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The bridge to possible

1 to 100 – Master all steps of Deployment, Integration, and Migration of large SDA and SD-WAN networks

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Jeremy Bowman, Sr. Delivery Architect

BRKENS-3834

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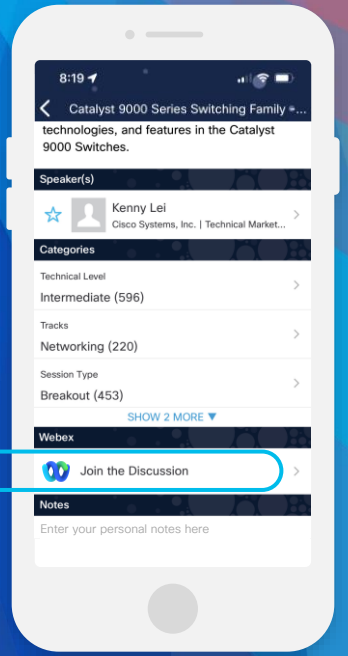

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Agenda

- Introduction
- Design and Deployment Best Practices
  - SDA & SDWAN Integration
  - 100,000ft view on Multi-Domain Design
- Deployment and Migration Lessons Learned from Large Scale Deployments
  - Having a solid Foundation
  - What is the migration process?
  - Lessons Learnt
- Conclusion

Who are we?

Dhrumil Prajapati

Sr. Delivery Architect

Technology and Transformation Group – CX

8+ Years @ Cisco

CCIE #28071 (R/S, SP)

CCDE #20210002

Specialized in: SD-Access, SD-WAN, MPLS, Multi-Domain Networks, Cloud, Automation

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Who are we?

Jeremy Bowman

Sr. Delivery Architect

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8+ Years @ Cisco

CCIE #51241 (R/S, Security)

CCDE #2018::16

Specialized in: Full Enterprise IBN with Security and Automation

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Design and Deployment Best Practices

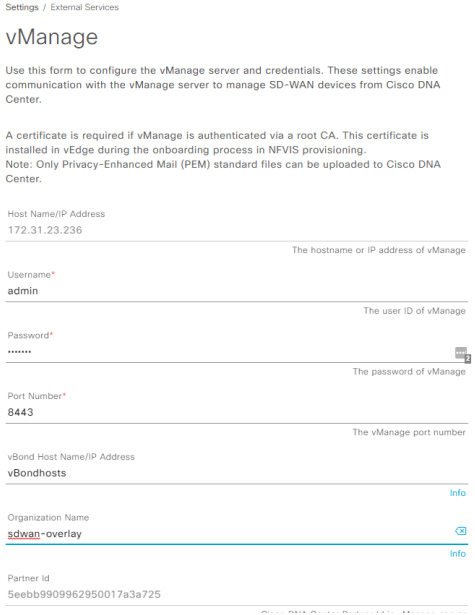
Why Multi-Domain?

- Individual architectures introduce
  - Segmentation
  - Automation
  - Within a single enterprise domain

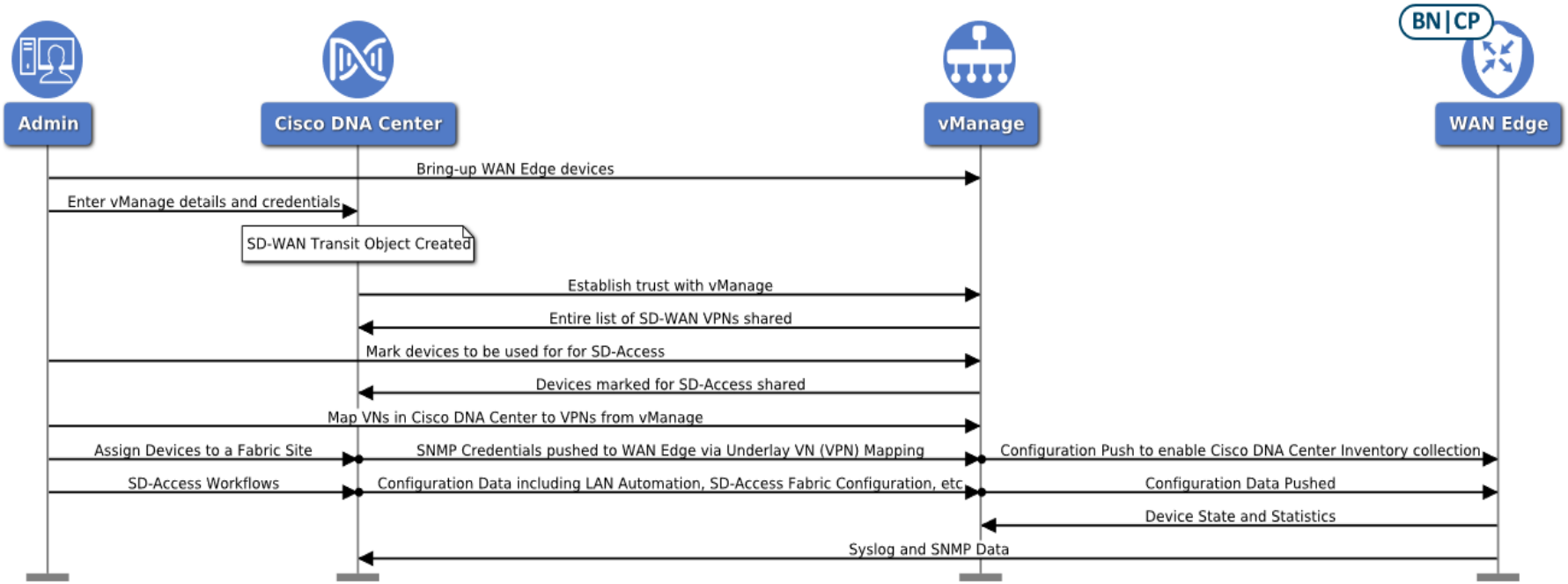
- Multi-Domain Architectures
  - Extend Segmentation
  - Utilize orchestration
  - Make the entire enterprise one IBN enclave

What Is Involved In SDA & SDWAN Integration?

