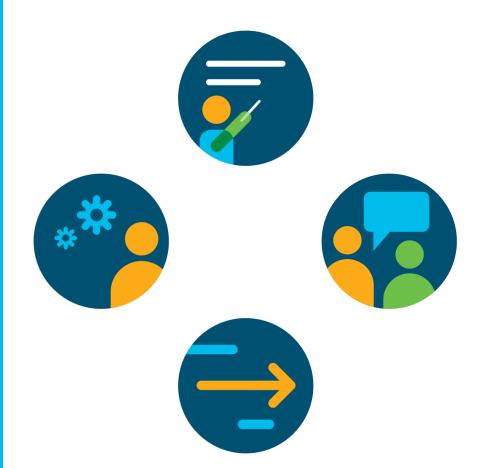


# Cisco Catalyst 8500 Series Edge Platforms

Redefining the WAN Infrastructure

William Ma, Sumant Mali IBNG - PM, TME November 2020

## News & Upcoming events



#### Upcoming Community Live Event

Use Serviceability Features to Troubleshoot your Cat9K as a Cisco TAC Engineer

December 1st, 2020

With Aaron Cespedes

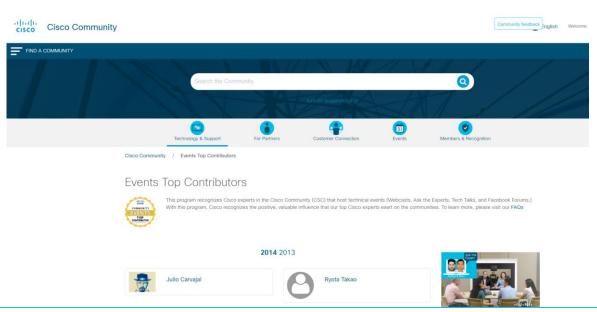
Participate: http://bit.ly/CL-9k1201



#### Become an event Top Contributor!

Participate in Live Interactive Technical Events and much more

http://bit.ly/EventTopContributors





#### Cisco Designated VIPs



The Cisco Designated VIP program recognizes the top external individual contributors in Cisco's online communities, including the Cisco Support Community (CSC), Cisco Learning Network (CLN) and the Cisco Developers Network (CDN). Cisco Designated VIPs are recognized by their peers for their expertise and tireless contributions, and their abundant participation is vital to community success. With this program, Cisco formally recognizes the positive, valuable influence our top individual members exert on the communities overall. FAQs

#### Rate content at the Cisco Community

Help us to recognize the quality content in the community

Rate documents, Videos & blogs!



Accept as Solution

Encourage and acknowledge people who generously share their time and expertise



#### Cisco Community Experts



Sumant Mali Technical Marketing Engineer



# Thank You For Joining Us Today!



Download Today's Presentation https://bit.ly/cl-8500slides

#### Submit Your Questions Now!

Use the **Q&A** panel to submit your questions and the panel of experts will respond.

They will be answered eventually



Please take a moment to complete the survey at the end of the event



# Cisco Catalyst 8500 Series Edge Platforms

Redefining the WAN Infrastructure

William Ma, Sumant Mali IBNG - PM, TME November 2020

#### It's a Multicloud World



#### Journey to Cloud Fueled by Technology Transformation



"Cloud migration will continue to accelerate the adoption of SD-WAN"

- Markets & Markets



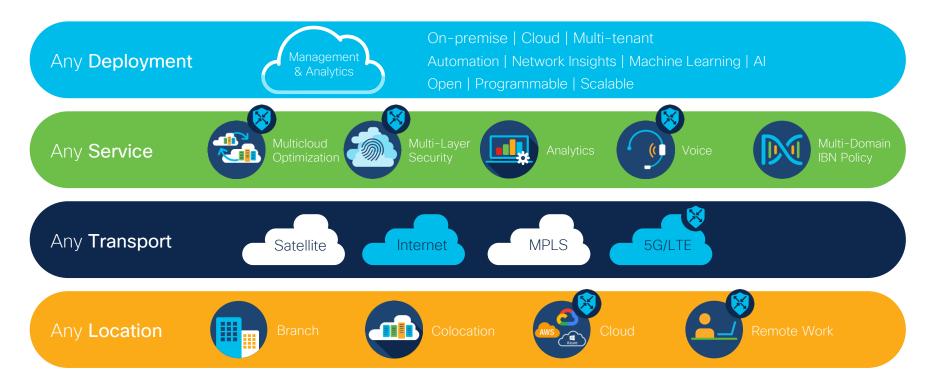
"5G Enterprise Market is expected... CAGR of over 42% during the forecast period (2020-2025)... pushing toward the industrial revolution 4.0"

- Mordor Intelligence Report



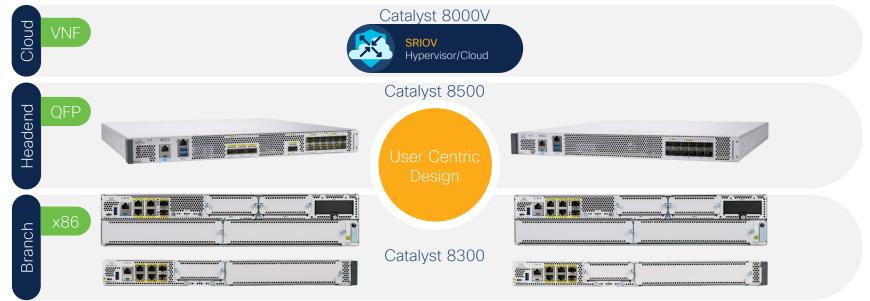
"By 2022, **72%** of network strategists project using **Al-enabled predictive insights** or prescriptive remediation" - Cisco VNI Report

## Powered by secure cloud scale SD-WAN Cisco's flexible architecture for Intent-based Networking





#### Cisco Catalyst 8000 Edge Platforms Family



IOS XE
Common Software Architecture

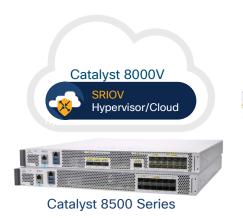
X86 SoC, QFP 3.0 Scalable Hardware Architecture

