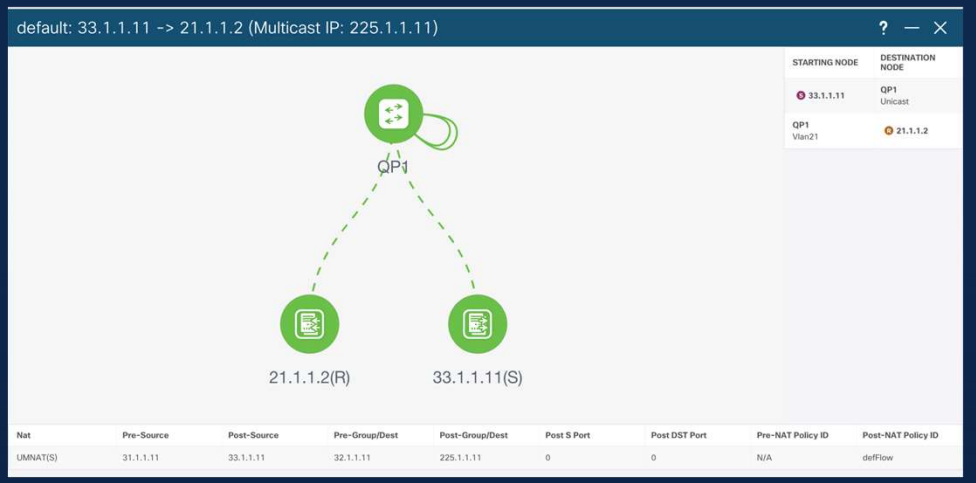
High level network visibility

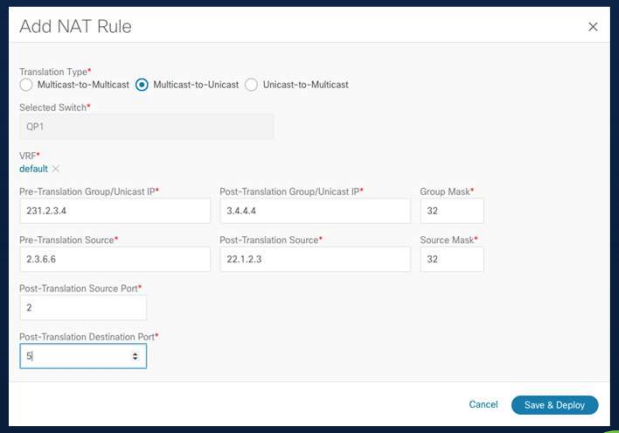
Host and flow path visibility in the network

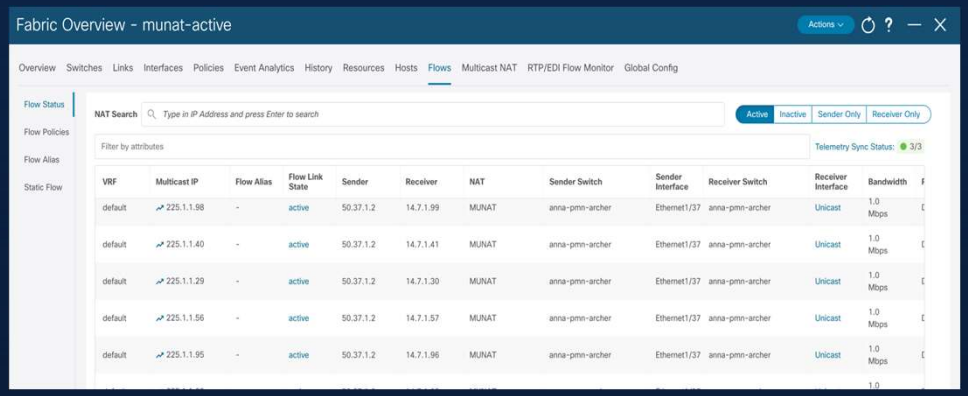
IPFM visibility and analytics
Multicast NAT

Multicast NAT visualization

NDFC aggregates the multicast flows per sender and receiver combination and provides visibility into NAT rules through topology





