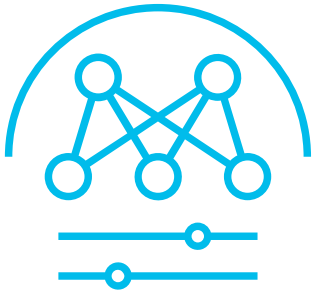
The bridge to possible

Nexus Dashboard Fabric Controller 12

The Essentials

Yves Louis, Cloud Networking Solution Architect

Agenda



- Enhanced Classic LAN
- Network and VRF
- Data Center VXLAN EVPN
- VXLAN Multi-Site
- Programmability with the Ansible Collection
- External Layer 3 Connectivity
- L4-L7 Service Node insertion

Agenda

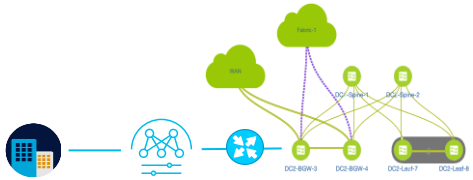
- Nexus Dashboard Fabric Controller Introduction

NDFC 12 Strengths

NDFC LAN Fabric

Enhanced Visibility + Connectivity Automation

Define your network configuration and deploy it on multiple switches/routers



Programmability

REST/JSON

Infrastructure-as-Code (Terraform/Ansible)

Strengths

Automation

Deploy your Fabrics & Overlay networks with a few clicks

Auto-bootstrap

Integrated best-

Control

Extensible & Customizable

Free-form Templates

Health Visibility

Real-time monitoring Daily

Per device, interface & End-Point - OAM

Reliability

Preserve compliance

Configuration consistency checks

Why NDFC?

Multi-Architecture

3-stage CLOS, 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

Visibility & Maintenance

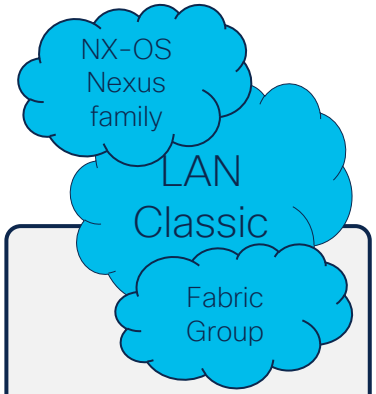
- Real-Time Network Topology & Fabric Health
- Compute Stack Visualizer
- 3rd Party integration
- Performance Monitoring & Reports
- Event Analytics
- Configuration Compliance
- Image Management, Upgrades and RMA
- Enhanced RBAC support
- Backup & Restore Configuration

NDFC

E2E Network Provisioning

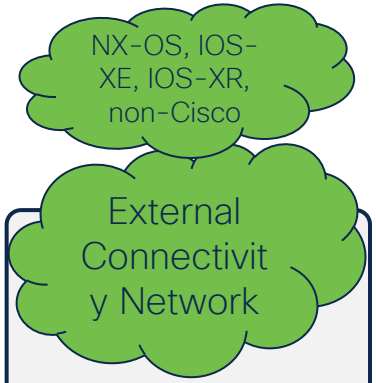
- GUI/API-based Auto-provisioning
- Classic LAN, VXLAN EVPN Fabric Automation
- BrownField import and GreenField creation
- Multiple Fabrics & Multi-Site
- Advanced Network services
- External Layer 3 connectivity (VRF-Lite, MPLS, SR)

Different type of Fabric Templates



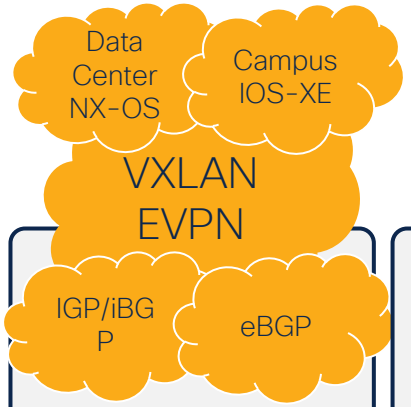
Monitor or Managed Mode

- Only Cisco Nexus switches
- Configuration compliance
- Backup or restore
- Network Insights
- Performance monitoring
- VMM
- Topology view
- Kubernetes visualization
- RBAC



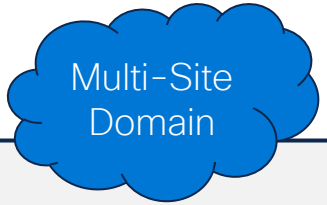
Similar to LAN Classic +

- VXLAN EVPN (manual)
- Multi-Site IFC
- VRF-lite IFC
- NX-OS family devices
- OS-XE family devices
- IOS-XR family devices
- Arista 4.2 (any model)



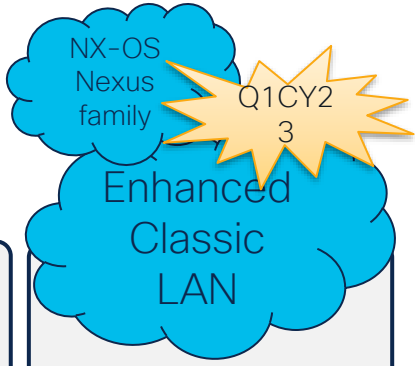
Used to automate deployment of VXLAN EVPN
3 use-cases:
- N9k/N3k IGP/iBGP
- N9k/N3k eBGP
- C9k OSPF/iBGP

- Automation for Brownfield/Greenfield Fabrics (Refresh Platforms)
- Templatized Best Practices



Multi-Site Domain

- Multi-Fabric container
- Single Point of Control for Overlay networks & VRF shared across members (Fabrics)
- Easy Fabric are members for Multi-site creation
- ToR, External Fabric, can also be members to automate overlays networks (ToR) and underlay (IFC)



Used to automate deployment of Classic LAN

- Investment protection for existing networks
- Automation for Brownfield/Greenfield Fabrics (Refresh Platforms)
- Templatized Best Practices

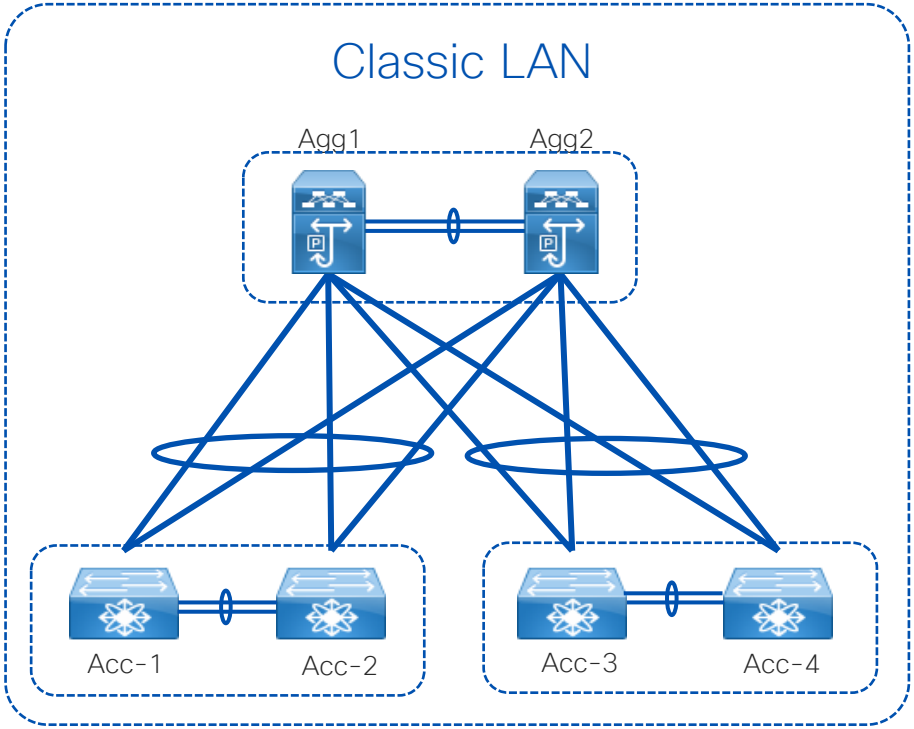
Agenda

- Nexus Dashboard Fabric Controller Enhanced Classic LAN

Why Classic LAN for NDFC?

Short Term Benefits		Long Term Benefits
A large % of customers are still on Legacy networking	Adoption of SDN	Enable the business with Multi-tenancy, overlays and Virtualization
Most haven't adopted a Controller/SDN approach	Modernize Networks to Scale Better	Prepare customers to move to VXLAN
Most of their applications don't require overlays	Innovation with Digitization and Cloud	Co-existence of Classic LAN, VXLAN & Routed Fabrics
Large Nexus install base: Nexus 5000, Nexus 7000, Nexus 9000		NDFC, NDI... NDO: Adoption of ND suite; HYBRID: Cloud ready!

Operate a Classic LAN with NDFC 12



- Full Automation — Q1CY23
- Configuration Compliance
- Backup & Restore Multiple DC Network
- Performance Monitoring
- VMM and Container Visualizer
- Role-Based Access Control Users

Topology View for one or multiple DC Networks

Introducing Enhanced Classic LAN
Preview in NDFC 12.1.2

Provisioning of 3 Tier Hierarchical Networking

Role specific Configurations for Access, Agg and Core

One click vPC pairing

Spanning Tree, FHRP, Routing between Agg <-> Core

Provisioning of L2 and L3 Networks and VRFs

Provision L2 Networks

L3 Networks in Default or custom VRF

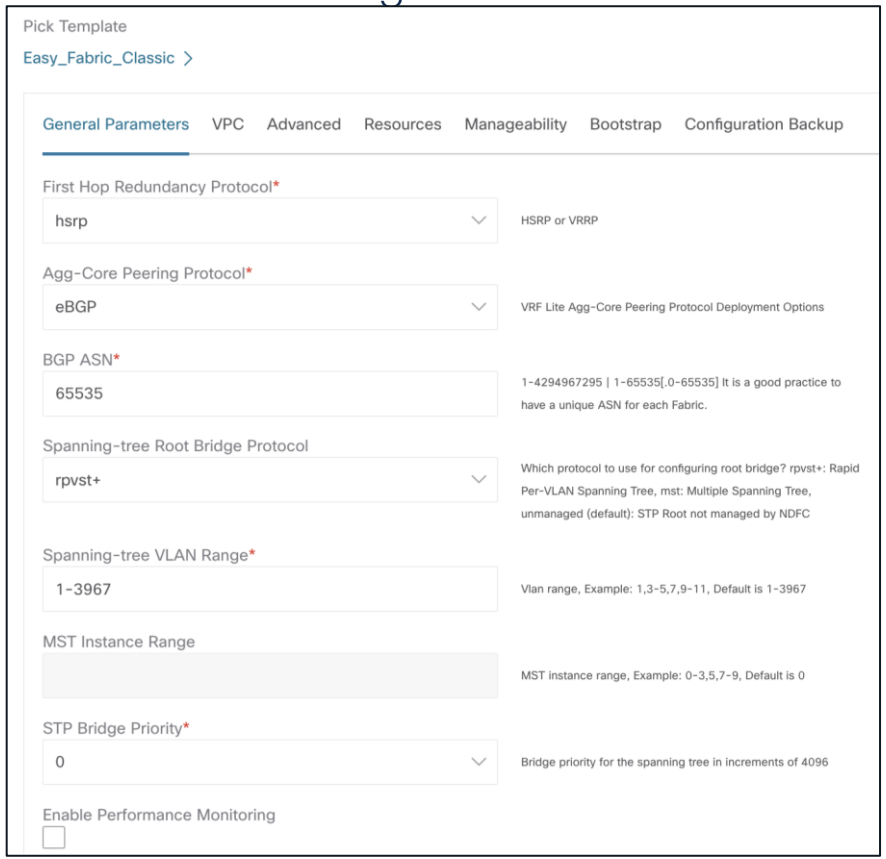
Define a unique gateway for each network

