CISCO *Live!*

Let's go

#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 9, 2023.

https://ciscolive.ciscoevents.com/ciscolivebot/#BRKENS-2051
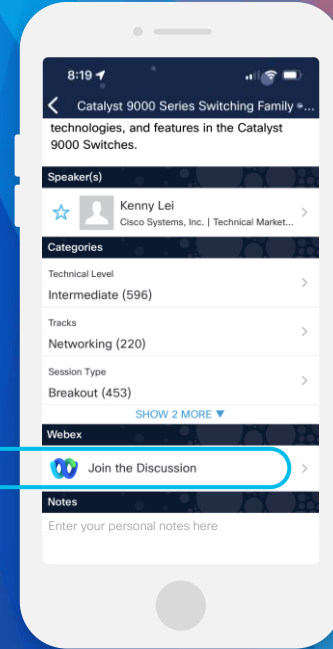
Agenda

- Introduction

- Catalyst 9000 Portfolio & Campus Network Architecture

- Migration Overview

- Migration Types, Approach and Process

- Technical Challenges

- Best Practices

- Automation Story

- Conclusion

Introduction

Krishna Haresamudram

- Customer Delivery Architect
- CX US Public Sector
- 12+ years at Cisco
- CCIE#36680
- Specialized in DC and Campus Routing and Switching, MPLS and Collaboration

Nirbhay Rane

- Customer Delivery Architect
- CX Center
- 10+ years at Cisco
- CCIE#65469
- Specialized Enterprise Routing and Switching, SD-WAN, MPLS

Catalyst 9000 portfolio & Three Tier Campus network architecture

Hardware Placement (Access/Core/Distribution)

Three Tier Campus Network Architecture

DC   Internet

10/25/40G   40/100/400G

Core

Distribution

Access

Tower 1   Tower 2   Tower N

Three Tier Campus Network Architecture

DC   Internet

10/25/40G   40/100/400G

Old Catalyst 6500 replaced with Catalyst 9600 Series — Core

Old Catalyst 6800/4500 replaced with Catalyst 9600/9400 Series — Distribution

Old Catalyst 2K/3K stack replaced with Catalyst 9300 Series Stack — Access

Tower 1   Tower 2   Tower N
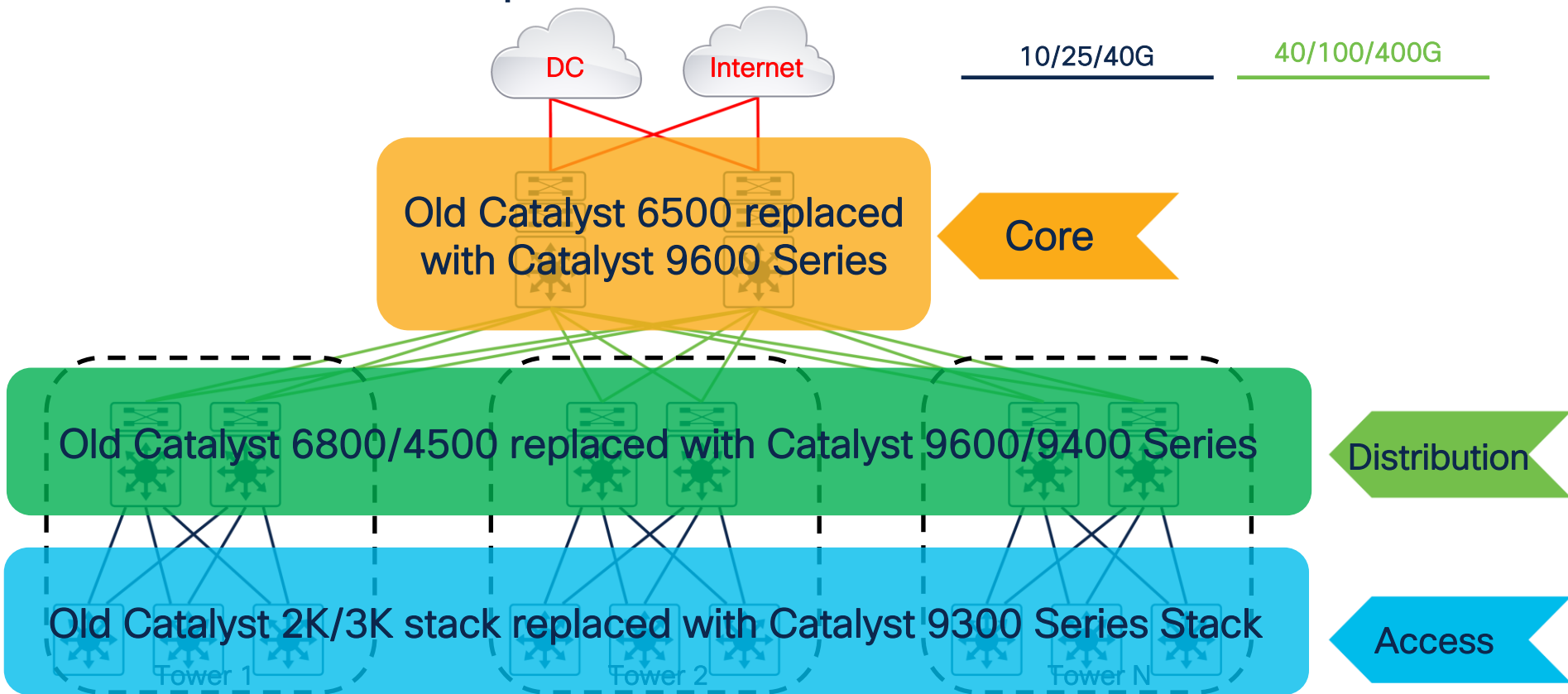
Migration Overview

How did we help the customer

Background

- Enterprise customer with 1000+ legacy Catalyst switches across 10 campus sites
- Customer wants to upgrade campus infrastructure to adopt newer technologies – Software Defined Access or VxLAN BGP EVPN fabric

Customer Asks

- Campus sites refresh with minimal business impact
- Minimize migration cost, time
- Incorporate design & operational best practices to increase network high availability & redundancy

Cisco CX

- Helping customer to migrate to Catalyst 9000 to start Enterprise Network Transformation journey
- Phased, well structured & well executed campus site migrations
- Phase 0 & 1 – 200+ devices (120 Access, 60 Distribution & 40 Core) migrated successfully

