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Cisco SD-Access Design and Deployment Best Practices

BRKENS-2502b

Prashanth Kumar- Technical Marketing Engineer
Enterprise Network Business Group

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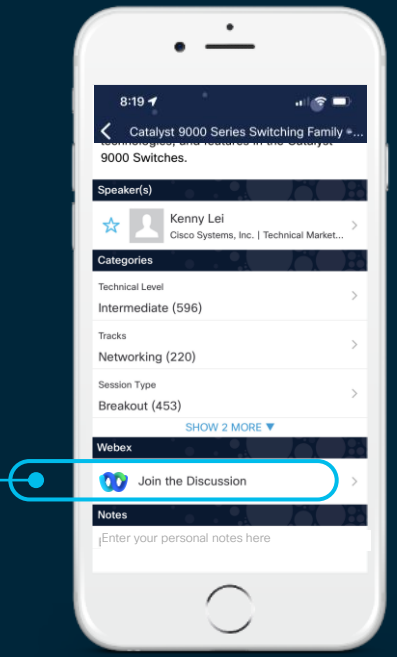

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Webex spaces will be moderated by the speaker until June 17, 2022.

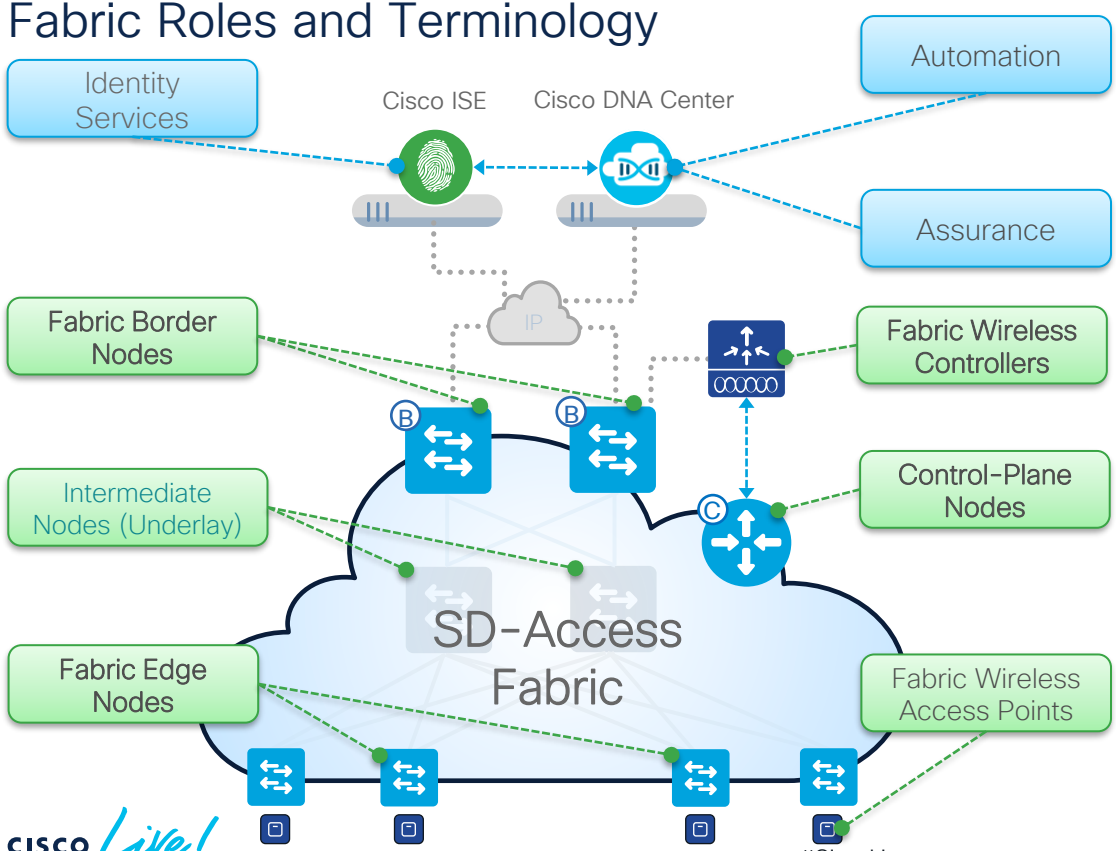
Agenda

- Multi-Site Overview
  - Design Strategy
- Multi-Site Design
  - SD-Access Transit
  - SD-WAN Transit
  - IP-Based Transit
- Migration Strategy
- Summary

For your reference

Cisco SD-Access

Fabric Roles and Terminology



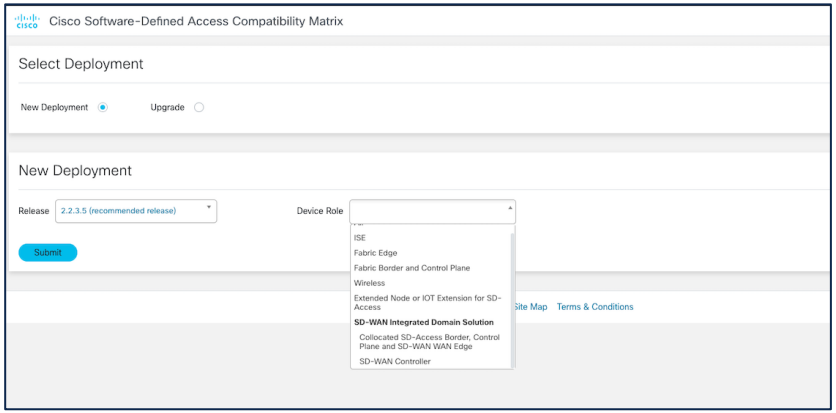
- **Network Automation** – Simple GUI and APIs for intent-based Automation of wired and wireless fabric devices
- **Network Assurance** – Data Collectors analyze Endpoint to Application flows and monitor fabric network status
- **Identity Services** – NAC & ID Services (e.g. ISE) for dynamic Endpoint to Group mapping and Policy definition
- **Control-Plane Nodes** – Map System that manages Endpoint to Device relationships
- **Fabric Border Nodes** – A fabric device (e.g. Core) that connects External L3 network(s) to the SD-Access fabric
- **Fabric Edge Nodes** – A fabric device (e.g. Access or Distribution) that connects Wired Endpoints to the SD-Access fabric
- **Fabric Wireless Controller** – A fabric device (WLC) that connects Fabric APs and Wireless Endpoints to the SD-Access fabric

For your reference

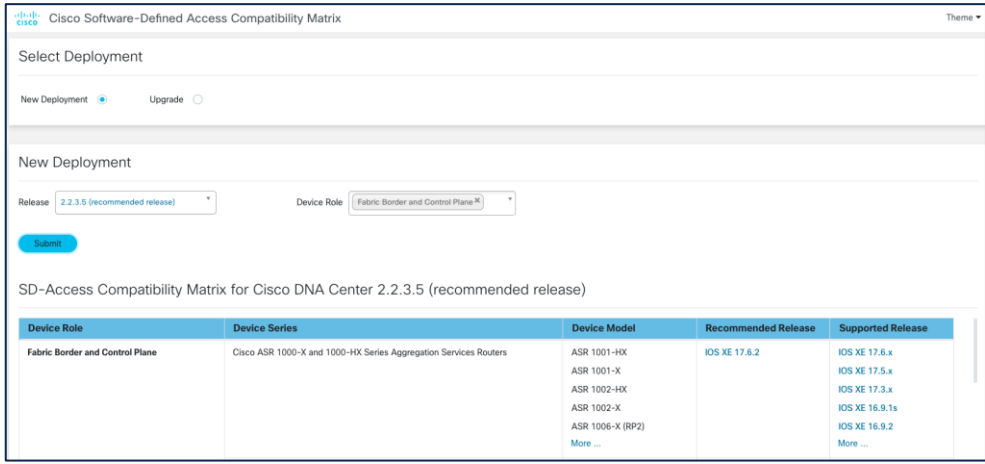
SD-Access Platform Support

Digital Platforms for your Cisco Digital Network Architecture

For more details: cs.co/sda-compatibility-matrix



Platform support based on the Fabric Role



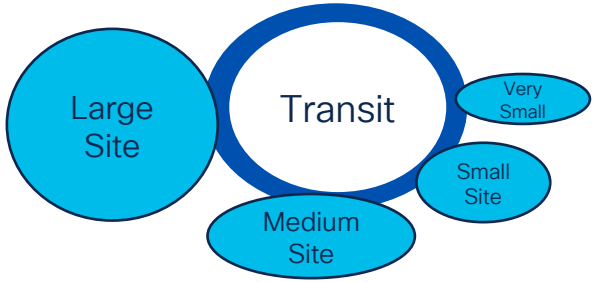
Supported Hardware and Software Version for all Cisco SD-Access components