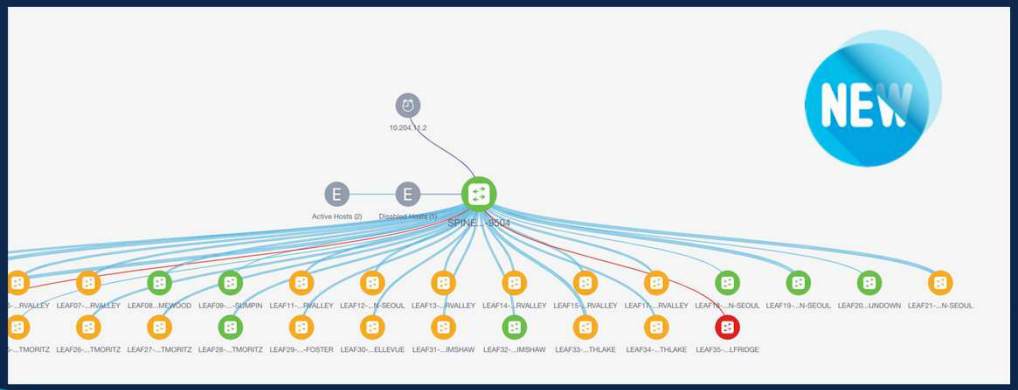


Benefits

High level of network visibility for NAT'ed flows

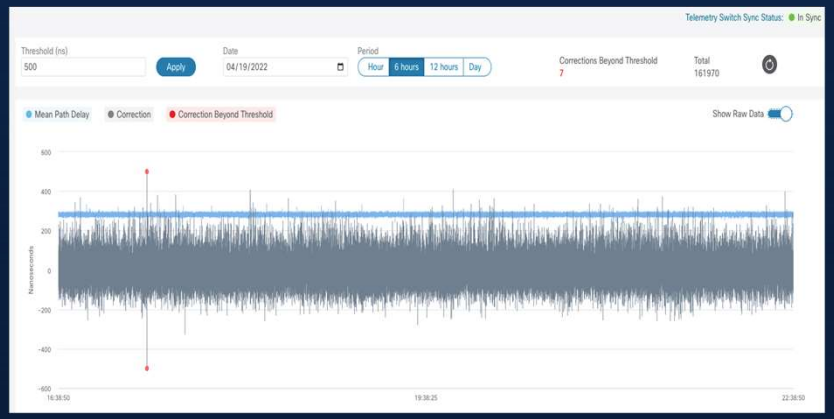
Monitoring and management of Multicast Service Reflection

IPFM visibility and analytics
PTP monitoring



PTP monitoring

NDFC provides a view of PTP related statistics such as Correction beyond threshold, Mean Path Delay, Clock
and Port Status



PTP Topology View

NDFC provides a topology view of Boundary Clock implementation [master-slave hierarchy]

Benefits

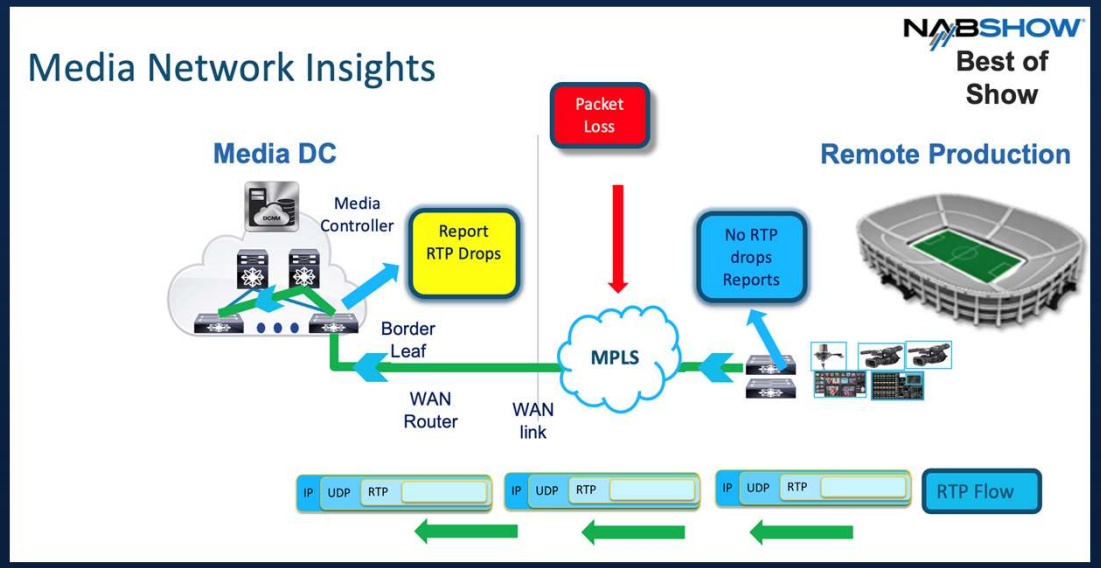
High level of visibility for diagnostics