Key Players

Project Manager

2 Managing Project Timelines and engineer requests

3 Setting realistic migration schedules

Project Manager

Bridging the Gap

1 Bringing Stakeholders Together

4 Maintaining, updating and reporting project data to stakeholders
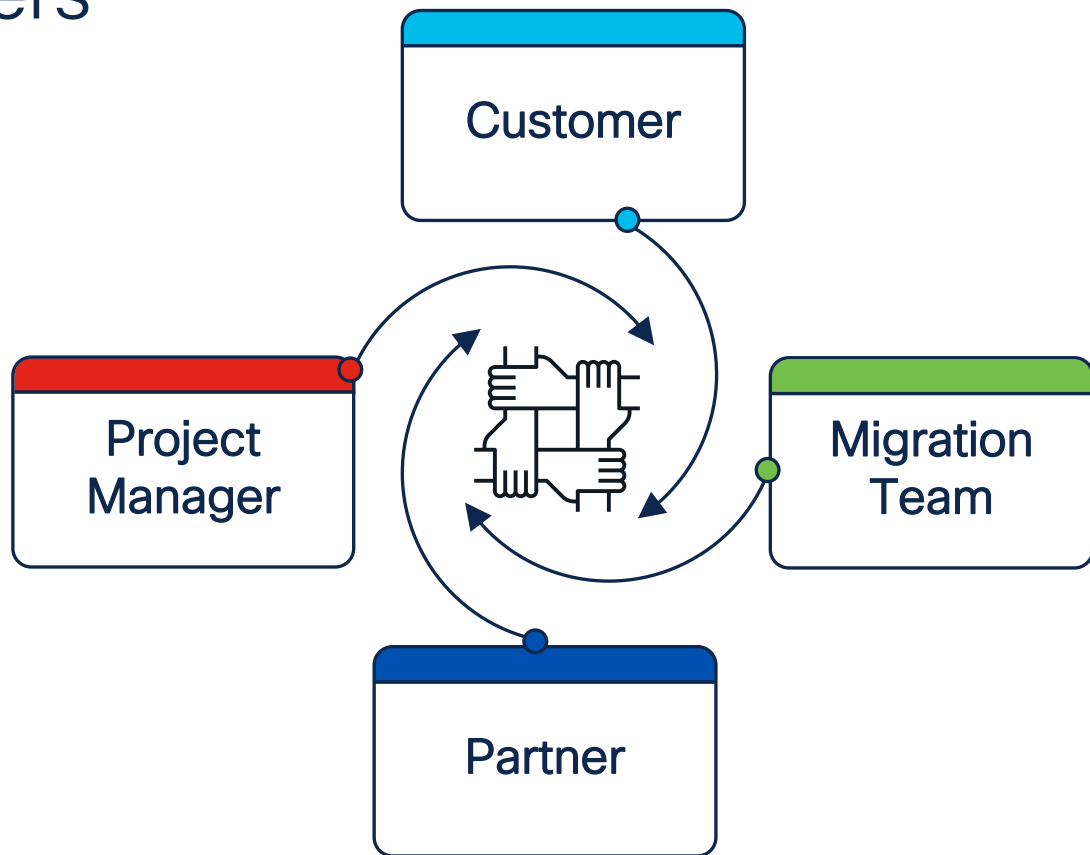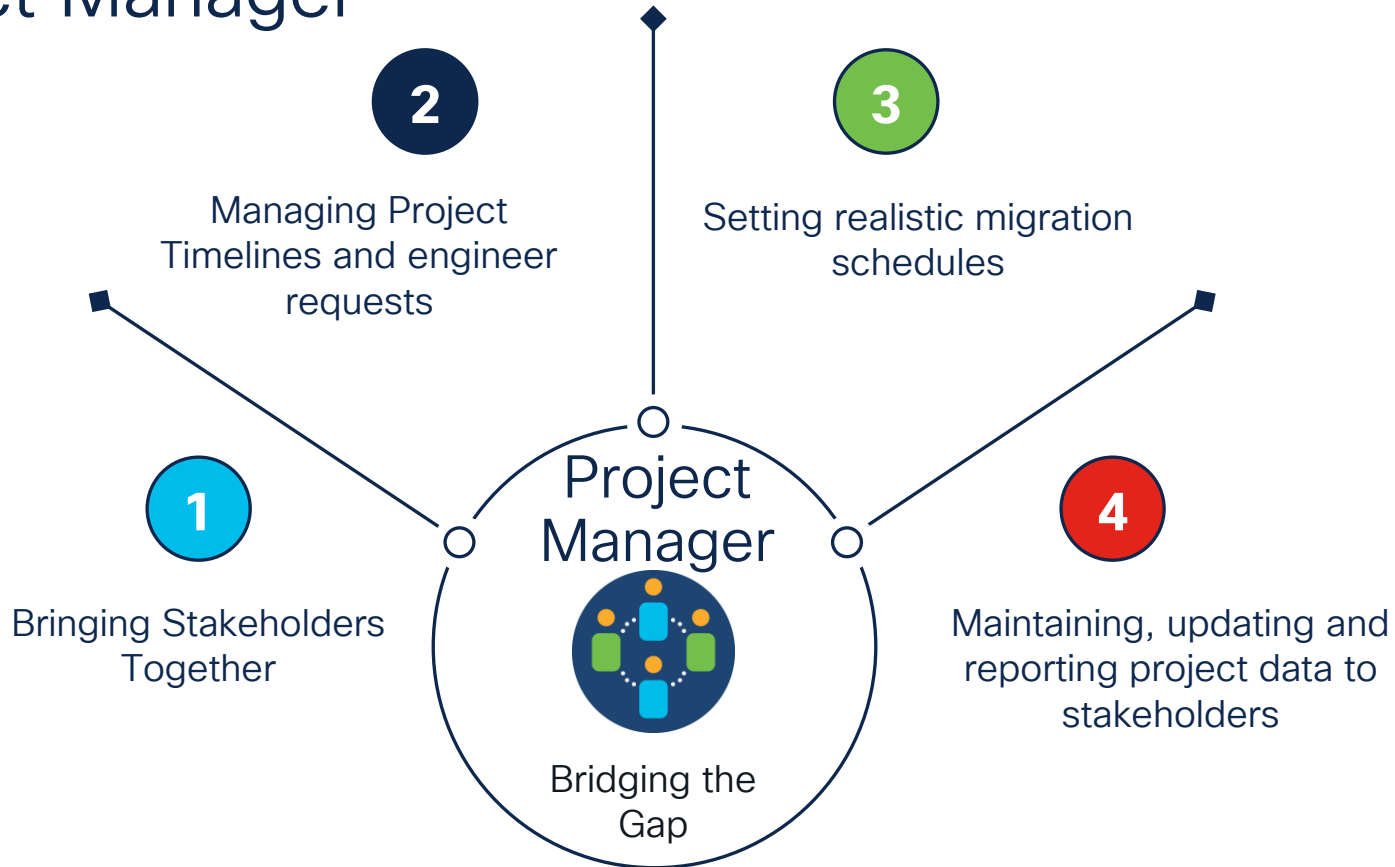
CX Migration Team

