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#CiscoLive



The bridge to possible

Automating Highly Available Data Center Architecture with NDO and NDFC

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BRKDCN-2731



#CiscoLive

Cisco Webex app

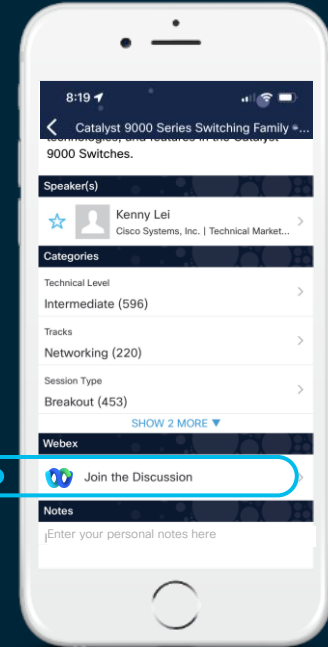
Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 17, 2022.



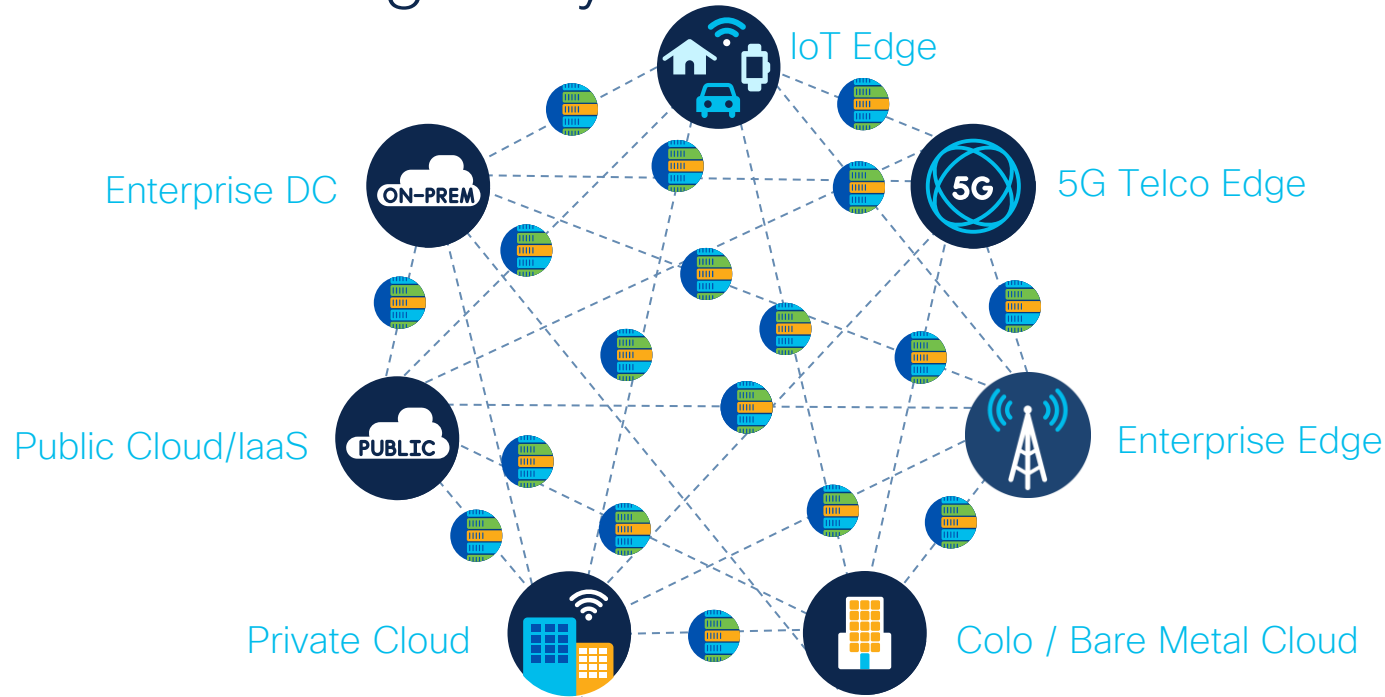
<https://ciscolive.ciscoevents.com/ciscolivebot/#BRKDCN-2731>



Agenda

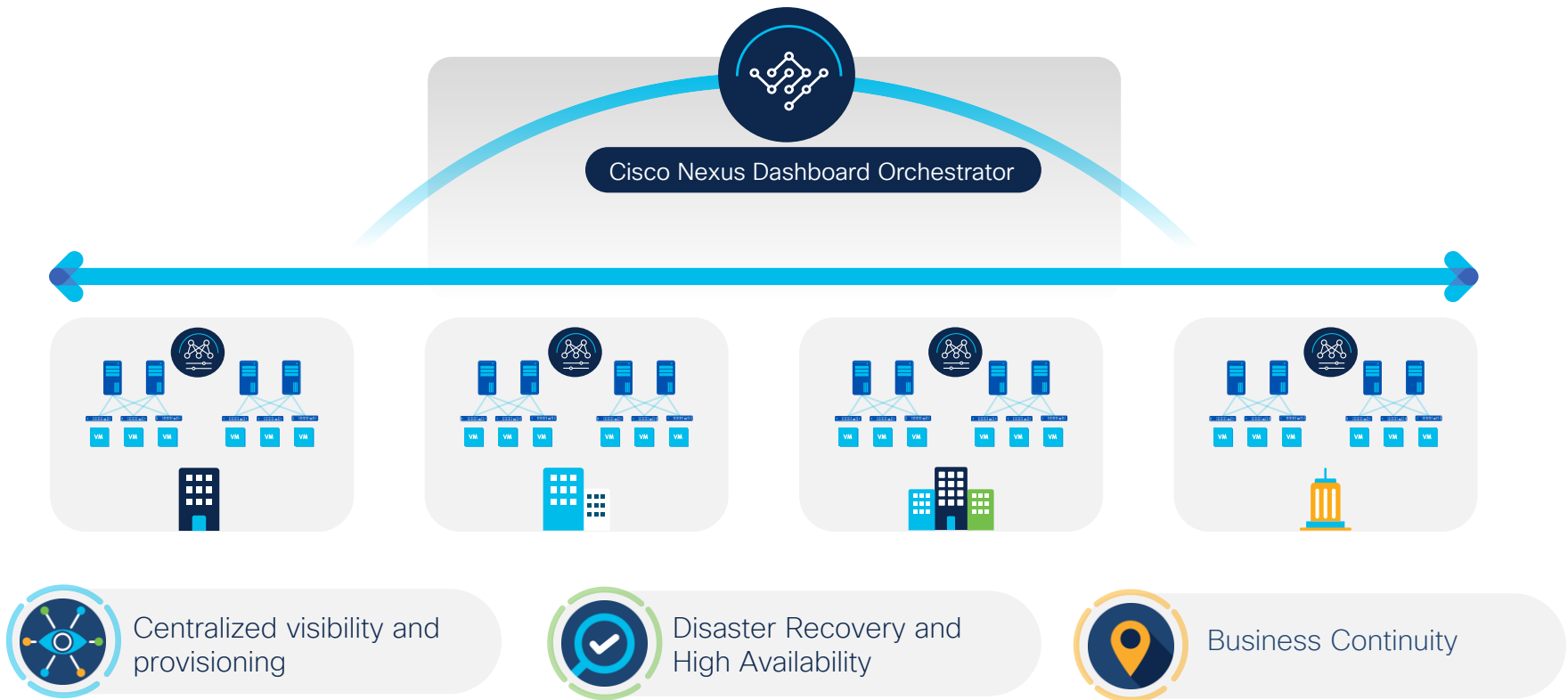
- Introduction to NDO-NDFC
- NDO Use-Cases
- NDO Deployment Considerations
- Deploying NDO-NDFC Architecture
- Day-1 Operations with NDO-NDFC
- Conclusion

The DC needs to go anywhere the data is



What is Nexus Dashboard Orchestrator?

Single Point of Network Orchestration for Large Scale Data Center Deployment



Cisco Nexus Dashboard

Simple to automate, simple to consume

Powering **automation**
Unified **agile** platform

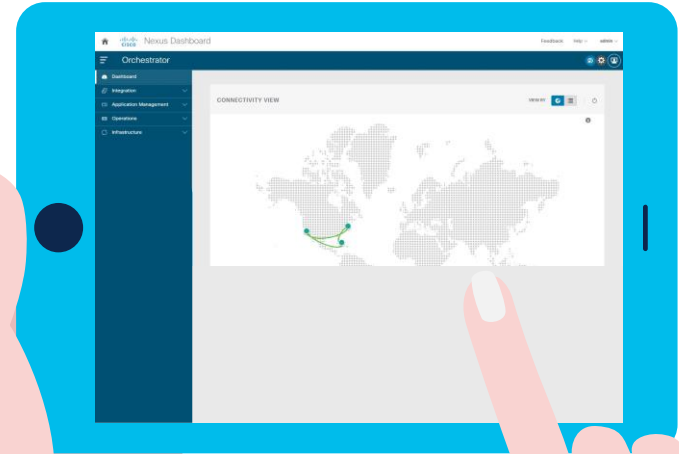
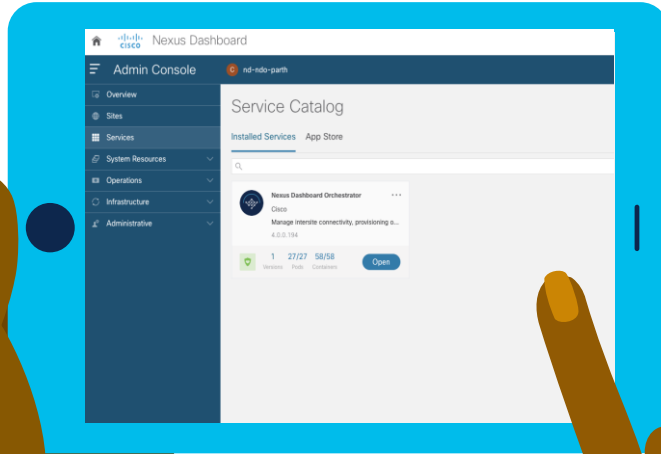