Monitoring of PTP

IPFM visibility and analytics
RTP Flow Monitoring

RTP and EDI monitoring

NDFC provides a view of all the active RTP and EDI flows and drops and provides topology view to pinpoint the loss in the network

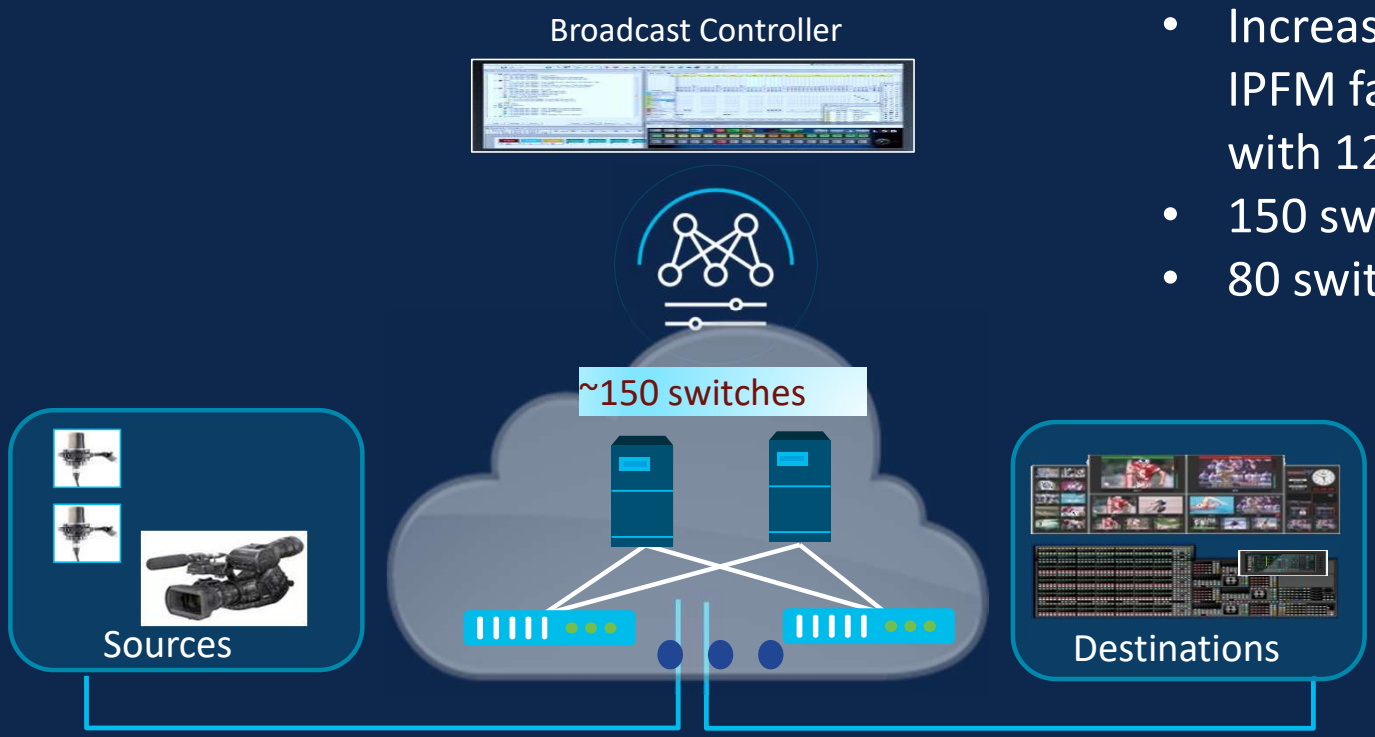


Benefits

High level of network visibility for diagnostics

Monitoring and management of IP media networks

IPFM Fabric Switch Scale



- Increased switch scale support for IPFM fabrics from 35 to 150 switches with 12.1(1) version
- 150 switches for greenfield
- 80 switches for Brownfield