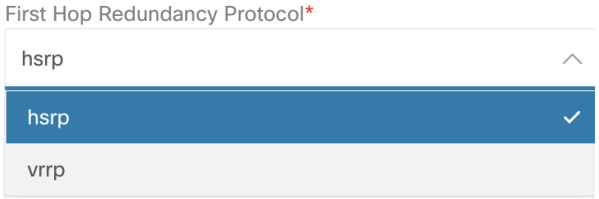
VRF-Lite Between Aggs and Core

In a few clicks, configure VRF-Lite between Agg and Core in specific VRFs

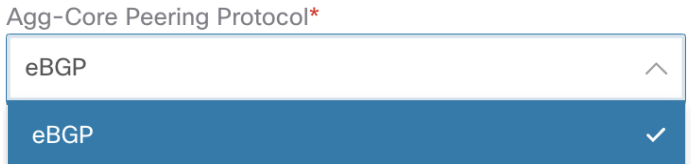
Enhanced Classic LAN Template

Fabric level settings

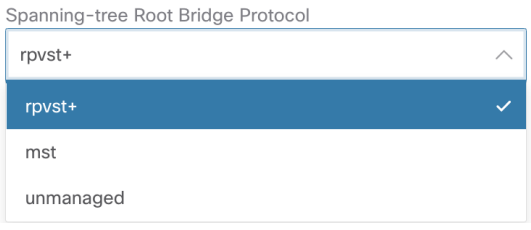




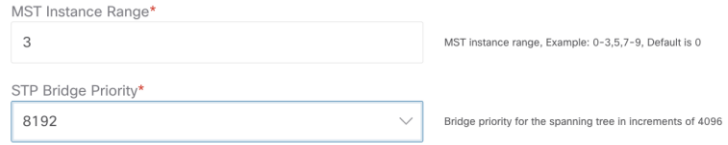
FHRP – HSRP, VRRP



eBGP and OSPF



Spanning Tree – RPVST+, MST

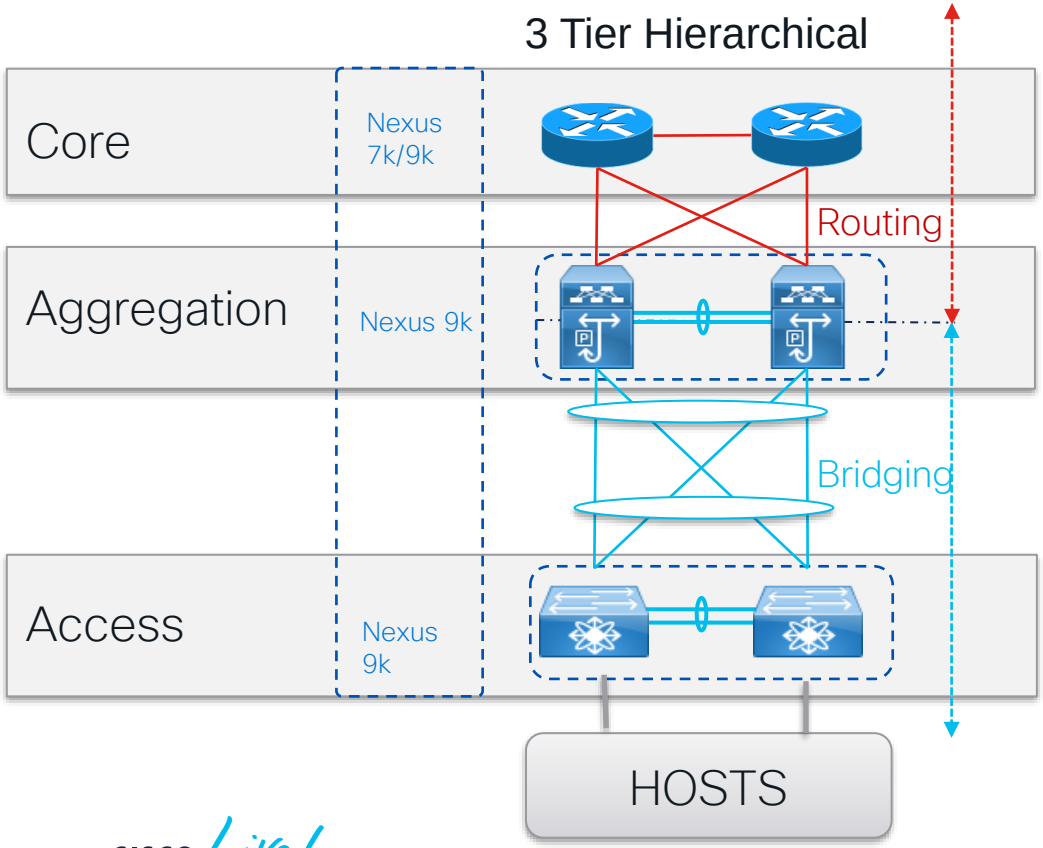


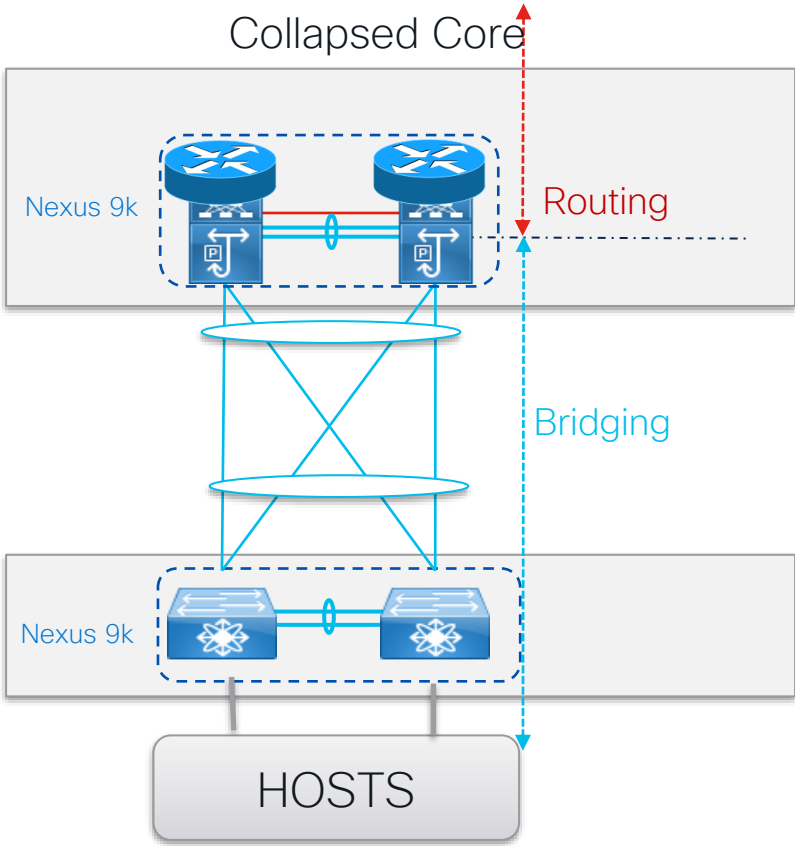
With Enhanced Classic LAN – Full support for Brownfield

Enhanced Classic LAN will allow users to import existing switches into a fabric

‘preserve config = yes’ and incrementally manage switches from NDFC

Enhanced Classic LAN Fabric
Possible Designs and Recommended Platforms





Agenda

- Nexus Dashboard Fabric Controller Network and VRF

Day in the life of NDFC
Overlay Network Management

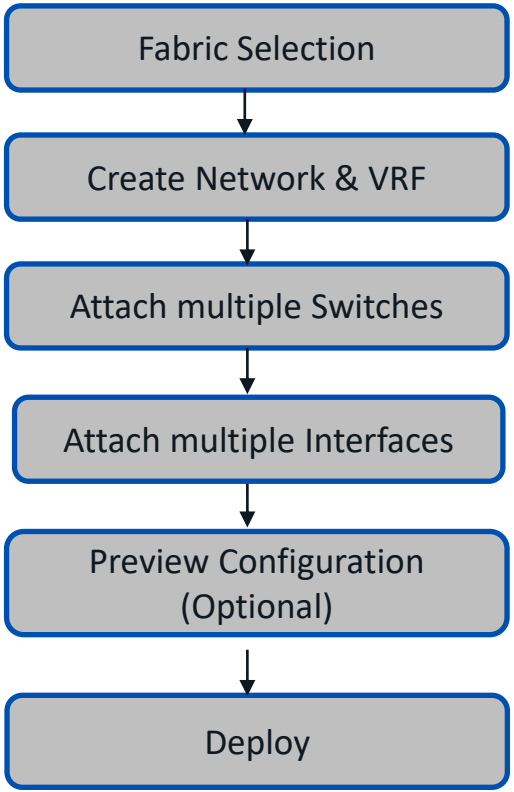
Top-Down deployment via GUI or REST APIs

Network/VRF Creation with Overlay Policies

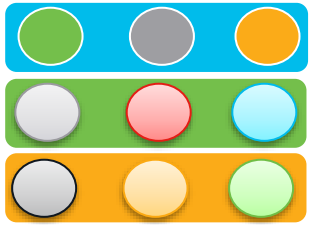
Attach Network to Switches and Interfaces

Per Network/Per Switch deployment History

Centralized Overlay Resource Manager Tracking for VNIs, VLANs etc.



