

Catalyst 9400X and 9400 comparison

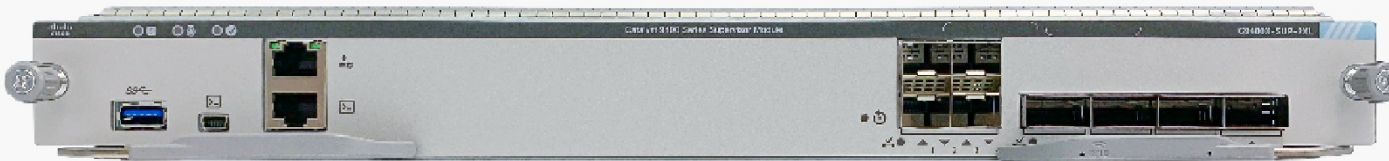


Why Sup-2XL and Sup -2?

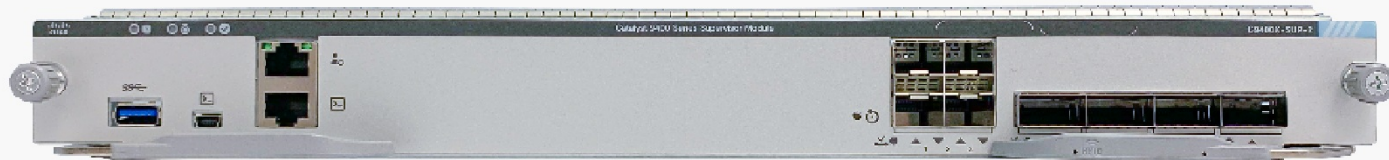
- ✓ No oversubscription per slot on any chassis (w/ Sup 2XL)
- ✓ Higher non-oversubscribed port density
- ✓ Higher Access Point (AP) Density
- ✓ Perpetual and Fast PoE hardware capable



- ✓ 100 Gbps ports on Supervisors
- ✓ More Active Ports on Supervisors
- ✓ Higher TCAM scale
- ✓ Proven 25 Gbps value