Large Scale Media Deployments

Increased Scalability

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Nexus Dashboard platform
Hardware vs. Software Stack: Multiple choices

Physical Nexus Dashboard Cluster
Software pre-installed. (.iso)

Virtual Nexus Dashboard Cluster

(.ova)

Since 12.0.1

(.qcow2)

Roadmapped

NDFC 12 Form Factors

DCNM*1	OVA/ISO	16 vCPUs	32G	500G HDD	3 x NIC

1-Node Cluster

pND*1	SE Appliance

DCNM*2	OVA/ISO	16 vCPUs	32G	500G HDD	3 x NIC

3-Node Cluster

vND*3 App node	OVA	16 vCPUs	64G	500G SSD	2 x NIC

OR

pND*3	SE Appliance

5-Node Cluster

vND*5 App node	OVA	16 vCPUs	64G	500G SSD	2 x NIC

OR

pND*3	SE Appliance

https://www.cisco.com/c/dam/en/us/td/docs/dcn/tools/nd-sizing/index.html

NDFC 12 Installation

NDFC installation happens in two major steps:

1. Install Nexus Dashboard cluster Platform
   Either Virtual OVA [App profile 3 or 5 nodes] or 3 Physical Cisco Service Engines

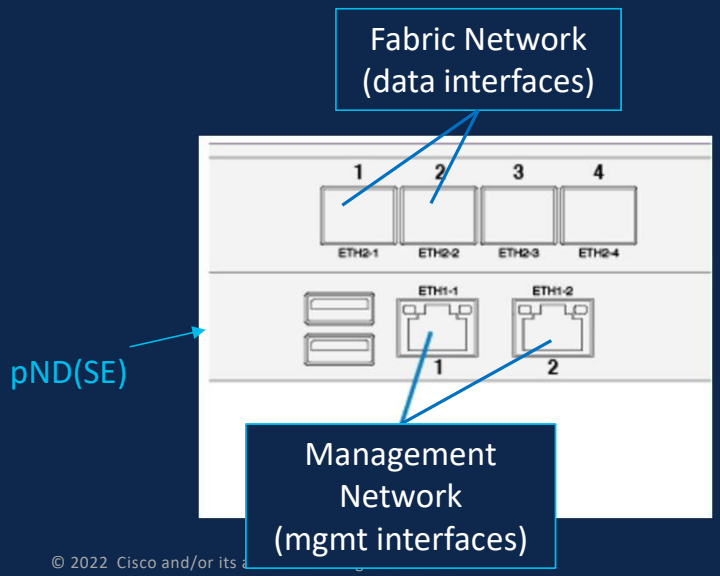
2. Install the NDFC service from Cisco DC App Center on top of the Nexus Dashboard Cluster