Pre-Migration

Migration Strategy

- Requirements Gathering
- Design Documentation
- Migration Execution Procedure

BoM Validation

Feature, HW Support Check

Port-Mapping

Config Conversion

Lab testing

Staging

Device Configuration

Recommended SW Version

Stacking/StackWise Validation

Hardware Resource Check

Migration

L2/L3 Post Migration Checks

Failover Checks

Resolving Technical Issues

Assisting in Service Validation

Post MW 24-hour Support

Migration Closure Document

Customer

Pre-Migration

- Site Survey Information
- Site Technical PoC
- Site Readiness

Migration

- Service Validation
- User Acceptance Testing

1

2

3
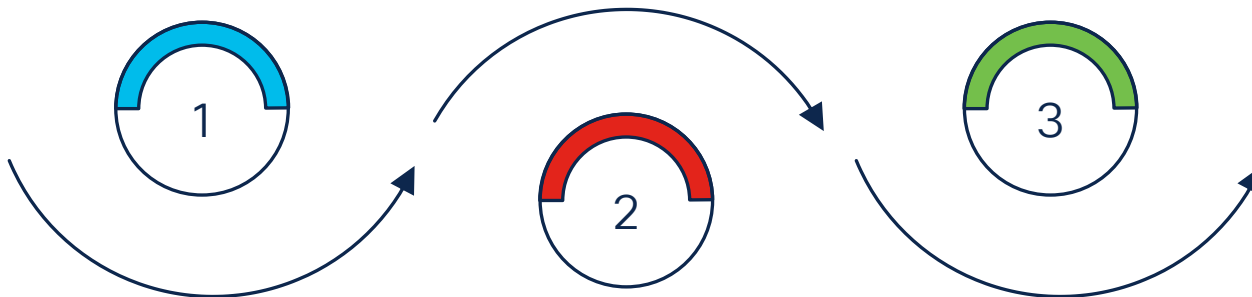
Staging

- Sufficient Power & Connectors
- Rack Space
- Facilitating Device Movement

Partner

Pre-Migration
- Carrying out site survey
- Assessing rack space requirement
- Capturing power/PDU requirements

Staging
- SFP – Copper & Fiber, SMF/MMF Cables
- Cable labeling
- Rack, Stack, Power
- POST

Migration
- Device Commissioning/De-commissioning
- Cable movement as per MoP
- Cable dressing & final labeling

Migration Types, Approach and Process

Migration Types

1:1 Migration

Stack Migration

Old Stack

Cat 9300 stack

1:N Migration

Cat 9300 stack

1:2 Migration

StackWise Virtual

SVL

DAD

2:2 Migration

VSS

StackWise Virtual

SVL

DAD
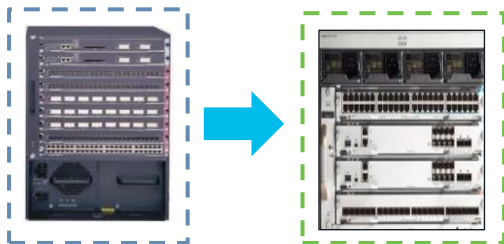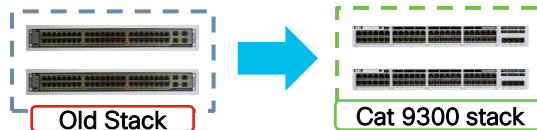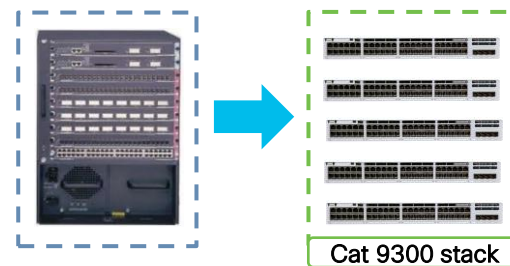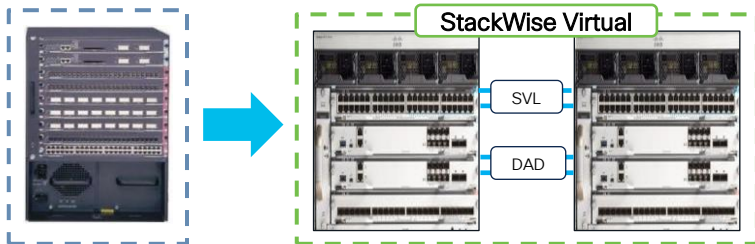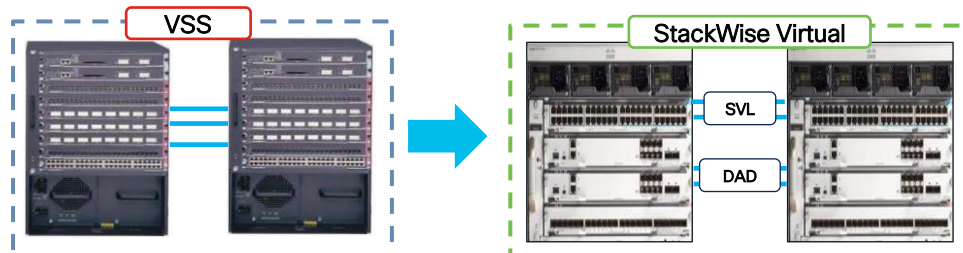
Migration Approach