Cisco Nexus Dashboard Orchestrator

app accessed through Cisco Nexus Dashboard

Cisco Nexus Dashboard

Access NDO



Benefits

Single Orchestration

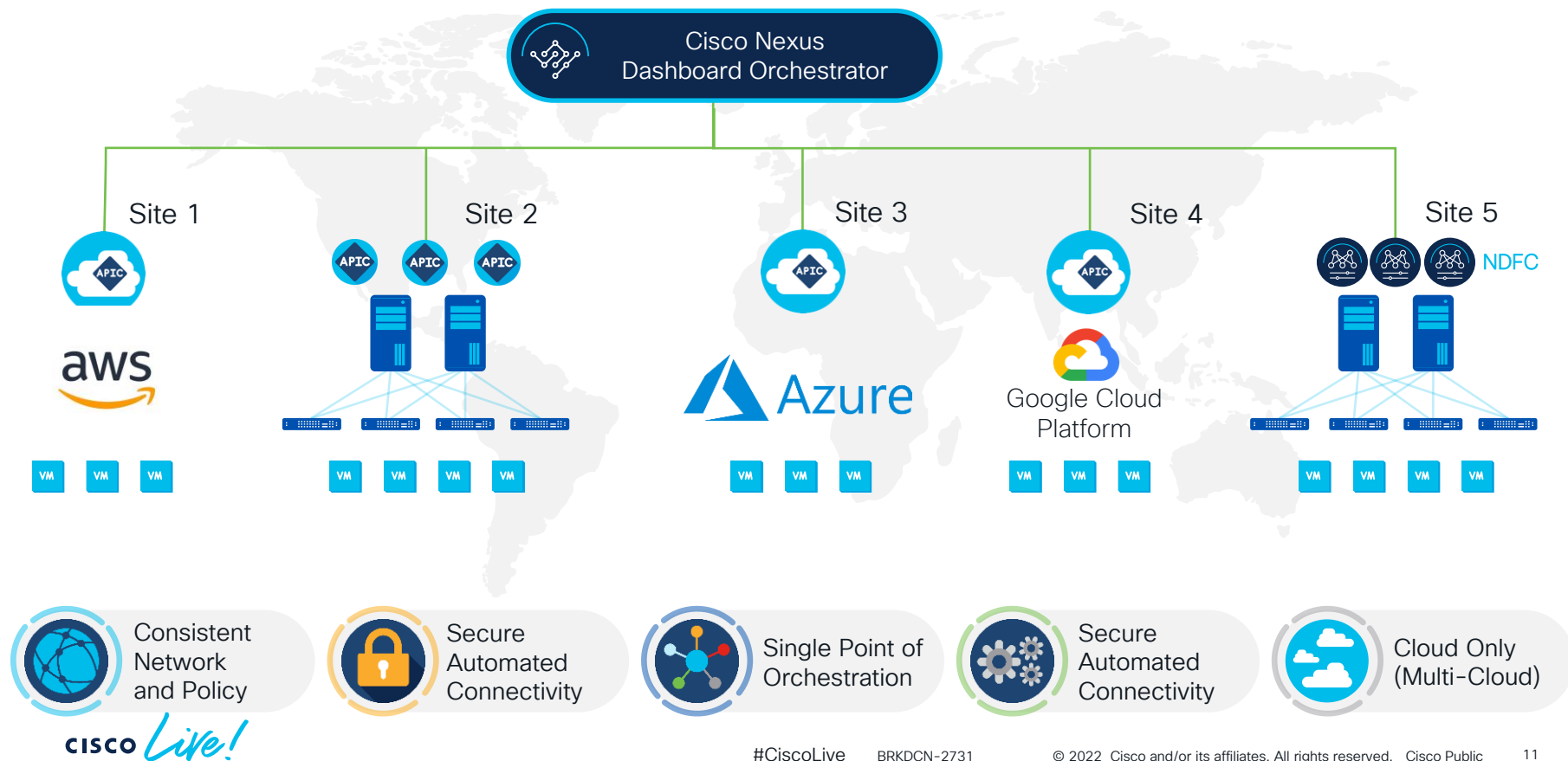
Agile

Multi-Site and Multi-Cloud

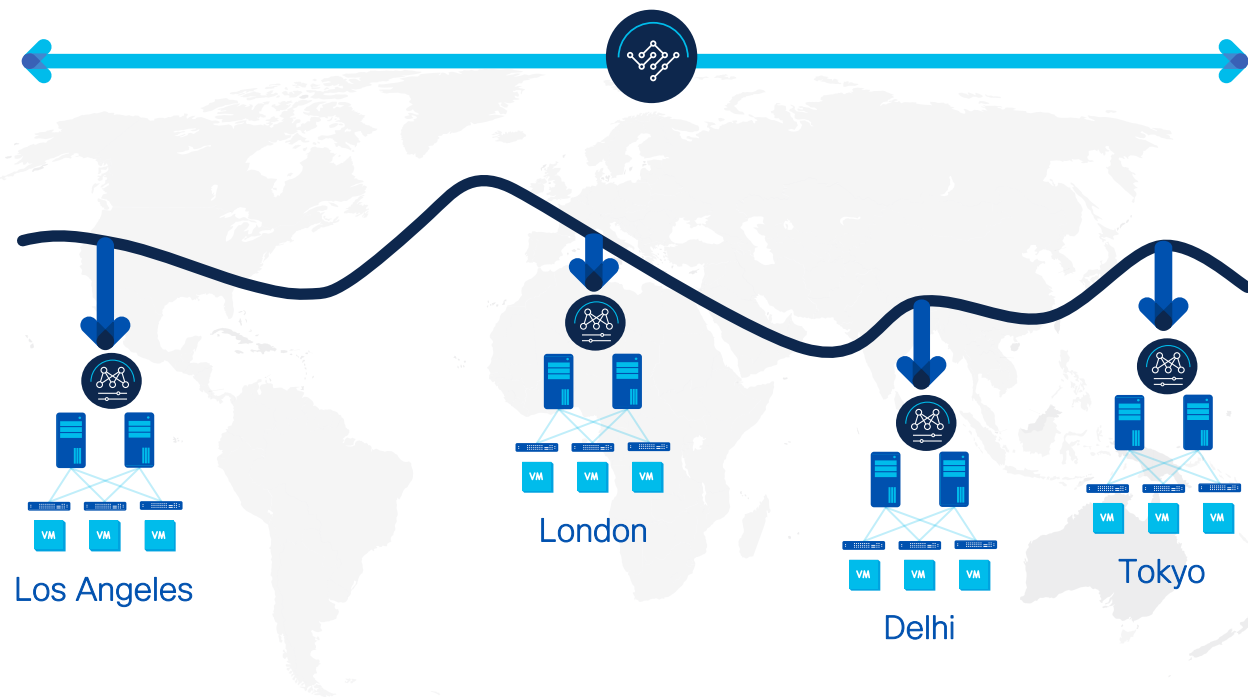
Use-Cases?

Multi-Cloud & Multi-DC Networking

Evolution of Cisco Hybrid Cloud and Multi-Cloud Architectures



Data Center Interconnectivity



Scale out

- 30 Cisco NDFC VXLAN-EVPN fabrics (Starting NDO 4.0)
- 500 VRFs and networks (L2–1500, L3–1000)



Virtual routing and forwarding stretch



L2/L3 network stretch



BGP EVPN/VXLAN across sites

- Full-mesh
- Centralized to route-server
- Inter-site connectivity automation through BGWs



Static port/VLAN provisioning



Visibility

- Fault information for NDFC objects within NDO
- Tunnel and NDFC object health within NDO

Benefits

End-to-end connectivity and policy between loosely coupled DC sites

Disaster Recovery, IP Mobility and Active-Active use cases

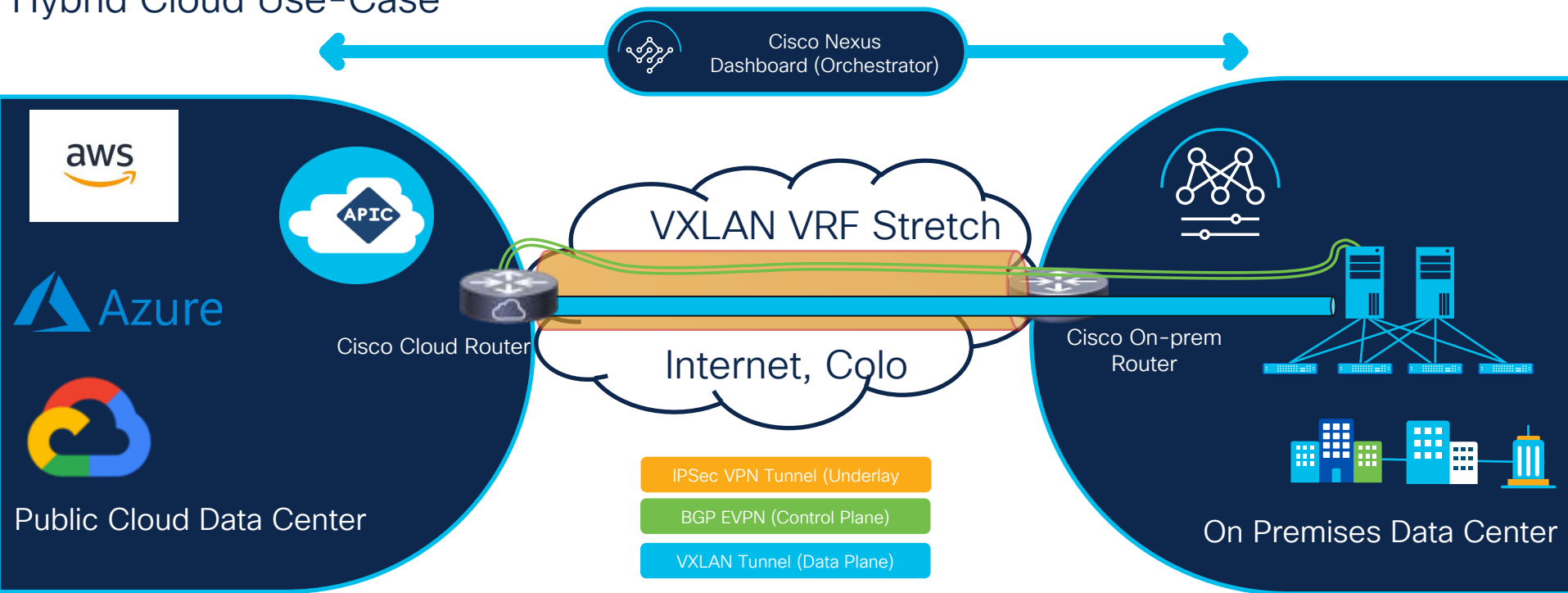
Change control domains separation

Flexible geo-redundancy for NDFC

Single point of Orchestration

Evolving Cloud Networking

Hybrid Cloud Use-Case

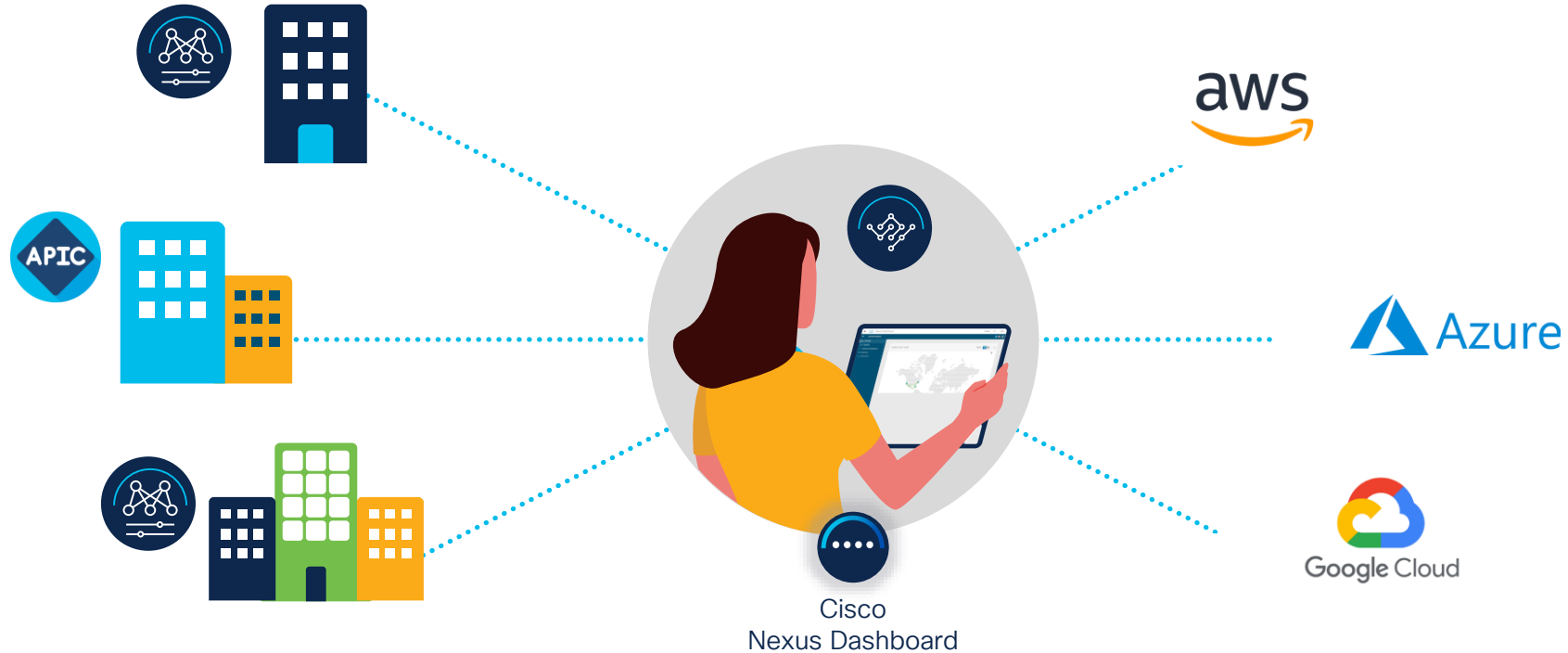


Secure On-Prem to Cloud Extension

Consistent
ManagementCentralized Visibility
and DeploymentVRF stretch and VRF
Leaking use-casesOperational
Consistency

Single Point of Network Orchestration

Automation across multiple fabrics and clouds



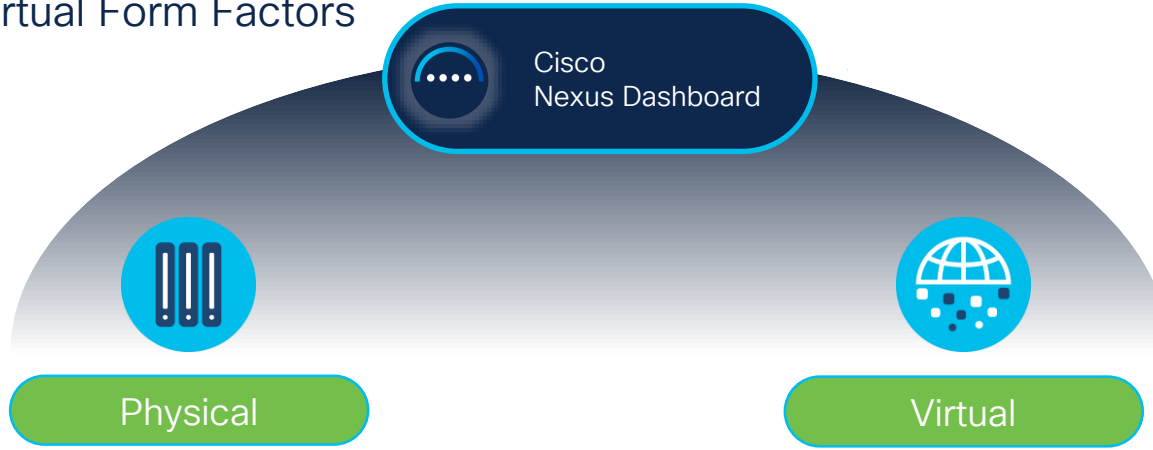
Cisco solution

Centralized visibility | Ease of troubleshooting hotspots | Run audits for compliance for multi-site environment

Deployment Considerations?