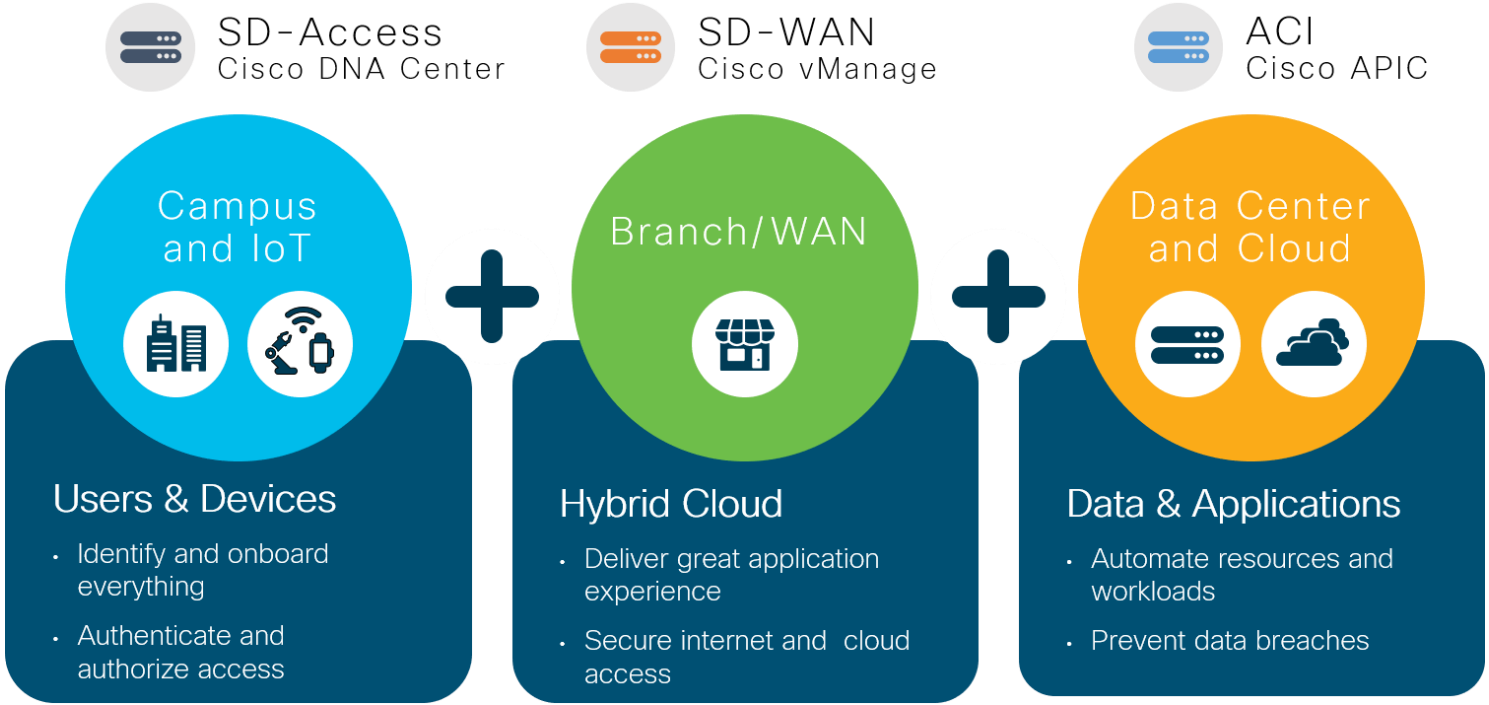
- Steps
  - DNAC and vManage integration
  - vManage owns each cEdge and assigns to DNAC
  - Provision SDA specific changes through DNAC, SDWAN specific changes via vManage
- Results
  - SDA VNs and SDWAN Service VPNs tied together
  - SDA SGT information propagated via SDWAN
  - cEdge participates in both fabric domains
  - Consistent application and security policy
  - API based communication between DNAC and vManage



SDA and SDWAN Integration



Really Really High-Level View

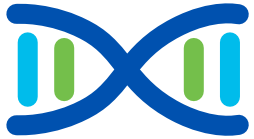


100,000 ft view

- SDA
  - Endpoints dynamically assigned SGTs and placed into VNs
  - Macro and Micro-segmentation
  - Unified wired and wireless networks
- SDWAN
  - Extends and bridges segmentation
  - Applies DNAC per-VPN security and application policy.
  - Enables end-to-end segmentation

What did we learn from Large Deployments?

SDA and SDWAN Deployments



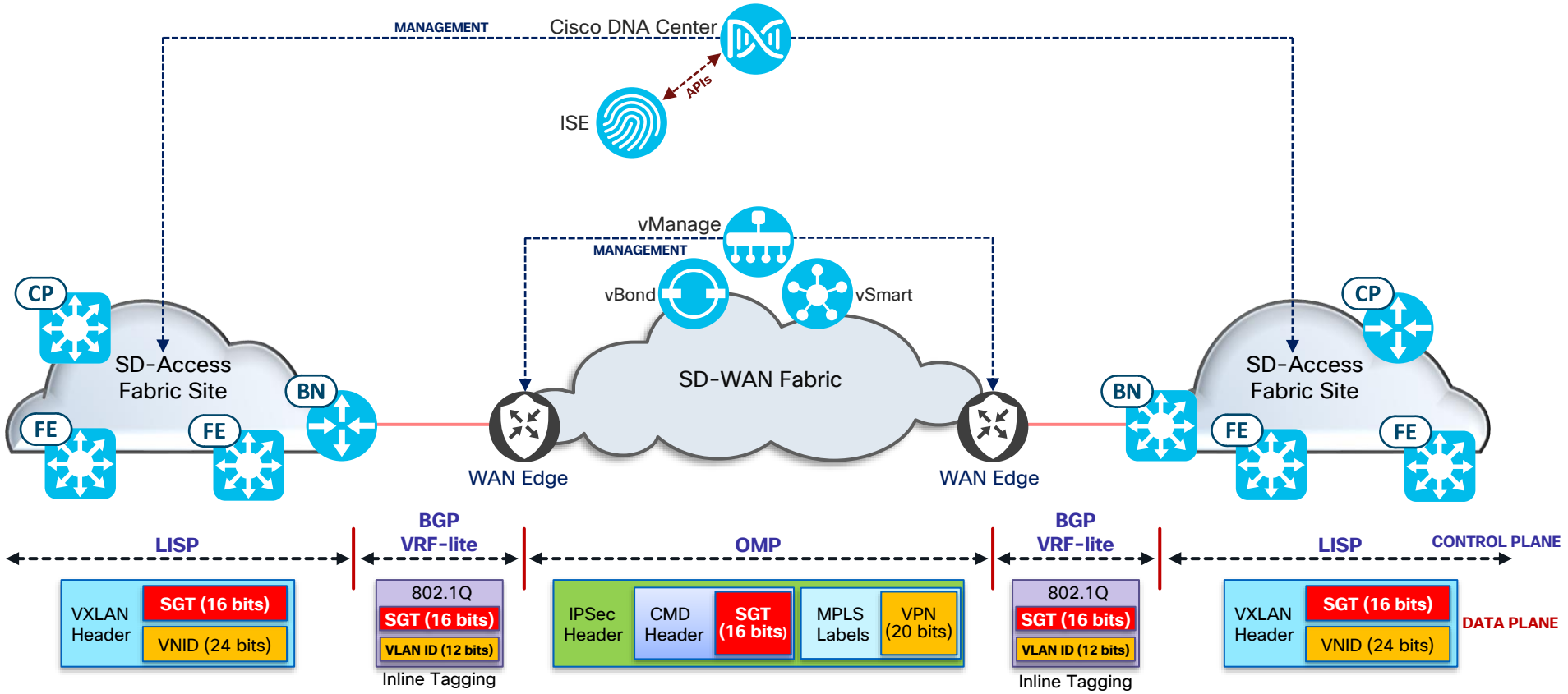
- Today available in partly manual “two-box” solution

- Two-box solution (non-integrated solution)
  - Clear demarcation between SDA and SDWAN architectures
  - SDA BNs can be ISR4K, ASR1K or Cat9K switches, SDWAN edges can be ISR4K or ASR1K series routers
  - SDA and SDWAN designs can be implemented at a different pace