Catalyst 9400 SUP 2XL



Catalyst 9400 SUP 2



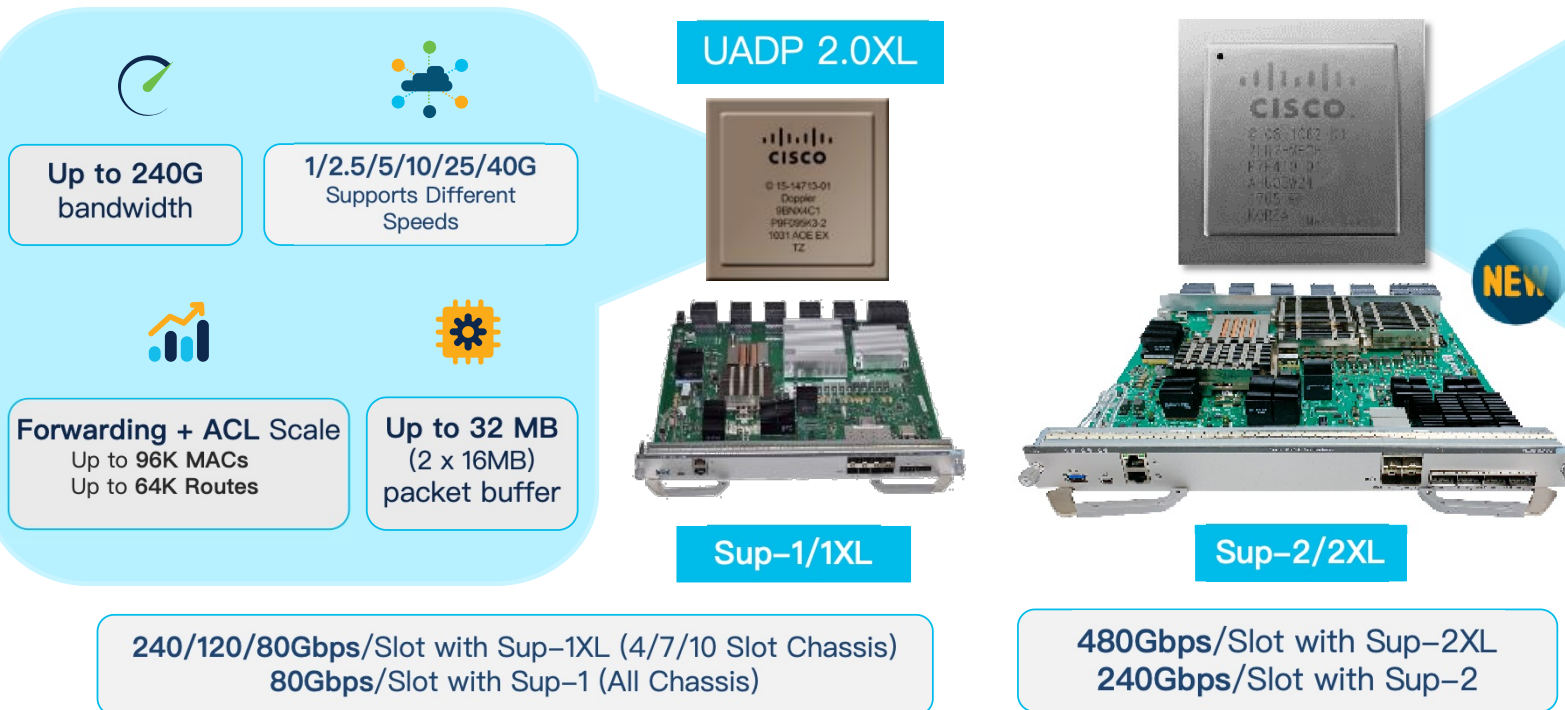
Catalyst 9400 SUP 1/1XL

Hardware



Cisco Catalyst 9400X

New Supervisor 2/2XL powered by Cisco UADP 3.0sec ASIC



Unmatched Flexibility

Maximum Investment Protection

100G Leadership in Access

Same Series, Chassis options — New SUPs and Line cards

* Hardware Capable, Software Support not committed

Cisco Catalyst 9400X

New Supervisor 2/2XL powered by Cisco UADP 3.0sec ASIC

Higher TCAM Scale



IPSec*,
WAN-MACsec*
Capable



Powered by
UADP 3.0sec



Catalyst 9400X

2x Higher
Throughput



Improved
App Hosting

Bigger, Unified Buffers



C9400-SUP-1 XL
(w/ UADP 2.0XL)

✓ Optimized for Features

- 24 x 1/2 & 5G mGig
- 24 x 1 & 10G SFP+
- 2 x 25G or 40G Uplinks

✓ Scale

- Up to 96K MACs
- Up to 64K Routes
- 96MB Buffers (2x 16MB x3)

✓ Services

- L2 Switching, L3 Routing
- Line-rate MACsec
- Flexible Netflow, AVC
- Fabric Edge (SDA,EVPN)



C9400X-SUP-2 / 2XL
(w/ UADP 3.0sec)

NEW

✓ Optimized for Features and SCALE

- 48 x 1/2/5 & 10G mGig
- 48 x 1 & 10G SFP+
- 4 x 25G or 100G Uplinks

✓ Scale

- Up to 128K MACs*
- Up to 256K Routes*
- 108MB Buffers (Unified 36MB x3)

✓ BW per Slot

- 480 Gbps w/ SUP2XL
- 240 Gbps w/ SUP2

✓ Services

- L2/L3 Routing, MPLS/TE
- Line-rate MACsec, IPSec*, WAN-MACsec*
- Custom ASIC Templates* (FIB/ACL)
- Fabric Edge/Border (SDA,EVPN)