Hardware Swap

- Remove existing gear and replace with new
- Ensure transceiver compatibility
- Ensure proper site access
- Ensure cables are marked properly
- Longer downtime
- Difficult roll back
- New gear should be pre-staged for config/software upgrade at a different location
- More suitable for Access Layer switches

Parallel Migration

- Existing and New gear will run parallelly
- Layer 2 and Layer 3 interconnects between Existing and New Gear allows for easier migration and roll back
- VLAN migration and STP convergence should be thoroughly planned
- HSRP states can be easily controlled using priorities
- If carefully planned, almost no downtime in most cases
- More suitable for Distribution/Core Layer switches

Migration Process

START

1 — Site Survey

2 — Old Inventory Collection / New BoM Check

3 — Port-Mapping

4 — Old IOS to IOS-XE Config Conversion / Feature & Platform Support Validation

Pre -Migration

5 — MoP Creation

Staging

6 — Device Staging / HW Validation with Stacking/StackWise / New Device Configuration

7 — Site Readiness & Checks / Rack/Stack (if possible) / Cable Labelling

8 — Pre-MW Checkpoint

Migration & Post-MW

> Old Device De-commission
> New Device Commission
> Cable Movement as per MoP

9 — Migration Window

> L2/L3 Connectivity Post Checks
> Failover Testing
> UAT & Service Validation

10

> Post Migration 24-hour Support
> Migration Closing Document
> Handover

FINISH

Technical Challenges

Challenge - TCAM Exhaustion

Lots of Access Control List Entries

Background –

Legacy Catalyst device is having many ACLs configured

Issue –

On new Catalyst 9000, large number of Access Control Entries (ACEs) are not getting programmed in HW

```
Switch#
Switch#show platform hardware fed Switch active fwd-asic resource tcam utilization
Codes: EM - Exact_Match, I - Input, O - Output, IO - Input & Output, NA - Not Applicable

CAM Utilization for ASIC  [0]
Table                 Subtype    Dir    Max      Used    %Used    V4     V6    MPLS   Other
--------------------------------------------------------------------------------------------
Mac Address Table     EM         I      32768    27      0.08%    0      0      0      27
Mac Address Table     TCAM       I      768      21      2.73%    0      0      0      21
L3 Multicast          EM         I      32768    0       0.00%    0      0      0      0
L3 Multicast          TCAM       I      768      6       0.78%    3      3      0      0
L2 Multicast          TCAM       I      2304     7       0.30%    3      4      0      0
IP Route Table        EM/LPM     I      212992   36      0.02%    35     0      1      0
IP Route Table        TCAM       I      1536     11      0.72%    6      3      2      0
QOS ACL Ipv4          TCAM       I      5632     15      0.27%    15     0      0      0
QOS ACL Non Ipv4      TCAM       I      2560     30      1.17%    0      20     0      10
QOS ACL Ipv4          TCAM       O      6144     13      0.21%    13     0      0      0
QOS ACL Non Ipv4      TCAM       O      2048     27      1.32%    0      18     0      0
Security ACL Ipv4     TCAM       I      7168     6752    94.20%   6752   0      0      0
Security ACL Non Ipv4 TCAM       I      5120     76      1.48%    0      36     0      40
Security ACL Ipv4     TCAM       O      7168     5718    79.77%   5718   0      0      0
Security ACL Non Ipv4 TCAM       O      8192     29      0.35%    0      24     0      5
Netflow ACL           TCAM       I      512      6       1.17%    2      2      0      2
PBR ACL               TCAM       I      3072     22      0.72%    16     6      0      0
Netflow ACL           TCAM       O      512      6       1.17%    2      2      0      2
Flow SPAN ACL         TCAM       I      512      4       0.78%    1      2      0      1
Flow SPAN ACL         TCAM       O      512      4       0.78%    1      2      0      1
```

⚠️

```
%ACL_ERRMSG-4-UNLOADED: Chassis 1 F1/0: fed: Output IPv4 L3 ACL on interface
Vlan639 could not be programmed in hardware and traffic will be dropped.
```

Challenge – TCAM Exhaustion
Lots of Access Control List Entries

Solution – Switch Device Manager (SDM) Template

- SDM templates can be used to configure system resources to optimize support for specific features, device role

- Catalyst 9600 & 9500 supports **Custom** as well as three Standard SDM templates
  - Core
  - NAT
  - Distribution

- Catalyst 9400 supports 4 Standard SDM templates
  - Access
  - Core
  - SDA
  - NAT

- Catalyst 9300 supports 2 Standard SDM templates
  - Access
  - NAT

```
Switch(config)#
Switch(config)#sdm prefer custom ACL
Switch(config-sdm-acl)#acl-ingress 20 priority 1
Switch(config-sdm-acl)#acl-egress 20 priority 2
Switch(config-sdm-acl)#exit
Use 'show sdm prefer custom' to see proposed values and 'sdm prefer custom commit' to apply
Switch(config)#sdm prefer custom commit
Changes to the running SDM preferences have been stored and will take effect on the next reload.

Switch(config)#
Switch(config)#
```

```
Switch#
Switch#show sdm prefer custom
Showing SDM Template Info

This is the Custom template
  Number of VLANs:                          4094
  Unicast MAC addresses*:                   32768
  Overflow Unicast MAC addresses*:          768
  Overflow L2 Multicast entries*:           2304
  L3 Multicast entries*:                    32768
  Overflow L3 Multicast entries*:           768
  Ipv4/Ipv6 shared unicast routes*:         212992
  Ingress Security Access Control Entries*: 12288  (current) - 20480  (proposed)
  Egress Security Access Control Entries*:  15360  (current) - 20480  (proposed)
  Egress QoS Access Control Entries*:       8192   (current) - 1024   (proposed)
  Policy Based Routing ACEs / NAT ACEs*:    3072   (current) - 1024   (proposed)
  Netflow Input ACEs*:                      512    (current) - 512    (proposed)
  Netflow Output ACEs*:                     512    (current) - 512    (proposed)
  Input Flow SPAN ACEs*:                    512    (current) - 512    (proposed)
  Output Flow SPAN ACEs*:                   512    (current) - 512    (proposed)
  Tunnels*:                                 2816   (current) - 768    (proposed)
  LISP Instance Mapping Entries*:           2048   (current) - 1024   (proposed)
  Control Plane Entries*:                   512    (current) - 512    (proposed)
  Input Netflow flows*:                     32768
  Output Netflow flows*:                    32768
  SGT/DGT (or) MPLS VPN entries*:           32768
  SGT/DGT (or) MPLS VPN Overflow entries*:  768
  Wired clients:                            2048
  MACSec SPD Entries*:                      256    (current) - 256    (proposed)
  VRF:                                      1024
```