NDO and NDFC

Physical and Virtual Form Factors



- ND virtual cluster supported on ESXi and KVM hypervisors
- NDO supported on 3x pND or 3x vND
- NDFC supported on 3x pND or 3x vND/5x vND
- *NDO and NDFC must be part of different ND Clusters

NDFC Scale

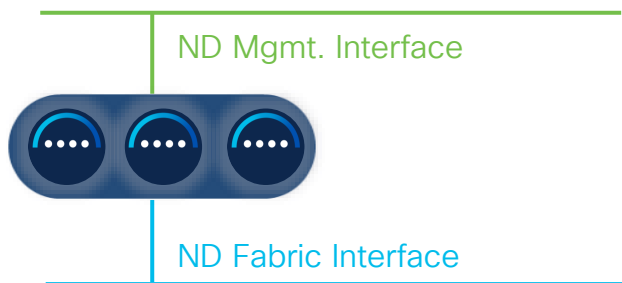
- 80 switches w/ 3 x vND
- 400 switches w/ 3 x pND or 5 x vND
- 150 switches per Fabric/Site
- 500 VRF and 1000 Network per Fabric/Site

NDO Scale

- 30 NDFC Fabrics/Sites (Easy fabric, External fabric) (**Starting NDO 4.0**)

Nexus Dashboard

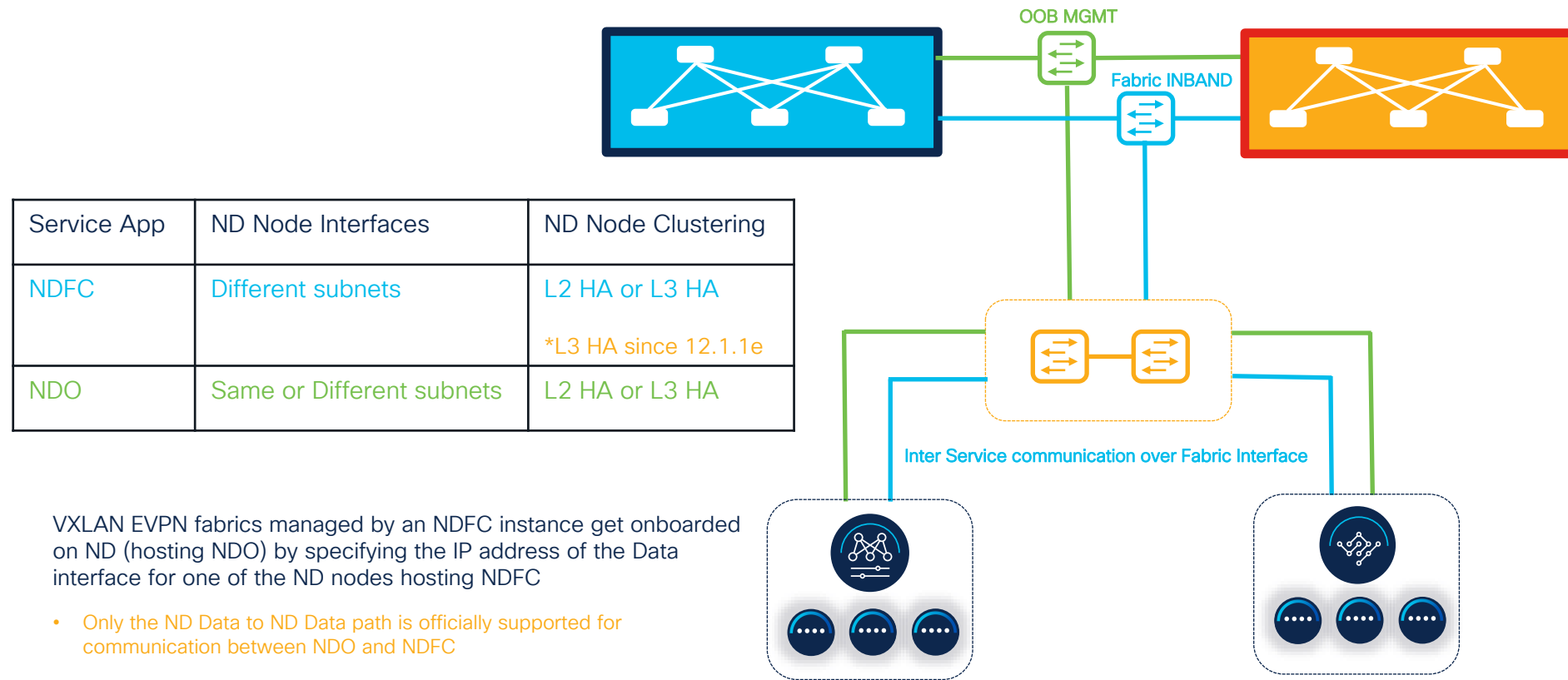
Interface Types



- Each ND node has two interface types:
 - **Management Interface**: should be dedicated to the management of the ND cluster → connectivity to NTP and DC Proxy servers, Intersight, DNS, ND (and ND Apps) UI access and to perform firmware upgrade (for ND or Apps)
 - **Fabric Interface**: used for the bring up of the ND cluster (node to node communication) and application to application (NDO, NDI, NDFC, etc.) communication

Nexus Dashboard

ND/NDO and ND/NDFC Connectivity Considerations

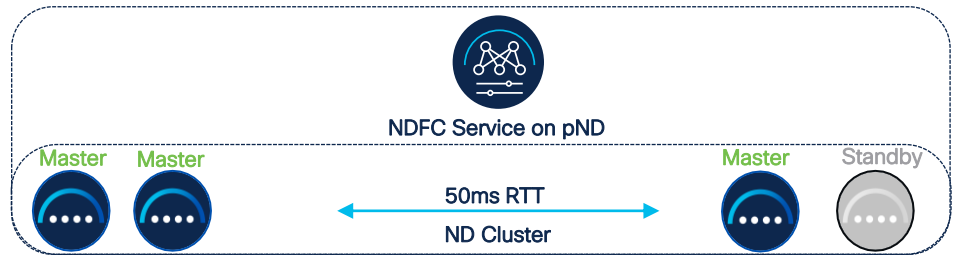
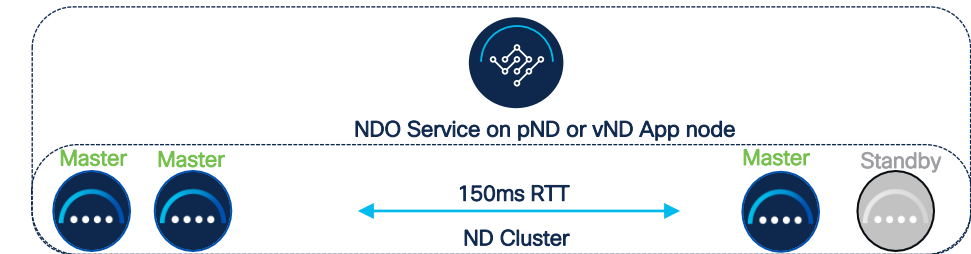


Nexus Dashboard

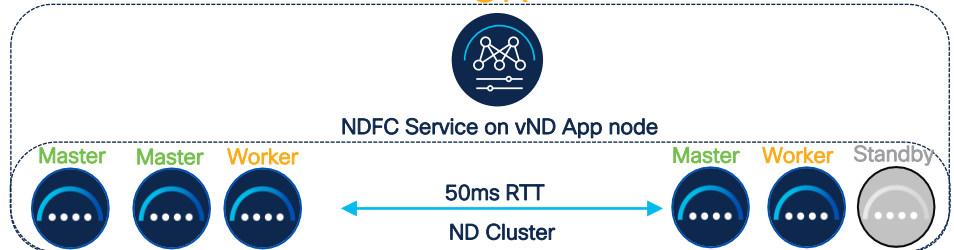
Distributed Cluster Deployment for NDO/NDFC

- **Master node:** Control plane of a cluster. Performs scheduling tasks when PODs are instantiated based on resources/load and maintains state of the cluster.
- **Worker node:** Horizontal scale-out and host the application microservices.
- **Standby node:** Increasing HA in case of Master node failure. Only a Standby node can be promoted to Master.
- NDO/NDFC tolerates failure of up to 1 Master node. The NDO/NDFC cluster goes into read-only when 2 Master nodes are down.