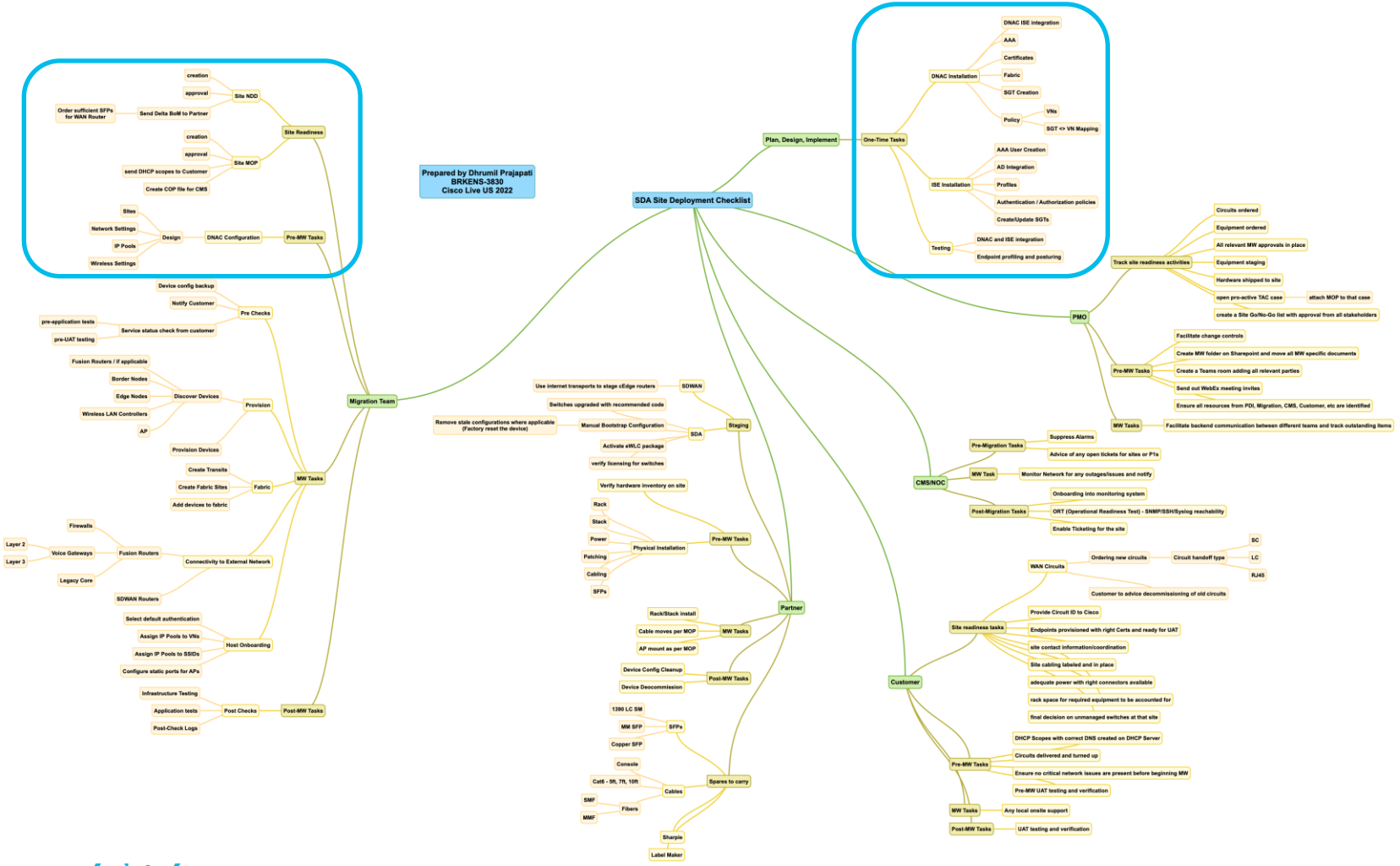
SDA and SDWAN Deployments Contd.

- Majority of customers have employed two-box solution for modularity of deployment and flexibility in operations
- Mapping of VNs and VPNs is crucial
- Inter-site traffic flow greatly depends on SDWAN tunnel design and SDWAN underlay.
- For Multi-Regional (Global) networks, consistency across multiple DNAC clusters is key.
- Special consideration for inter-VN routing within the site

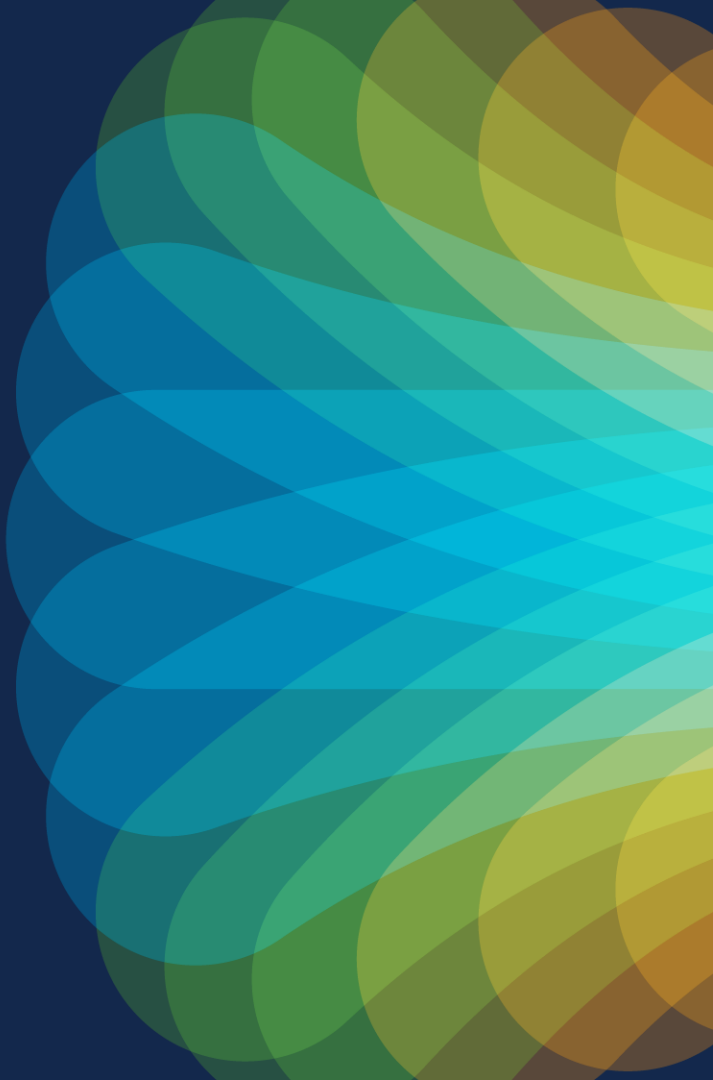
SDA to SDWAN Integration (Two-Box)



Migrating The Beast!