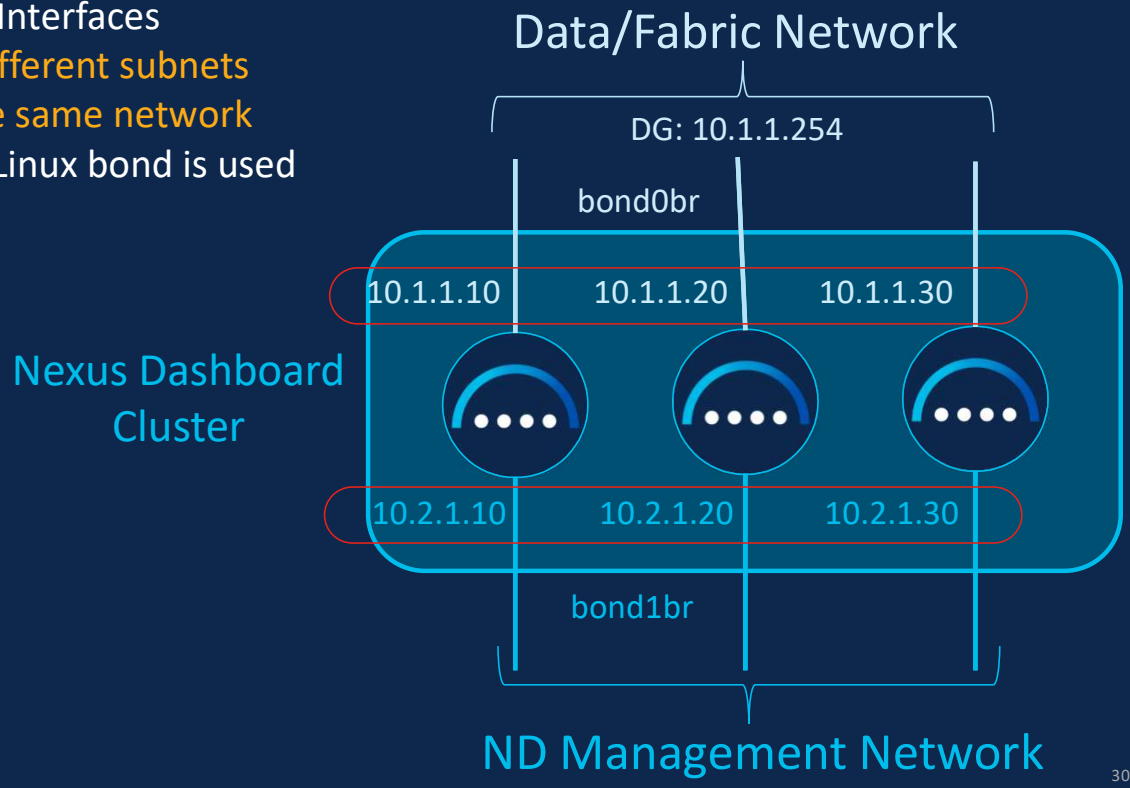
* for vND you need 5 nodes for >80 switch nodes)

NDFC 12 Installation

Nexus Dashboard Network Interface connectivity - vND and pND (SE)

- 2 Interfaces per Node; Management and Data Interfaces
- Mgmt and Fabric/Data interfaces must be in different subnets
- On each interface, all ND nodes must share the same network
- For the physical interfaces, an Active/Standby Linux bond is used