* NDO to NDFC managed sites latency: 150ms



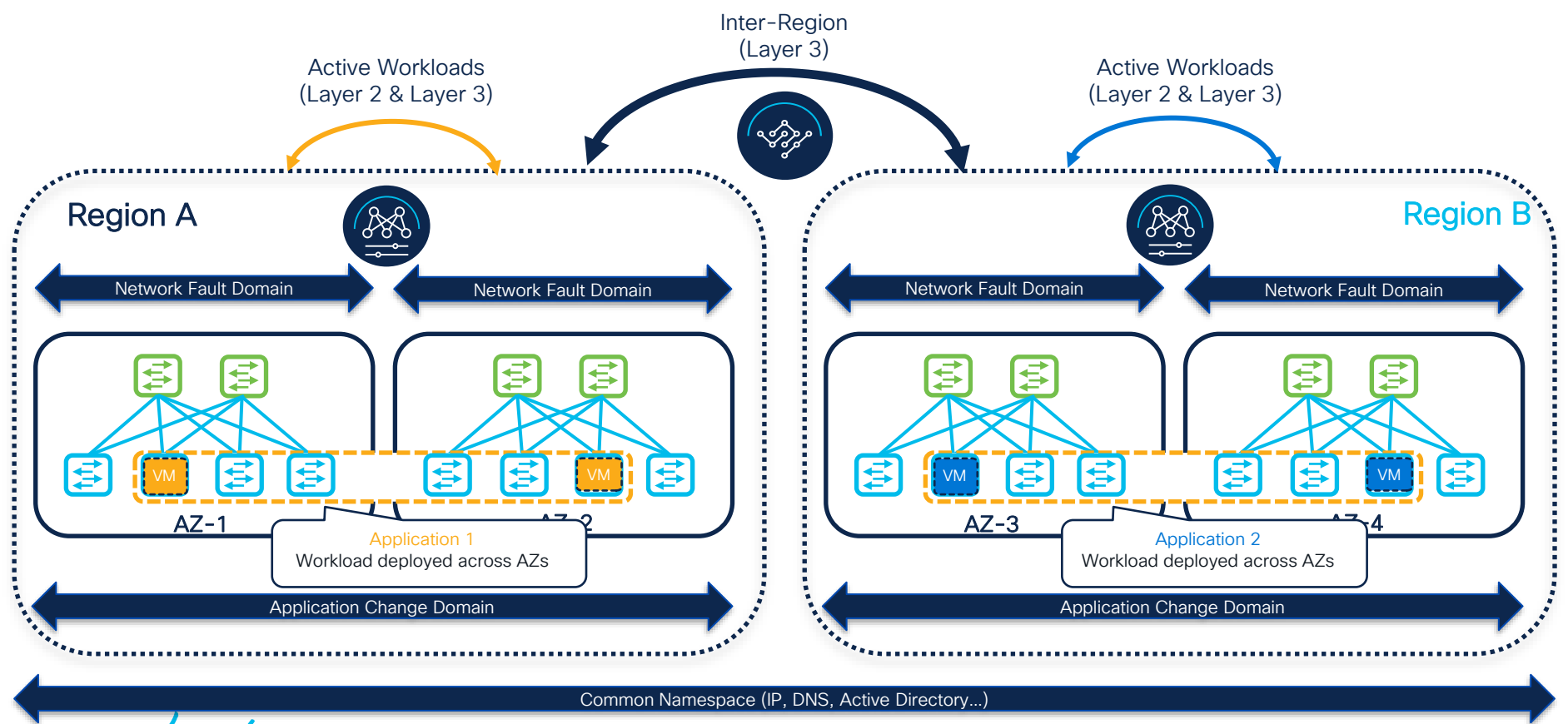
OR



Deploying NDO- NDFC Architecture

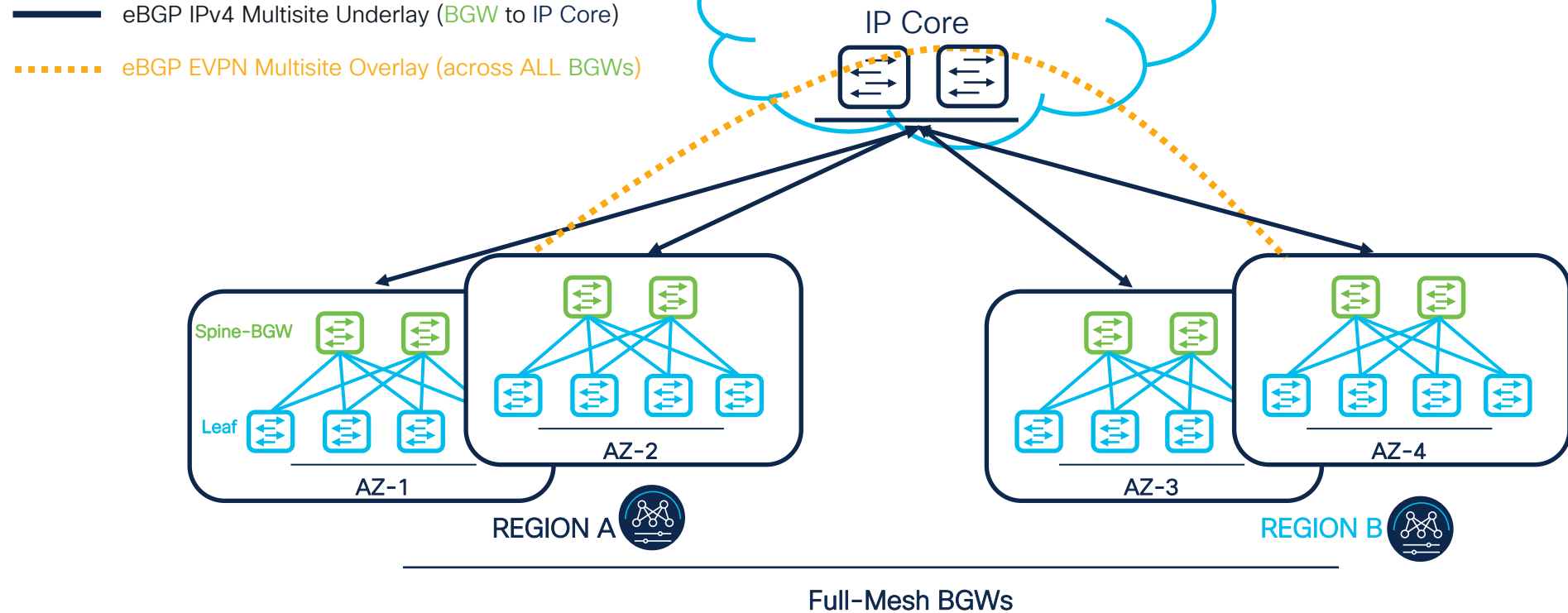
Availability Zones and Regions

Change and Network Fault Domain Isolation



VXLAN Multisite with NDO

Option-1

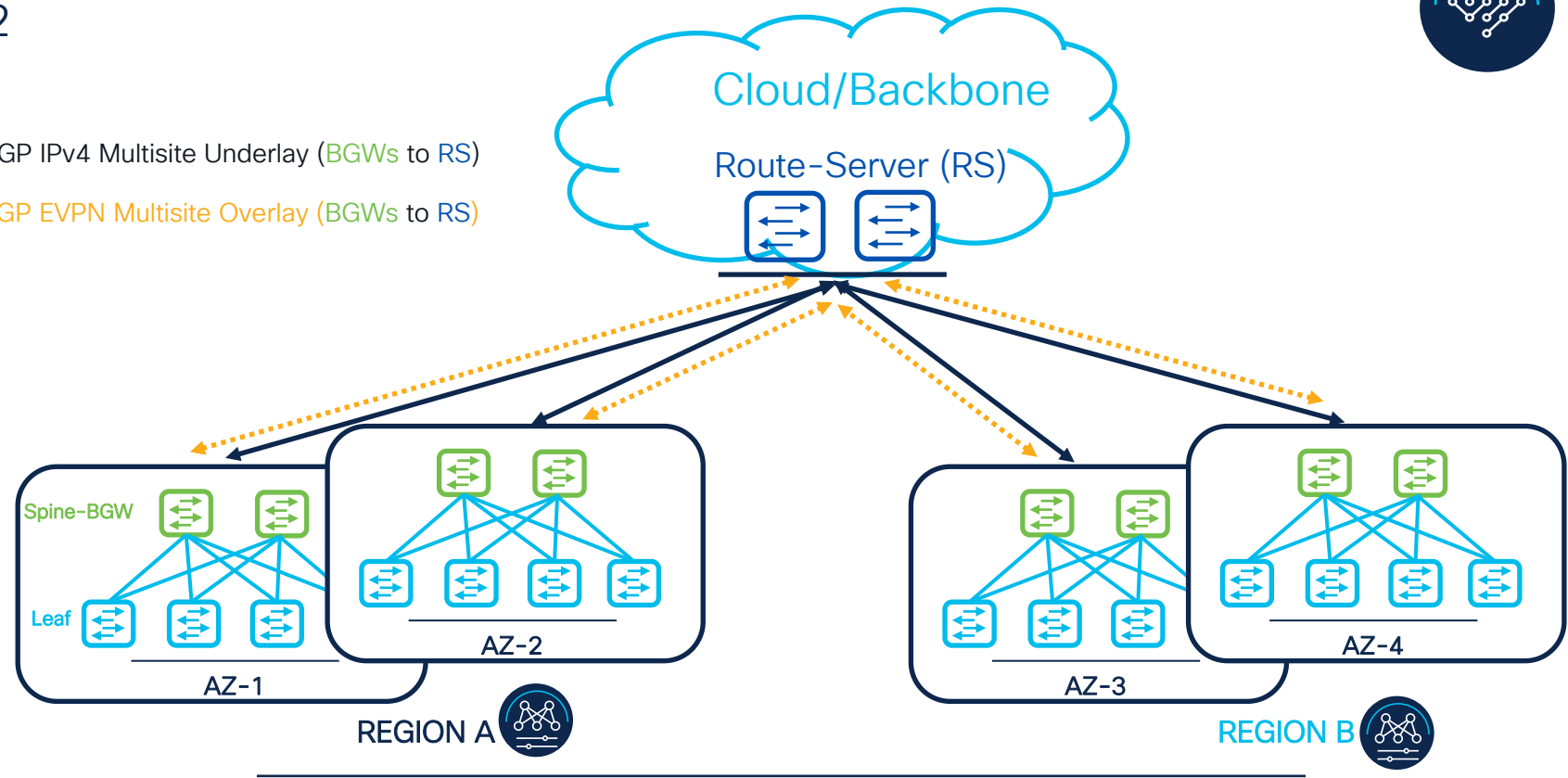


VXLAN Multisite with NDO

Option-2



- eBGP IPv4 Multisite Underlay (BGWs to RS)
- eBGP EVPN Multisite Overlay (BGWs to RS)

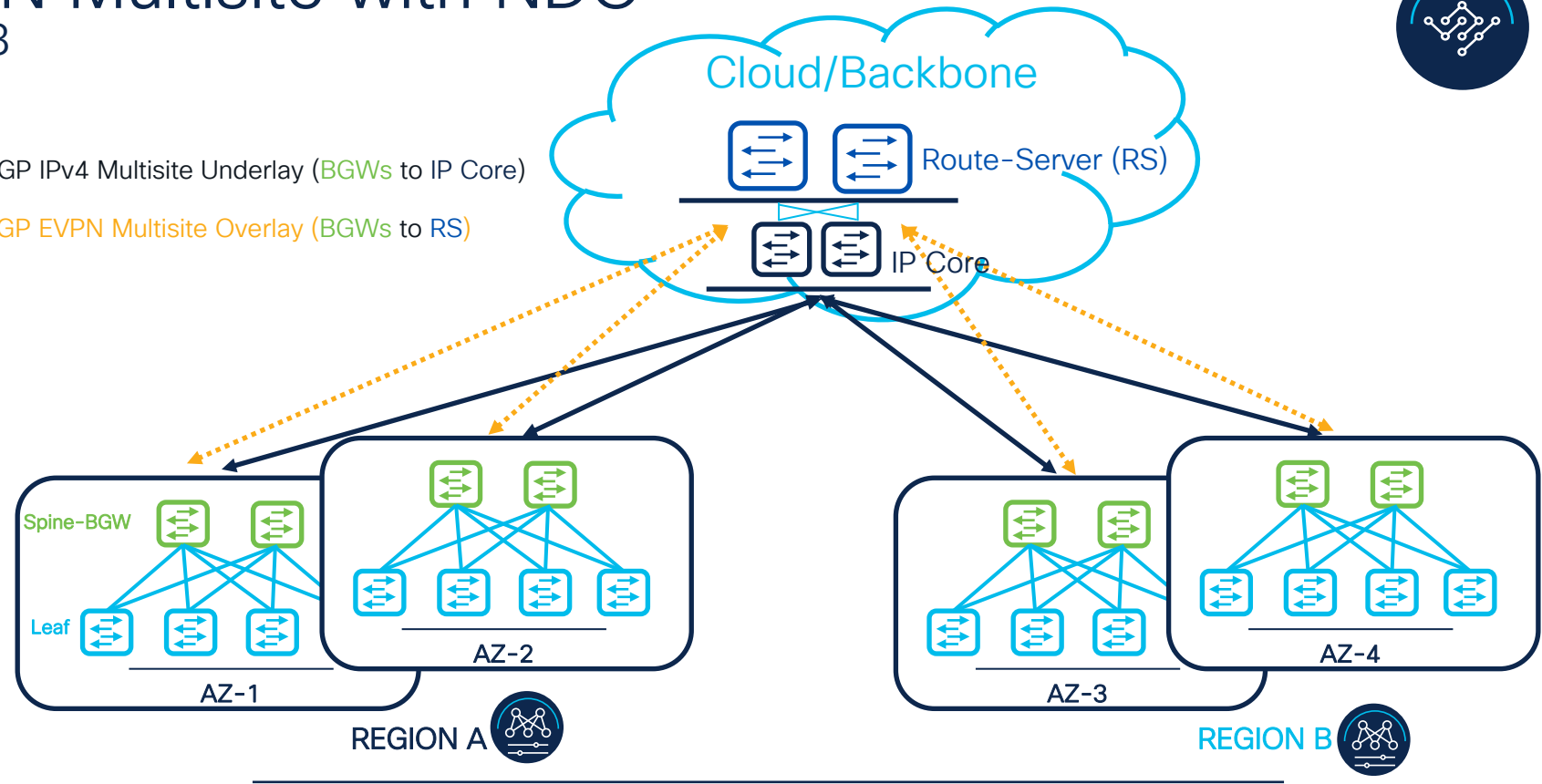


VXLAN Multisite with NDO

Option-3



- eBGP IPv4 Multisite Underlay (BGWs to IP Core)
- eBGP EVPN Multisite Overlay (BGWs to RS)