Cisco SD-Access

Distributed Fabric Site Design Options

Managed by single Cisco DNA Center and ISE Deployment

Fabric Site Design	Distributed Site Design
High Availability & Scale defines Platform and Fabric Roles	Transport connection defines Transit type: IP | SD-Access | SD-WAN



- Administrative domain
- Site Survivability and Scale
- End-to-End Segmentation
- Unified and Consistent Policy

Cisco SD-Access Scale

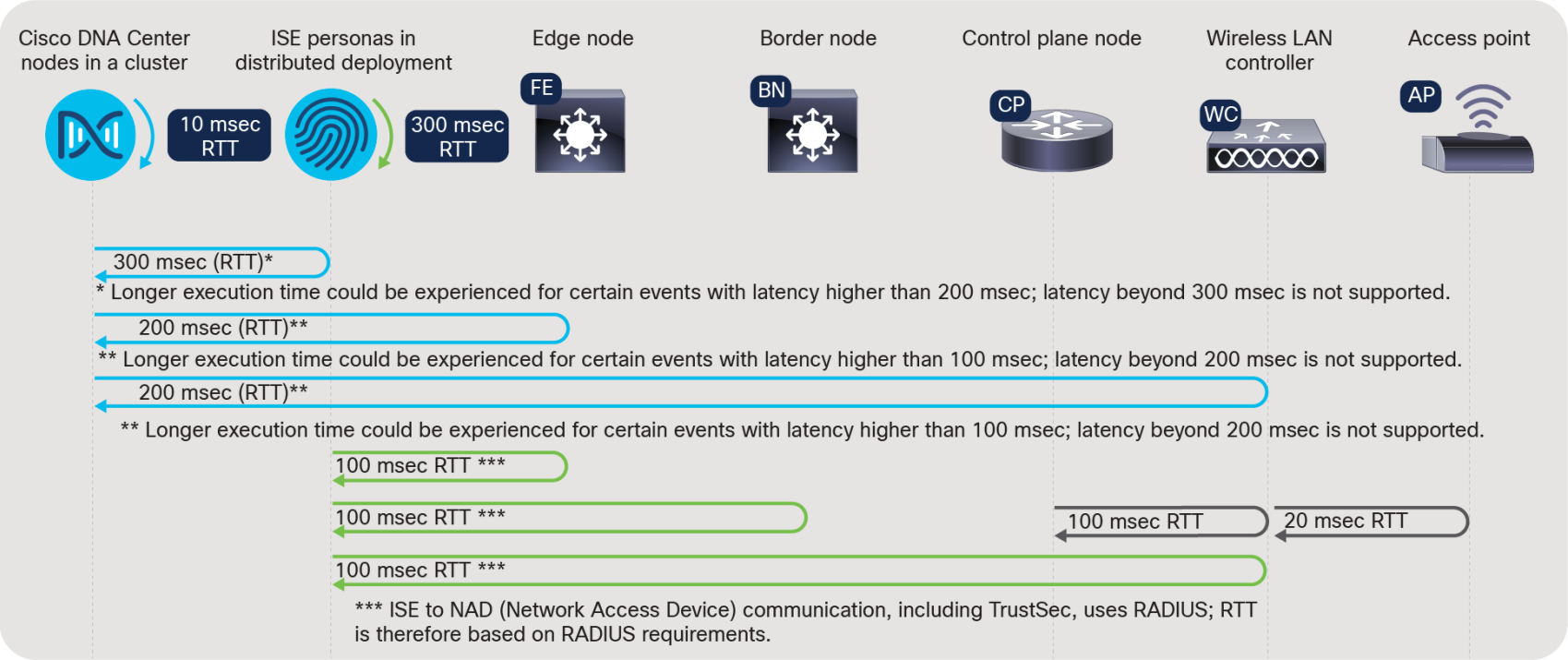
Fabric Scale based on DNA Appliance

	DN2-HW-APL	DN2-HW-APL-L	DN2-HW-APL-XL
No of Fabric Domains	10	20	20
No of Fabric Sites	500	1000	2000
No of Virtual Networks	64/site	64/site	256/site
No of Fabric Devices	500/site	600/site	1000/site
No of Scalable Groups	4000	4000	4000
No of Access Contracts	500	500	500
No of Group-Based Policies	25000	25000	25000
No of IP Pools	100/site	300/site	600/site