Challenge - TCAM Exhaustion

Lots of Access Control List Entries

<u>Solution</u> – Switch Device Manager (SDM) Template

- Once the device is reloaded with proper SDM template, ACLs will be programmed in HW

```
Switch#show platform hardware fed Switch active fwd-asic resource tcam utilization
Codes: EM - Exact_Match, I - Input, O - Output, IO - Input & Output, NA - Not Applicable

CAM Utilization for ASIC  [0]
Table                     Subtype     Dir     Max      Used    %Used      V4      V6     MPLS    Other
--------------------------------------------------------------------------------------------------------
Mac Address Table         EM          I      32768      26     0.08%       0       0       0       26
Mac Address Table         TCAM        I        768      21     2.73%       0       0       0       21
L3 Multicast              EM          I      32768       0     0.00%       0       0       0        0
L3 Multicast              TCAM        I        768       6     0.78%       3       3       0        0
L2 Multicast              TCAM        I       2304       7     0.30%       3       4       0        0
IP Route Table            EM/LPM      I     212992       3     0.00%       2       0       1        0
IP Route Table            TCAM        I       1536      11     0.72%       6       3       2        0
QOS ACL                   TCAM        I       1024      45     4.39%      15      20       0       10
QOS ACL                   TCAM        O       1024      40     3.91%      13      18       0        9
Security ACL              TCAM        I      20480    17998    87.88%   17922      36       0       40
Security ACL              TCAM        O      20480     8969    43.79%    8940      24       0        5
Netflow ACL               TCAM        I        512       6     1.17%       2       2       0        2
PBR ACL                   TCAM        I       1024      22     2.15%      16       6       0        0
Netflow ACL               TCAM        O        512       6     1.17%       2       2       0        2
Flow SPAN ACL             TCAM        I        512       4     0.78%       1       2       0        1
Flow SPAN ACL             TCAM        O        512       4     0.78%       1       2       0        1
```

```
%ACL_ERRMSG-6-RELOADED: Chassis 2 F0/0: fed: Output IPv4 L3 ACL on interface
Vlan639 has now been loaded into the hardware.
```

Challenge – Object Group ACL Syntax Difference

Config conversion for Object Group based ACLs

<u>Background</u> –

Object group ACL configuration syntax difference between Legacy Catalyst and new Catalyst 9000 switches

Legacy Catalyst Switches	Catalyst 9000 Switches

```object-group ip address g1```
 ` host 10.20.20.1`
 ` host 10.20.21.1`
 ```object-group ip port p1```
 ` gt 100`
 ` lt 200`
 `ip access-list extended test1`
 ` permit tcp host 1.1.1.1 port-group p1 adrgroup g1`
	```object-group network g1```
	 ` host 10.20.20.1`
	 ` host 10.20.21.1`
	 ```object-group service p1```
	 ` tcp source gt 100`
	 ` tcp source lt 200`
	 `ip access-list extended test1`
	 ` permit object-group p1 host 1.1.1.1 object-group g1`

```object-group ip address g2```
 ` host 10.30.20.1`
 ` host 10.30.21.1`
 ```object-group ip port p2```
 ` gt 300`
 ` lt 400`
 `ip access-list extended test2`
 ` permit tcp host 1.1.1.1 addrgroup g2 port-group p2`
	```object-group network g1```
	 ` host 10.20.20.1`
	 ` host 10.20.21.1`
	 ```object-group service p1```
	 ` tcp source gt 100`
	 ` tcp source lt 200`
	 `ip access-list extended test1`
	 ` permit object-group p1 host 1.1.1.1 object-group g1`

Challenge – Object Group ACL Syntax Difference

Config conversion for Object Group based ACLs

⚠️ <u>Issue</u> –

- Multiple Legacy Devices with 10-15K configuration lines of object group ACLs

- Impossible to do manual config conversion for Object Group ACLs due to syntax changes

✅ <u>Solution</u> –

- Automation tool for quick & easy Object Group ACL config conversion

- No manual errors, time saving

Challenge – Catalyst 9400 PVST Instance Scalability

Catalyst 9400 Supervisor PVST Instance limit

Background –

- On legacy device, there are more than 300 PVST instances are active

Issue -

- Catalyst 9400 sup models currently supports up to 300 PVST instances with IOS-XE 17.1

```
%SPANTREE_VLAN_SW-2-MAX_INSTANCE: Platform limit of 300 STP instances exceeded. No
instance created for VLAN301 (port Po10)
```

Solution –

- Use Catalyst 9600 or Catalyst 9500 (UDAP 3.0 models) to replace these legacy devices
- Catalyst 9600 Sup-1 supports 1000 & Sup-2 up to 4096 PVST instances*
- Catalyst 9500 (UDAP 3.0 models) up to 4000 PVST instances*

* refer Catalyst 9000 data sheet for more details

Challenge – Policy Based Routing (PBR) Support

PBR support to forward traffic into GRE tunnel

Background –

- On legacy device, PBR is configured to forward traffic into GRE tunnel using "set interface tunnel" in PBR

Issue –

- Set interface, set default next-hop and set default interface are not supported in PBR route-map on Catalyst 9000

```
%FMANRP_PBR-3-UNSUPPORTED_RMAP: Route-map PBR has unsupported options for Policy-
Based Routing. It has been removed from the interface, if applied.
```

Challenge – Policy Based Routing (PBR) Support

PBR support to forward traffic into GRE tunnel

✓ Solution –

- Starting with the Cisco IOS XE -17.7.1 release, PBR can forward traffic into GRE tunnel on Catalyst 9000

- Use "set ip next hop" instead of "set interface"

Legacy Catalyst Switches	Catalyst 9000 Switches
<pre>!
interface Vlan105
description **Server-Vlan**
ip address 1.1.1.1 255.255.255.0
ip policy route-map PBR
!
route-map PBR permit 10
match ip address PBR-ACL
set interface Tunnel100
!
route-map PBR permit 20</pre>	<pre>!
interface Vlan105
description **Server-Vlan**
ip address 1.1.1.1 255.255.255.0
ip policy route-map PBR
!
route-map PBR permit 10
match ip address PBR-ACL
set ip next-hop <x.x.x.x>
!
route-map PBR permit 20</pre>