Centralized to RS

VXLAN Multisite with NDO

Option-4

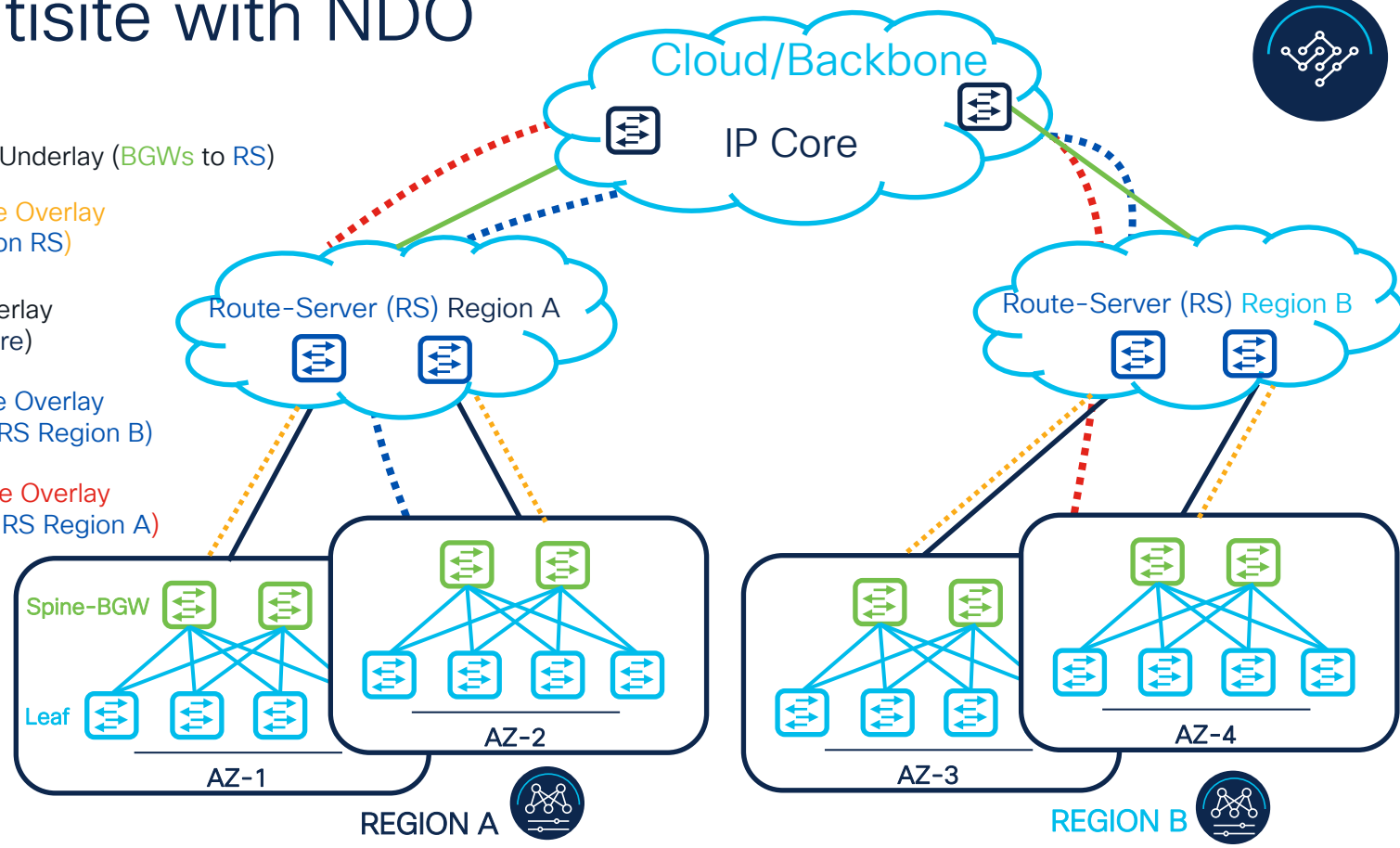
— eBGP IPv4 Multisite Underlay (BGWs to RS)

- - - eBGP EVPN Multisite Overlay (BGWs to Intra-region RS)

— eBGP IPv4 ISN Underlay (Region RS to IP Core)

- - - eBGP EVPN Multisite Overlay (BGWs Region A to RS Region B)

- - - eBGP EVPN Multisite Overlay (BGWs Region B to RS Region A)



BGWs to Multi-Region Centralized to RS

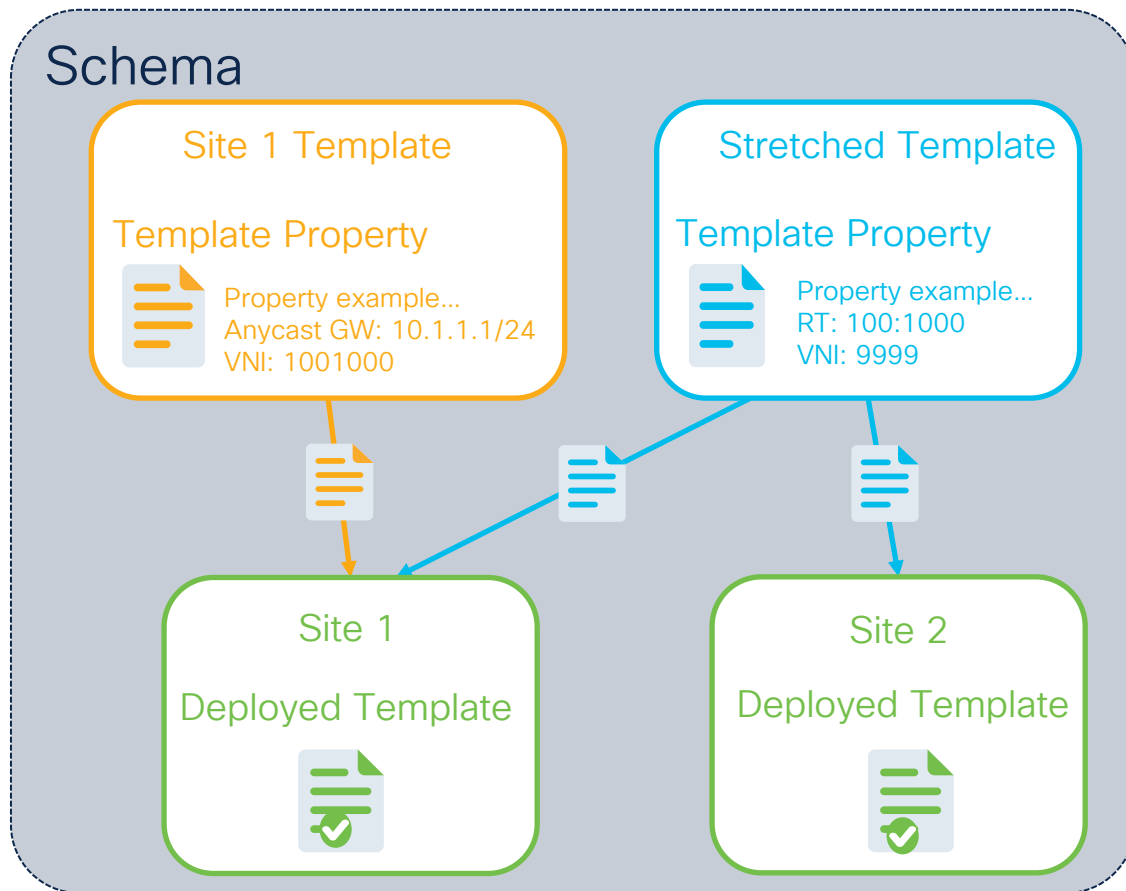
Day-1 Operations with NDO-NDFC

NDO Schema and Templates

Template = Set of configuration objects (VRFs, Networks) and their properties that you deploy all at once to one or more sites.

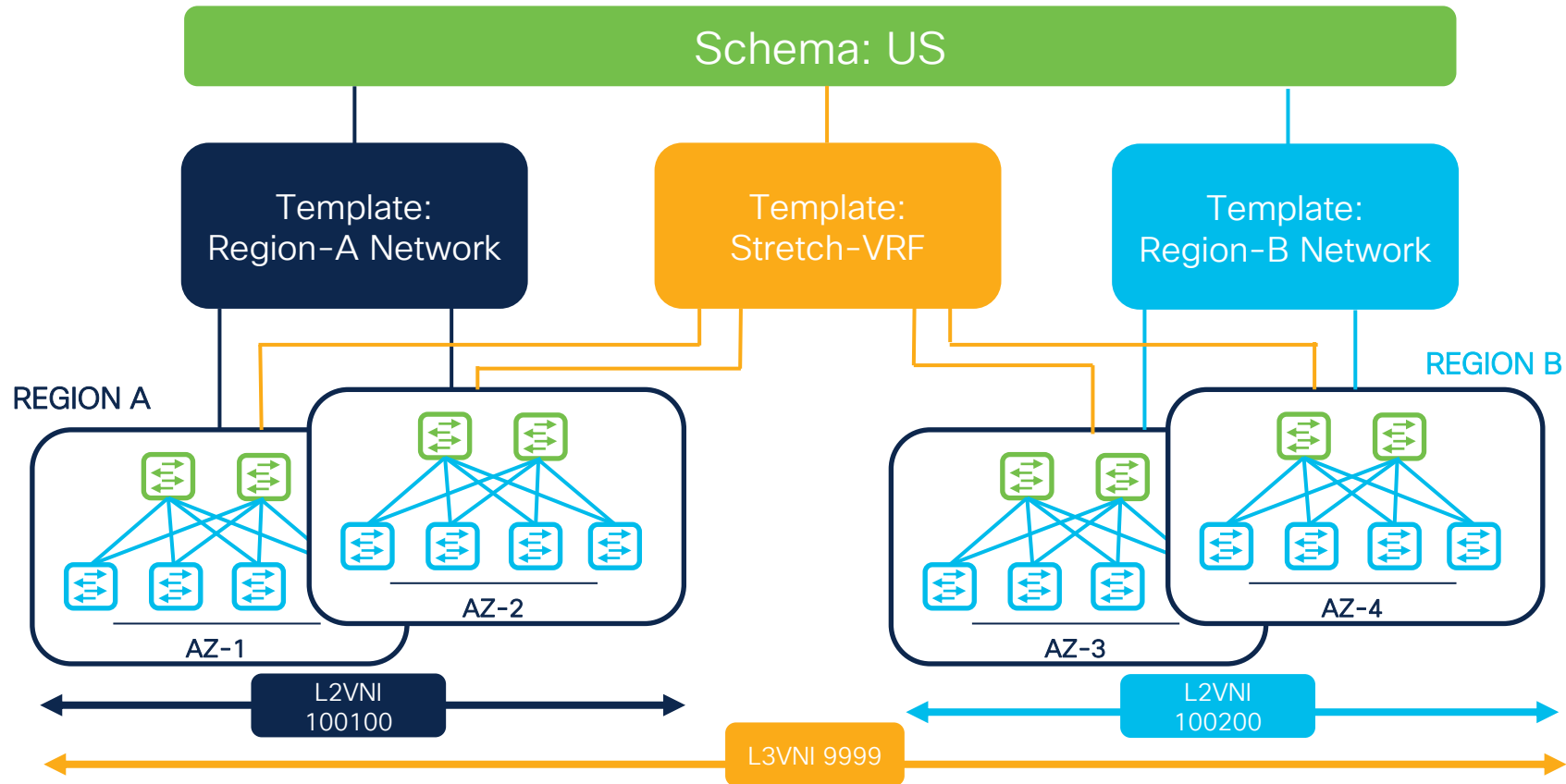
- Each template must have at least **one site** associated with it.
- A template associated to a **single site** allows to deploy site-local configuration (i.e., networks and VRF that are provisioned only in that site).
- A template associated to **multiple sites** allows instead to provision stretched networks/VRFs (i.e., objects that are concurrently deployed in multiple sites).

Schema = Container and collection of Templates sharing a common use-case.