For more details: cs.co/sda-compatibility-matrix

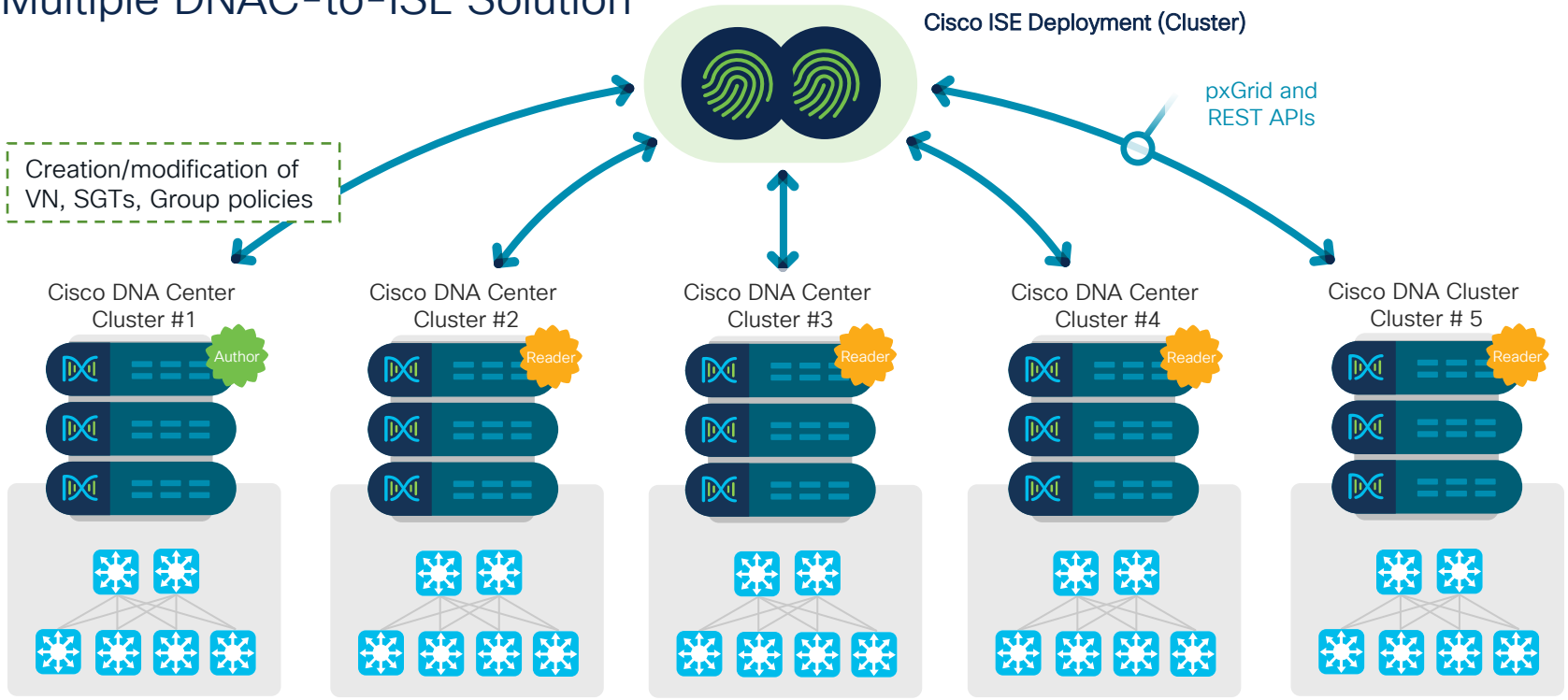
Cisco SD-Access

Latency Requirements



Multiple Cisco DNA Center

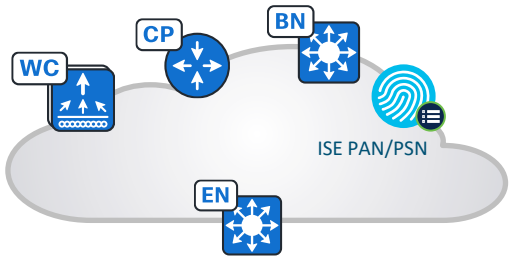
Multiple DNAC-to-ISE Solution*



* Limited Availability.
Reach out to Cisco representative for more details

Cisco SD-Access Design Options

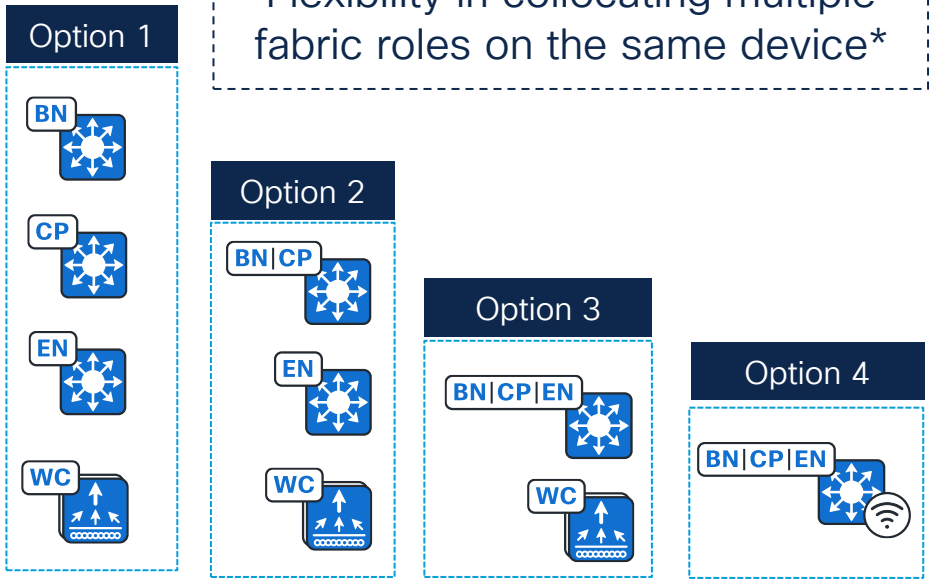
Fabric Site Design Options



Fabric Site

- Logical construct that contains:
  - Fabric Edge, Border, Control Plane
  - (optional) Wireless LAN Controller, Access Points
  - (optional) Extended Nodes
  - ISE PAN/PSN Node

Flexibility in collocating multiple fabric roles on the same device*

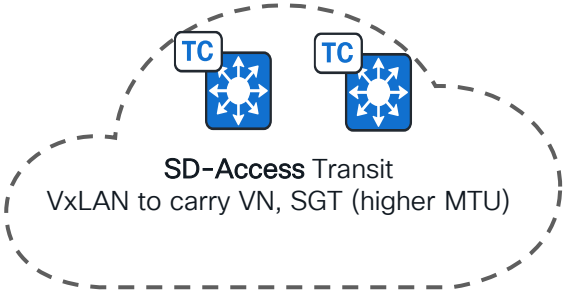


* Refer to Cisco SD-Access compatibility matrix for latest information

Cisco SD-Access Transit: SD-Access

Cisco SD-Access Deployment

Multisite Deployment with SD-Access Transit



SD-Access Transit is a native solution carrying VN and SGT between Fabric sites.

Key Considerations:

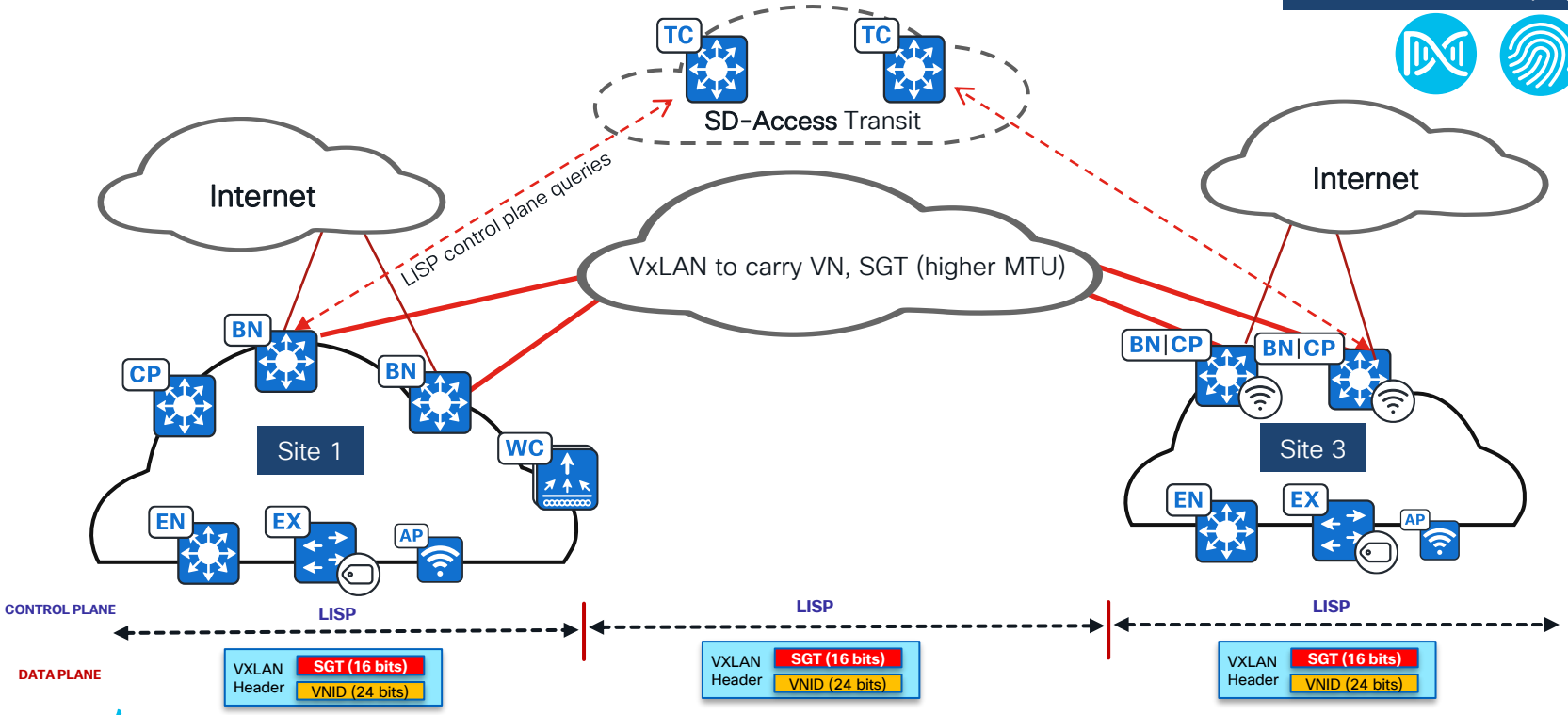
- Higher MTU support

- Transit Control Plane nodes are dedicated devices with IP reachability to every fabric site's Border nodes
- Transit Control Plane nodes is not required to be in data forwarding path
- Transit Control Plane nodes maintains aggregate prefixes of all Fabric sites
- Fabric site Border node should be either External or Anywhere border type to connect to SD-Access Transit.
- SD-Access Transit can be deployed with LISP-BGP (up to 2 nodes) or **LISP Pub/Sub** (up to 4 nodes)
- Fabric site connected to SD-Access Transit can provide Internet service to remote fabric sites.