Challenge – Policy Based Routing (PBR) Support

PBR based on TOS, DSCP and IP Precedence

<u>Background</u> –

- On legacy device, PBR is configured to set IP precedence, TOS, DSCP

<u>Issue</u> -

- On Catalyst 9000 switches, PBR based on TOS, DSCP and IP Precedence are not supported.

```
%FMANRP_PBR-3-UNSUPPORTED_RMAP: Route-map Marking-Voice has unsupported options for
Policy-Based Routing. It has been removed from the interface, if applied.
```

Challenge – Policy Based Routing (PBR) Support

PBR based on TOS, DSCP and IP Precedence

✓ <u>Solution</u> –

- Use QoS service-policy configuration to set IP Precedence, TOS, DSCP.

Legacy Catalyst Switches	Catalyst 9000 Switches

```
!
access-list 1 remark ** Voice traffic **
access-list 1 permit any
access-list 1 deny any
!
route-map Marking-Voice permit 10
 match ip address 1
 set ip precedence critical
!
!
interface Vlan96
 description IP Phones
 ip policy route-map Marking-Voice
!
```

```
!
access-list 1 remark ** Voice traffic **
access-list 1 permit any
access-list 1 deny any
!
class-map match-any VOICE
 match access-group 1
!
policy-map Marking-Voice
 class VOICE
  set ip precedence 5
!
interface Vlan96
 service-policy input Marking-Voice
!
```

Challenge – Traditional vs Flexible NetFlow

NetFlow Support

⚠️ <u>Issue</u> -

- Traditional NetFlow is configured on legacy devices however flexible NetFlow is supported on Catalyst 9000 switches.

✅ <u>Solution</u> –

- Traditional NetFlow configuration can be easily mapped to flexible NetFlow configuration which provides more customized and flexible option for flow data

Challenge – Traditional vs Flexible NetFlow

NetFlow Support

Legacy Catalyst Switches	Catalyst 9000 Switches

```
!
ip flow-export destination 1.1.1.1 9996
ip flow-export source GigabitEthernet 0/2
ip flow-export version 5
!
ip flow-cache timeout active 1
ip flow-cache timeout inactive 15
!
interface GigabitEthernet 0/1
 ip flowingress
!
```

```
flow export export1
 destination 1.1.1.1
 transport udp 9996
 export-protocol netflow-v5
 source GigabitEthernet 1/0/2

flow record record1
 match ipv4 source address
 match ipv4 destination address
 match ipv4 protocol
 match transport source-port
 match transport destination-port
 collect interface output
 collect counter bytes

flow monitor monitor1
 record record1
 exporter export1
 cache timeout active 1
 cache timeout inactive 15

interface GigabitEthernet 1/0/1
 ip flow monitor monitor1 input
```

Challenge – Parameter differences

Legacy Catalyst 6500 vs Catalyst 9600

Parameter	Legacy Catalyst 6500 Switches	Catalyst 9600 Switches
Default Port Type & State	Layer 3 & Off (shutdown)	Layer 2 & On (no shutdown)
Interface Numbering	`interface <Type><Slot#>/<Port#>` Example - `TenGigabitEthernet1/1`	`interface <Type><Slot#>/<Bay#>/<Port#>` Example - `TenGigabitEthernet1/0/1`
Mgmt Interface & VRF	• Mgmt0 • management	• GigabitEthernet0/0 • Mgmt-vrf
Port-channel numbering	Cisco IOS Release 15.1SY - • 1 to 512 in VSS mode • 1 to 256 in standalone mode	• IOS-XE 17.3.x & below – 1 to 128 • IOS-XE 17.4.x & later – 1 to 192 • In StackWise Virtual setup, PO 127 and 128 are reserved by default
CoPP Differences	• Default – Enabled • CoPP Class map can be added, modified, deleted	• Default - Enabled (can't be disabled, but policing rates can be modified) • CoPP class map - System predefined
Domain	`ip domain-name <name>` `ip domain-lookup`	`ip domain name <name>` `ip domain lookup`
ntp calendar	`ntp update-calendar`	`clock calendar-valid`

Best Practices

Design and configuration Best Practices

- ✓ Consider to plan for Routed Access Design
    - Avoid Spanning Tree, make use of ECMP
    - Consistent and Predictable
- ✓ Summarization at Distribution Layer
    - Limits the number of EIGRP Queries or OSPF LSAs
- ✓ Use Passive Interfaces for IGP
- ✓ Consider deploying QoS even if you have tons of bandwidth today

- ✓ Use VTP Transparent mode
    - Avoids Operational Errors
- ✓ Configure portfast on Edge ports
- ✓ Use Uni Directional Link Detection (UDLD)
    - Protects against One-Way Communication in Fibre Optic links
- ✓ Configure device hardening best practices
    - AAA & TACACS, password/key, SNMP, SSH, Syslogs

Catalyst 9600 – Power Redundancy Mode

- Supported power supply redundancy modes

  - Combined

  - N+1

- Combined mode is the default, redundant mode is configurable

	Normal operation	Power supply failure
Operation	• Equal load sharing and all active	• Equal load sharing among the remaining power supplies
Power budgeting	• Combined mode: Use all available power supplies for system budgeting • N+1 mode: Use N power supplies for system budgeting	• Combined mode: Line card can shut down if there isn't enough power • N+1 mode: Always enough power with single power supply outage

✓ Use redundant mode (N+1)

Catalyst 9600 Power Priority

- All components in the system are assigned with a power priority level

- Supervisors and the fan tray have the same highest priority level

- Line cards with lower slot numbers have the higher power priority level by default