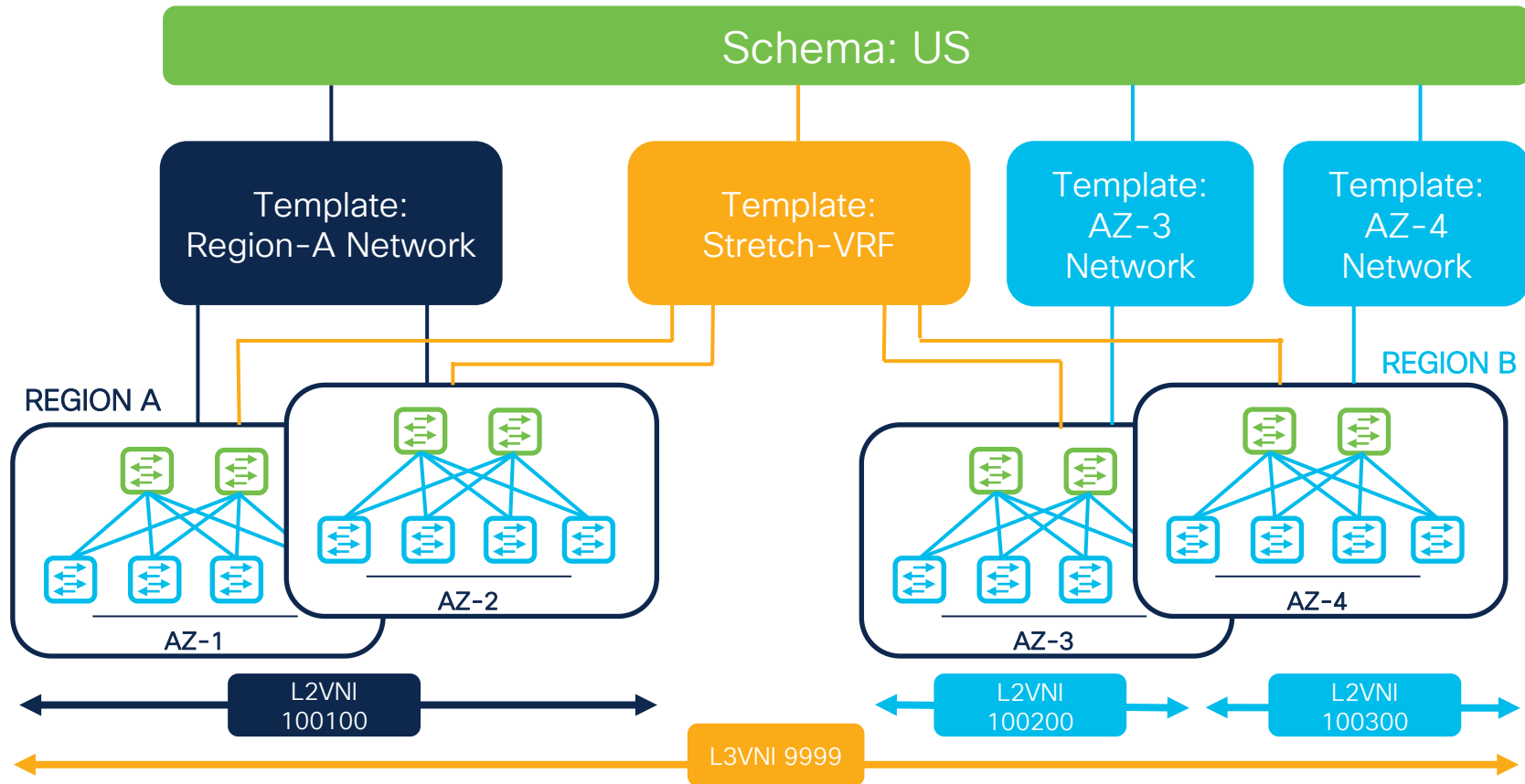
NDO Schema and Templates

Use-Case-1



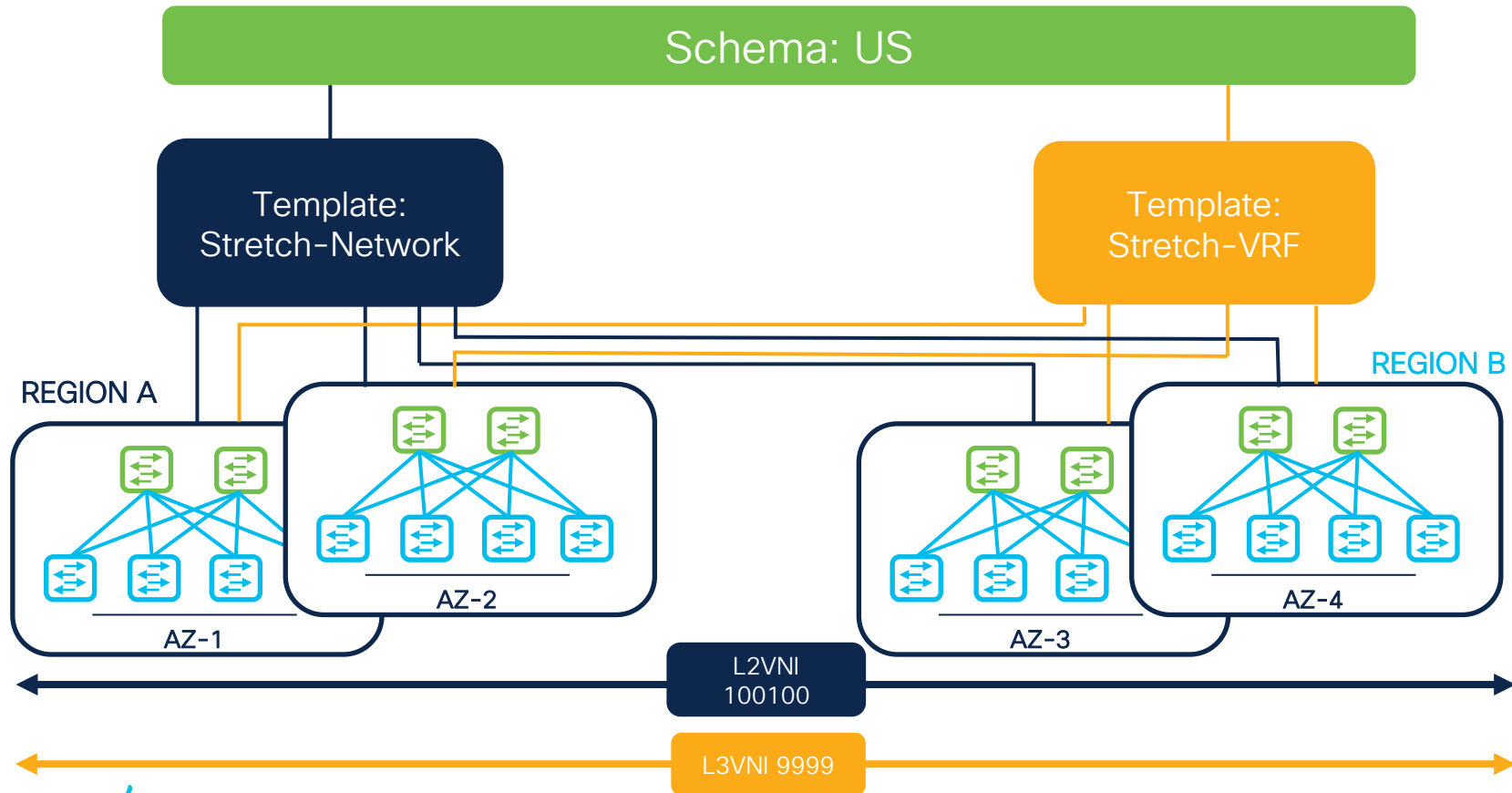
NDO Schema and Templates

Use-Case-2

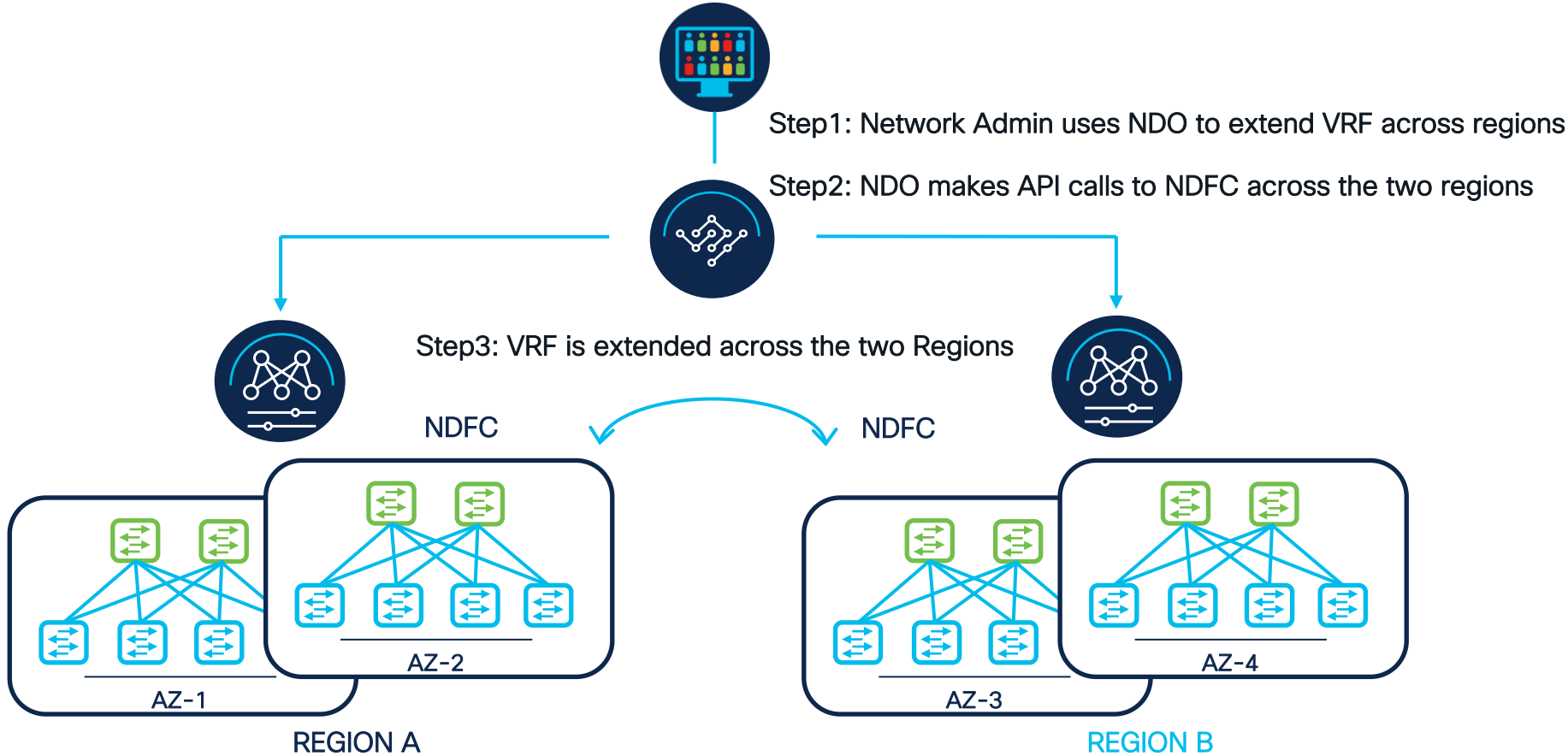


NDO Schema and Templates

Use-Case-3

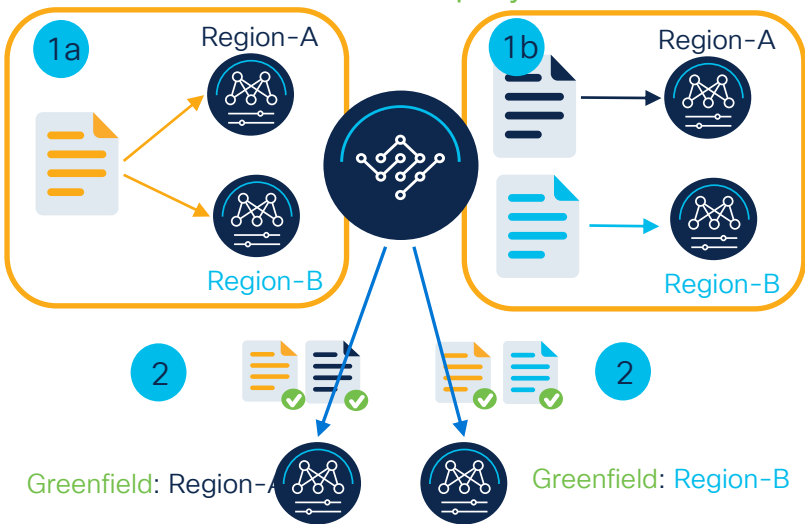


Operating Multi-Region DCs



Greenfield and Brownfield Template support

Greenfield Deployment

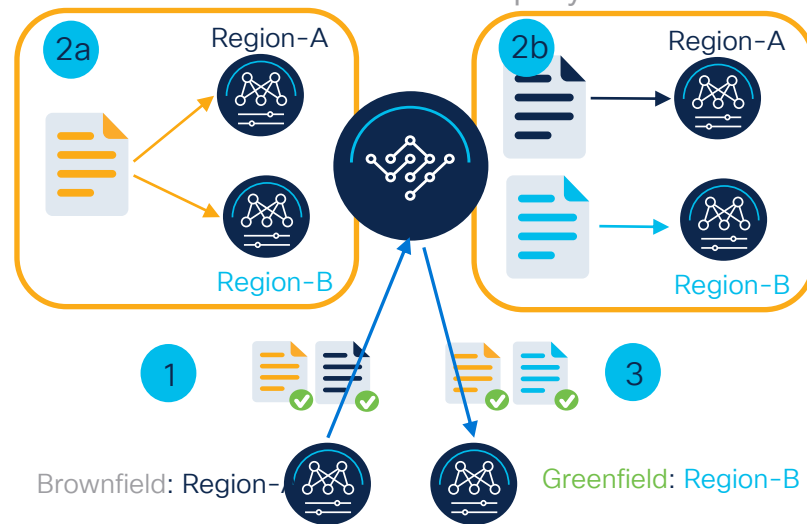


1a. Create new template for common objects such as VXLAN VRFs and associate the template to both sites.