#### Catalyst Everywhere



Catalyst 9K

**Enterprise Campus Networks** 

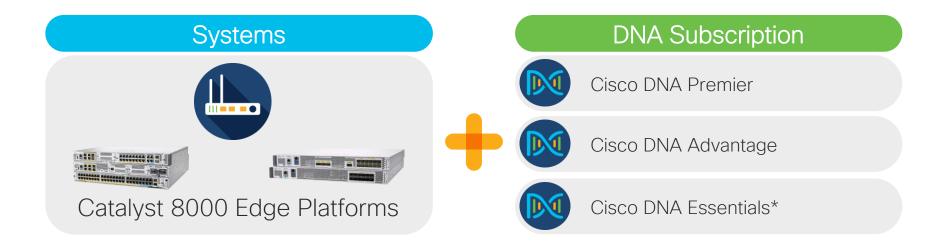


Catalyst 8300 Series

Catalyst 8K

Enterprise WAN Networks

#### Single Offer with common DNA Subscription



#### Catalyst 8000 - Certification & EFT



Ready to serve Enterprise WAN Edge

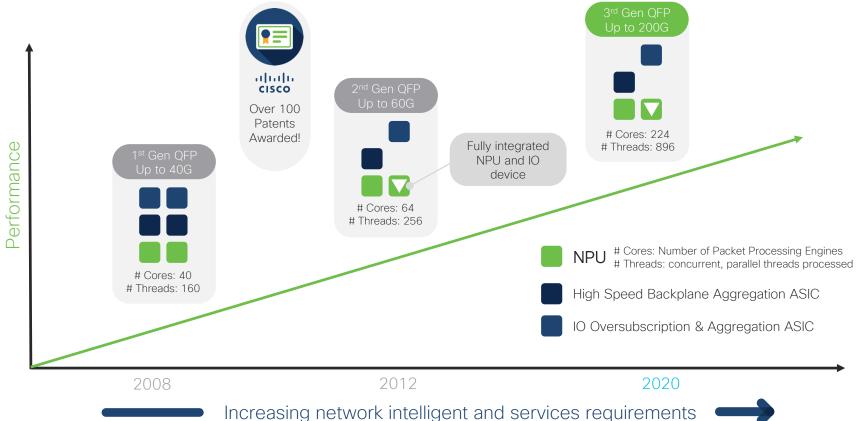


## Catalyst 8500 Aggregation Redefined

#### Cisco Enterprise Routing ASIC Leadership



Continuing Investment in Network Processor Technology



### Cisco Third Generation QFP Exceptional Data Path ASIC





Hardware Accelerated IPsec In-Line Encryption, Decryption



Multi-Core Parallel Processing 224 PPEs, 896 Threads

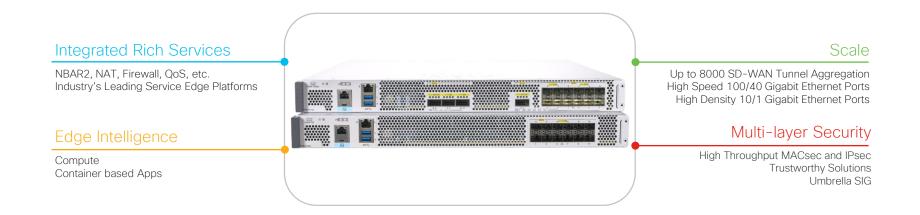


Built-in L2 Sub-system 240 Gbps L2 Aggregation



High Scale Feature Velocity Improved Performance, Programmable

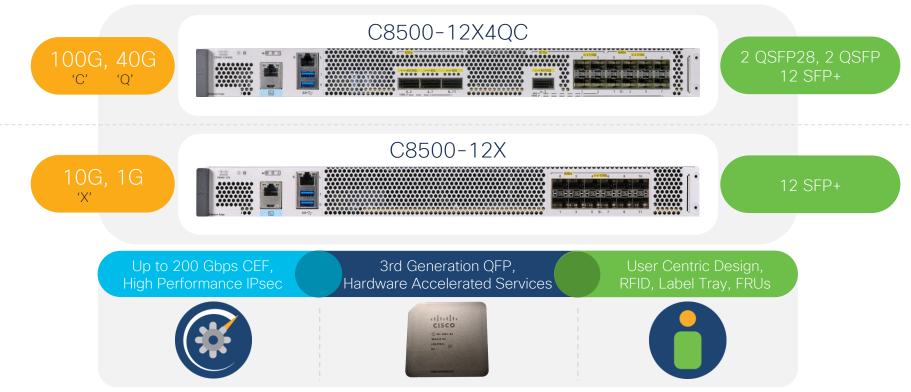
## Cisco Catalyst 8500 Series Edge Platforms Highly Capable 1RU SD-WAN Headend



**DNA** Center



#### Catalyst 8500 Series Edge Platforms



#### Polling Question #1

#### How much of SD-WAN throughput you need at headend platform?

- Up to 10 Gbps aggregate IMIX
- 10 to 20 Gbps aggregate IMIX
- 20+ Gbps aggregate IMIX
- Not planning to deploy SD-WAN