Cisco SD-Access Deployment Options

Multisite Fabric Deployment with SD-Access Transit

Managed by single Cisco DNA cluster and ISE Deployment



Cisco SD-Access Transit: SD-WAN

Cisco SD-Access Deployment

Multisite Deployment with SD-WAN Transit

Cisco SD-WAN Transit provides capability to carry VN and SGT across WAN Transport.

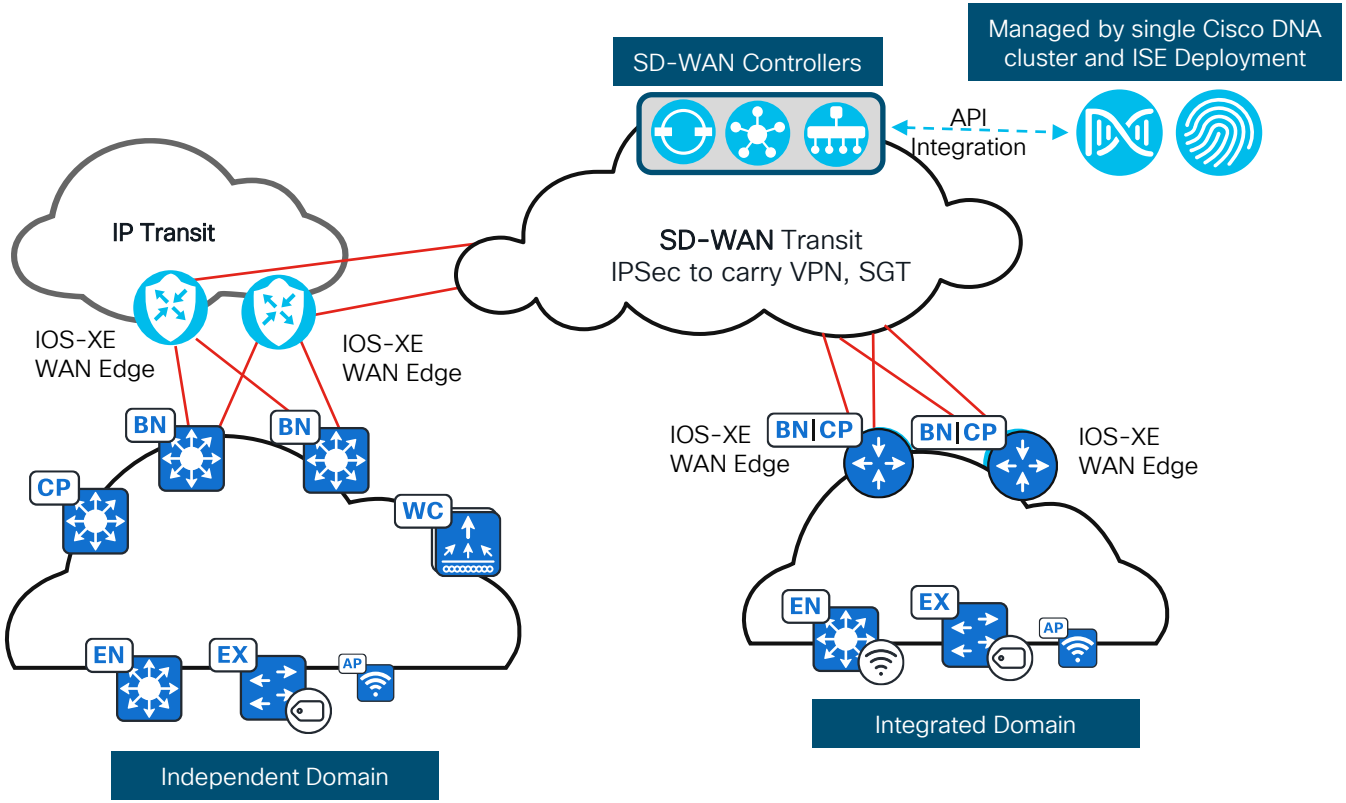
Key Considerations:

- Greenfield or Brownfield Fabric Site
- Fabric Site network requirements
- Border, WAN Edge platform capabilities.

- Cisco SD-WAN solution, powered by Cisco IOS-XE software provides highly secure and reliable WAN overlay topologies.
- IOS-XE WAN Edge devices provides flexibility to add-on security capabilities as Direct Internet Access (DIA), Application-Aware routing, Firewall, IPS and more..
- Cisco SD-Access provides flexibility to deploy integrated LAN and Wireless with consistent policy at scale.
- Cisco SD-Access and SD-WAN can be deployed with:
  - With **Integrated-Domain:** DNA Center and vManage are integrated.
  - With **Independent-Domain**: DNA Center are vManage are not integrated.

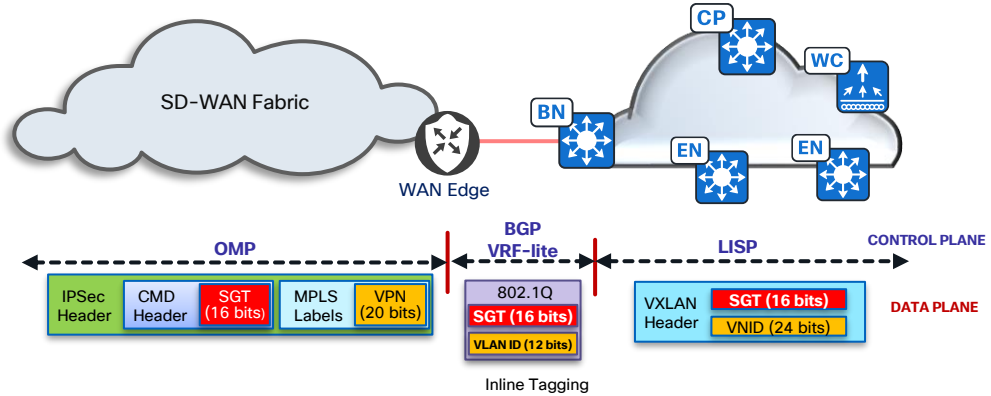
Cisco SD-Access Deployment Options

Transit – SD-WAN Transit



Cisco SD-Access Deployment

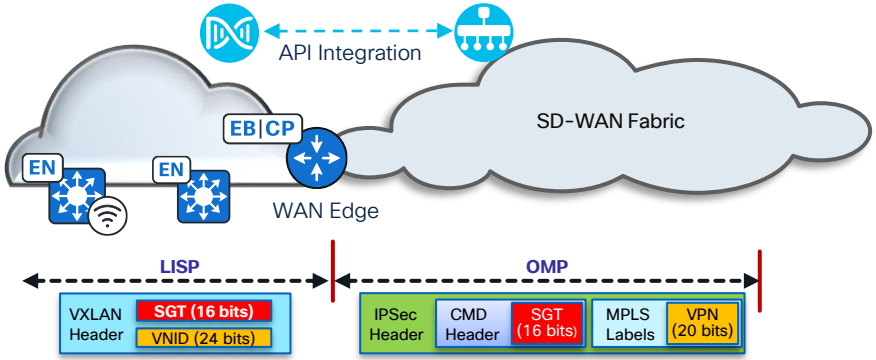
Cisco SDA|SDWAN Independent Deployment



- Cisco SD-WAN WAN Edge and SD-Access Border node are different devices, managed by respective domain controllers.
- Macro-segmentation (VN) is maintained with IP-Handoff between Fabric Border node and WAN Edge device.
- Micro-segmentation (SGT) is shared with Cisco TrustSec Inline tagging. This requires the WAN Edge router and the interface to support TrustSec.