1b. Create site-specific templates for site-specific template such as VXLAN Networks and associate them to each site.

2. Push template to NDFC sites.

Brownfield Deployment



1. Import existing objects such as VXLAN VRFs and Networks from NDFC to common and site-specific templates on NDO.

2a. Associate the common template to both sites (for stretched objects).

2b. Associate site-specific templates to each site.

3. Push the template to the NDFC sites.

NDO operational enhancements



Features

NDO 3.4(1)

Template versioning
and rollback

NDO 3.4(1)

Template deployment
plan visibility

NDO 3.4(1)

Change
control workflow

NDO 3.4(1)

Detach templates
from Sites

NDO 3.6(1)

Configuration drift
reconciliation workflow

Support rollback of template
from newer to older
version-id

Label templates with tags

Shows preview of exactly
what's getting deployed
to each site
before deployment

New personas for
template management

Configuration is not
removed from the sites

NDO workflow that synchronizes
and merges any config changes
made in APIC or NDFC level



Simple roll back of
templates without
un-deploy of
older templates

Better visibility to reduce
errors and seize the impact of
template deployment

More structured
deployments
which enables
increased flexibility

Ease of use
for migration

NDO is single source of truth
Prevents errors or governance issues

Benefits

NDO Change Control management



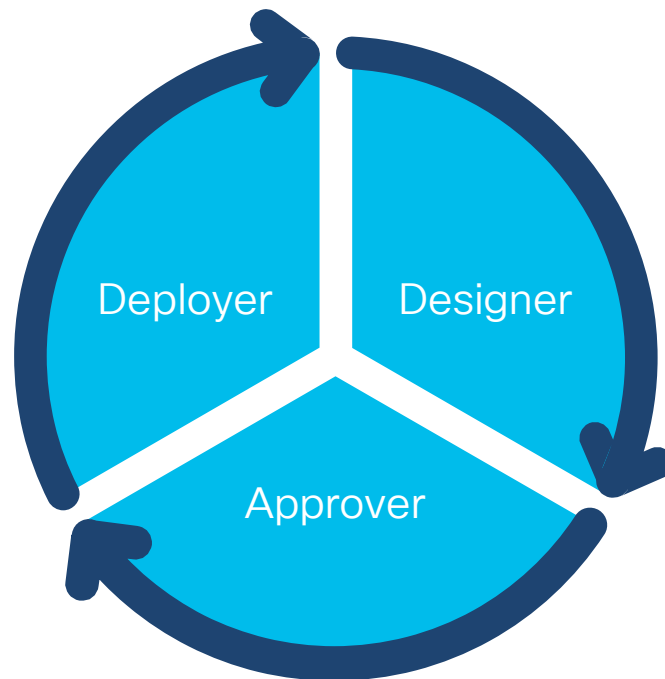
Cisco Nexus Dashboard Orchestrator 3.4(1)

Problem

- Template configuration creator can review and deploy the configuration
- Need personas for different stages of the provisioning

Change control workflow

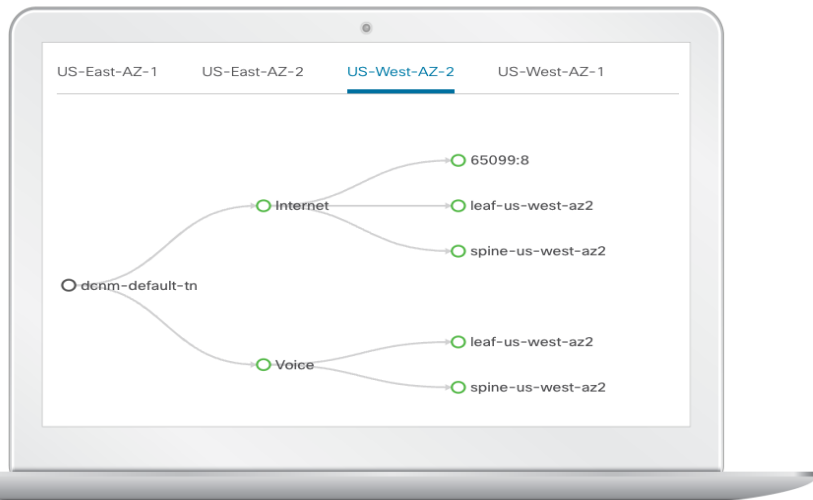
- New template management personas:
 - Designer
 - Approver
 - Deployer
- Multiple roles for users



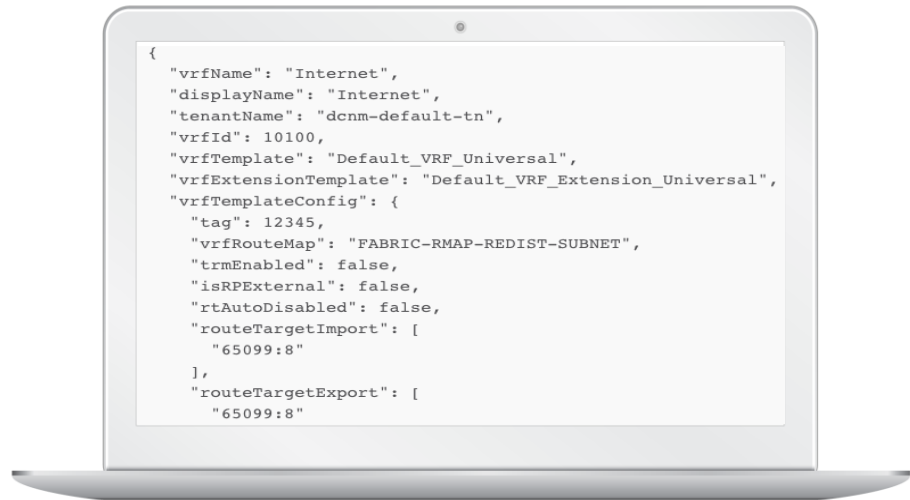
Template Deployment Plan Visibility



Cisco Nexus Dashboard Orchestrator 3.4(1)



Deployment graph visibility



Cisco NDFC JSON config preview



New Cisco NDO deployment plan visibility shows you exactly what's getting deployed to each site

- [Deployment graph visibility](#)
- [NDFC JSON Post Preview](#)



Can be triggered on-demand before or after template deployment



Use it for pre-change validation



Cisco Nexus Dashboard Orchestrator deployment plan visibility shows

- [Stretched VXLAN Overlays across sites](#)
- [VXLAN Overlays per site](#)
- [VXLAN Overlay properties configured per site](#)

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Template Versioning and Rollback



Cisco Nexus Dashboard Orchestrator 3.4(1)



Rollback template, ID and clean up differences



Compare templates so user can accept and deploy



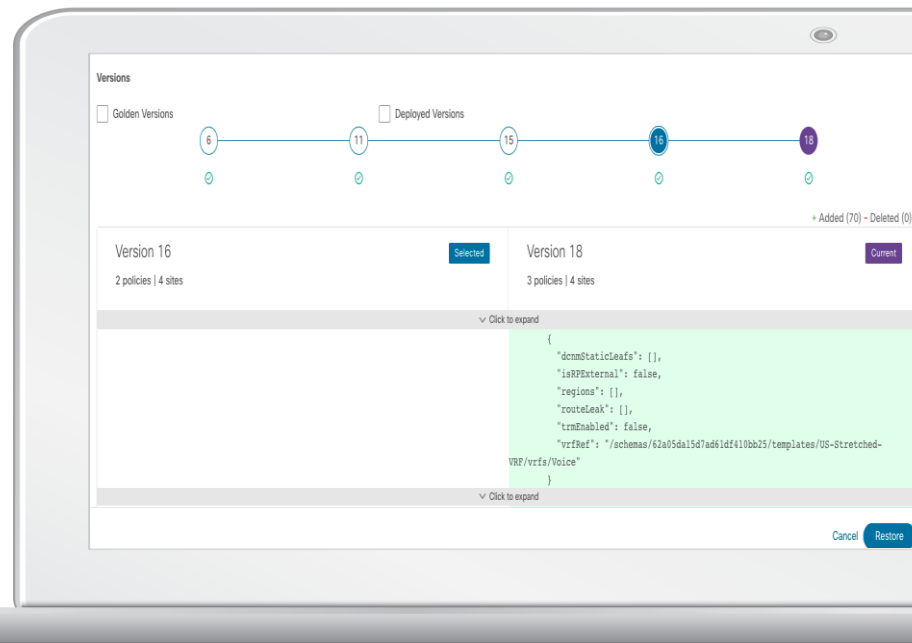
Golden template marking, template tagging



Stretched and site local templates for versioning/rollback



In-user interface and application programming interface



Benefit

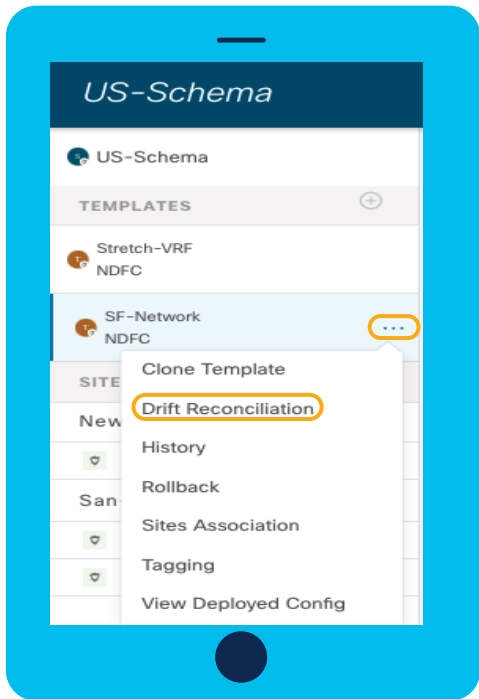
Simple roll back of templates without un-deploy of older templates

Configuration Drift Reconciliation

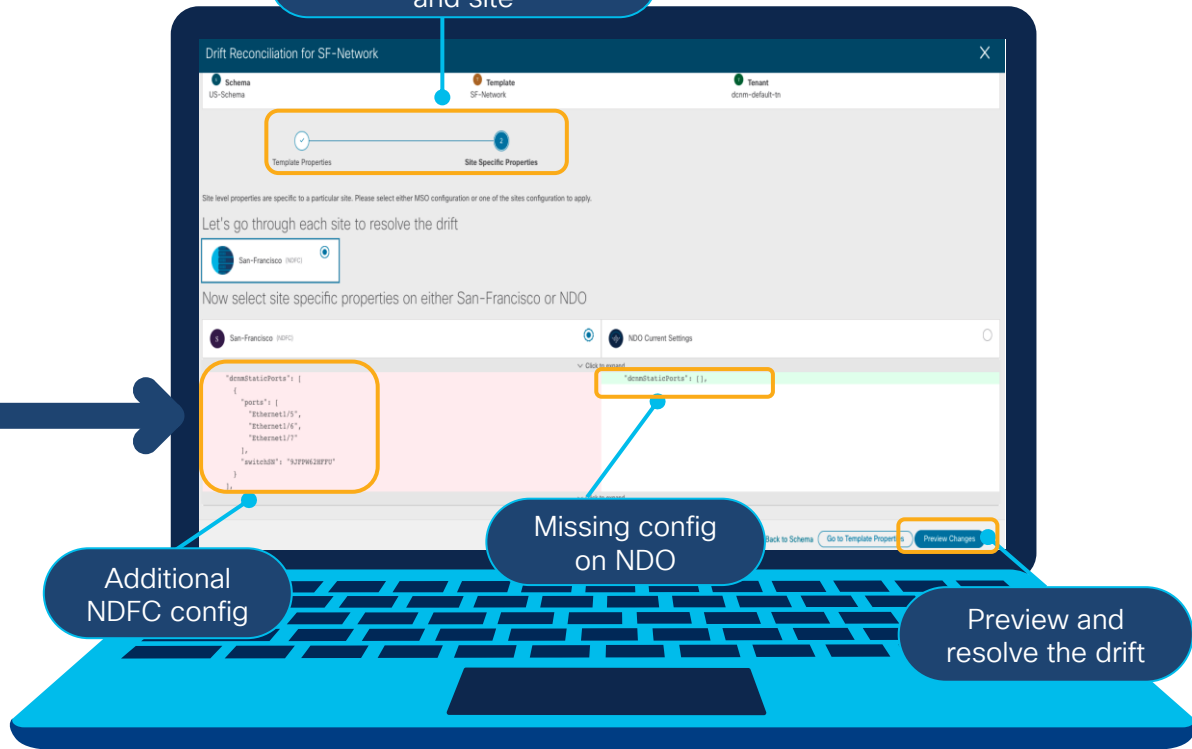


Cisco Nexus Dashboard Orchestrator 3.6(1)