## C8500-12X4QC, C8500-12X Deep Dive

#### Catalyst 8500 Series Overview



#### Data Plane

Third Generation QFP: 224 PPEs

80Mb / 10Mb\* TCAM, 32GB DP Memory

CEF: up to 200Gbps / 120Gbps\*

IPsec: up to 46Gbps / 30Gbps\*

SD-WAN IPsec: up to 33Gbps / 22Gbps\*

#### Control Plane

x86 Quad Core Processor

DRAM 16GB default - 64GB upgradable

32GB Bootflash, Optional 480GB SSD

#### Trustworthy

Trust Anchor module Secure Boot, Image Signing Modern Crypto, Runtime Defenses

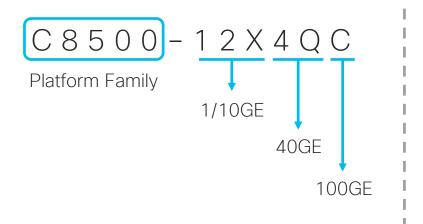
#### Interface Options

Two 100/40GE QSFP28, Two 40GE QSFP+ Ports

Twelve 10/1GE SFP+ Ports

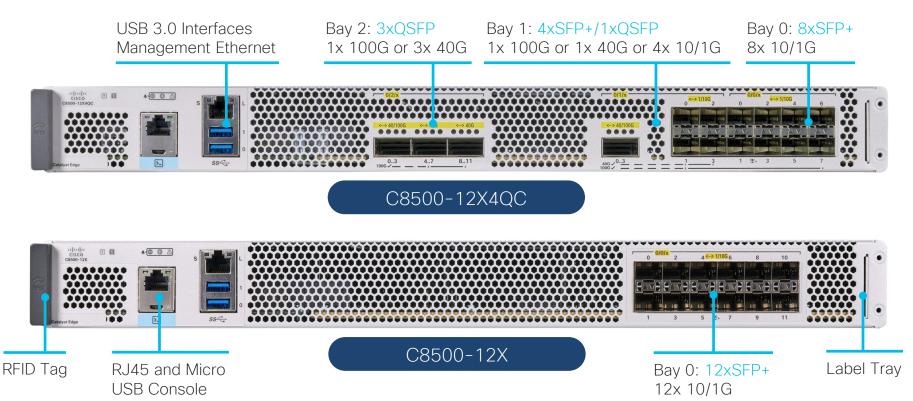
Cisco WAN MACSec, SYNCE Support

#### How to read the PID?



PID Character	Significance
X	1GE / 10GE Port
Q	40GE Port
С	100GE Port

#### Catalyst 8500 Series Front Face



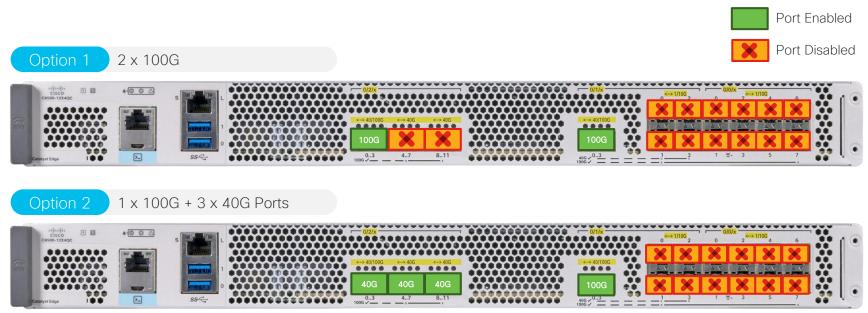
## C8500-12X4QC Port Connectivity Purpose-built 100GE, 40GE Port SD-WAN 1RU Platform



Option	Port Speed	Maximum Port Configuration
1	100G	2x100G
2	100/40G	1x100G + 3x40G
3	40/10G	4x40G + 8x10G
4	100/40/10G	1x100G + 1x40G + 8x10G
5	10G	12x10G
6	1G	12x1G

Note: 1/10G port's speed is detected based on SFP/SFP+ used in the port<sub>27</sub>

## 100GE, 40GE Connectivity Options (i) C8500-12X4QC



Note: For port speed change on any bay; there is an expected 1 sec traffic disruption due to backplane reset

## 100GE, 40GE Connectivity Options (ii)



Note: For port speed change on any bay; there is an expected 1 sec traffic disruption due to backplane reset

## High Density 10GE, 1GE Connectivity Options C8500-12X and C8500-12x4QC





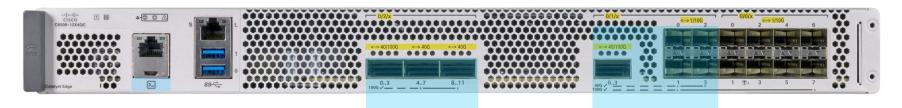
Option 5,6 C8500-12X: 12 x 1/10GE



Option 5,6 C8500-12X4QC: 12 x 1/10GE



#### C8500-12X4QC, Bay Speed Configuration



```
Router(config)#hw-module subslot 0/1 mode ?

100G configure EPA to 100G mode

10G configure EPA to 10G mode

40G configure EPA to 40G mode

Router(config)#hw-module subslot 0/1 mode 100G

Present configuration of this subslot will be erased and will not be restored.

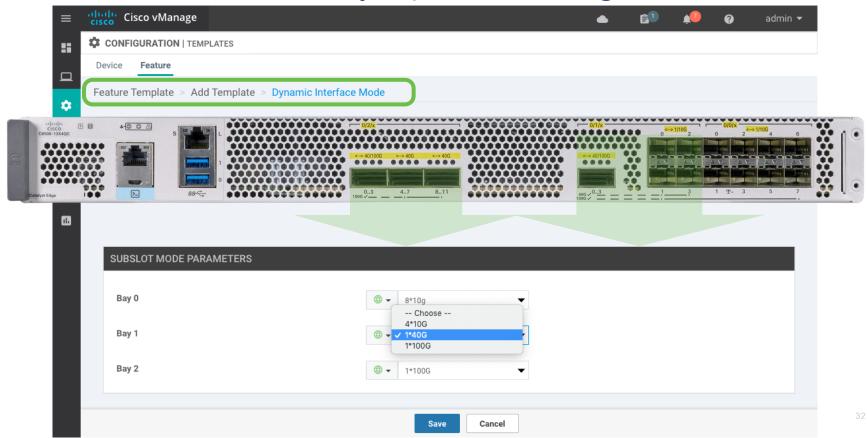
CLI will not be available until mode change is complete and EPA returns to OK state.

Do you want to proceed? [confirm]

<snip>
```

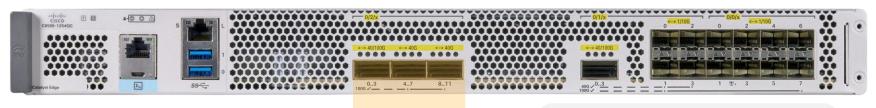


#### C8500-12X4QC, Bay Speed Configuration



#### Breakout Cable Support on C8500-12X4QC

40GE Speed Interfaces → Breakout into 4 x 10GE ports



\*Support on Autonomous mode only

```
Router(config)#hw-module subslot 0/2 mode 40g
Router(config)#
Router(config)#hw-module subslot 0/2 breakout 10G port ?
all configure all native ports in breakout mode
native_port_0 configure native port 0 in breakout mode
native_port_4 configure native port 4 in breakout mode
native_port_8 configure native port 8 in breakout mode
```



#### Secure Platform with Trustworthy Solutions



First instructions run on CPU stored in tamper-resistant hardware

Confidentiality Integrity Authenticity





#### Front Facing Passive UHF RFID

Ultra High Frequency (UHF)

860 to 960 MHz 1 to 4 meter Distance



Good read range Industry adopted standard Supply Chain Applications











#### Label Tray



Label Tray has a plastic strip that can be pulled out

#### Label Tray contains

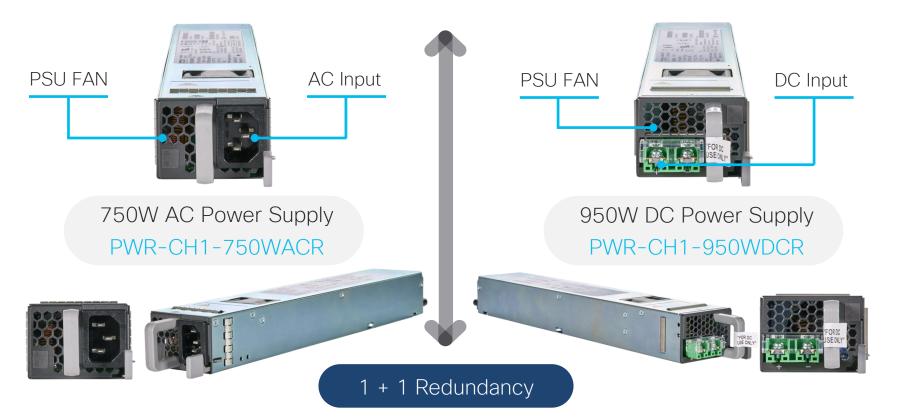
Product ID
PID version ID
CLEI
TAN
MAC and
Hardware version number