Unmatched Flexibility

Maximum Investment Protection

* Hardware Capable, Software Support in
ECS+

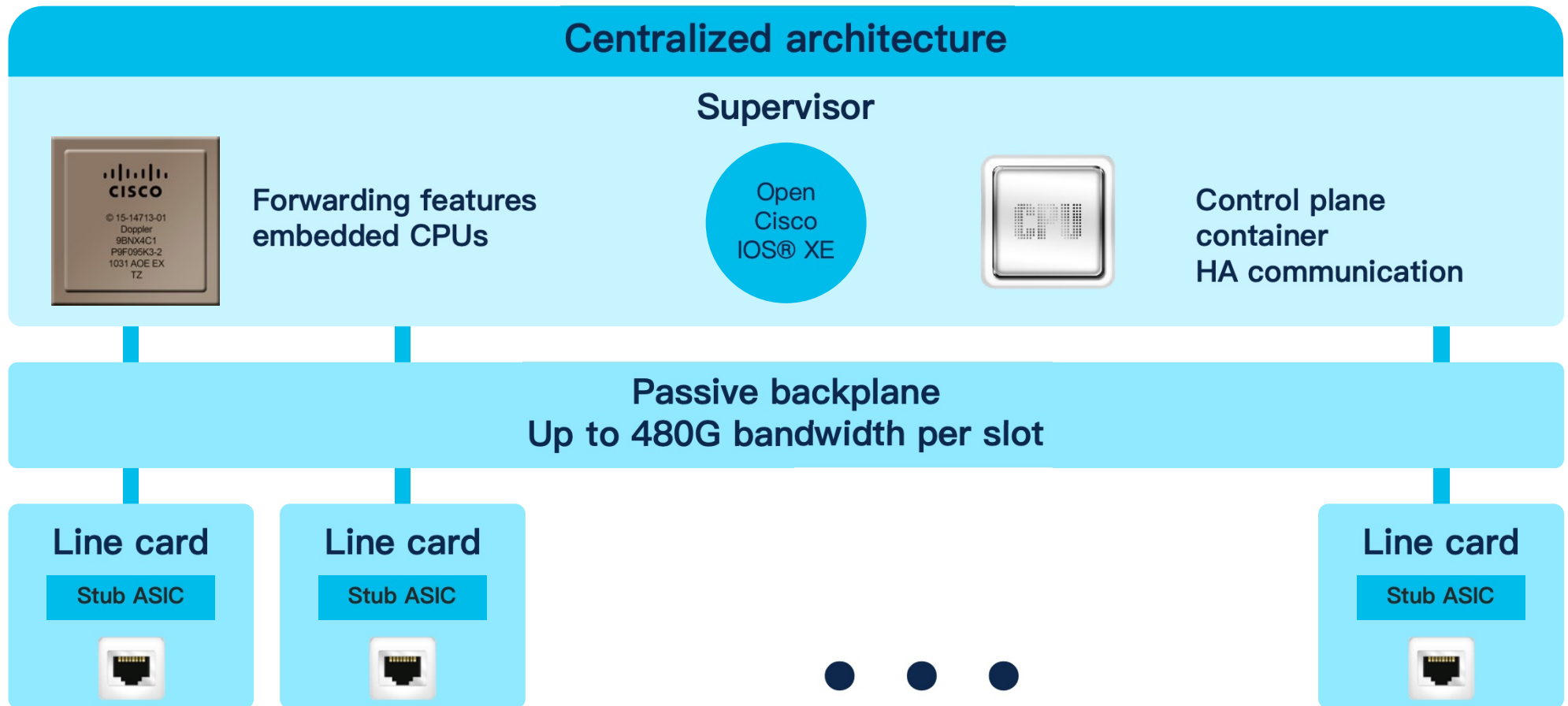
100G Leadership in Access

Same Series, Chassis options — New SUPs and Line cards

Architecture



Architecture for Sup 2XL/2 and Sup1/1XL/1XL-Y



UADP 2.0 XL



Investment protection
Flexible pipeline



Universal deployments
Adaptable tables



Shared TCAM Lookup
Multicore resource share

123

384,000 flex
counters



Shared
lookup



Up to 240G
bandwidth



Up to 2X to 4X
forwarding + TCAM



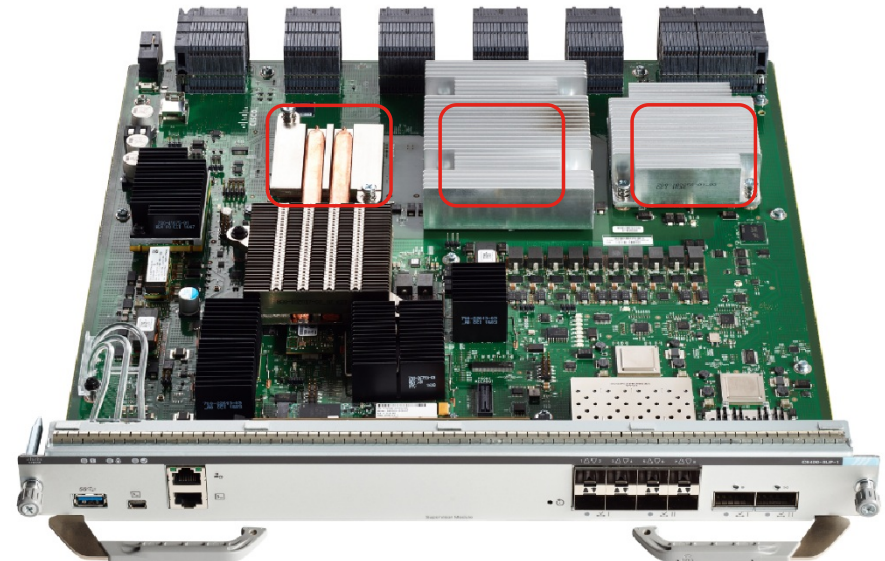
Embedded
CPUs



Up to 32 MB
packet buffer



Up to 64,000 x2
NetFlow records



UADP 3.0sec



Investment Protection
Flexible Pipeline



Enhanced Scale/Buffering



1.6Tbps (full duplex)
Bandwidth



36MB (Unified)
Packet Buffer



1/2.5/5/10/25/40/100G
Supports Different Speeds



Up to 64,000 x2
NetFlow records



Large Tables
Up to 256k IPv4 or IPv6 routes



100G Encryption
(IPSec)



Customizable ASIC
templates



Up to 3X
forwarding + TCAM



Enhanced App
Hosting



~20 B

16nm Technology
Transistors

UADP evolution

UADP 2.0 XL vs. 3.0sec per-ASIC capabilities

Throughput

500, 625,
750 MHz
Up to 240 Gbps

UADP 2.0 XL

750, 875 MHz,
1 GHz
Up to 1.6 Tbps

UADP 3.0sec

Ports

1, 10, 40G
ports



UADP 2.0 XL

1, 10, 25, 40,
100G ports



UADP 3.0sec

Forwarding

375 Mpps



UADP 2.0 XL

1000 Mpps



UADP 3.0sec

Buffers

32 MB
shared buffers



UADP 2.0 XL

36 MB
unified buffers



UADP 3.0sec

Backplane

720G
(36x 15G)

Stack
interconnect



UADP 2.0 XL

1.6T
(32x 56G)