- User-configurable power priority for line card slots is on the roadmap

Higher priority

Highest priority
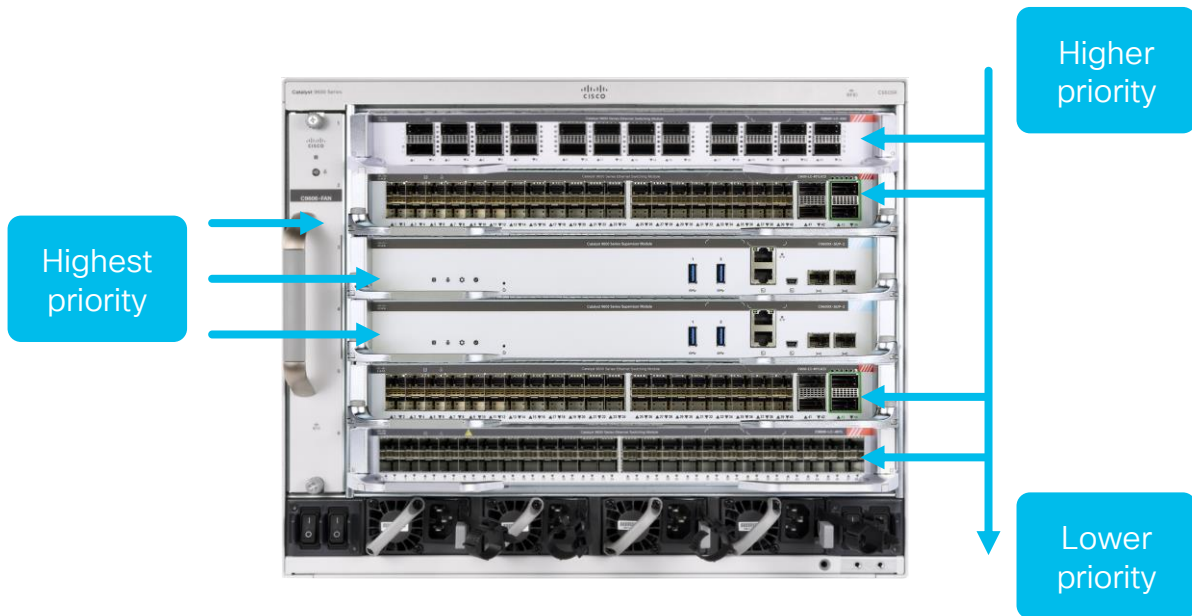
Lower priority

Place important connectivity on higher priority line cards

Catalyst 9400 – Power Redundancy Mode

- Supported power supply redundancy modes

  - Combined

  - N+1

  - N+N

- Combined mode is the default, redundant mode is configurable.

Power redundancy: N+1 and N+N

| Active | Standby |

- Default Active is PS1 through 4, and Standby is PS5 through 8
- Standby power slots are configurable

```
SW(config)#power redundancy-mode redundant ?
  N+N  Redundant N+N (N is active, N is standby)
  N+1  Redundant N+N (N is active, 1 is standby)
SW(config)#power redundancy-mode redundant N+1 ?
  <1-8>  standby slot in N+N mode
SWR(config)#
```

- Default Active is PS1 through 7, and Standby is PS8
- Standby power slot is configurable

```
SW(config)#power redundancy-mode redundant ?
  N+N  Redundant N+N (N is active, N is standby)
  N+1  Redundant N+N (N is active, 1 is standby)
SW(config)#power redundancy-mode redundant N+1 ?
  <1-8>  standby slot in N+1 mode
SWR(config)#
```

✅ Use redundant mode (N+1 or N+N)

Catalyst 9400 Power Priority

- All components in the system are assigned a power priority level

- Supervisors and fan tray have the same highest priority level

- Line cards with lower slot numbers have the higher power priority level by default if "`power supply autoLC shutdown`" is configured

- Software allows user-configurable power priority for line card slots
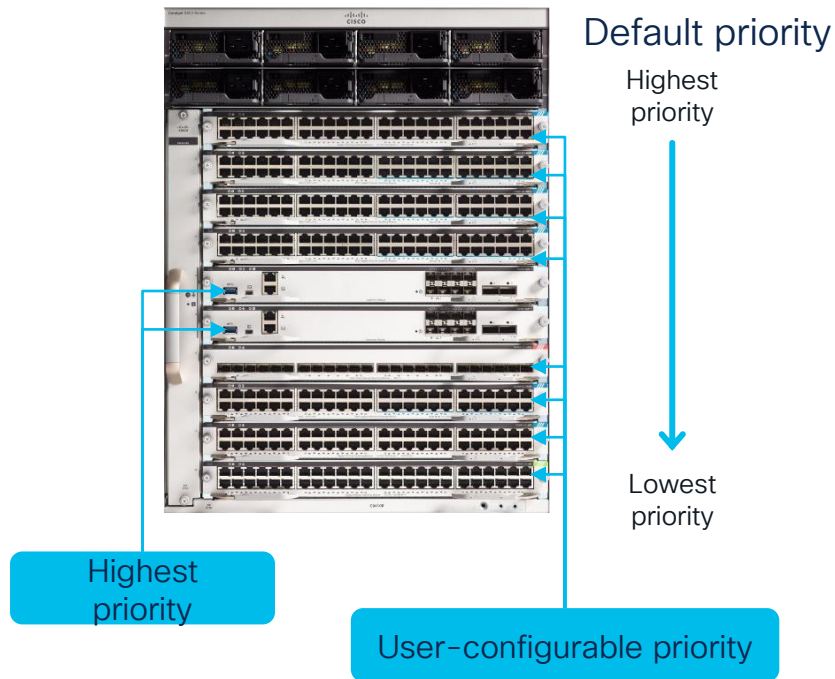
```
C94(config)#power supply autoLC priority ?
    <1-7>  Physical slot number
    <cr>
C94(config)#power supply autoLC priority
```

✓ Place important connectivity on higher priority line cards

Default priority

Highest priority

Lowest priority

Highest priority

User-configurable priority

Catalyst 9400 Sup-1 Uplink Ports Configurations

Port 1-8 – SFP/SFP+ & Port 9-10 - QSFP

8 + 0 (standalone setup)

Active

1	2	3	4
5	6	7	8	9	10
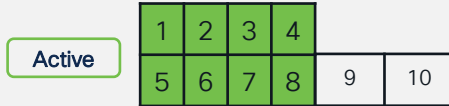
No Standby

2 + 0 (standalone setup)

Active

1	2	3	4
5	6	7	8	9	10

No Standby

5 + 0 (standalone setup)

Active

1	2	3	4
5	6	7	8	9	10

No Standby

5 + 0 (standalone setup)