Cisco SD-Access Deployment

Cisco SDA|SDWAN Integrated Deployment



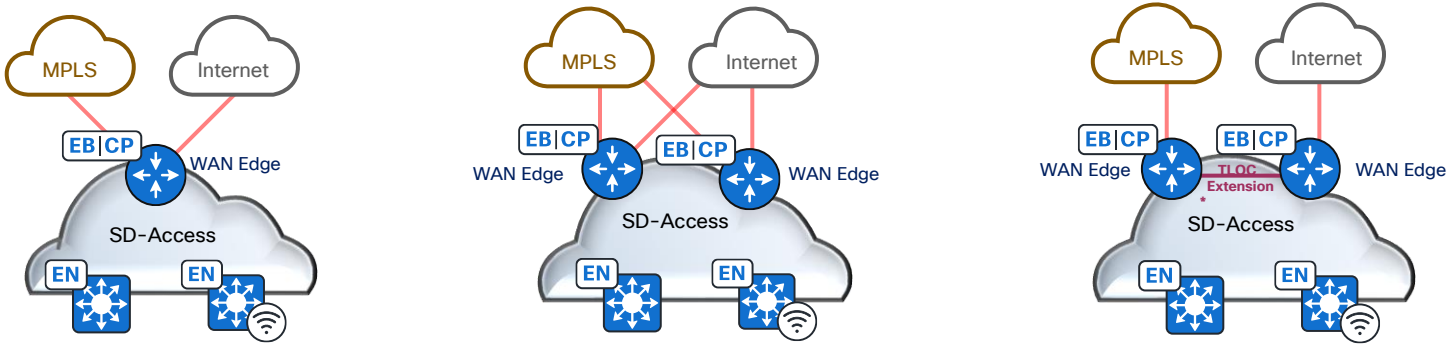
- Cisco vManage and DNA Center are integrated sharing WAN Edge device list and Service-VPN data.
- Cisco DNA Center maps the Fabric VNs to WAN Service-VPNs (1:1).
- Cisco SD-Access Fabric Site must be a Greenfield deployment.
- The router platform must support WAN Edge + colocated Border and Control Plane functionality. Max of 2 nodes can be deployed for the deployment.
- WAN Edge router learns the micro-segmentation (SGT) from VXLAN encapsulated packet and carries it in the IPSec CMD header across WAN transport.

For your reference

Cisco SD-Access Deployment

Cisco SDA|SDWAN Integrated Deployment Consideration

- Supported SD-WAN overlay network topologies .



- The following are <u>not supported</u> in the Integrated deployment model:
  - Multicast
  - IPv6
  - Layer 2 Flooding
  - LISP Pub-Sub
  - Layer 2 Border Handoff
  - SD-Access Transit
  - Multisite Remote Border

For your reference

Cisco SD-Access Transit

Cisco SDA|SDWAN Integrated & Independent Domain Deployment

Integrated Domain

- Cisco DNA Center and vManage are integrated.
- Provides ease of management and automation through integration of SD-Access and SD-WAN.

Independent Domain

- Cisco DNA Center and vManage are not integrated.
- Provides flexibility and independence between SD-Access and SD-WAN solution.

For your reference

Cisco SD-Access Transit

Cisco SDA|SDWAN Integrated & Independent Domain Deployment

- Assurance is visible in two locations:
  - Assurance for the SD-WAN and IOS-XE SD-WAN function is available on vManage.
  - Assurance for the colocated Border and Control Plane Node function along with the remainder of the SD-Access fabric is available on Cisco DNA Center.
  - Basic Assurance of WAN Edge is available in Cisco DNA Center for Integrated Domain deployment.

- Irrespective of Integrated or Independent domain deployment, solution provides:
  - Data plane integrations to main end-to-end segmentation.
  - Preserve SGT across WAN Infrastructure.
  - Consistent Group-Based policy across the enterprise.

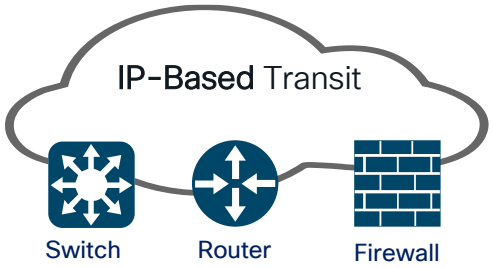
- Refer to Cisco SD-Access compatibility matrix for support/recommended hardware and software version

Cisco SD-Access Transit: IP-Based

For your reference

Cisco SD-Access Deployment

IP-Based Transit



IP-Based Transit connects Fabric to IP based external network.

Key Considerations:

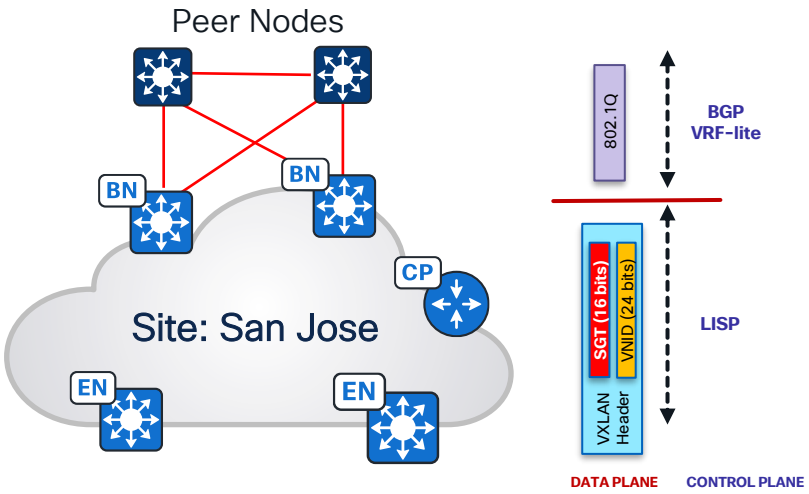
- Peer nodes must be Layer3 device – Switch, Router, Firewall.
- Peer network should support BGP.

- IP-Based transit leveraged to connect to rest of the company network or to Internet.
- Peer node can be either VRF aware or non-VRF aware.
- If peer node is VRF aware, leverage IP prefix lists to filter routes for inter-VRF communication
- If peer node is Firewall, implement stateful inspection for inter-VRF communication
- Cisco DNA Center automates the BGP handoff for each Virtual Network on the Fabric Border nodes.
- Peer Nodes configuration is manual today

Cisco SD-Access Deployment

IP-Based Transit

- If Border node is routing platform, L3 sub-interfaces will be provisioned to extend Virtual Networks
- If Border node is switching platform, SVI & trunk will be provisioned to extend Virtual Networks to Peer Network
- VXLAN is de-encapsulated on the Border node and native IP forwarded to Peer node.
- Security Group is not shared to Peer nodes natively. If required, Group can be shared using
  - Cisco Trustsec Inline Tagging from Border to Peer Nodes.
  - SXP connection from ISE to Peer Nodes.



Peer Network Configuration

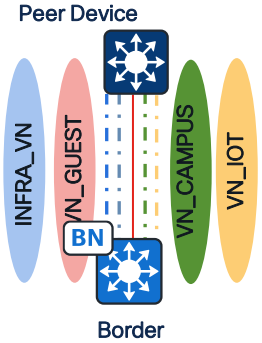
Layer 3 Handoff to External IP Domain

Extend

- Configure VRF
- Interfaces for each VN matching Border configuration

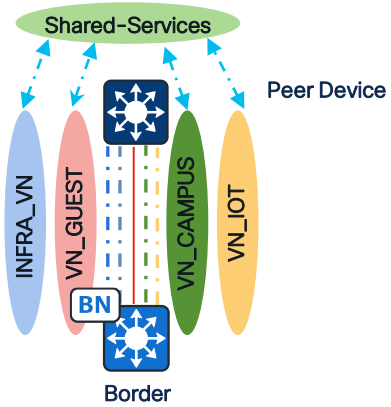
eBGP

- eBGP neighbors for each VN between Peer and Border node



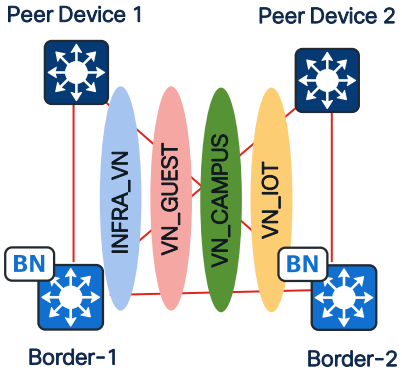
Route Leak

- Route-leak shared-services subnets to each VN
- Route-leak VN subnets into Global