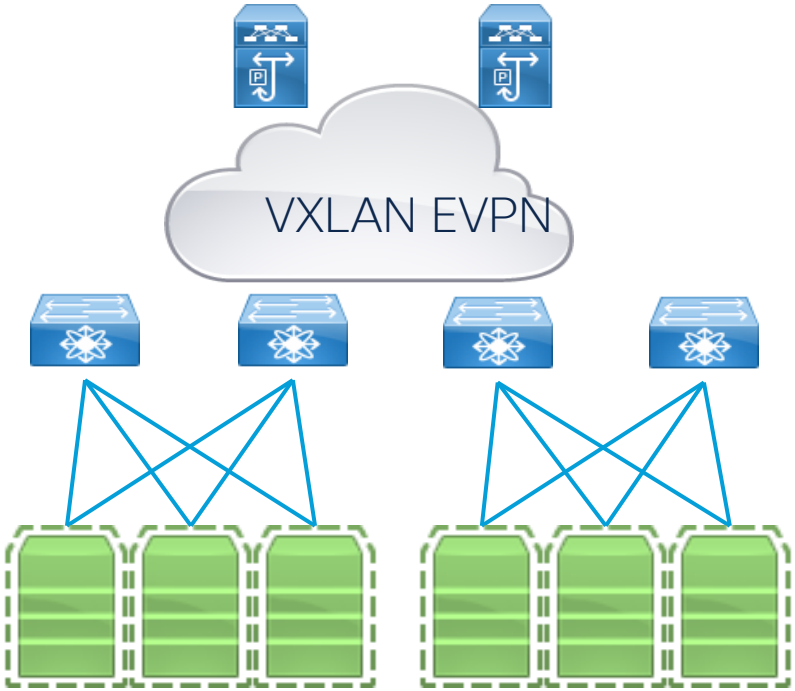
1. Create VRFs
2. Create Networks per VRF
3. Attach Networks



VRF Bleue

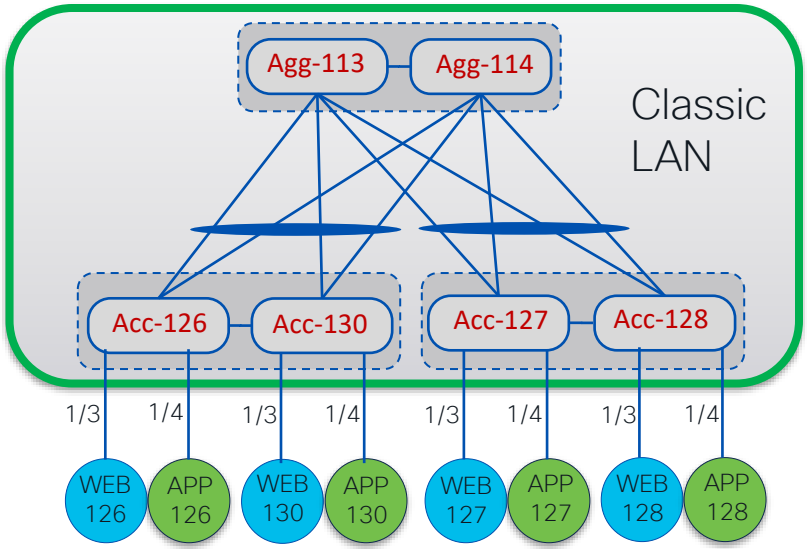
VRF Green

VRF Orange



Demo #1
Enhanced Classic LAN deployment

Scan me

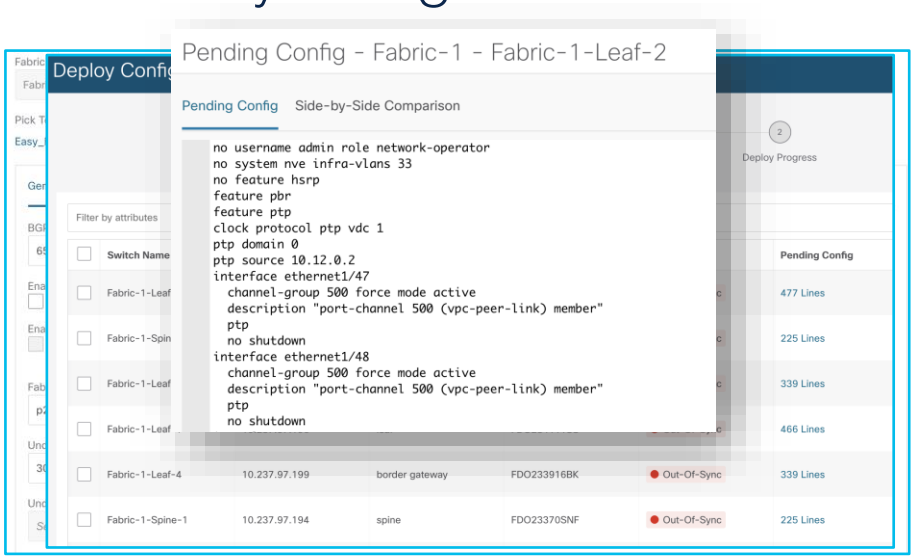


1. GreenField CE Deployment
2. Onboard Switches
3. Roles and vPC
4. Network and VRF Deployment

Agenda

- Nexus Dashboard Fabric Controller
- Data Center VXLAN EVPN

Day in the life of NDFC 12
Underlay using Fabric Builder

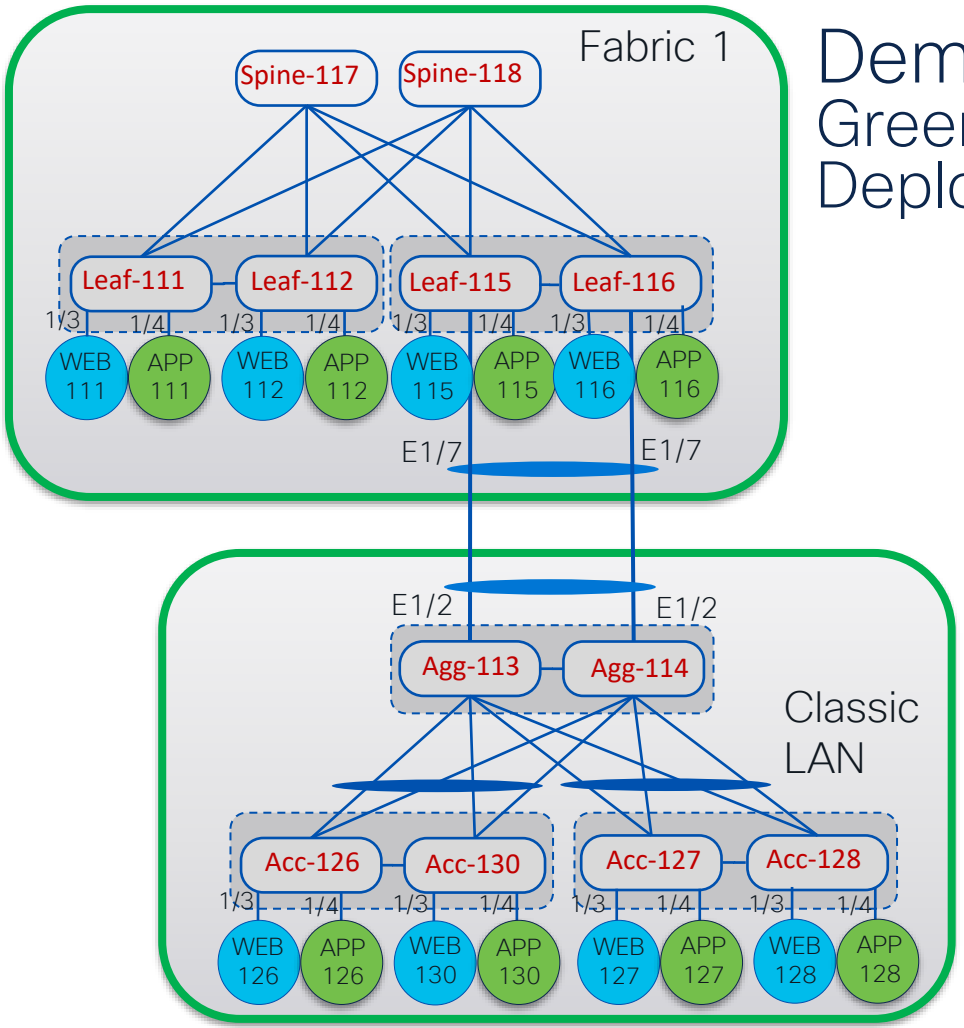


1. Create Fabric & define Settings
2. Discover and Import Switches
3. Recalculate the Configurations
4. Preview (Optional)
5. Deploy Configurations

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

Demo #2
GreenField DC VXLAN EVPN Deployment

Scan me



1. DC VXLAN EVPN Fabric
2. Onboard Switches
3. Roles and vPC
4. Network & VRF deployment

Agenda

- Nexus Dashboard Fabric Controller Multi-Site Domain

VXLAN Multi-Site
Different Roles for BGW

Border Gateway

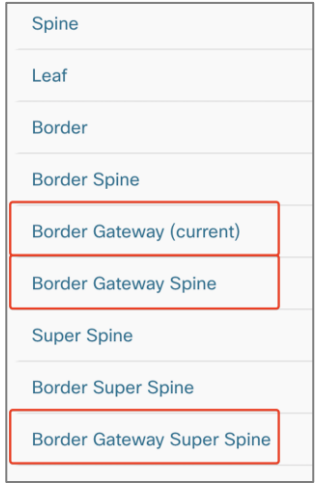
Layer 3 based Anycast BGW deployed at the leaf Layer