Active

1	2	3	4
5	6	7	8	9	10
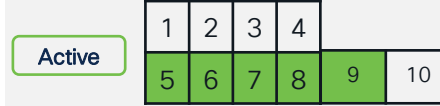
No Standby

4 + 4 (redundant setup)

Active

1	2	3	4
5	6	7	8	9	10

Standby

1	2	3	4
5	6	7	8	9	10

1 + 1 (redundant setup)

Active

1	2	3	4
5	6	7	8	9	10

Standby

1	2	3	4
5	6	7	8	9	10

4 + 1 (redundant setup)

Active

1	2	3	4
5	6	7	8	9	10

Standby

1	2	3	4
5	6	7	8	9	10

1 + 4 (redundant setup)

Active

1	2	3	4
5	6	7	8	9	10

Standby

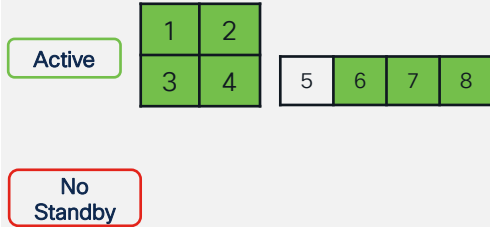| 1	2	3	4
5	6	7	8	9	10
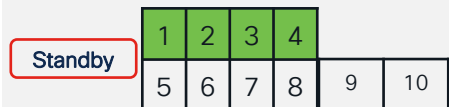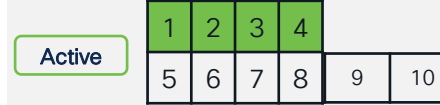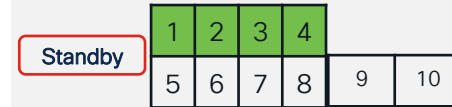
To use an SFP or SFP+ port, disable the corresponding QSFP interface

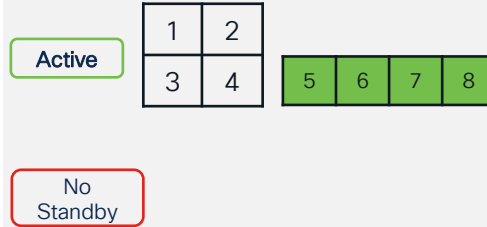# Catalyst 9400 Sup-2 Uplink Ports Configurations

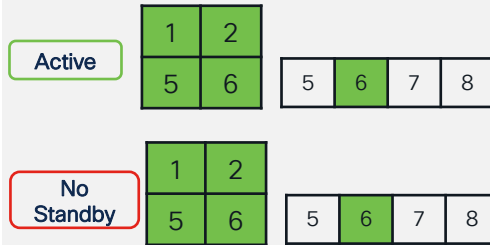Port 1-4 – SFP+/SFP28
Port 5-8 – QSFP/QSFP28
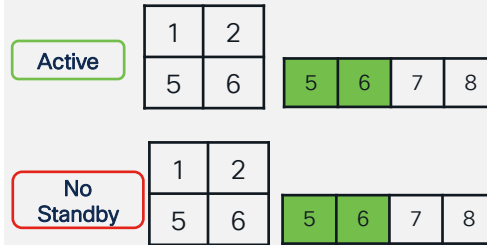
7 + 0 (standalone setup)

Active

1	2
3	4

| 5 | 6 | 7 | 8 |

No Standby

4 + 0 (standalone setup)

Active

1	2
3	4

| 5 | 6 | 7 | 8 |

No Standby

5 + 5 (redundant setup)

Active

1	2
5	6

| 5 | 6 | 7 | 8 |

No Standby

1	2
5	6

| 5 | 6 | 7 | 8 |

2 + 2 (redundant setup)

Active

1	2
5	6

| 5 | 6 | 7 | 8 |

No Standby

1	2
5	6

| 5 | 6 | 7 | 8 |

To use an SFP+ or SFP28 port, disable the corresponding QSFP/QSFP28 interface

Automation Story

Why is automation needed ?

- ✓ Eliminate hard work, enable smart work

  - Reduce repetitive work for configuring multiple Catalyst switches simultaneously

  - Avoid human errors/typos

  - Available to do more in less time

- ✓ Brings in configuration consistency

- ✓ Saves troubleshooting time

  - Automating pre and post checks during migration

  - Quickly identify which routes or mac addresses are missing

  - Capture the ideal network state for future references

- ✓ Version Control

  - Share templatized configurations with team

  - Desired state of the network managed as a code

Automation Use Cases for Campus Network Migration

Device Onboarding

- Pre-Migration switch configuration
- IOS to IOS-XE Config conversion

1

Software upgrade

- Upgrade the device to recommended version before migration

2

Migration

- Capture Pre and Post Migration checks
- Compare the checks to ensure post migration checks are as expected

3

Post Migration

- Day 2 changes
- SW Image Management
- Telemetry

4

Conclusion

Key Takeaways

- Campus infrastructure can be upgraded rapidly with well managed & executed migration process

- Automation helps in consistent, efficient, accurate & faster migrations

- Use infrastructure refresh opportunity to improve campus network design & deployment

- Cross team collaboration is key

- Cisco CX is always there to help you and work with you to achieve your campus network infrastructure transformation

Fill out your session surveys!

Attendees who fill out a minimum of four session surveys and the overall event survey will get **Cisco Live-branded socks** (while supplies last)!

Attendees will also earn 100 points in the **Cisco Live Challenge** for every survey completed.

These points help you get on the leaderboard and increase your chances of winning daily and grand prizes

Continue your education

- Visit the Cisco Showcase for related demos

- Book your one-on-one Meet the Engineer meeting

- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs

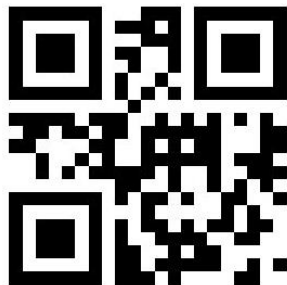- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

Thank you

Cisco Live
Challenge

Gamify your Cisco Live experience!
Get points for attending this session!

How:

1. Open the Cisco Events App.

2. Click on 'Cisco Live Challenge' in the side menu.

3. Click on View Your Badges at the top.

4. Click the + at the bottom of the screen and scan the QR code:

CISCO Live!

Let's go