iBGP

- iBGP neighbors for each VN between Border nodes

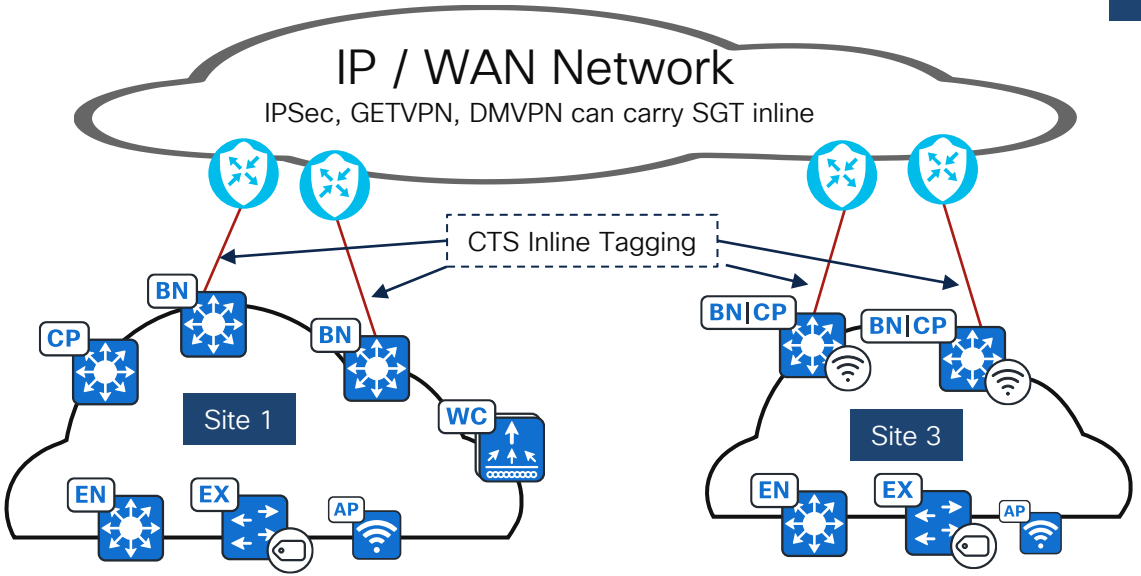


Not required at Fabric Site LISP Pub-Sub deployments.

Cisco SD-Access Deployment Options

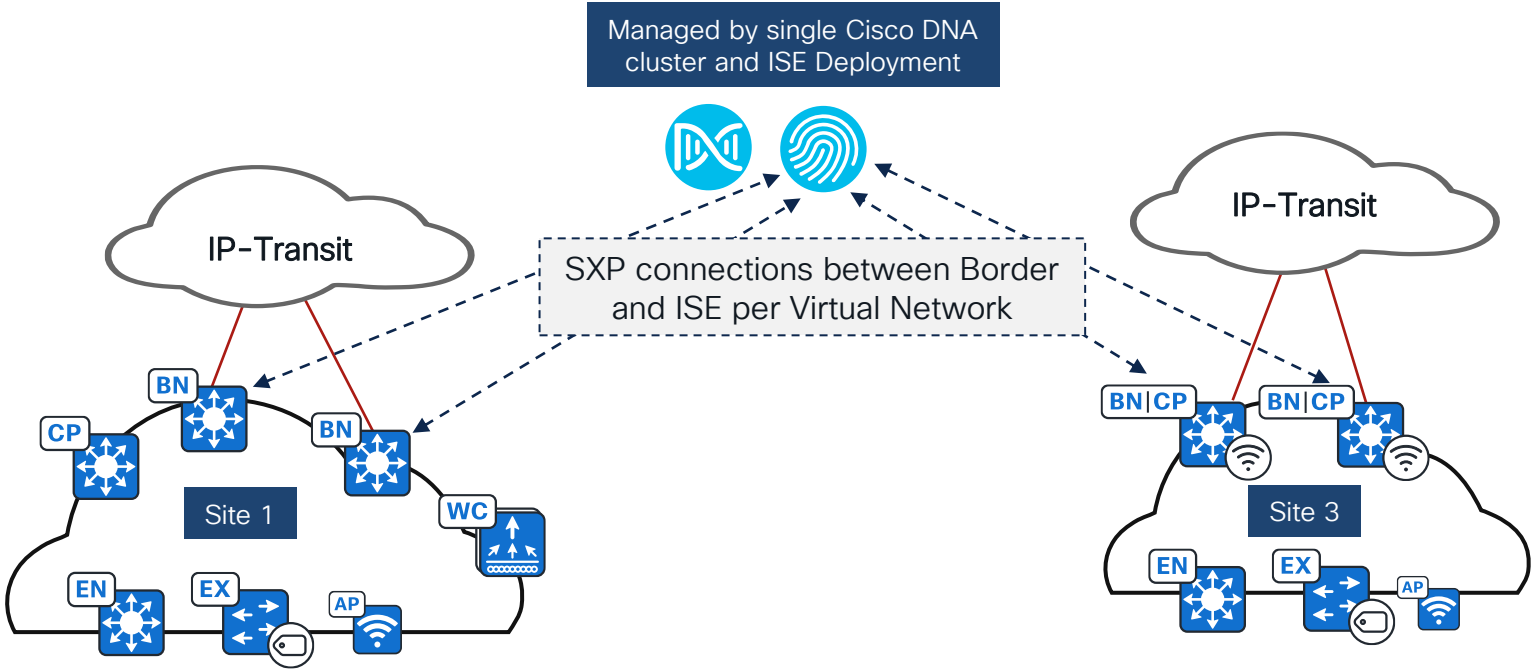
Multisite Fabric Deployment with IP-based Transit

Managed by single Cisco DNA cluster and ISE Deployment



Cisco SD-Access Deployment Options

Consistent Policy with SXP peering



Cisco SD-Access Migration Strategies

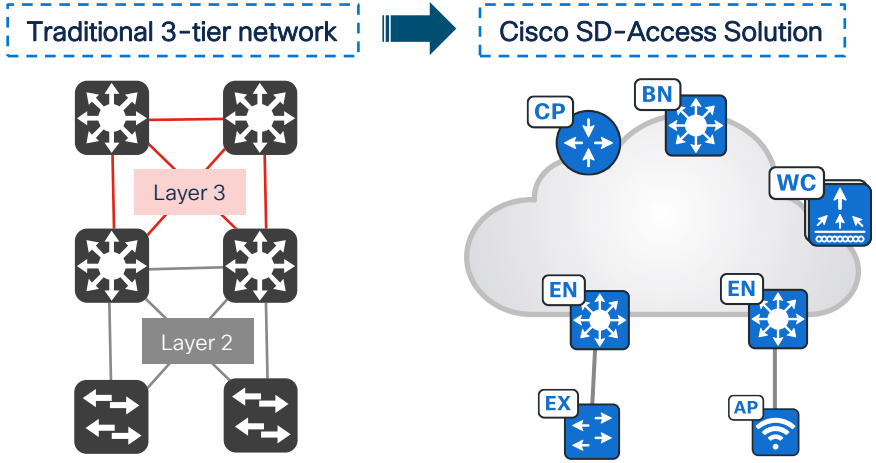
Cisco SD-Access

Fabric Migration Options

Cisco SD-Access solution provides flexible options to incrementally migrate existing network into Fabric environment.