Having a Solid Foundation



5 Pillars and a Bedrock

PDI/AMO

PMO

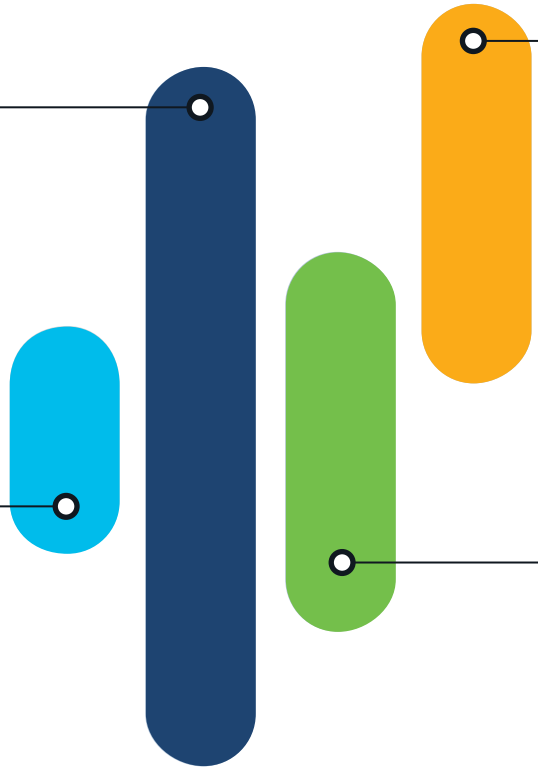
Migration Team

Customer

Partner

Automation

Plan Design Implementation / AMO



Design & Drive

DNAC ISE Integration

AAA Certificates Fabric Domain

SGT VN Policy Profiling

KT and Pilot Sites

Templates & Tools

Golden SDWAN Templates

Endpoint Discovery

Delta & Underlay Configs

Testing & Validation

Testing XL,L,M+,SM,XS Design

Snowflakes Validation

L2BN functionality

Post MW Hypercare

First 24hr hypercare support

Bringing stakeholders together

PMO : Build The City

Setting realistic schedules

Chase timelines and engineer requests

Bridging the gap and ensuring good customer sentiment

Migration Team

Site Readiness

Network Design Document

BoM Preparation

MoP Preparation

Target Design

Pre-Migration Window

DNAC Configuration

Staging of Devices

UAT

Migration Window

Discover & Provision

Add to Fabric – L2/L3

External Networks

Host Onboarding & Post Check

Customer

Site Readiness Tasks

- ✓ Circuit ID and Handoff Type
- ✓ Site Technical POC
- ✓ Site Survey Information
- ✓ Decommission of Old Circuit

Migration Window

- ✓ User Acceptance Testing
- ✓ Circuit Provider Ticket if required
- ✓ Correct DNS on DHCP Scopes

Pre-Migration

- ✓ Site Remediation Completed
- ✓ Adequate Power & Connectors
- ✓ Rack space & unmanaged devices

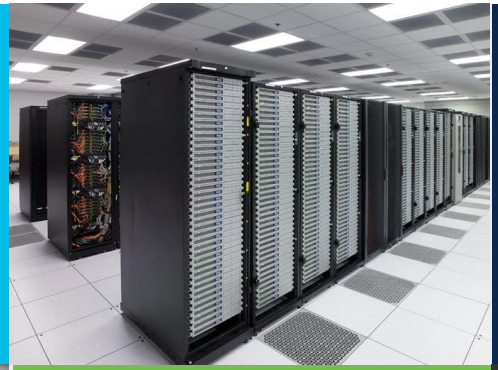
Post-Migration

- ✓ Post Migration UAT
- ✓ Coordination with Cisco for wireless/wired Testing

Partner

Staging

- Code Upgrade
- License & eWLC package
- Load Bootstrap
- vManage Reachability



MW & Post MW

- Cable Moves as per MoP
- AP mounting
- Device Cleanup & Decommission

Pre-MW

- Verify on-site inventory
- Rack, Stack, Power
- Cable all Devices

Readiness

- SFP : Copper & Fiber
- Cables: Console, Patch Cord
- Fibers: SMF, MMF
- Equipment: Label Marker

Automation In SDA/SDWAN

Why is it needed?

100%

Large Site can have over 15000 endpoints

Validation & UAT can miss a lot of endpoints

How Automation Helps

Underlay Config generator reduced MOP time

Reduced Migration Time with Fabric Config Generator

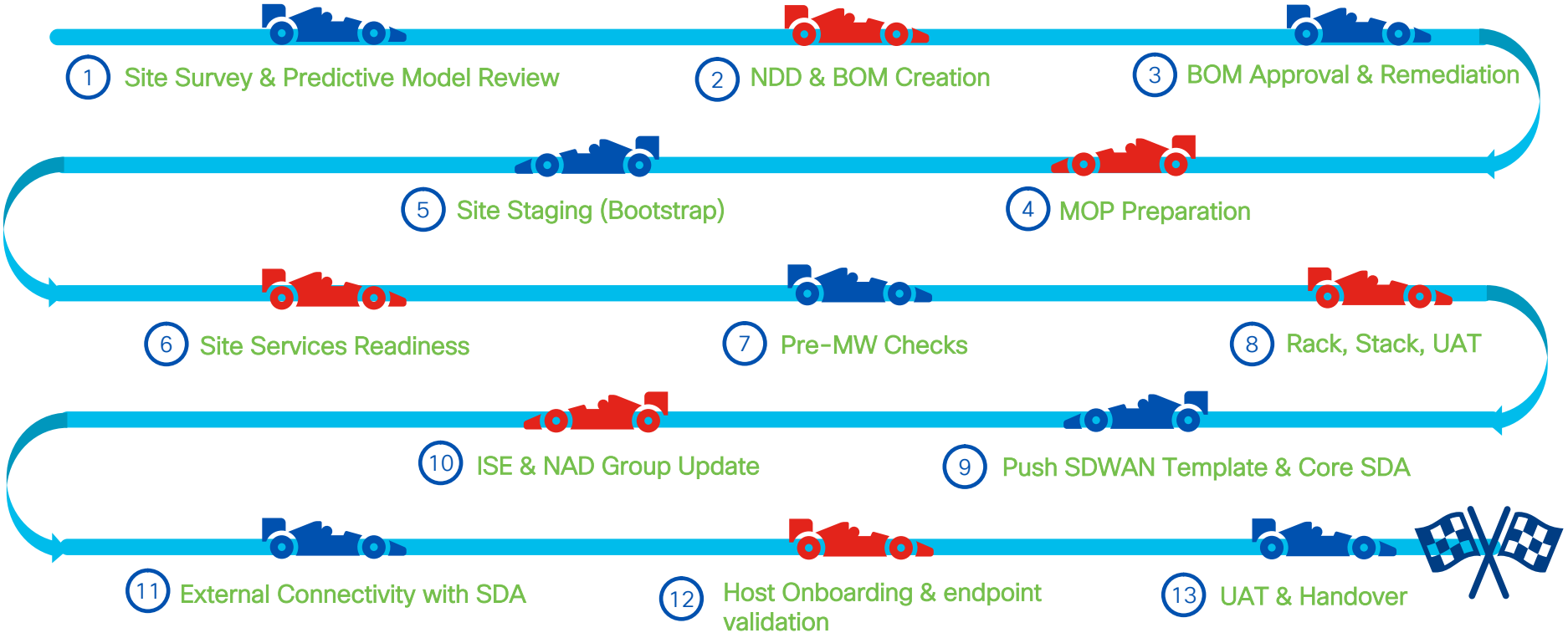
Site Snapshot & Overview of endpoints

Automation Possibilities

- Legacy Hardware Readiness & Assessment Tools
- Endpoint Discovery & Site Overview
- DNAC Site Hierarchy Push
- Fabric Fusion Config Generator
- Pre & Post Ping Sweep and Routing Delta

What is the Migration Process?