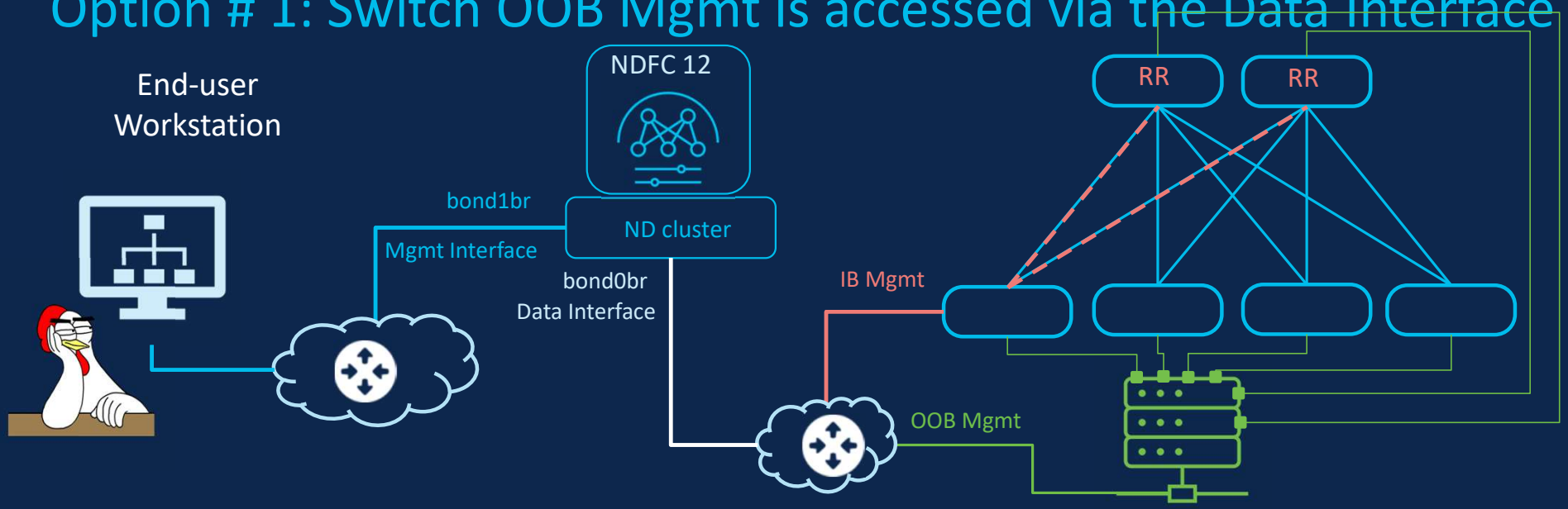




Recommended

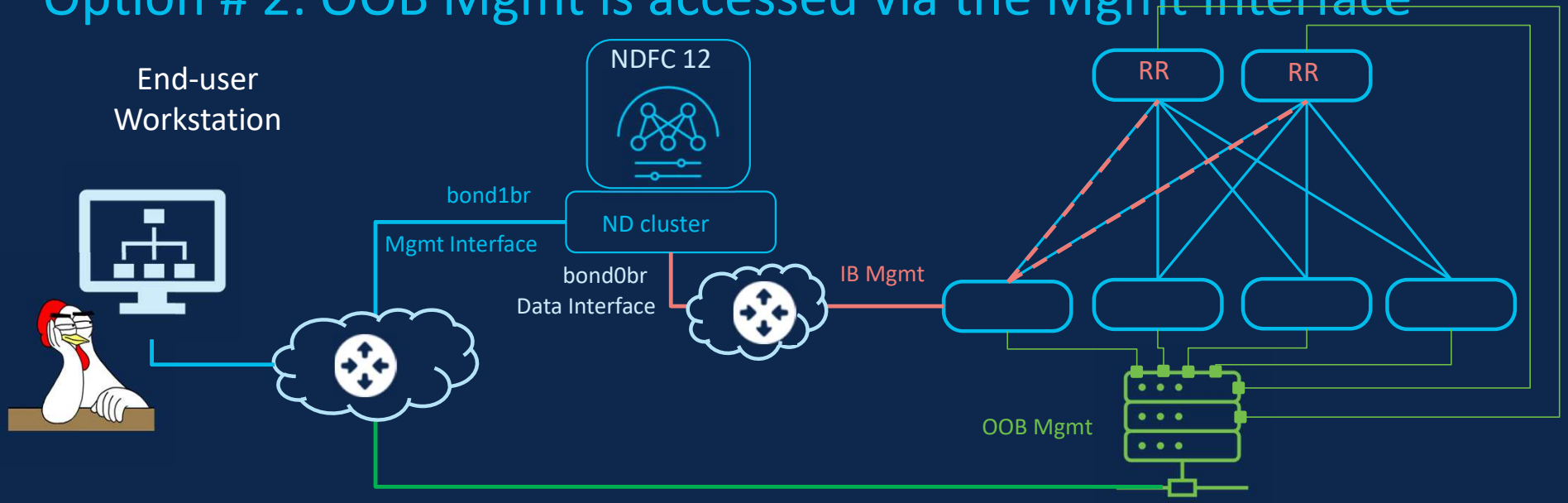
NDFC 12 connectivity

Option # 1: Switch OOB Mgmt is accessed via the Data Interface



- Mgmt Interface is dedicated to ND Cluster Mgmt (HTTPs/SSH access, NTP, DNS, Web Proxy, etc.
- Data/Fabric Interface is used for OOB Mgmt (Discovery, Onboard, Deploy, monitor, etc..)
- Data/Fabric Interface is used for Inband Mgmt (EndPoint Locator)