Label tray contains a QR code with information encoded in it

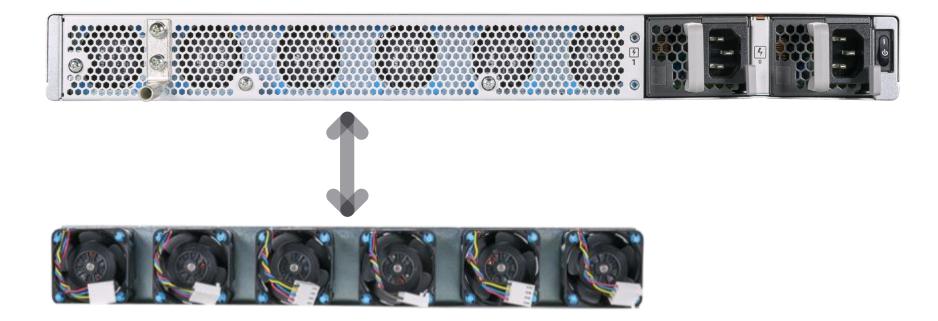


#### AC, DC Power Supply





#### Field Replaceable FAN Module





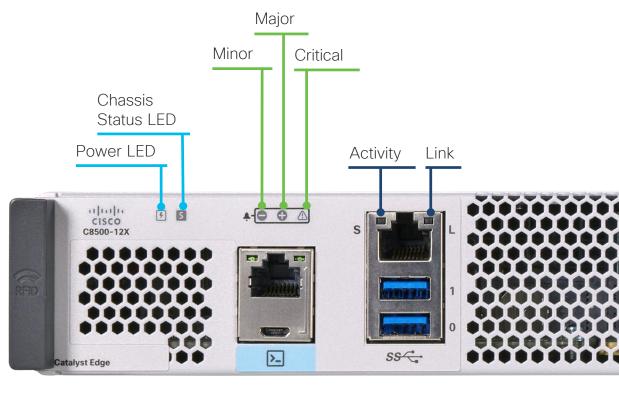
#### Front Panel LED Indicators



LED OFF → Port is not enabled by software

LED Amber → Port is enabled by software, but problem with link

LED Green → Port is enabled by software and link is valid



Similar LEDs applicable for C8500-12X4QC and C8500-12X platforms

#### Management Flexibility

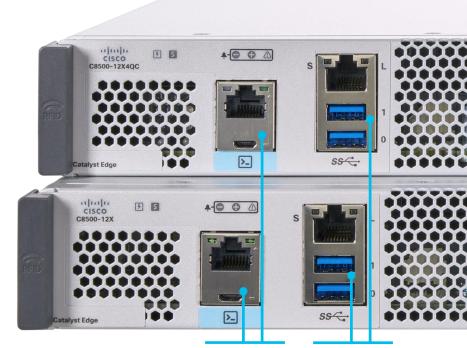


#### Console Flexibility

Traditional RJ45 Console Port
Micro USB Console Port

#### External Storage

2 x USB 3.0 Ports





#### Industrial Design and Ergonomics





Circle Pattern Hex Packing



Satin Aluminum Based Textured Finish



Rounded Frame 4 mm



# QFP 3.0 Innovations

#### Let's Roll the Video



# QFP 3.0, Key Building Block of Catalyst 8500 Scalable and Programmable ASIC Innovation



16 Channels

DDR4 x18bit



2x queues 256k



Up to 2x NBAR Up to 80Gbps



Inline Crypto
Up to 137Gbps

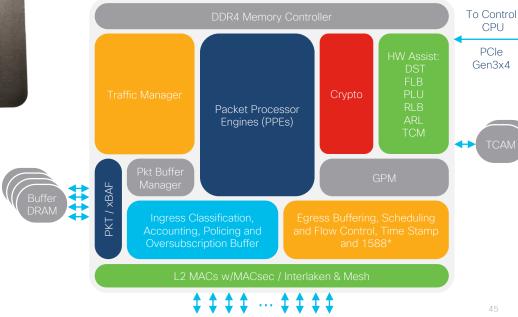


Up to 3x CEF Up to 200Gbps



8x DRAM 16M NAT, 32M CGN | 6M FW Sessions



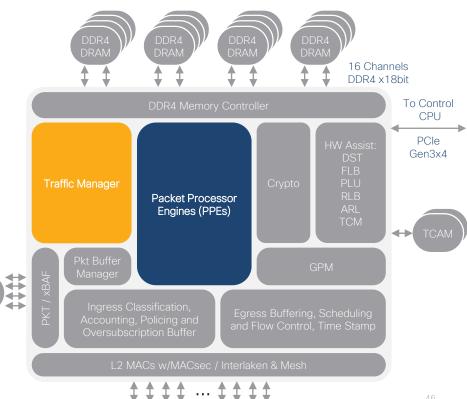


#### QFP 3.0, Multi Threaded Parallel Processing Tremendous Raw Power



**224 PPEs** 896 Threads 256K Queues

Simultaneous Packets Processing



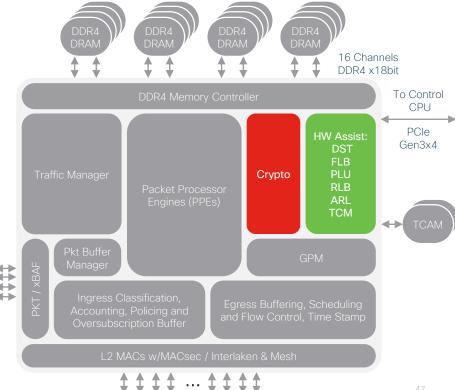
#### QFP 3.0, Inline Crypto Engines Hardware Accelerated IPsec



### 16 Crypto **Engines**

Up to 137Gbps Crypto Performance

> Suite-B Crypto Hardware Assist



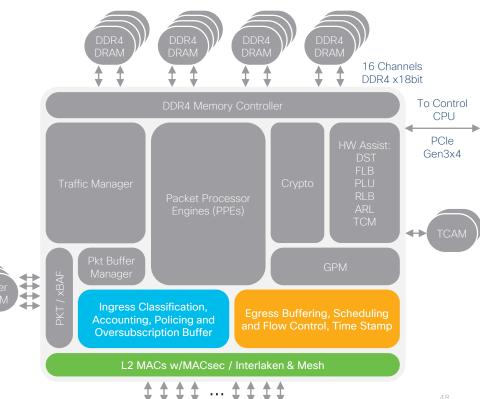
#### QFP 3.0, Built-in Layer 2 Aggregation End to end traffic Management