Migration Pit stops/Checkpoints



Migration Approaches

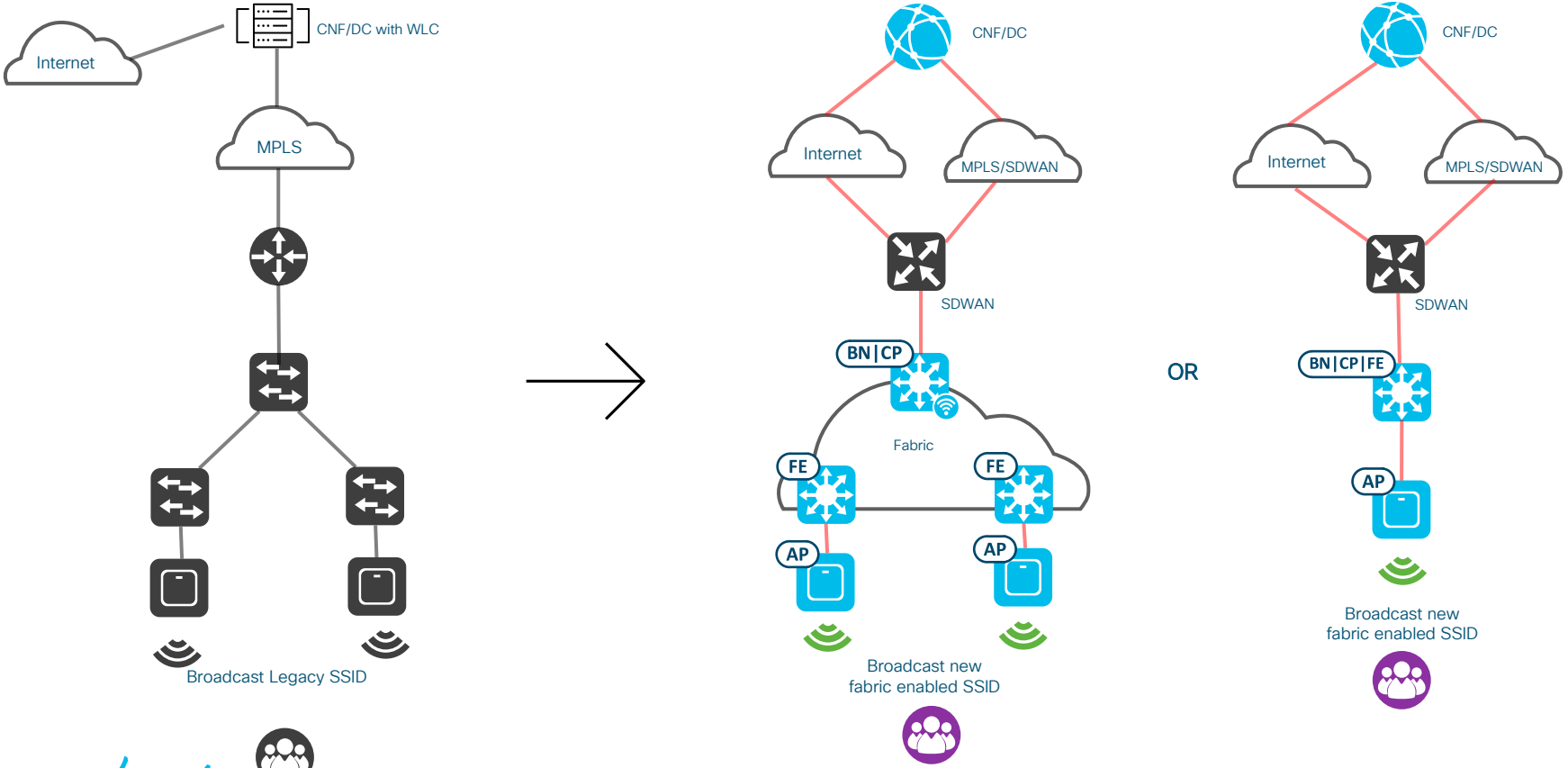
Single Step

- Move from current state to end state in 1 Maintenance Window
- Suited for Small Sites
- Process:
  - Move to SD-WAN
  - Replace and/or upgrade LAN switches to SDA
  - Migrate SDA Wireless