vPC Border Gateway

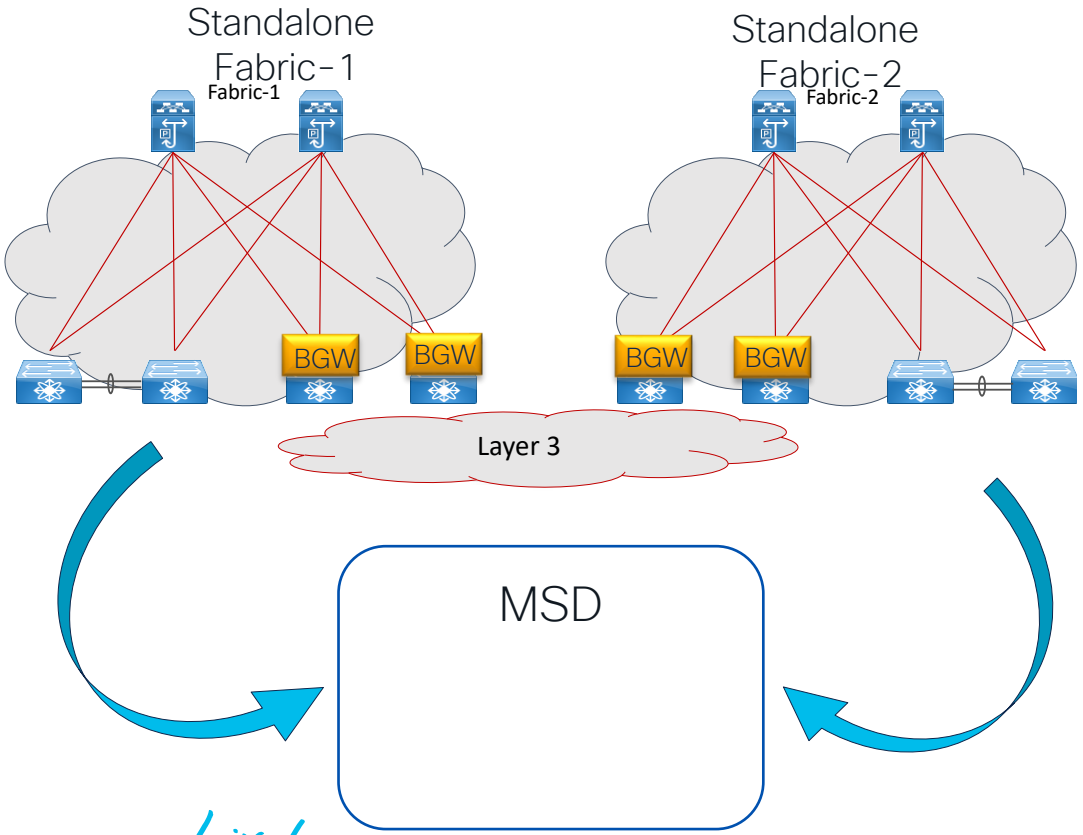
Used to locally dual-attach Layer 2 networks or Endpoints
Allows Distributed Anycast Gateway (DAG)

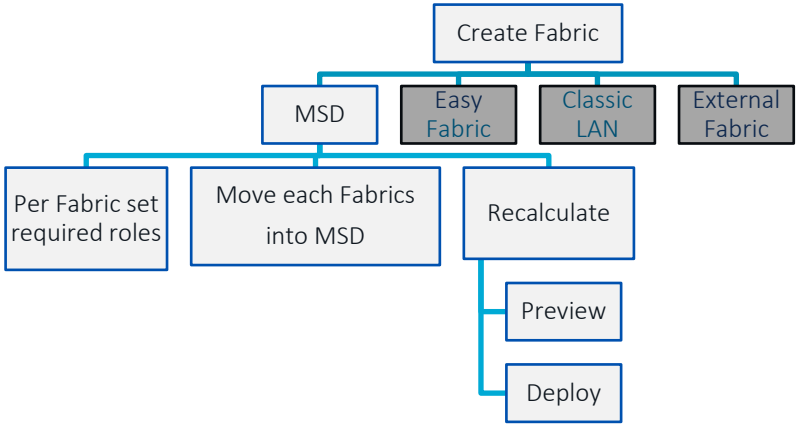
Border Gateway Spine

Layer 3 based Anycast BGW deployed at the Spine Layer



Interconnect Multiple VXLAN EVPN Fabrics
VXLAN EVPN Multi-Site Domain (MSD)





Demo #3
Multi-Site Domain

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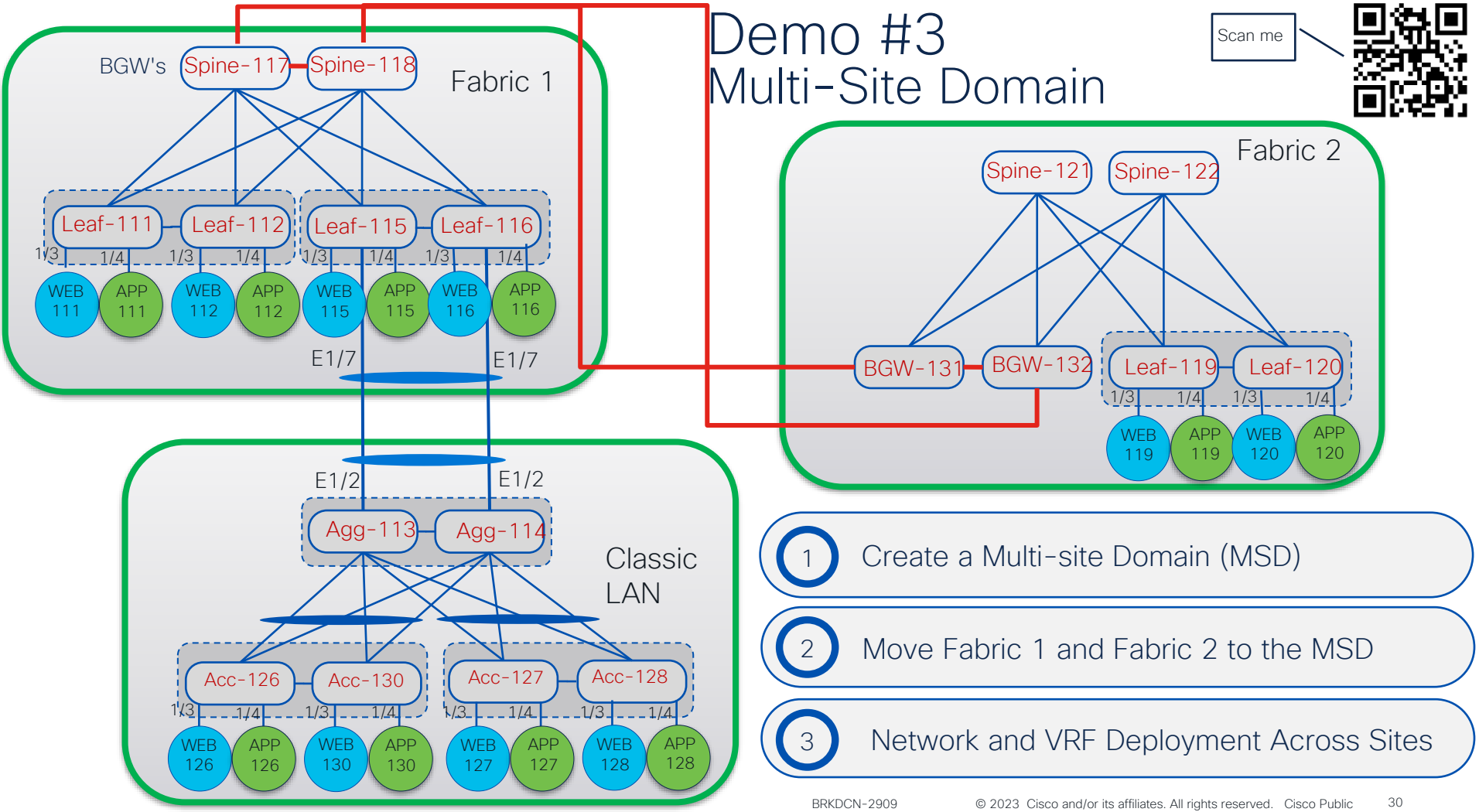


1. Create a Multi-site Domain (MSD)
2. Move Fabric 1 and Fabric 2 to the MSD
3. Network and VRF Deployment Across Sites

Agenda

Nexus Dashboard Fabric Controller

Programming the Fabric

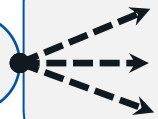
NDFC Automation Tools
Overlay Networks & VRF deployment

Day-0 Operations involve One-time steps

Day-1 Operations involve Multiple-time steps

NDFC Offers Features and Tools in addition to its Web UI

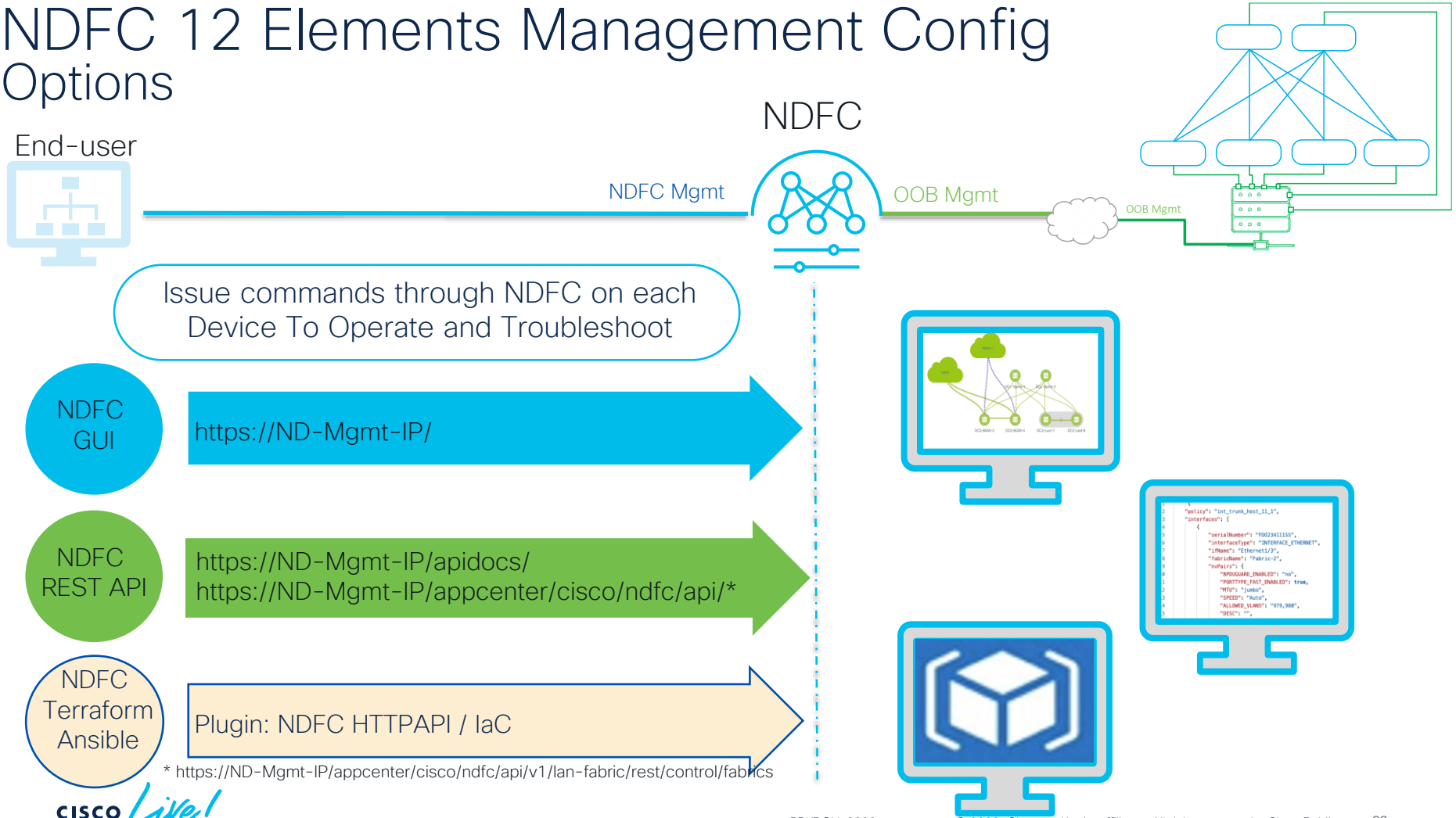
NDFC Programming with IaC



- API-Docs (formerly Swagger)
- Postman, Boomi, Oracle API Mgr
- Ansible Playbooks, Terraform