Access “drift reconciliation” at template



Check drifts for template and site



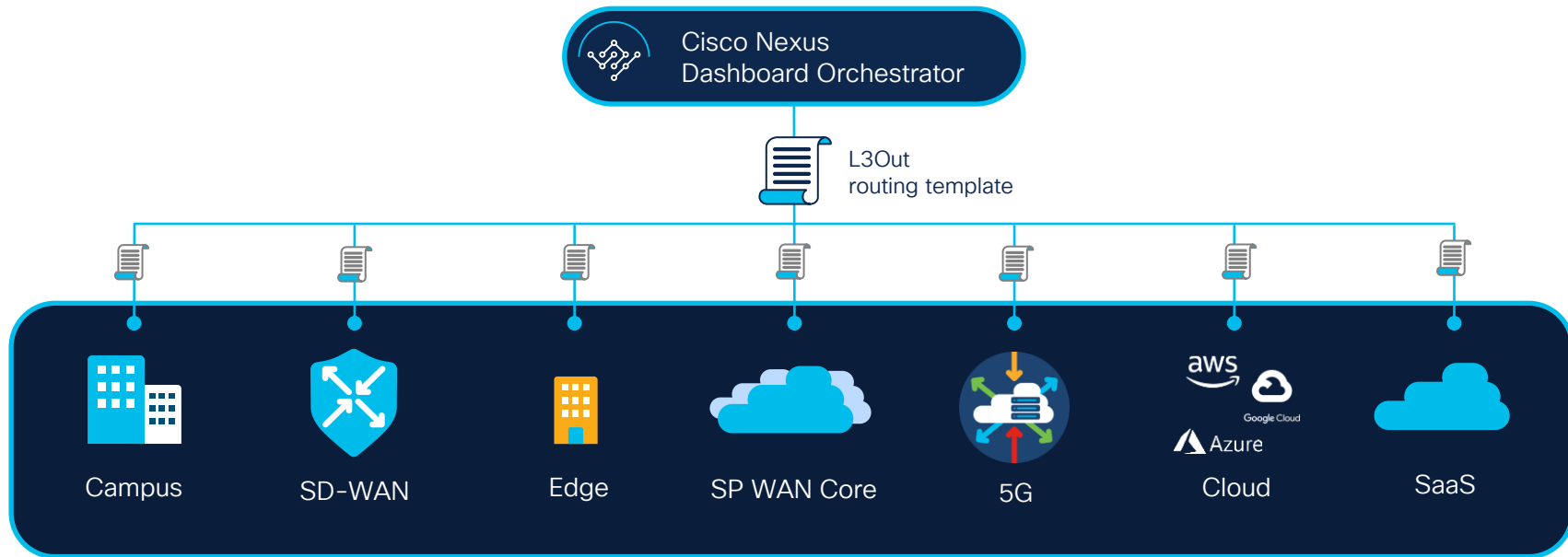
✓ NDO is single source of truth. Prevents errors or governance issues.

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External Connectivity

L3Out Configuration and Routing Template



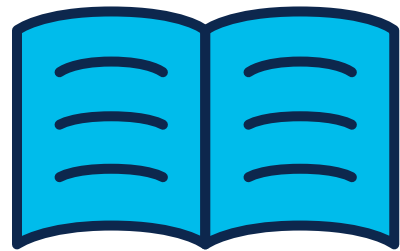
Benefits

New external connectivity template for all use cases

Single template can be re-used across 100+ fabrics

Supports ACI, NDFC and Cloud fabrics
Greenfield & Brownfield

Want to see NDO-NDFC in action?



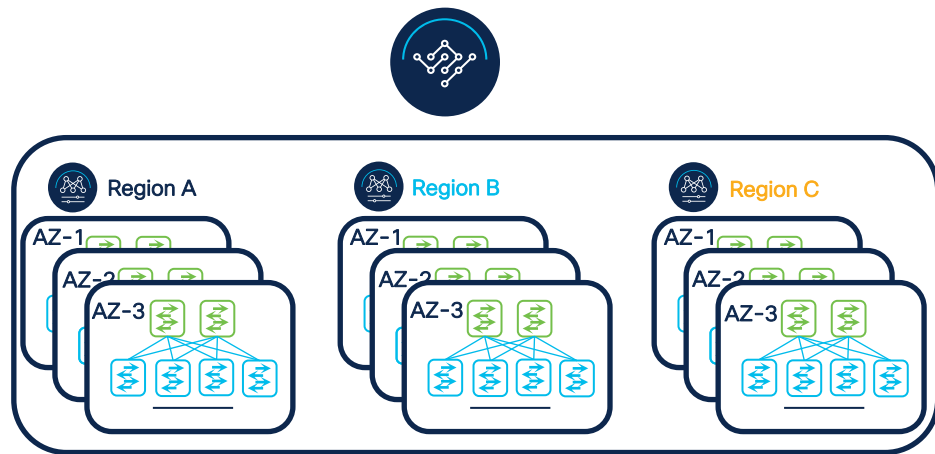
- Are you looking for a single orchestration point for automating multiple NDFC clusters?
- Are you looking to extend the existing NDFC Multi-Site domain to new Greenfield VXLAN sites?
- Are you Cloud-ready in today's Multi-Cloud, Multi-DC world?

[Check the Cisco White Paper on Automating Data Center Architecture with Nexus Dashboard Orchestrator \(NDO\) and Fabric Controller \(NDFC\)](https://www.cisco.com/c/en/us/td/docs/dcn/whitepapers/automating-data-center-architecture-with-ndo-and-ndfc.html)

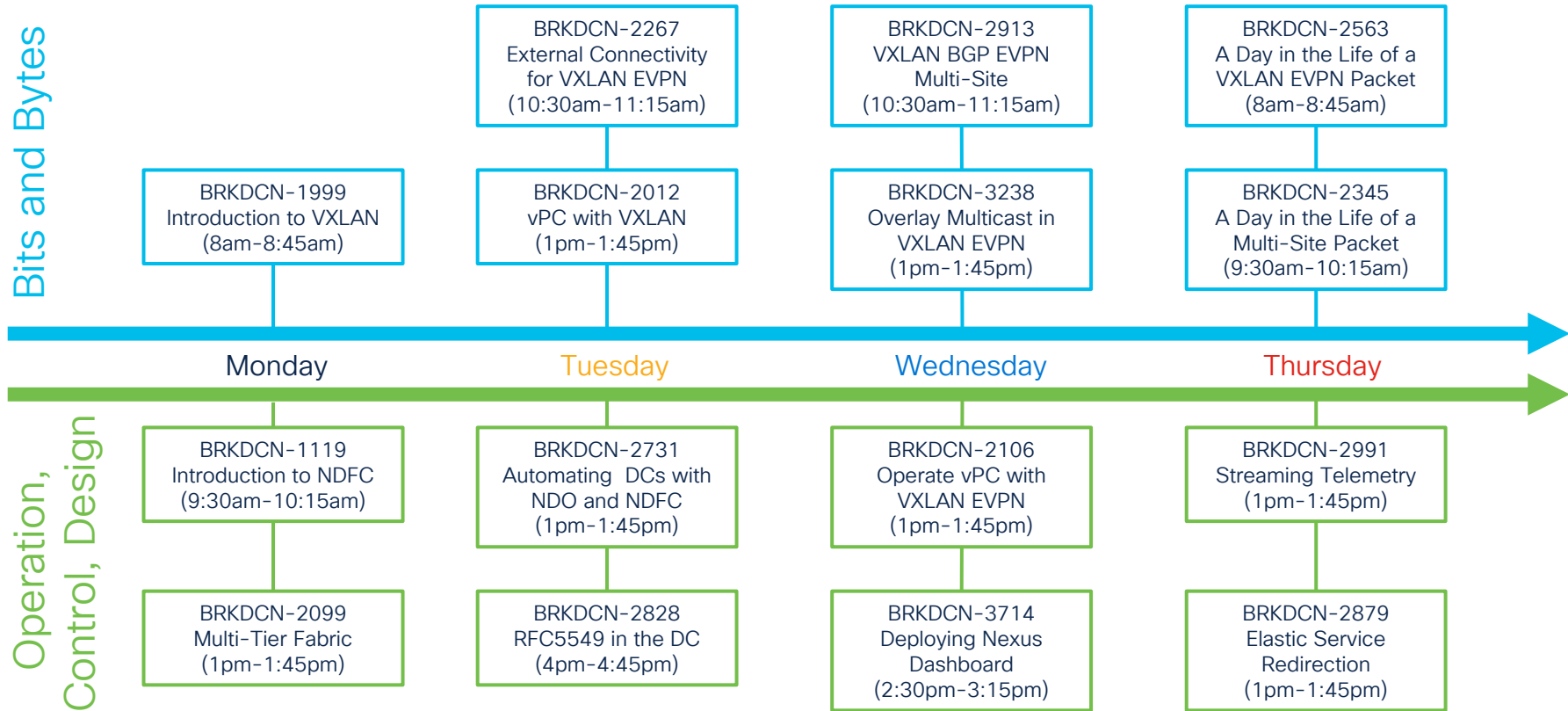
<https://www.cisco.com/c/en/us/td/docs/dcn/whitepapers/automating-data-center-architecture-with-ndo-and-ndfc.html>

Conclusion

- Cisco Nexus Dashboard Orchestrator allows interconnecting of separate regions, each managed by its own NDFC controller
- Simplified mechanism to extend and provide end-to-end network and policy consistency across regions, all with a single point of orchestration.
- Maintains clear change and fault domain separation to deploy large-scale and highly available DC architectures.



Companion sessions – week at a glance



Technical session surveys

- Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live branded socks!
- Attendees will also earn 100 points in the Cisco Live Game for every survey completed.
- These points help you get on the leaderboard and increase your chances of winning daily and grand prizes.



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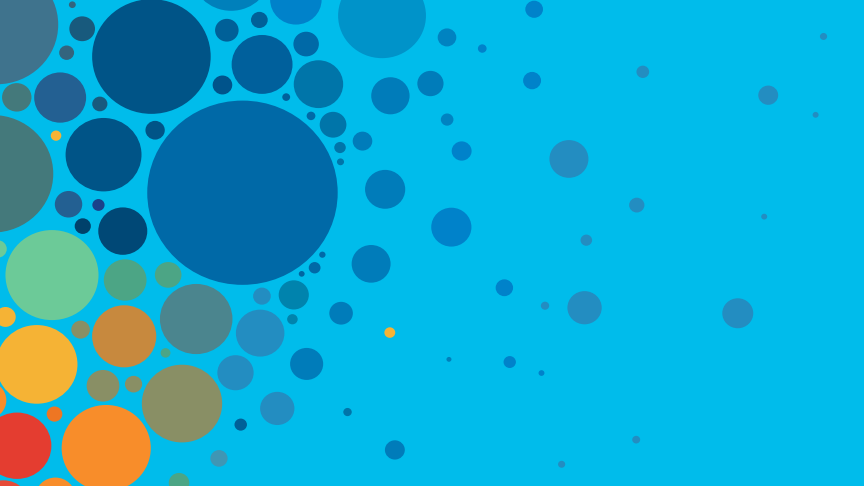
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- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand



The bridge to possible

Thank you

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