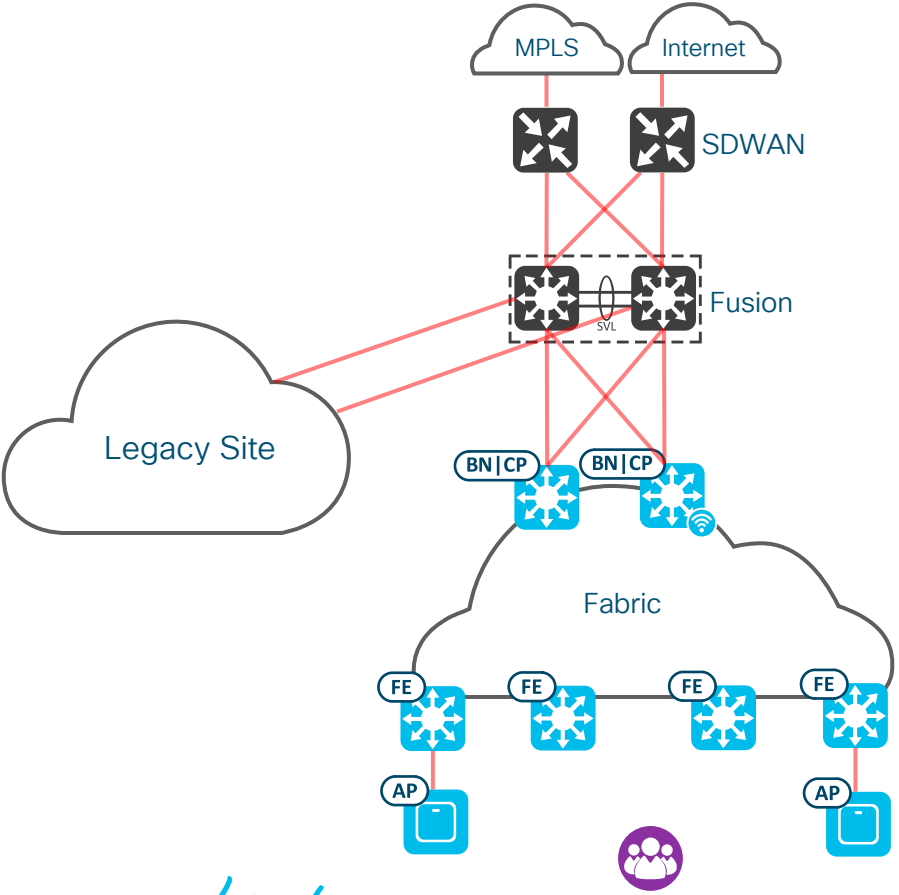
Multiple Step

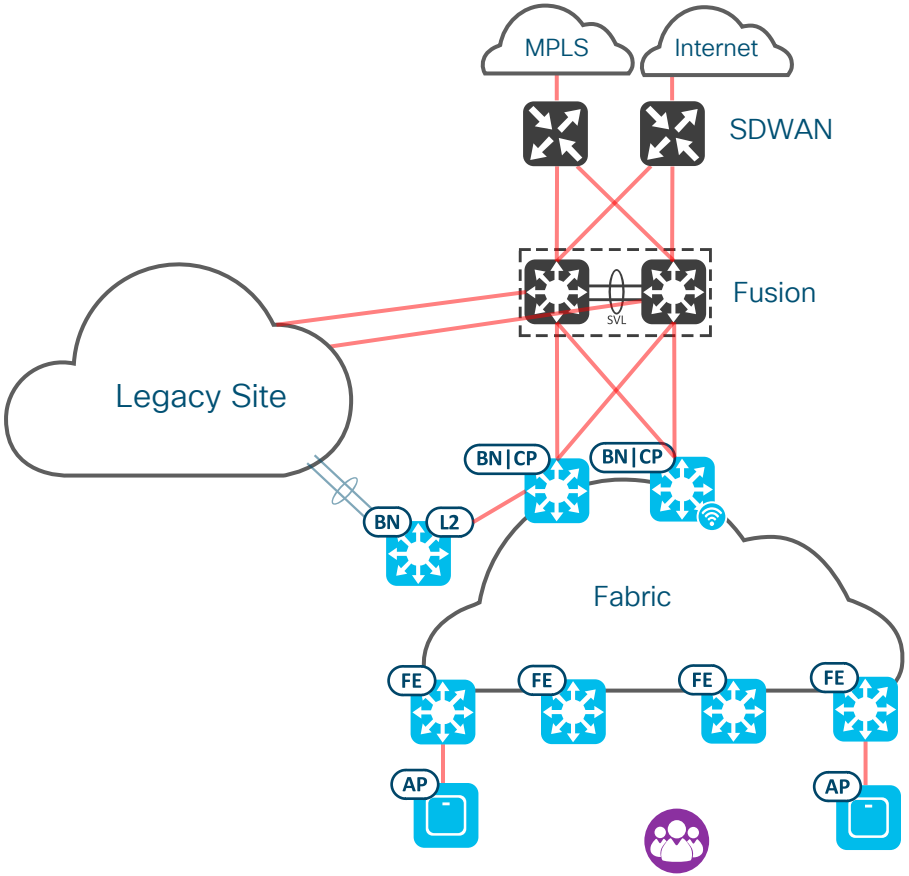
- Move from current to end state in multiple Maintenance Windows
- Suited for Medium to Large sites
- Process:
  - Day 1: SDWAN, Fusion and BN/CPs
  - Day 2+:Replace and/or upgrade targeted LAN closets to SDA
  - Migrate SDA Wireless