### 240Gbps Layer 2 Aggregation

#### Per Port L2/L3 Classification

Ingress, Egress Traffic Management





#### Third Generation QFP Blocks



256K useable queues 134K scheduling nodes Event driven flow control



240Gbps Aggregation
Per Port L2/L3 classification
Line rate WAN MACsec

#### Inline Crypto

Higher IPsec throughput
16 Crypto Engines
Next Generation Strong
Encryption: Suite-B

# Catalyst 8500 Platform Architecture

#### C8500-12X4QC Bays

0/2

Bay 2: 3xQSFP

1x 40/100GE QSFP28 Port 2x 40GE QSFP+ Ports

0/0

Bay 0: 8xSFP+

8x 1/10G SFP+ Ports

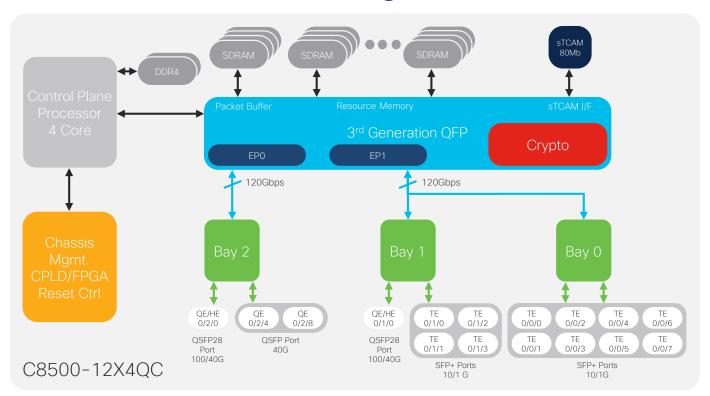
Bay 1: 4xSFP+/1xQSFP

4x 1/10G SFP+ Ports 1x 40/100GE QSFP28 Port

0/1



#### C8500-12X4QC Block Diagram



Third Generation QFP

Built-in L2 Sub-system

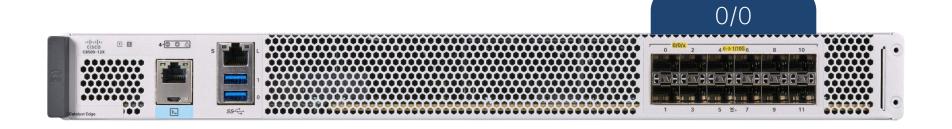
Built-in Cryptography

#### C8500-12X Bay

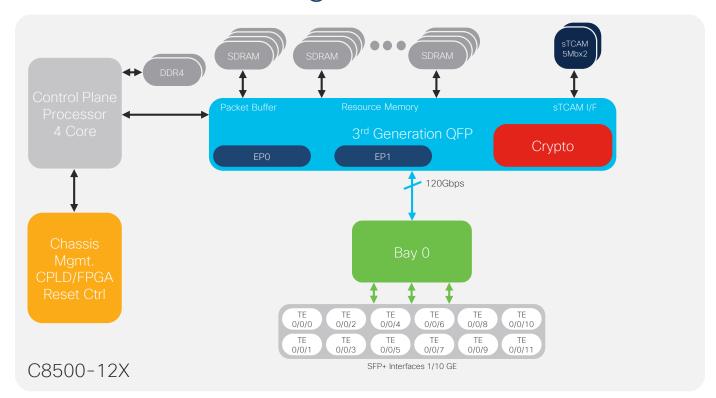
0/0

**Bay 0:** 12xSFP+

12x 1/10G SFP+ Ports



#### C8500-12X Block Diagram



Third Generation QFP

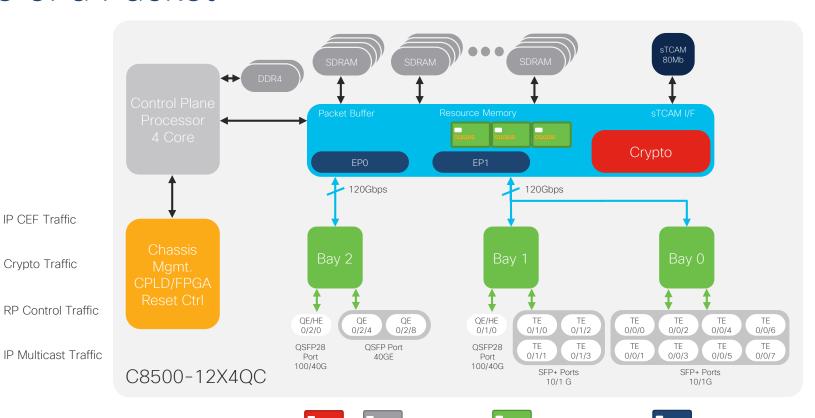
Built-in L2 Sub-system

Built-in Cryptography

#### Life of a Packet

IP CEF Traffic

Crypto Traffic



# IOS XE Software Architecture

Ready on Day-0 IOS XE Richness



### L2VPN SD-WAN Aggregation

Business VPNs

NAT Firewall

Internet Gateway

**IPsec Aggregation** 

High End Branch

Route Reflector Catalyst 8500 Series

Secure WAN Aggregation

MPLS, L2/L3VPN

NAT, CGN

VXLAN, OTV

Data Center Interconnect

IOx App-Hosting

Key Server

Services Performance

Cloud Gateway

MACsec

L4-L7 Services

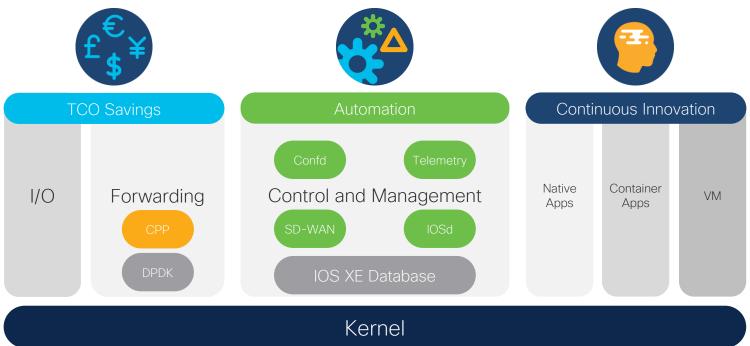
IPsec Gateway Traditional Routing

-7 Services
Synchronous Ethernet WAN Aggregation

Cisco Catalyst 8500 Series inherits IOS XE Routing, SD-WAN features!