Migration options include:

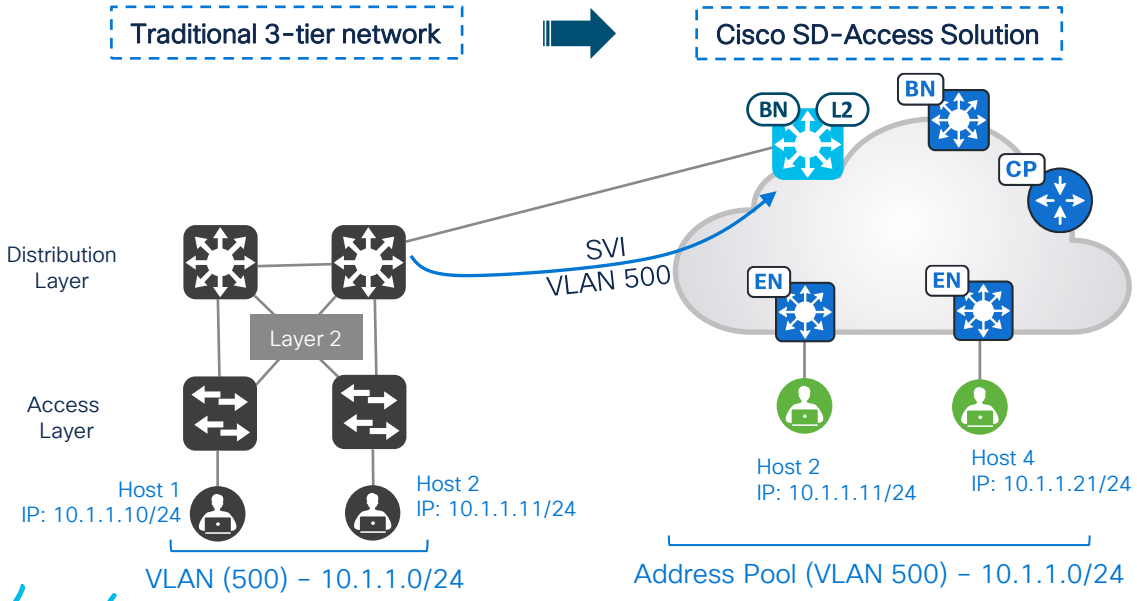
- Port-by-Port
- Switch-by-Switch
- connect Layer-2 Switching Domain



Cisco SD-Access

Fabric Migration Option - Layer2 Border Handoff

- Layer2 Border allows fabric and traditional network operate on the same subnet
- Layer2 Border hosting the anycast-gateway functionality for traditional network



Migrating Port by Port

Cisco SD-Access

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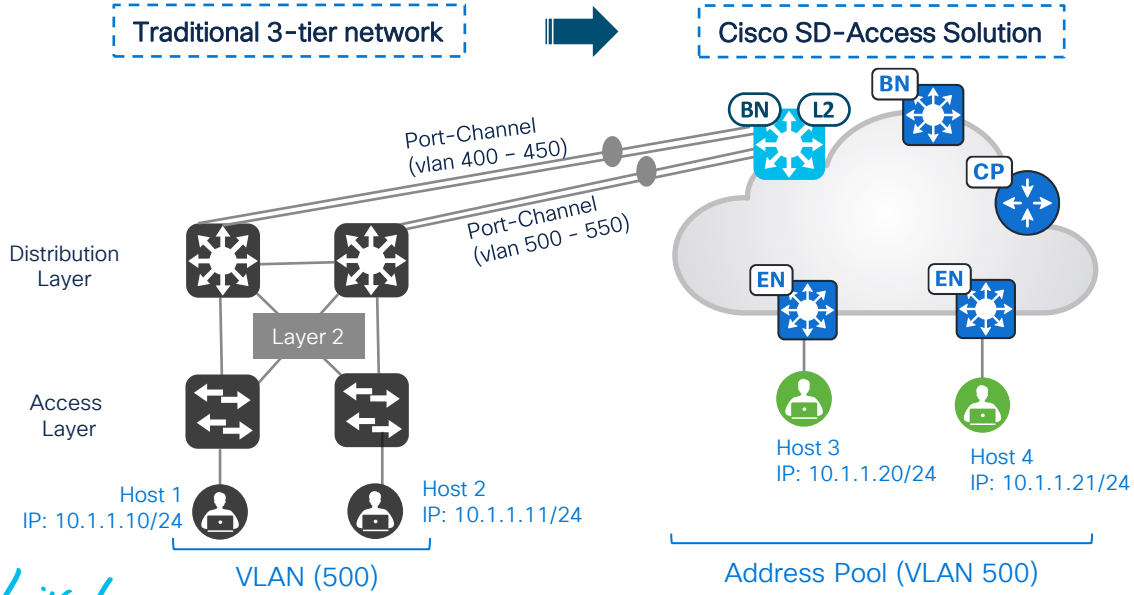

Migrating Port by Port

For your reference

Cisco SD-Access

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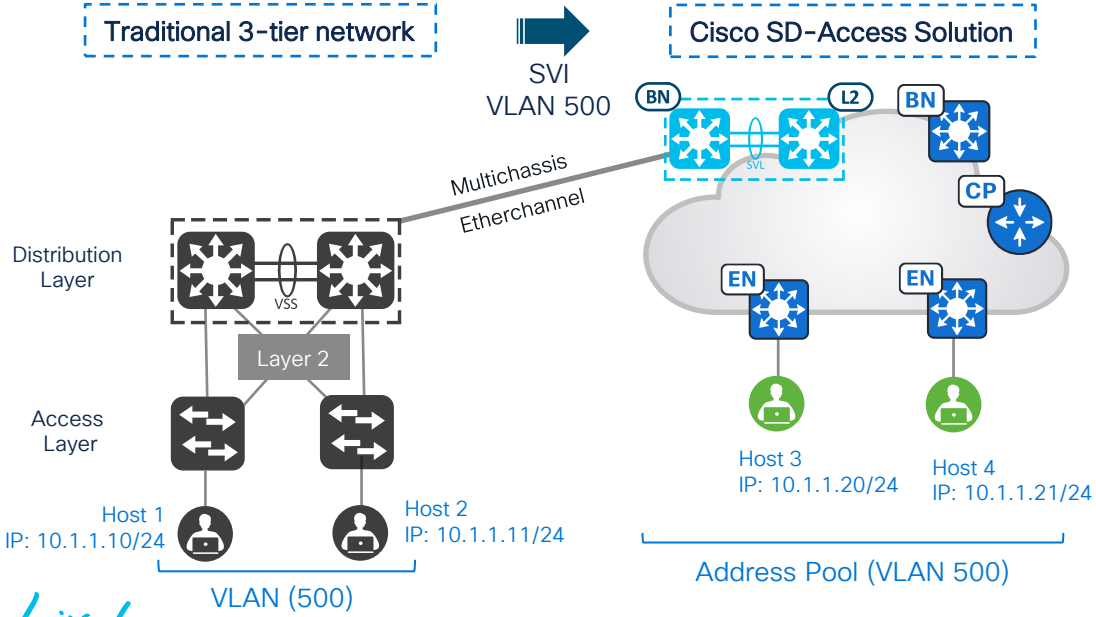
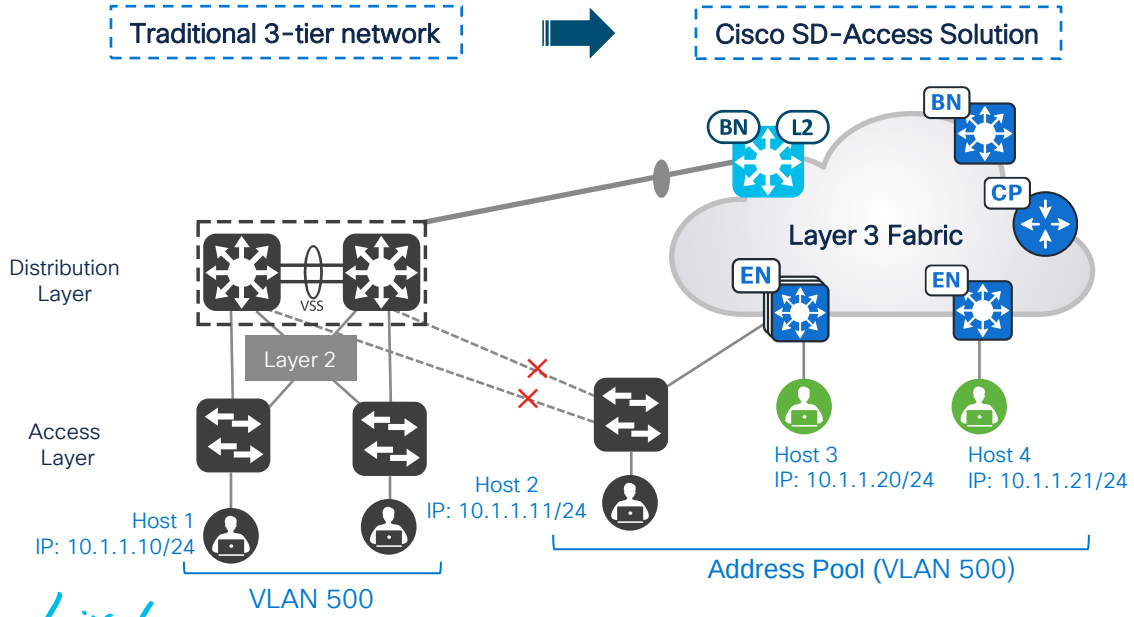