Migration Approach – Single Step



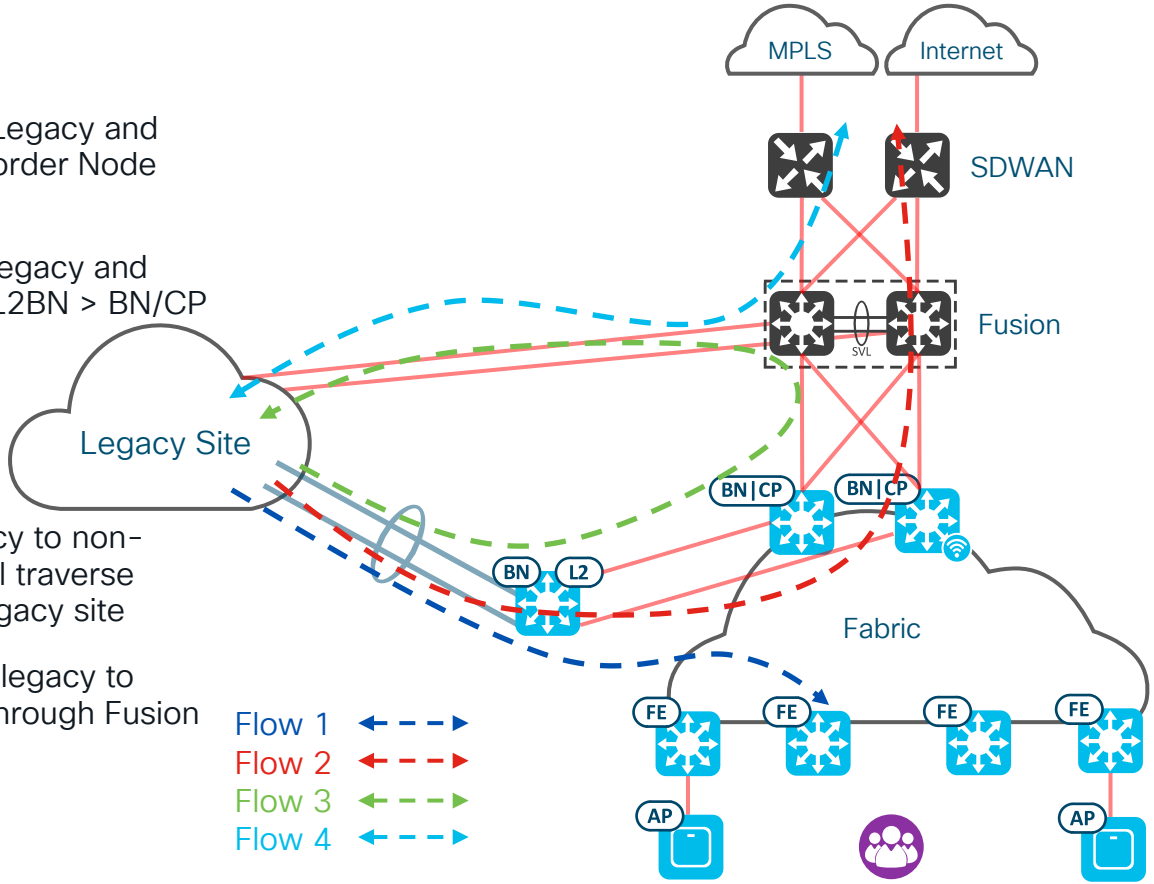
Migration Approach – Multiple Step





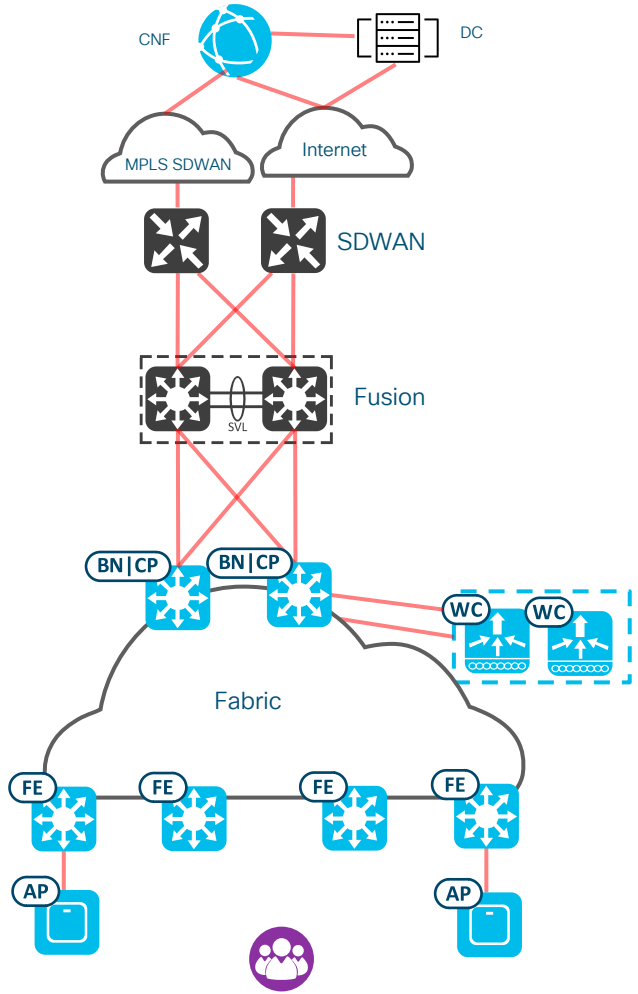
Multi Step Migration with L2BN Traffic Flow

- Any migrated subnet traffic between Legacy and Fabric will traverse through Layer 2 Border Node (L2BN)
- Any migrated subnet traffic between legacy and remote location will traverse through L2BN > BN/CP > Fusion > SDWAN
- Any migrated subnet traffic from legacy to non-migrated subnet in legacy network will traverse through L2BN > BN/CP > Fusion > Legacy site
- Any non-migrated subnet traffic from legacy to remote location will traverse directly through Fusion > SDWAN

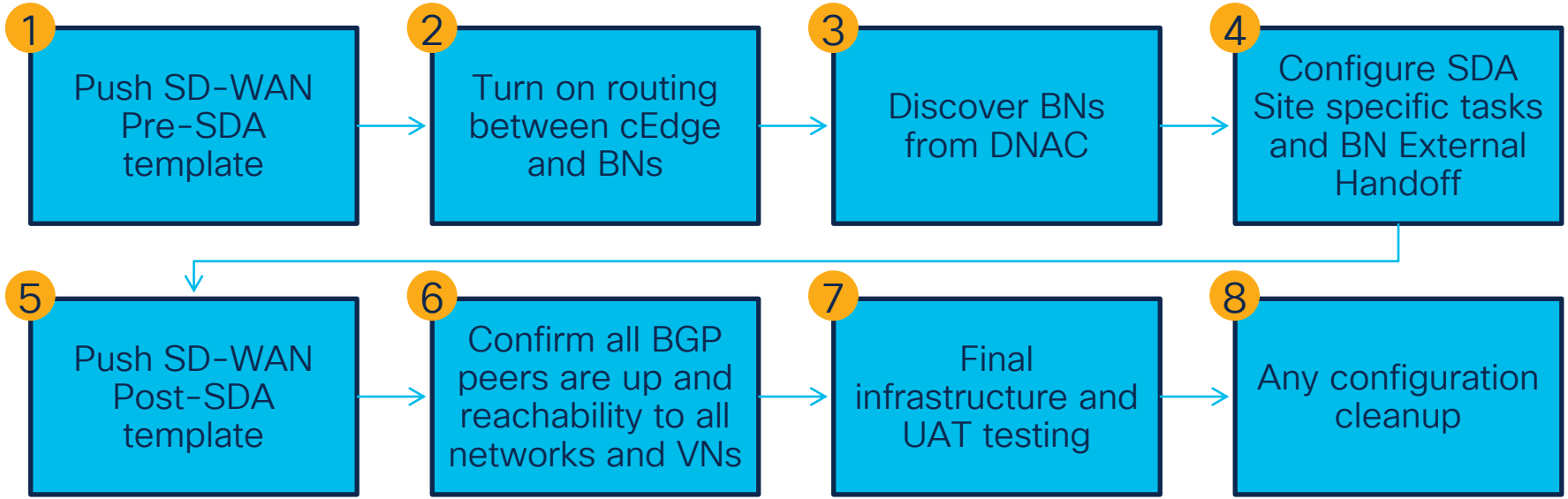


Migration Approach – Final Step

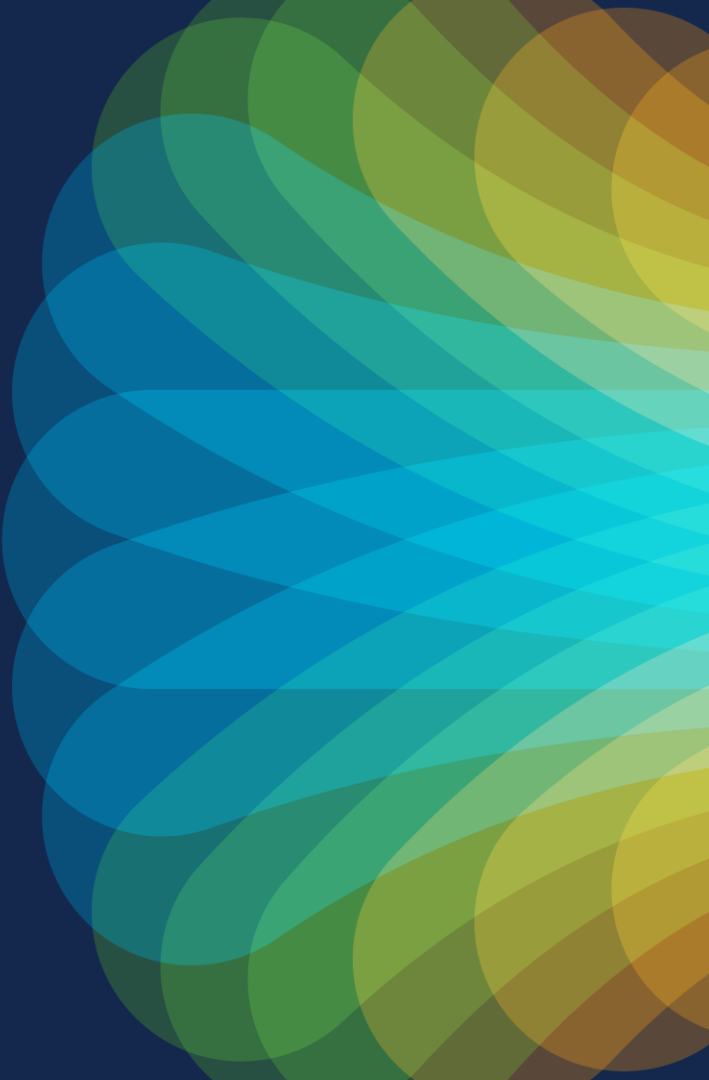
- SDA Capable devices will be on boarded into the fabric
- Any temporary configurations will be cleaned
- Local C9800 WLC will be enabled for fabric mode and re-provisioned with fabric SSIDs
- All the APs will be provisioned to broadcast the fabric enabled SSIDs.