NDFC Bulk Attachment and Detachment

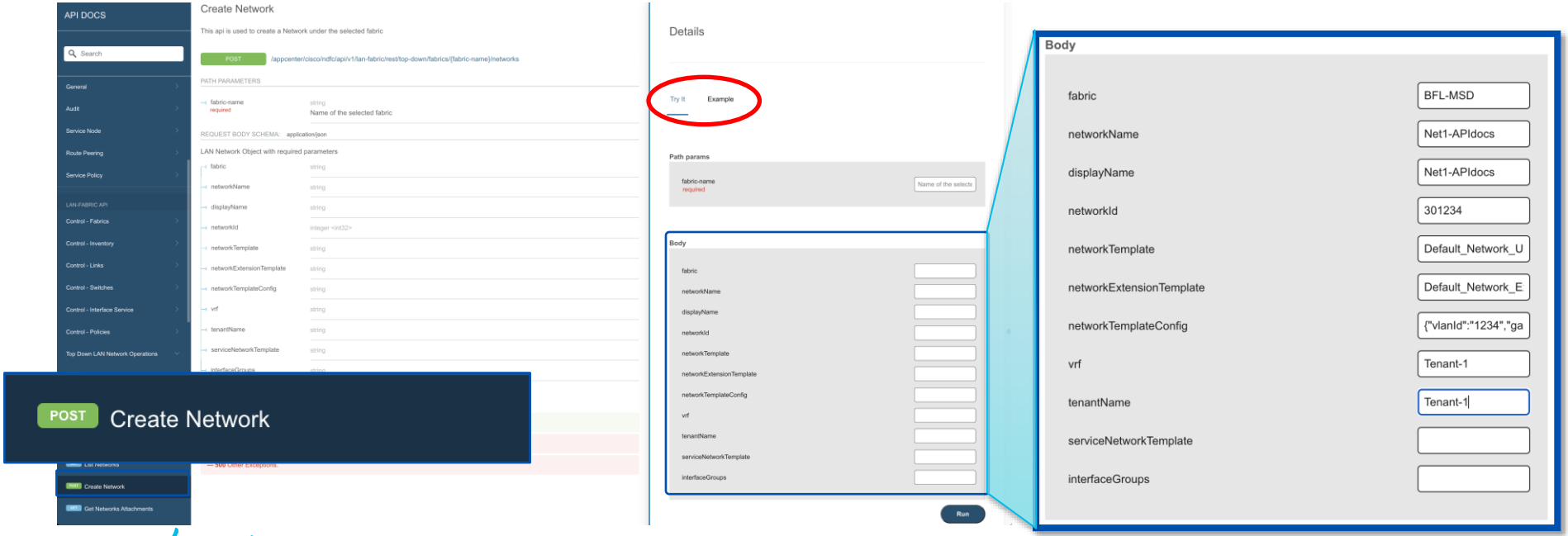
NDFC 12 Elements Management Config Options



NDFC 12 REST API – Embedded API Docs

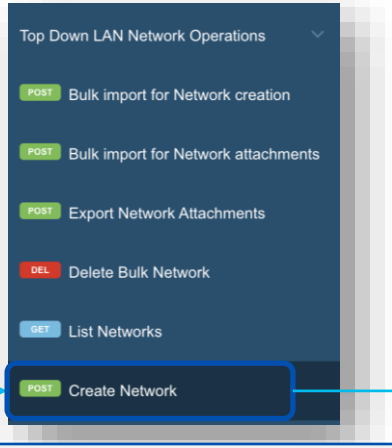
Select the definition of interest and Expand it

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



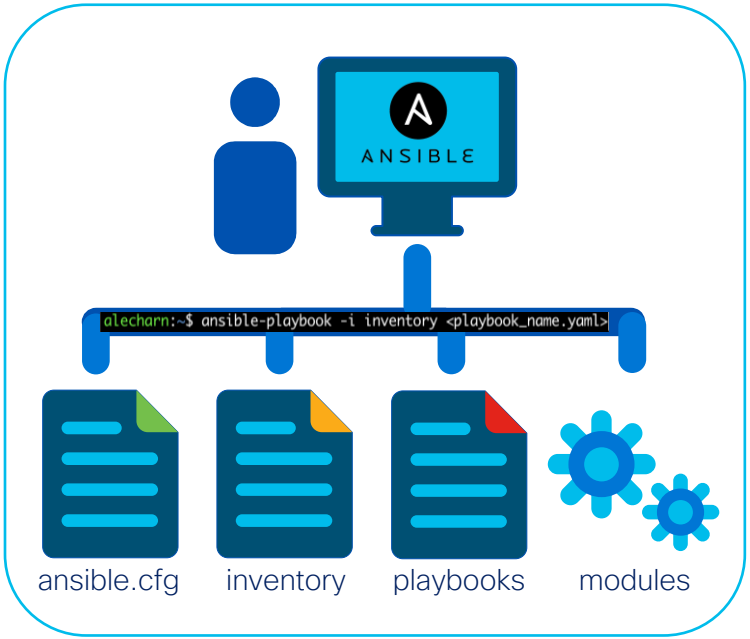
NDFC 12 and REST API

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

Ansible Components and Architecture



SSH / Call API

1. Push configurations
2. Get configurations/state
3. Execute commands

- Inventory: target systems for automation
- Playbook: a series of plays (automation tasks)
- Modules: accomplish specific tasks in Ansible (e.g. install packages, configure NX-OS, etc)
- Ansible Config: determines how your Ansible setup behaves (how many concurrent connections, etc)

Agentless ☺

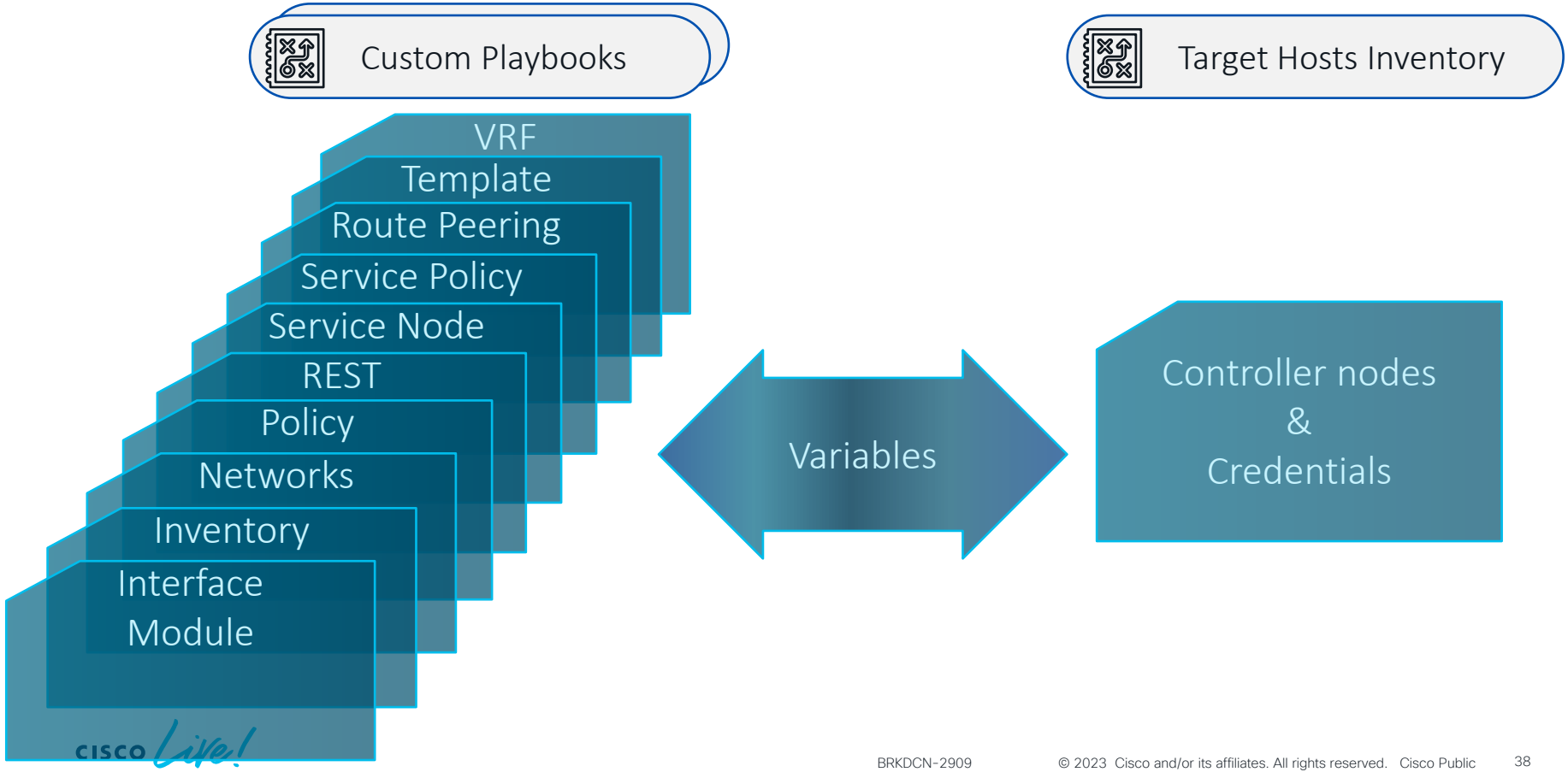
Cisco DevNet GitHub

The Ansible NDFC collection includes modules to help automate common daily operations for VXLAN EVPN fabrics.