#### Open IOS XE – A Modern Operating System





#### Easy Operations with Single Image

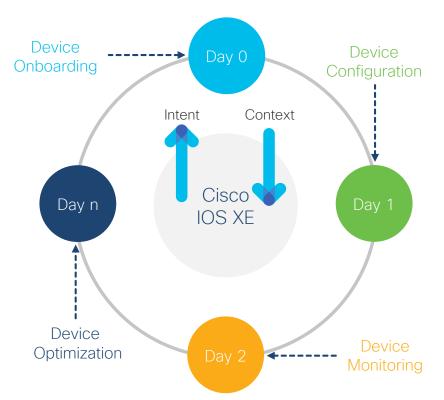
Single IOS XE **IMAGE** Image universalk9 universalk9 IOS XE 'Autonomous' mode Simplify Deployments Accelerate SD-WAN

IOS XE SD-WAN **IMAGE** IOS XE SD-WAN 'Controller' mode

Cloud-scale Applications

#### Programmability Device Lifecycle Phases

Zero-Touch, PNP Provisioning



YANG Data Models Network Configuration Protocols

Guest Shell Application Hosting Python Scripting

Telemetry

# Catalyst 8500 Product Comparison

#### Catalyst 8500 Edge vs ASR 1000





#### ASR1002-HX vs C8500-12X4QC

#### **Product Comparison**

Up to 18Gbps SD-WAN, 6000 tunnels

Up to 100Gbps CEF, 25Gbps Crypto

8M NAT/PAT, 12M CGN Sessions

4GB DP Memory, 232K Queues

Ports: 8x 1G, 8x 10G, One EPA Slot

16GB to 32GB upgradable DRAM

QFP 2.0, Extra Crypto HW

Up to 33Gbps SD-WAN, 8000 tunnels

Up to 200Gbps CEF, 46Gbps Crypto

16M NAT/PAT, 32M CGN Sessions

32GB DP Memory, 256K Queues

Ports: 12x 1/10G, 2x 40/100G, 2x 40G

16GB to 64GB upgradable DRAM

QFP 3.0, Inbuilt Crypto & L2





All perf numbers are aggregate IMIX for Crypto throughput

#### ASR1001-HX vs C8500-12X

#### Product Comparison

Up to 11.5Gbps SD-WAN, 6000 tunnels

Up to 60Gbps CEF, 16Gbps Crypto

2M NAT/PAT, 4M CGN Sessions

1GB DP Memory, 116K Queues

Ports: 8x 1G, 4x 10G, 4x 1/10G

16GB to 32GB upgradable DRAM

QFP 2.0, Extra. Crypto HW

Up to 23Gbps SD-WAN, 8000 tunnels

Up to 120Gbps CEF, 30Gbps Crypto

12M NAT/PAT, 24M CGN Sessions

32GB DP Memory, 256K Queues

Ports: 12x 1/10G

16GB to 64GB upgradable DRAM

QFP 3.0, Inbuilt Crypto & L2

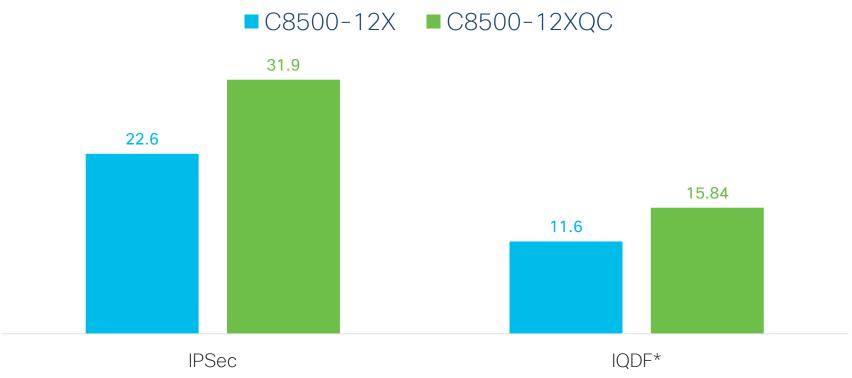




All perf numbers are aggregate IMIX for Crypto throughput

# Catalyst 8500 Performance and Scale

#### SD-WAN Throughput Performance

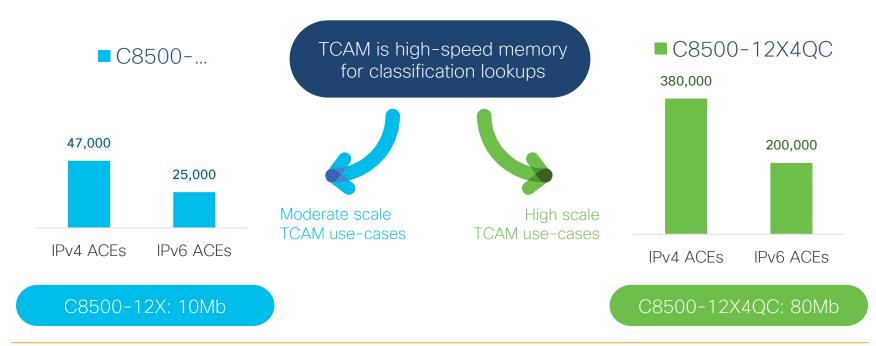


#### IOS XE IPsec Throughput Performance



All numbers are for aggregate IMIX traffic in Gbps IMIX Profile: 64B:7, 594B:4, 1418B:1

#### Catalyst 8500 TCAM Capacity



Select C8500-12X4QC for high TCAM scale use-cases

#### Polling Question #2

Which Catalyst 8500 Platform is more suitable for your use-case?