Migrating Port by Port

Cisco SD-Access

Fabric Migration Option – Retain Layer2 access layer

- Connect layer 2 access-switch (or) 3rd party switch to Edge node via trunk link.
- Edge node hosting the anycast-gateway.



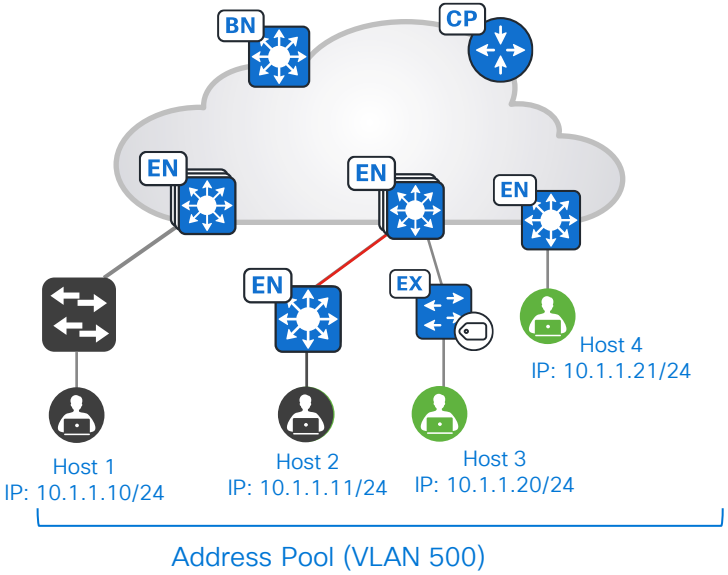
Retaining existing Layer 2 switch in Fabric provides

- Virtual Network segmentation
- SGT will be based on VLAN-SGT binding on the Edge node.

Cisco SD-Access

Fabric Migration Option – Convert Layer2 access layer

- Retain layer2 Switch
- Convert layer2 access-layer to Edge or Policy Extended Node role



- Retain Layer 2 access-switch
- Migrate Switch into Edge role

For your reference

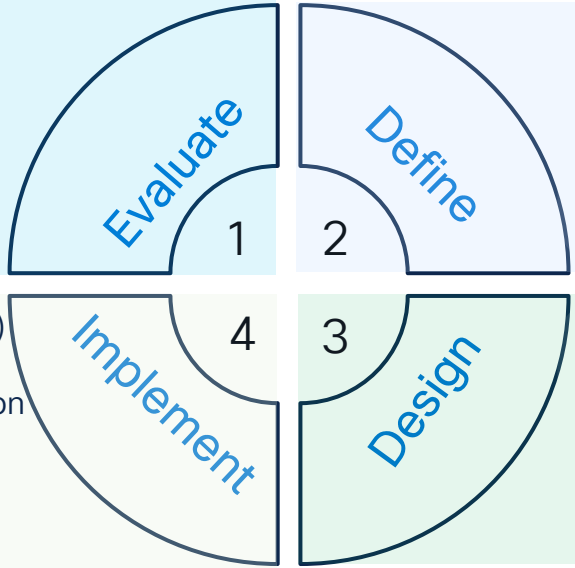
Cisco SD-Access Deployment Lifecycle

For your reference

Cisco SD-Access

Deployment Lifecycle

- Understand current network
- (wired, wireless, IoT, WAN)
- Platform in the network
- Endpoints, traffic types
- Subnets
- Current access-policies



- Segmentation (macro, micro)
- Policy/access-control
- Single or Multi site
- Scale
- Integration with other domains

- Hands on - Lab it !(small-scale PoC)
- Learn the technology.
- Leverage workflow-based automation to built robust network
- Validate your network
- Continue to add usecases
- Integrate with ecosystems

- Start small and build to scale
- Research and pick right platform
- Segmentation strategy
- Strategize for robust/resilient network
- Migration strategy
- Leverage Design Tool to help here..

https://fwm.cisco.com/

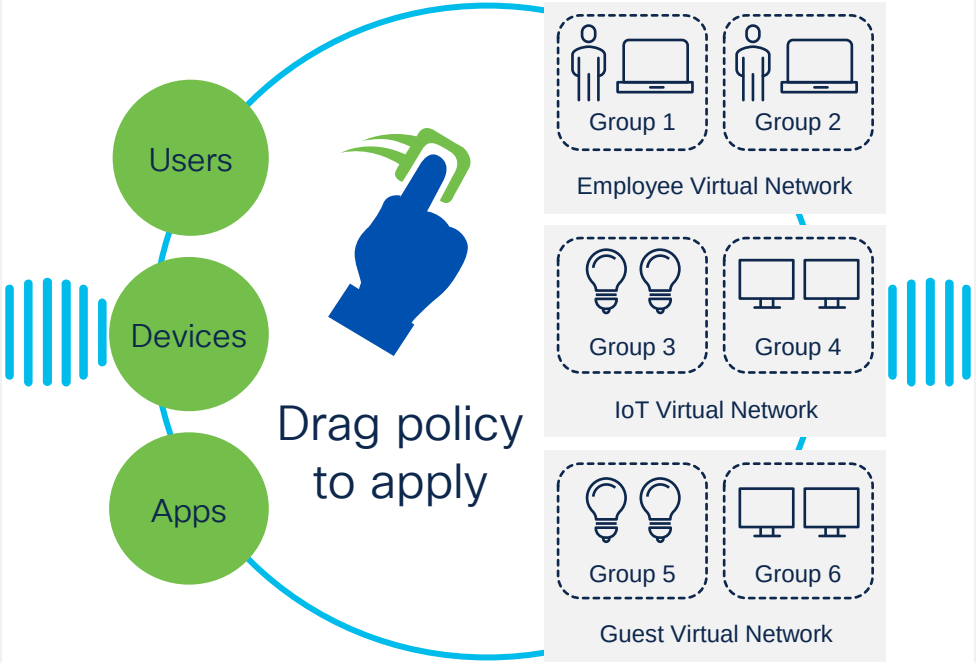
Summary

Secure onboarding of users and devices

Segmentation and Access Control

Before SD-Access

- VLAN and IP address based
- Create IP based ACLs for access policy
- Deal with policy violations and errors manually



After SD-Access

- No VLAN or subnet dependency for segmentation and access control
- Define one consistent policy
- Policy follows Identity

Completely Automated | Group-Based Policy | Policy follows Identity

SD-Access Resources

Would you like to know more?

cisco.com/go/dna

cisco.com/go/sdaccess

- SD-Access At-A-Glance
- SD-Access Ordering Guide
- SD-Access Solution Data Sheet
- SD-Access Solution White Paper

cisco.com/go/dnacenter

- Cisco DNA Center At-A-Glance
- Cisco DNA ROI Calculator
- Cisco DNA Center Data Sheet
- Cisco DNA Center 'How To' Video Resources

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Validated Architectures, Prescriptive Guidance, Confidence to Deploy

- 6 Validated Design Guides
- 12 Prescriptive Deployment Guides

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ALL IN

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