- DCNM Release 11.4(1) or later
- NDFC Release 12.0 or later.

https://github.com/CiscoDevNet/ansible-dcnm

Collection



Demo #4
Ansible Playbooks for NDFC

Scan me

Use-case: You have been asked to urgently build and deploy dozens of networks across multiple Leaf nodes and interfaces, and you want to use the Ansible collection to speed up deployment while mitigating the risk of errors.

Install Cisco Ansible DCNM Collection * version 2.0.1 for both DCNM & NDFC

Configure the controller (NDFC) reachability information

Configure the Network Playbook to merge new Networks & VRF

Run the Ansible Playbook command associated with the Environment

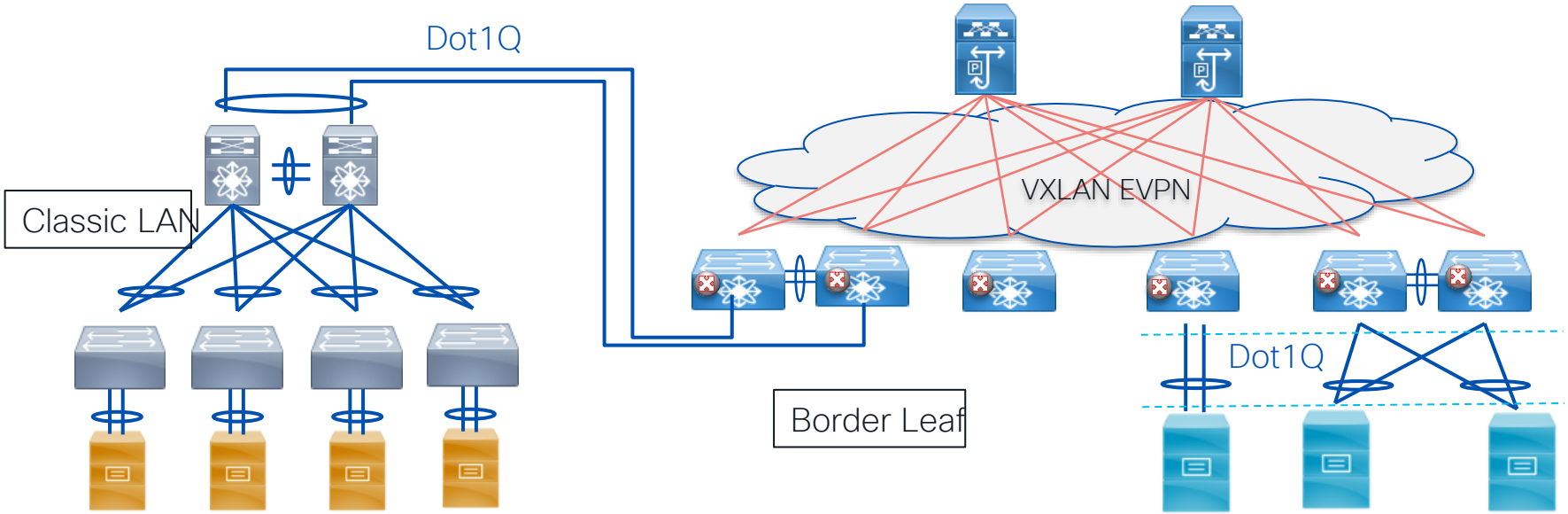
* $ ansible-galaxy collection install cisco.dcnm

Agenda

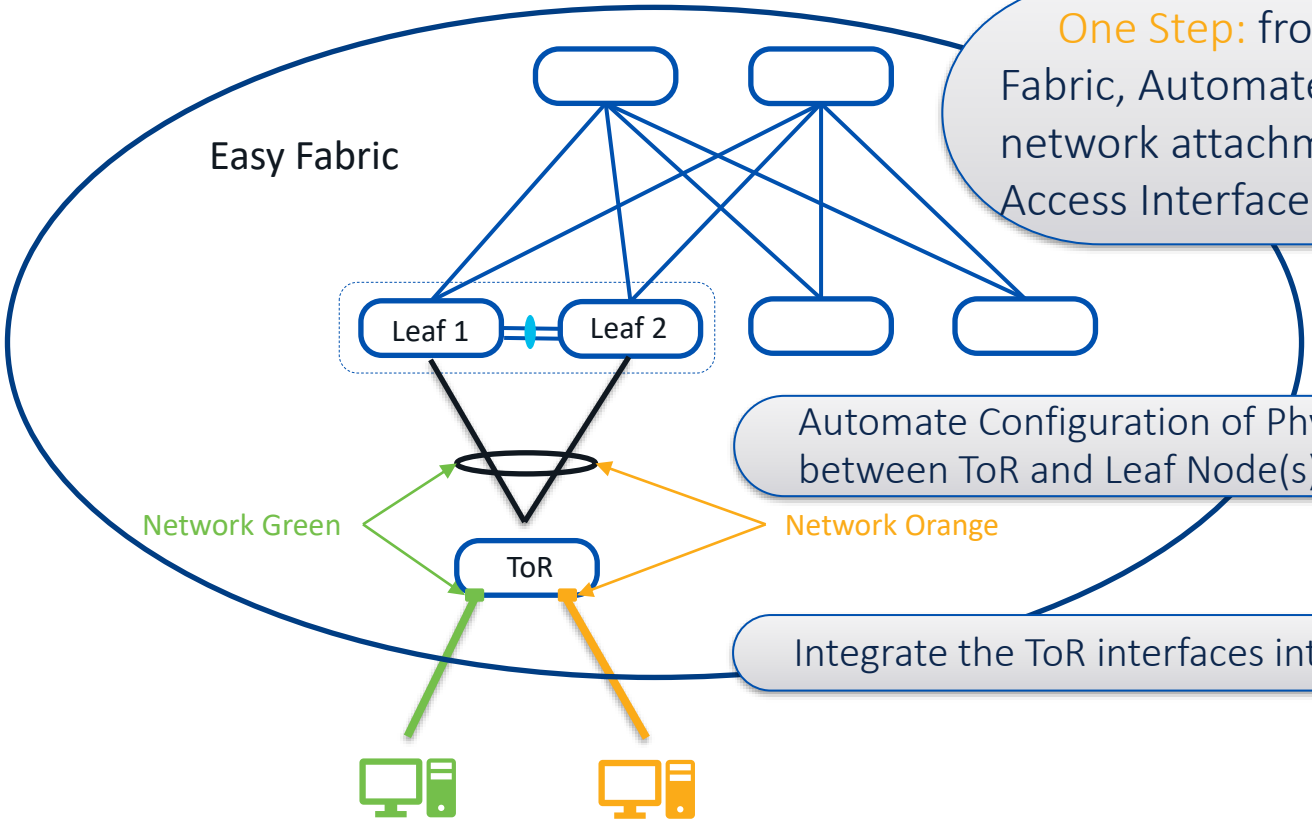
- Nexus Dashboard Fabric Controller
- External Layer 3 Connectivity

VXLAN EVPN
External Layer 2 connectivity

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



Option 2: ToR Switches in DC VXLAN EVPN Fabric*



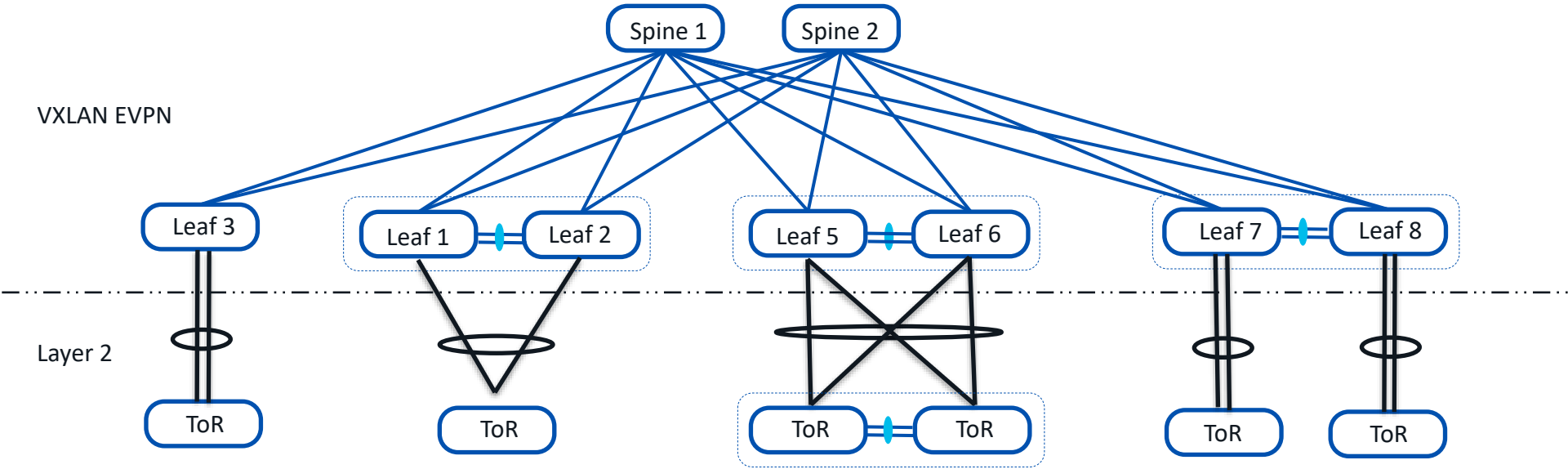
One Step: from the same Easy Fabric, Automate and deploy network attachment up to the Access Interfaces of the ToR

Automate Configuration of Physical Connectivity between ToR and Leaf Node(s)

Integrate the ToR interfaces into the Leaf Node(s)