- C8500-12X4QC
- C8500-12X
- None

# Catalyst 8500 Solutions and Use-cases

### Cisco Catalyst 8500 Series Edge Platforms Best Platform for SD-WAN Aggregation



01 Improved Data Plane

02 Accelerated SD-WAN Services

03 High Speed Multicloud Access

04 Highly Scalable Control Plane

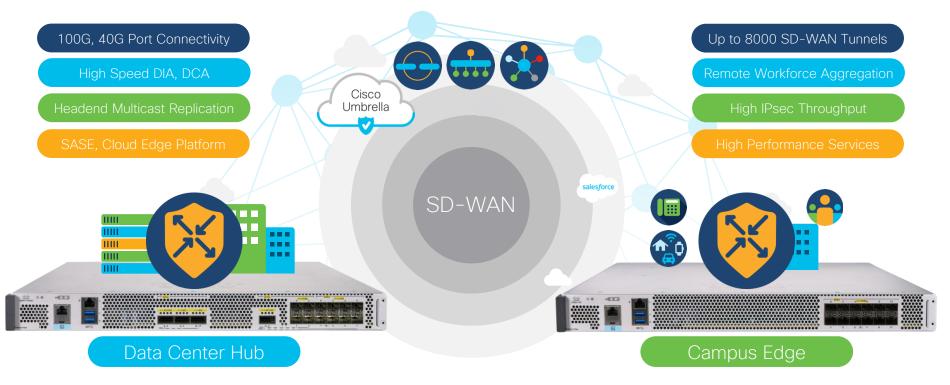








## Catalyst 8500 for SD-WAN Data Center Hub, Campus Edge



## Catalyst 8500 for Cloud-Scale, Co-location Large capacity in small form factor

#### Cloud MSP: Edge, CPE

#### Rich Features

Multi-tenant, VRF Aware
VxLAN
Route Scale
Convergence Services
IPsec, NAT, Firewall
B2B Redundancy



Co-lo, Cloud Gateway

#### Highly Scalable

8000 VRFs
4M IPv4, IPv6 Routes
16M NAT, 32M CGN
6M Firewall Sessions
Up to 8000 IPsec Tunnels
WAN MACsec on all ports

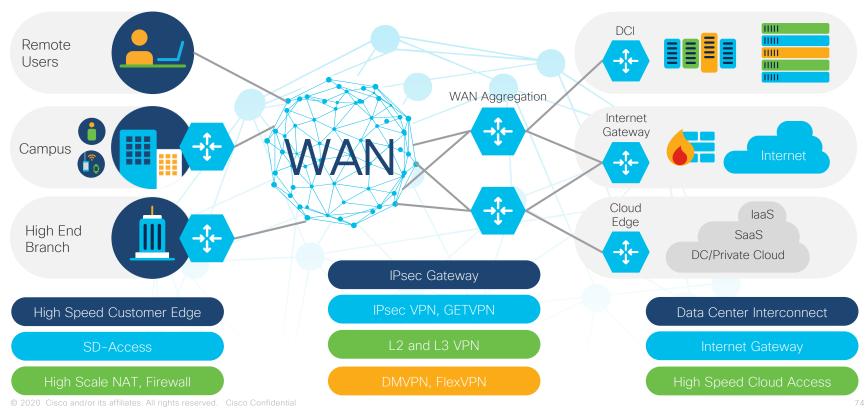
Port Flexibility: 100/40/10/1G

Small 1 RU form factor

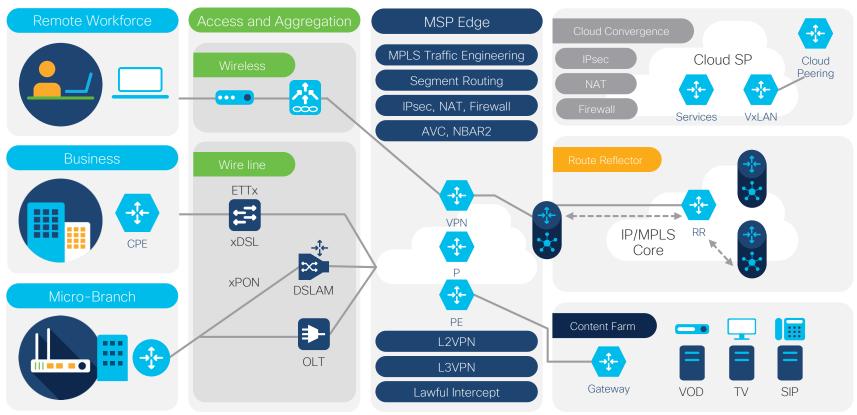
Platinum Power Efficiency

## Catalyst 8500 for Enterprise Networks

Traditional Routing Headend Applications



## Catalyst 8500 Edge for MSP Applications



## Catalyst 8500: One Platform, Many Solutions

#### SD-WAN

High Speed DIA, DCA
Headend Multicast Replication
Feature Inheritance
40GE, 100GE
Port Connectivity

#### Internet Gateway

High Throughput Performance
High Scale NAT, AVC, Firewall
Direct Internet Access
1G/10G/40G/100GE
Port Offering

#### Cloud GW, CoLo

Multi-Tenant, VRF Aware
High Scale NAT, AVC, Firewall
Inter VRF
Communication-VASI
Stateless/Stateful
Box-to-Box Redundancy

#### Secure WAN

Site-to-site, Remote Access VPN GETVPN, DMVPN, FlexVPN, IPsecoGRE, sVTI High Scale NAT, AVC, Firewall Cisco WAN MACsec

#### SD-Access

Control-Plane Node

Border Node

SD-A/SD-WAN Multi-Domain

#### DCL

EoMPLS, L2TPv3, VPLS, MPLS

Overlay Transport Virtualization

VxLAN

Cisco WAN MACsec

#### Network Infra

MPLS, Segment Routing
L2VPN, L3VPN
mVPN
MPLS-TE
AVC, H-QoS
Route Reflector

#### Cloud MSP

Multi-Tenant, VRF Aware
VxLAN
Route Scale
Convergence Services
IPsec, NAT, Firewall
B2B Redundancy

Catalyst 8500

Inherits Cisco ASR 1000 features for IOS XE and IOS XE SD-WAN use-cases

## Polling Question #3

## What use-case are you most interested in deploying Catalyst 8500 Edge Platforms?

- SD-WAN Headend
- Internet Gateway
- Cloud Gateway / Co-Lo Platform
- Secure WAN Aggregation
- Data Center Interconnect
- SD-Access



## Cisco Catalyst 8500 Series Edge Platforms Highly Capable 1RU SD-WAN Headend



Ready for the **Agile Cloud** Journey High Speed Cloud Access Multi-Cloud Application Optimization Compact, Powerful 1RU Platforms



Ready for 5G, Edge Compute
3rd Generation QFP In-Line Crypto
SASE driven Feature Innovations
Improved Services Performance



5G Ready Edge Intelligence
High End Aggregation 100/40/10/1GE
Port flexibility
Multi-Domain Intent Based Networking