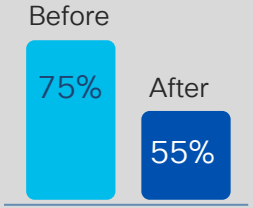
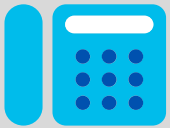
SD-Access & SD-WAN Migration Steps



Lessons Learned From Large Scale Migrations



Technical Learnings

 Extensive UAT	 Presence of Hubs	 Automation	 DNAC Site Location	 Reusable VLANS
 Interface & Tunnel Mismatch (SDWAN)	 GUEST Portal Login	 Static Endpoints	 External Connectivity	 3850 License

Technical Learnings Continued...

 Circuit Tagging	 Fusion & Legacy Core	 ISE and DNAC Sync	 vManage GUI	 L2BN VLAN 1
 SDWAN Template Issue	 DHCP Option 43	 cEdge in CLI mode	 Bandwidth Shaping	 ASR1002-HX Cert Fail

Operational Issues

On-Site	Ad-Hoc	Limitations	Others
Circuit Testing, Circuit Handoff & labelling	Project Milestones & RACI	Platform Limitation	Cross Team Dependency
Rack, Stack, Mount APs in Advance	Snowflakes per Request	High burnout rate	Hardware Upgrades
BoM Lead Time	Scoping & Resourcing	Accountability	Staging Facility
Spare SFPs, Cables	Site Variations & Consolidation changes	Endpoint Visibility	Compliance
COVID, Travel & Security Guideline	Unknown devices	Unmanaged Switches	Timely Approvals

Conclusion

Key Takeaways

- Order of operations is key!
- Underlay of SDA and Trusted VN needs to be bridged to overlay of SDWAN
- DC first approach – get those cEdge headends built first
- At branch, install SDWAN first, test it and then proceed with SDA
- Infrastructure and UAT testing is very critical
- TrustSEC needs to be configured on SDWAN first and then SDA BN
- For sub-interfaces, TrustSEC must be enabled on physical and all sub-interfaces

Key Takeaways

- SD-Access and SD-WAN migrations can be done at rapid pace
- Consistency in design is key for at-scale migrations
- You are getting one chance to re-do the network – take that opportunity!
- Remember those 5 pillars
- Automation is crucial for efficiency and accuracy
- BEAST is not as scary as it seems!
- Cisco CX is always there to work with you and accomplish success together.

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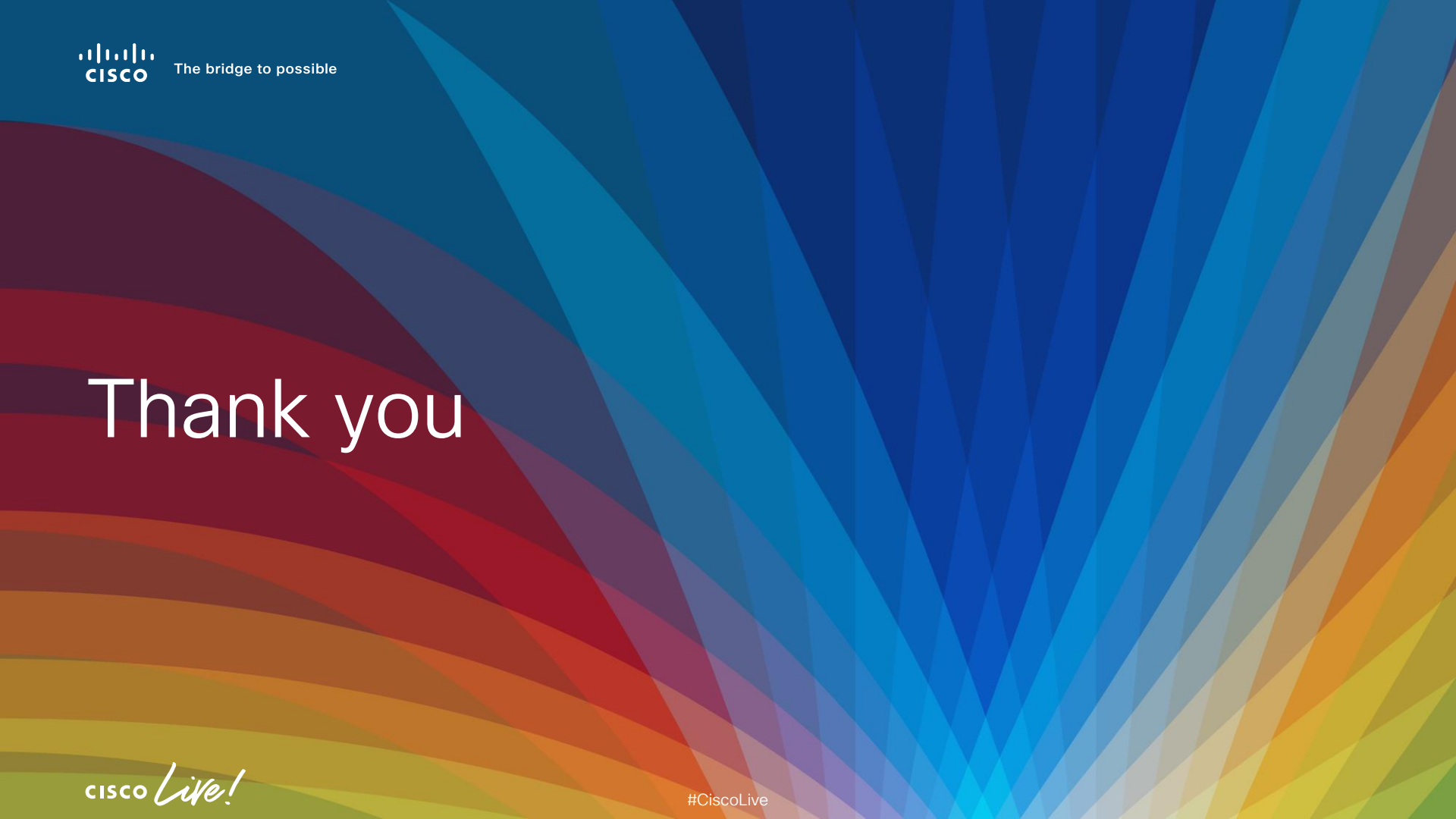
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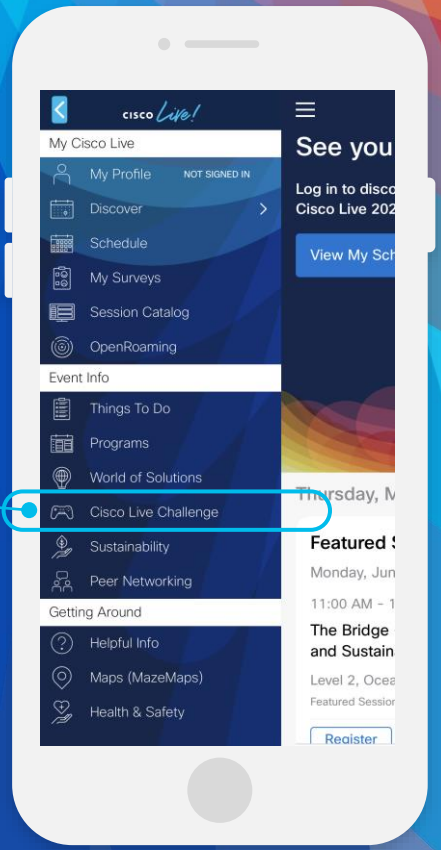

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