* Since 12.1.1e

ToR Switches in DC VXLAN EVPN Fabric Supported Topologies



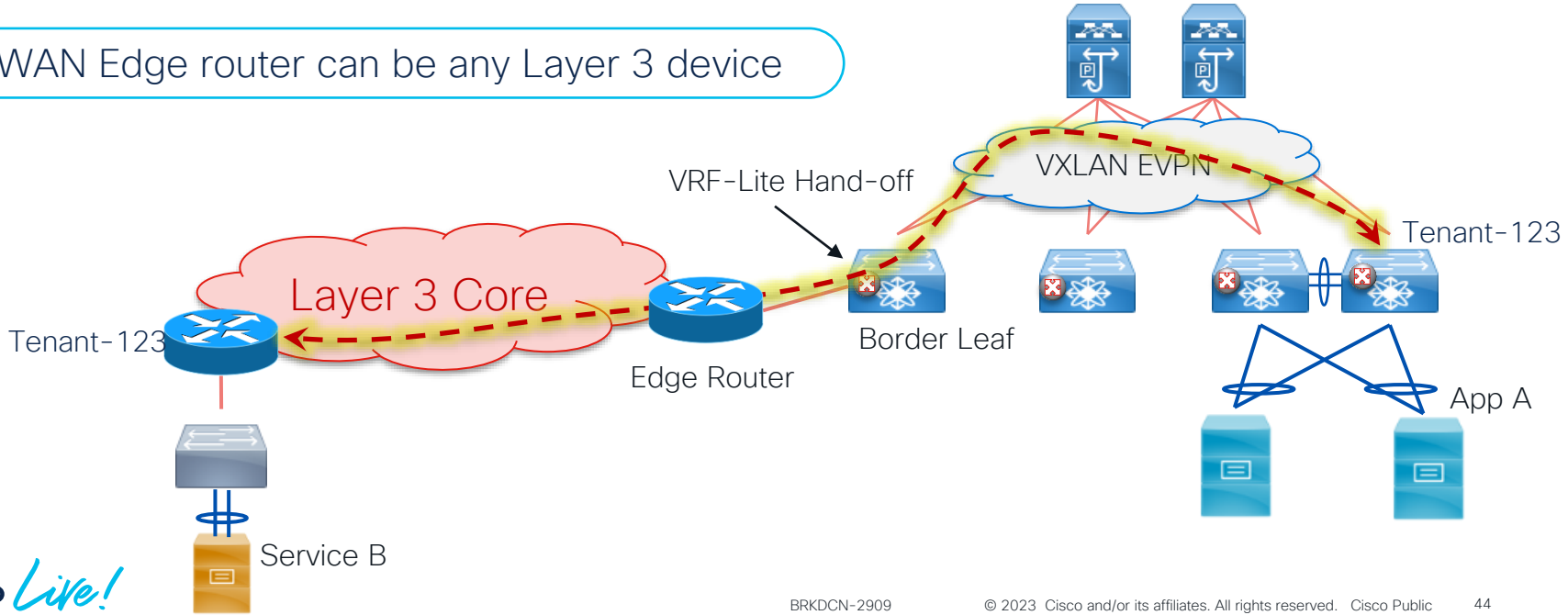
Multiple Supported Topologies

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 Border Leaf function

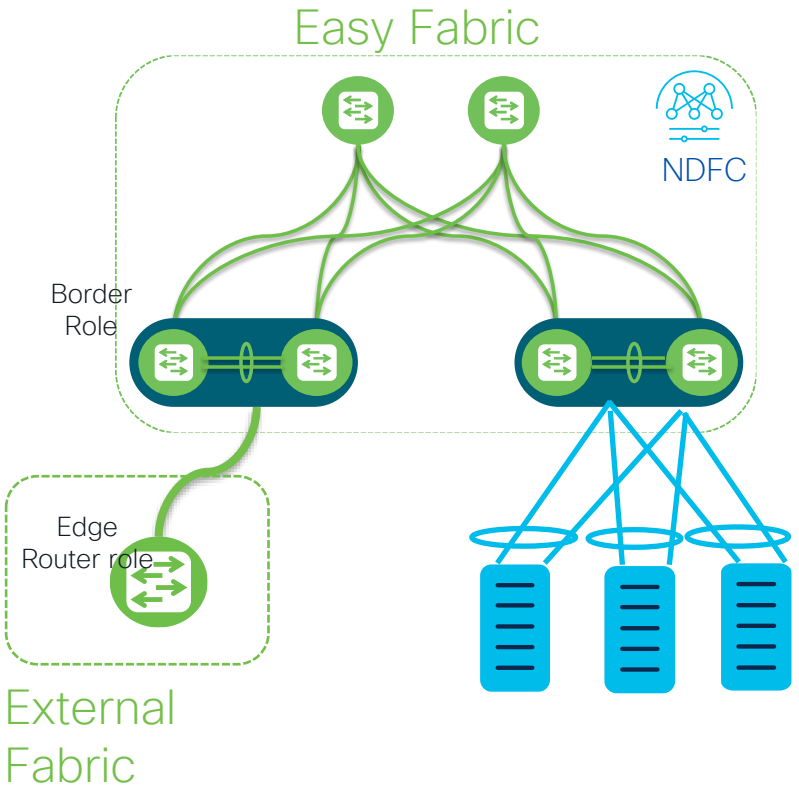
The WAN Edge router can be any Layer 3 device



VXLAN EVPN External Layer 3 connectivity
Prerequisites and Guidelines

NDFC auto deployment of VRF-Lite rules

1. The target router must be part of an External Fabric or Easy Fabric
2. VRF-Lite hand-off must be initiated from DC VXLAN EVPN
3. The Role of the border device must be Border <role>
4. The Role of the Target router must be Edge Router or Border node
5. Advertise Default Route is enough for ext. L3 conn



Demo #5
Automating VRF-Lite Deployment

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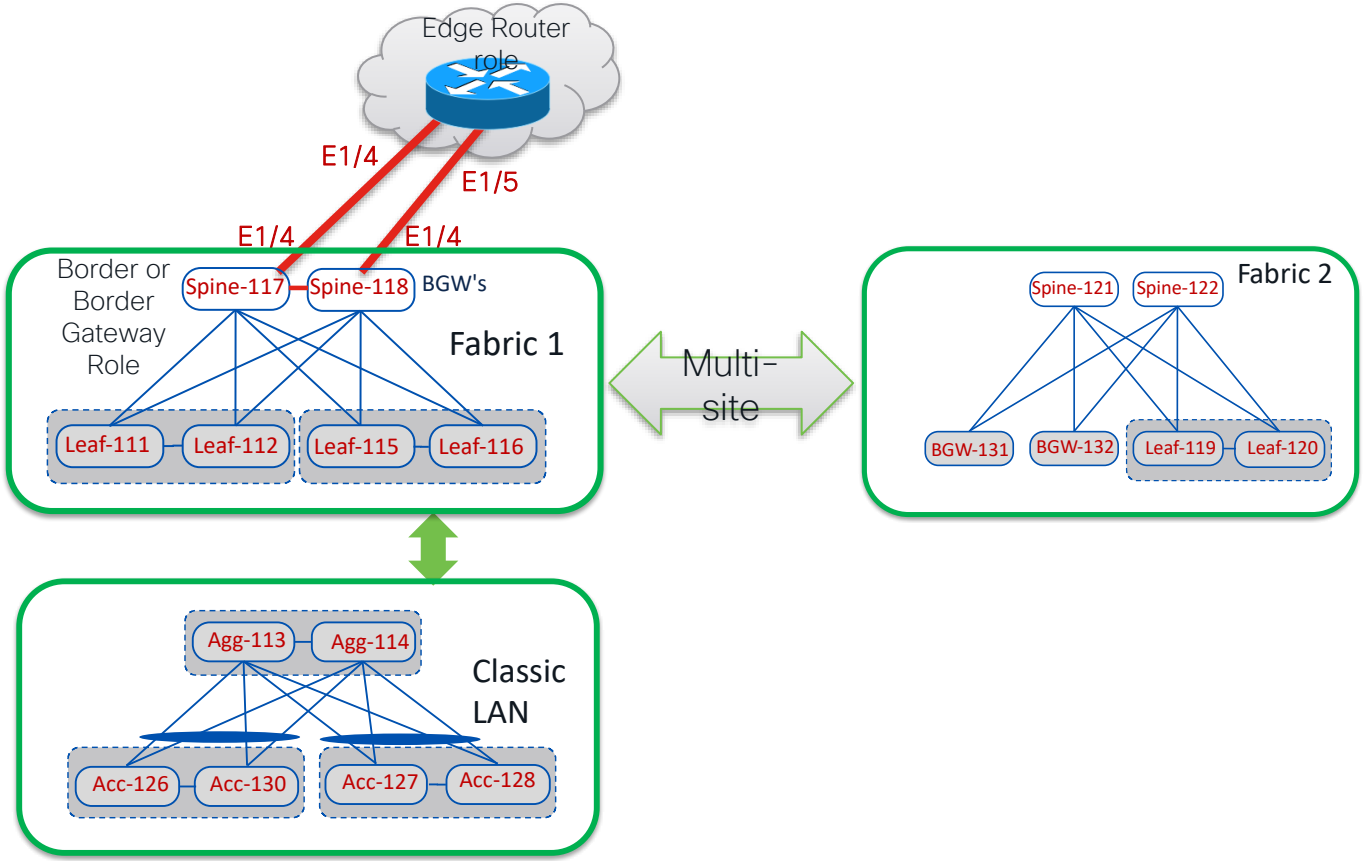
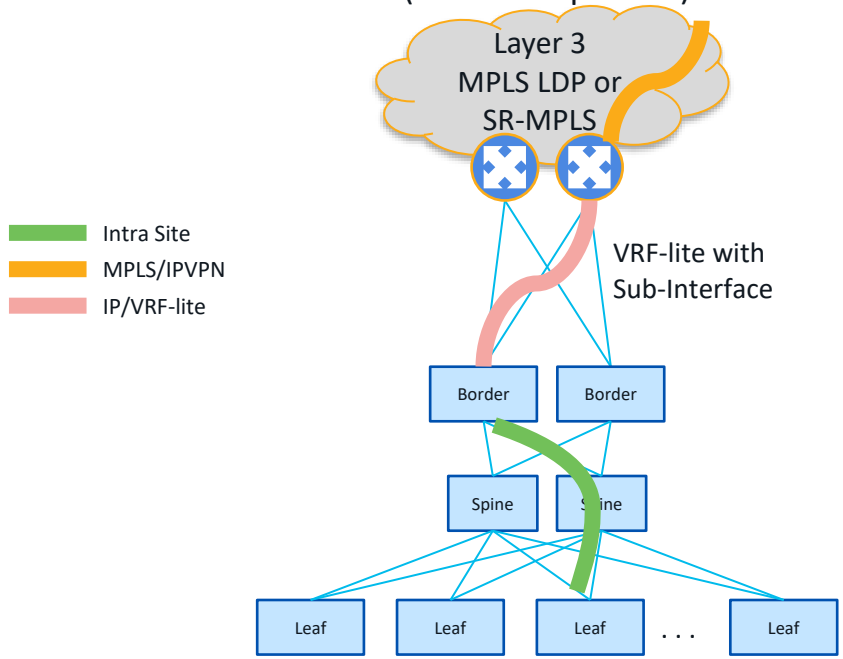