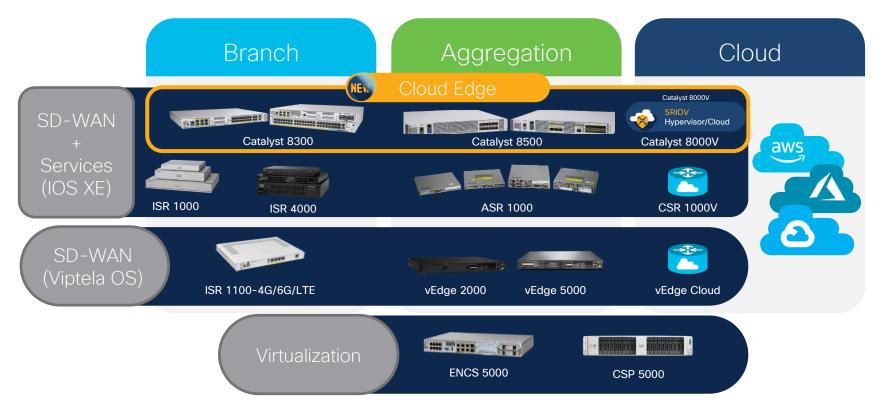


Equipped with User Centric Design Operational Ease for better Tracing Passive UHF Radio Frequency ID Easy Access Label Tray Field Replaceable FAN Tray





#### The Broadest Set of SD-WAN Platforms





### Catalyst 8500 Series Edge Platforms

- Datasheet:
  - https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8500-series-edge-platforms/datasheet-c78-744089.html
- Frequently Asked Questions:
   https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8500-series-edge-platforms/g-and-a-c67-744086.html
- Ordering Guide: <a href="https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8500-series-edge-platforms/quide-c07-744092.html">https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8500-series-edge-platforms/quide-c07-744092.html</a>

### Catalyst 8300 Edge Platforms

- Datasheet:
  - https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8300-series-edge-platforms/datasheet-c78-744088.html
- Frequently Asked Questions:
   https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8300-series-edge-platforms/g-and-a-c67-744085.html
- Ordering Guide: <a href="https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8300-series-edge-platforms/guide-c07-744100.html">https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8300-series-edge-platforms/guide-c07-744100.html</a>

## Catalyst 8000V Edge Platforms

- Datasheet:
  - https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-8000v-edge-software/datasheet-c78-744101.html?oid=dstetr023051
- Frequently Asked Questions: <a href="https://www.cisco.com/c/en/us/products/routers/catalyst-8000v-edge-software/index.html">https://www.cisco.com/c/en/us/products/routers/catalyst-8000v-edge-software/index.html</a>

### Catalyst Cellular Gateway

- Datasheet:
  - https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-cellular-gateways/data-sheet-c78-744210.html
- Frequently Asked Questions:
   https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-cellular-gateways/q-and-a-c67-744212.html
- Ordering Guide: <a href="https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-cellular-gateways/guide-c07-744211.html">https://www.cisco.com/c/en/us/products/collateral/routers/catalyst-cellular-gateways/guide-c07-744211.html</a>

### Catalyst 8000 Blogs

- blogs.cisco.com: <a href="https://blogs.cisco.com/networking/catalyst-8000-edge-platforms?dtid=osscdc000283">https://blogs.cisco.com/networking/catalyst-8000-edge-platforms?dtid=osscdc000283</a>
- Cisco Community:
  - The New Era of WAN an ASIC innovation story
     <a href="https://community.cisco.com/t5/networking-blogs/the-new-era-of-wan-an-asic-innovation-story/ba-p/4175243">https://community.cisco.com/t5/networking-blogs/the-new-era-of-wan-an-asic-innovation-story/ba-p/4175243</a>
  - 'Cisco Catalyst 8000 Edge Platforms Family, What's under the hood?'
     <a href="https://community.cisco.com/t5/networking-blogs/cisco-catalyst-8000-edge-platforms-family-what-s-under-the-hood/ba-p/4177121">https://community.cisco.com/t5/networking-blogs/cisco-catalyst-8000-edge-platforms-family-what-s-under-the-hood/ba-p/4177121</a>

## Catalyst 8000 Blogs

- sdxcentral: <a href="https://www.sdxcentral.com/articles/news/cisco-unifies-services-routers-under-catalyst-umbrella/2020/10/">https://www.sdxcentral.com/articles/news/cisco-unifies-services-routers-under-catalyst-umbrella/2020/10/</a>
- zdnet: <a href="https://www.zdnet.com/article/cisco-debuts-new-catalyst-family-of-wan-edge-platforms/">https://www.zdnet.com/article/cisco-debuts-new-catalyst-family-of-wan-edge-platforms/</a>
- **Networkworld:** <a href="https://www.networkworld.com/article/3586590/cisco-targets-wan-edge-with-new-router-family.html">https://www.networkworld.com/article/3586590/cisco-targets-wan-edge-with-new-router-family.html</a>
- eweek: <a href="https://www.eweek.com/networking/cisco-systems-brings-some-muscle-to-sd-wan">https://www.eweek.com/networking/cisco-systems-brings-some-muscle-to-sd-wan</a>
- err-disable: <a href="https://err-disable.com/the-new-routers-are-here-cisco-catalyst-8000-series/">https://err-disable.com/the-new-routers-are-here-cisco-catalyst-8000-series/</a>

## Submit Your Questions Now!



Use the Q&A panel to submit your questions, our expert will responde

#### Collaborate within our Social Media





#### Twitter

@Cisco\_Support http://bit.ly/csc-twitter

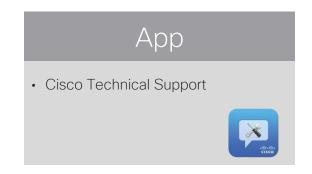
#### Facebook

Cisco Community
 http://bit.ly/csc-facebook

Learn About Upcoming Events

## We invite you to review our Social Media Channels

# YouTube Cisco Community http://bit.ly/csc-youtube





## Cisco has support communities in other languages!

If you speak Spanish, Portuguese, Japanese, Russian or Chinese we invite you to participate & collaborate





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View Upcoming Sessions Schedule <a href="https://cisco.com/go/techseminars">https://cisco.com/go/techseminars</a>

## Thank you for Your Time!

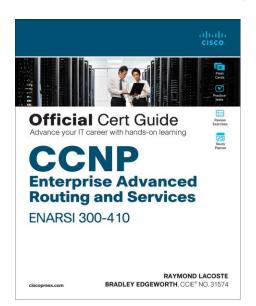
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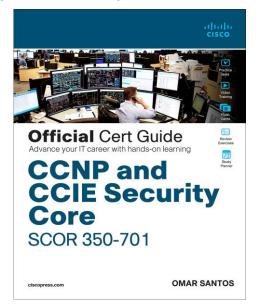


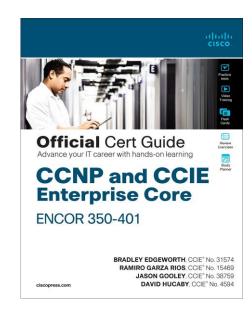
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## Thanks For Joining today!

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