NDFC 12 connectivity
Option # 2: OOB Mgmt is accessed via the Mgmt Interface

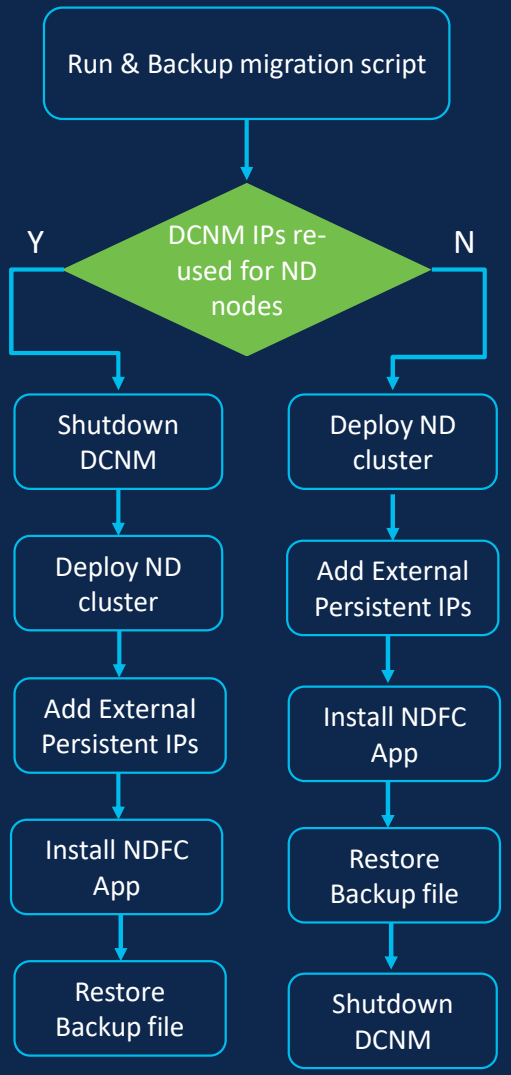


Mgmt Interface is used to communicate with the NDFC Service for Network Mgmt purposes

Mgmt Interface is used for OOB Mgmt (Discovery, Onboard, Deploy, monitor, etc..)

Data/Fabric Interface is used for Inband Mgmt (EndPoint Locator)

DCNM to NDFC migration



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Demo – Important Materials

- DCNM to NDFC migration guide:
  - https://www.cisco.com/c/en/us/td/docs/dcn/ndfc/1202/installation/cisco-ndfc-install-and-upgrade-guide-1202/upgrading-ndfc.html
  - Download and run backup script on DCNM
- Install Nexus Dashboard
  - Install guide: https://www.cisco.com/c/en/us/td/docs/dcn/nd/2x/deployment/cisco-nexus-dashboard-deployment-guide-221.html
  - Capacity planning tool: https://www.cisco.com/c/dam/en/us/td/docs/dcn/tools/nd-sizing/index.html

DCNM to NDFC migration– Demo

- Deploy a vND or pND Cluster
- In ND Cluster Configuration
  - Add appropriate static routes
  - Add External Service IPs in ND Mgmt/Data pools
- Install the NDFC app on ND cluster
- Take a backup from DCNM 11.5
  - Copy backup file out and shutdown the DCNM
- Enable the NDFC app
  - Do not enable any feature-sets !
  - In NDFC 12.0 Backup/Restore workflow, select Restore and provide the backup file

Changes from DCNM to NDFC

- Telemetry information are provided by Apache Kafka Producer
  - https://www.cisco.com/c/en/us/td/docs/dcn/ndfc/120x/ipfm/kafka-notifications-for-cisco-ndfc-release-120x.html
- Nexus Dashboard Fabric controller REST API documentation:
  - https://developer.cisco.com/docs/nexus-dashboard/#!nexus-dashboard-fabric-controller-lan-release-12-0-2
  - Example: Discovered Hosts API:
    - **DCNM: GET /pmn/fabrics/{fabric-name}/hosts/discovered**
    - NDFC: GET /appcenter/cisco/ndfc/api/v1/pmn/fabrics/{fabric-name}/hosts/discovered

Thank You
Questions?