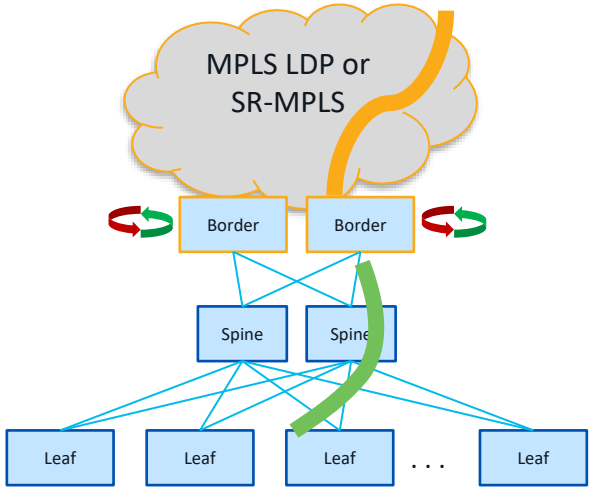
Seamless Protocol Gateway
Various Models

Separated Border + PE
(Inter-AS Option A)



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

Collapsed Border + PE

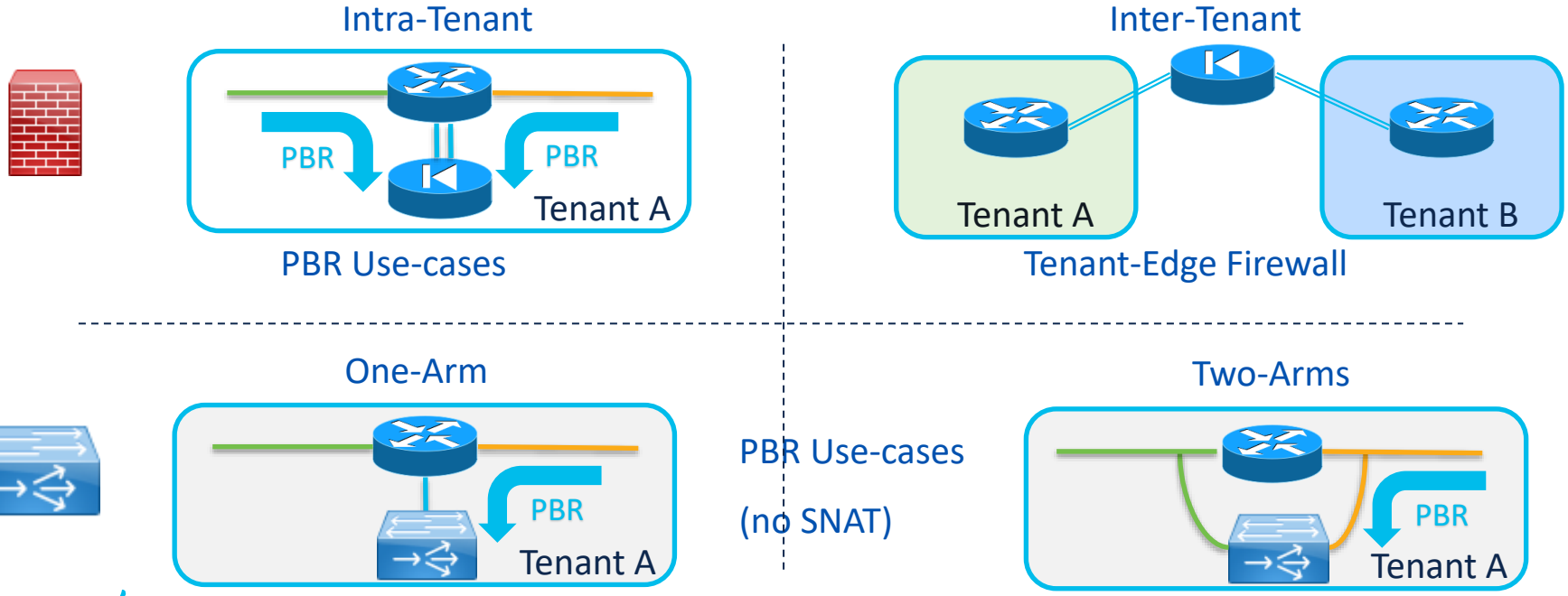


Agenda

- Nexus Dashboard Fabric Controller
- Layer 4-7 Service Node Deployment

Service Node Insertion - Supported Use-cases

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

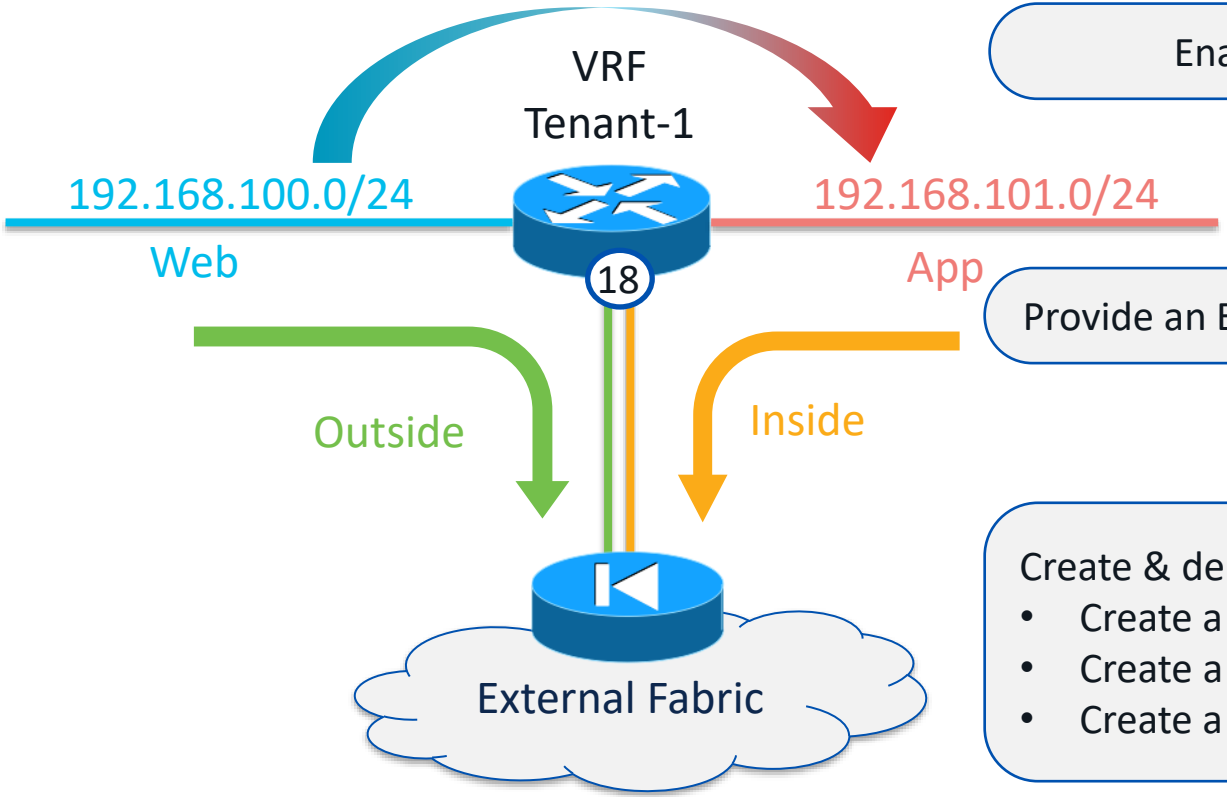


L4-L7 Service Node Guidelines

- Supported on VXLAN EVPN with the Easy_Fabric Template
- Enabled on Cloud Scale based Switches (Starting Nexus 9300-EX series)
- 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

Demo #6
Service Node Attachment

Scan me



Enable PBR at the Fabric level

Provide an External Fabric for the Service node

Create & deploy a new Service Node
- Create a new Service Node (FW)
- Create a Route Peering
- Create a Service Policy

Agenda

- Nexus Dashboard Fabric Controller
- Additional Information

Other Sessions & Labs

- BRKDCN-2931 – 02/08/23 at 8:30 AM
  Automating Highly Available Data Center Architecture with NDO and NDFC

- BRKDCN-1619 - 02/07/23 at 8:30 AM
  Introduction to NDFC: Simplifying Management of Your Data Center

- BRKDCN-2671 - 02/09/23 at 10:30 AM
  Connecting On-prem network to Public Cloud using Nexus Hybrid Cloud

- LTRDCN-2419 – - 02/07/23 from 2:00 PM to 6:00PM
  Automate and Manage VXLAN EVPN Fabrics using NDFC

NDFC 12: A Series of Videos

More Hands-on labs on NDFC 12?

https://dcloud.cisco.com ➔ catalog

You can also run additional Labs on NDFC 12 On-demand for the following topics

VXLAN EVPN Multi-Site

VXLAN EVPN Multi-Site Deployments

- Import and Deploy Brownfield into NDFC
- Bulk Creation of Networks and VRFs (Optional)
- Import and Deploy VXLAN EVPN fabric on Greenfield
- Import and Deploy Core Fabric
- Configure Multi-Site
- VMM integration
- Configure Endpoint Locator.
- Network Deployment via REST API (Swagger)

VXLAN EVPN Super-Spine

VXLAN EVPN Super-Spine Deployments

- Create and provision a new Greenfield VXLAN EVPN 3-tier fabric with Super Spine switches
- Create and configure VRFs and Networks within a VXLAN EVPN fabric.
- Create and provision new external fabric.
- Configure Inter-Fabric connectivity between the VXLAN EVPN fabric and external fabric.

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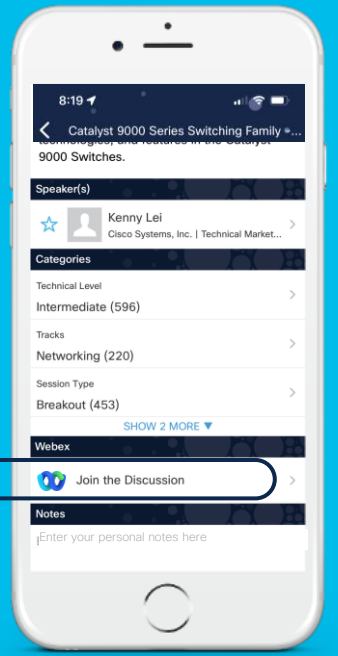

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Thank you


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