ASIC DPP*
interconnect



UADP 3.0sec

Security

LAN MACsec



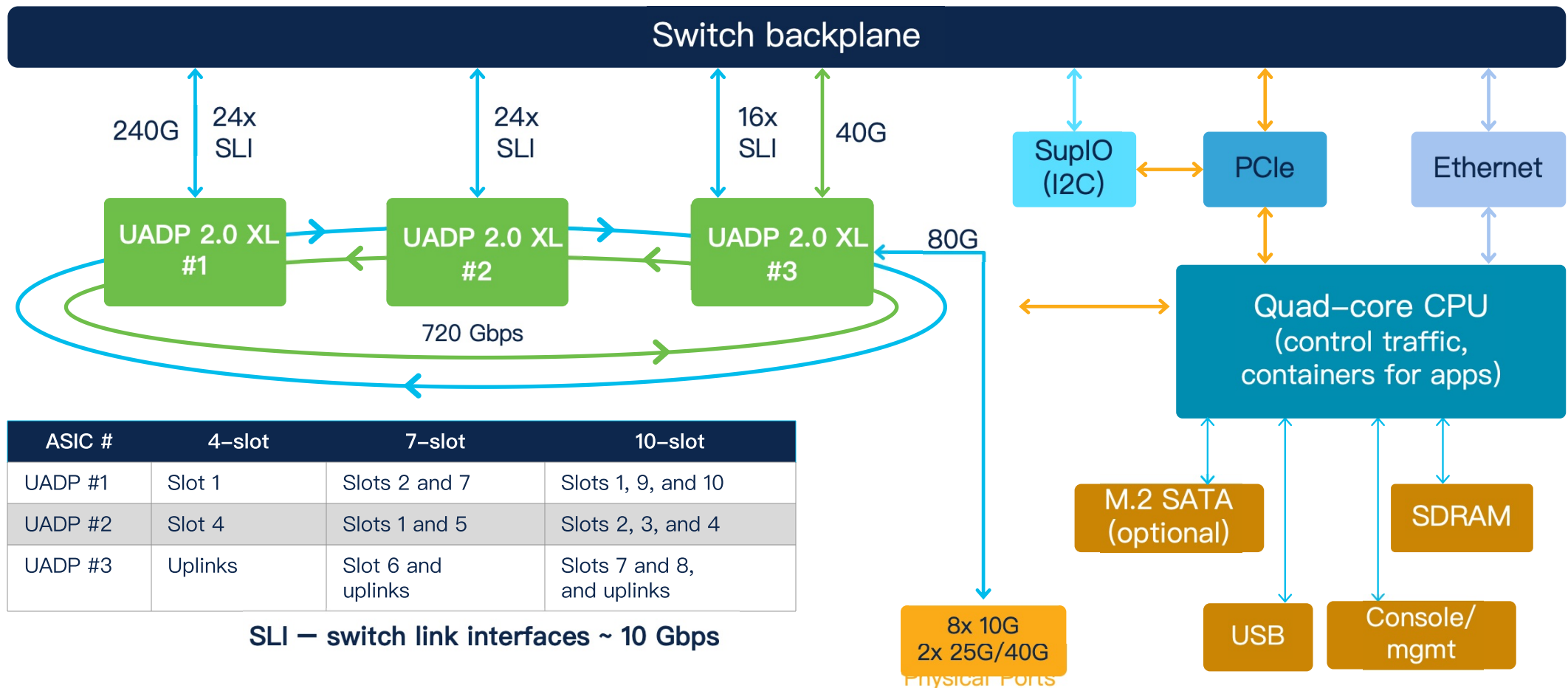
UADP 2.0 XL

LAN MACsec, IPSec**,
WAN MACsec **

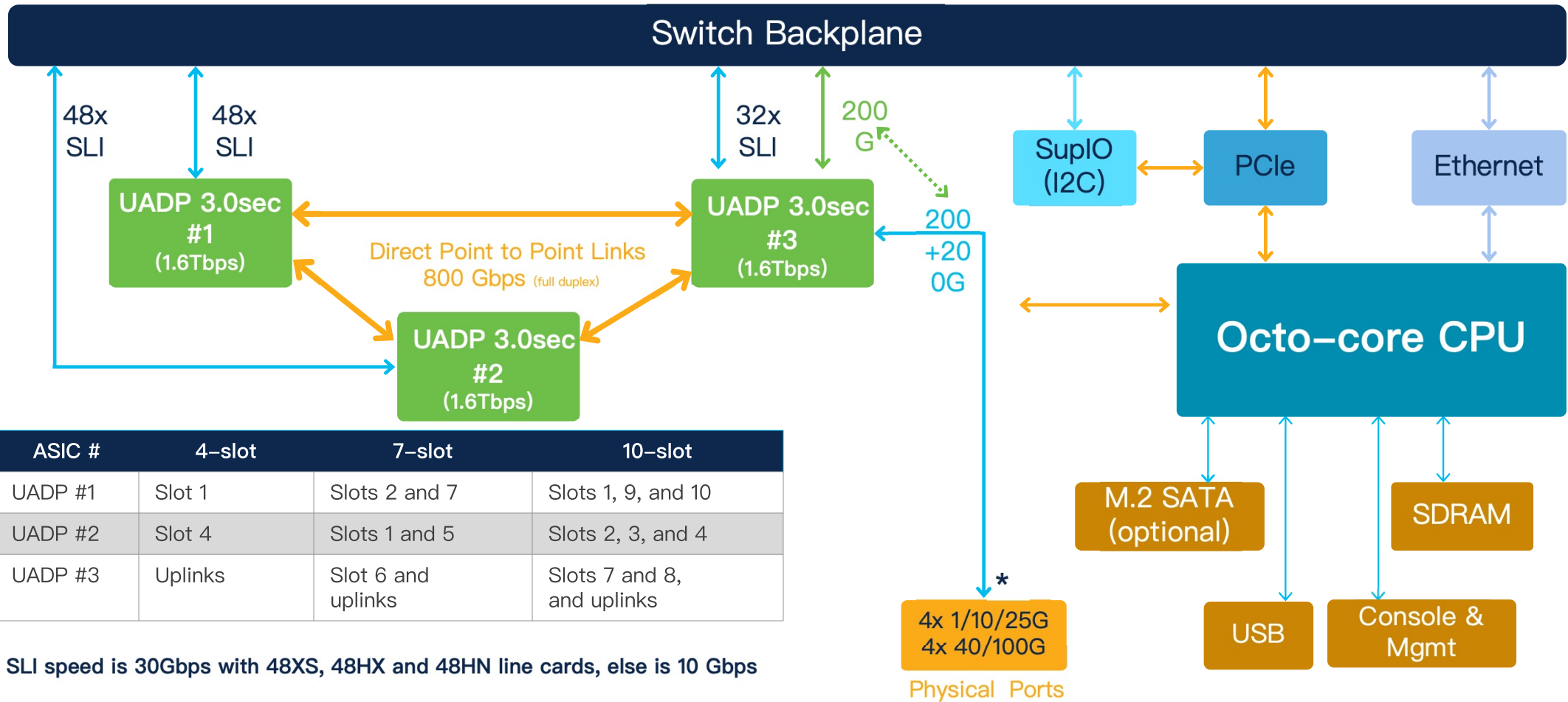


UADP 3.0sec

Sup-1, Sup-1XL, Sup-1XL-Y block diagram



Sup 2 / 2XL Block Diagram



Catalyst 9400X vs. 9400 models — Physical

	 Catalyst® 9400X (UADP 3.0sec)				 Catalyst 9400 (UADP 2.0XL)			
	LC-24XY	LC-12QC	LC-48HX	LC-48XS	LC-48HN	LC-48UX	LC-24XS	LC-48S
CPU (number)	2.4-GHz Intel® 8C (BDW D-1564N)				2.4-GHz Intel 4C (BDW D-1530)			
DRAM (type)	16 GB DDR4				16 GB DDR3			
ASIC (number)	UADP3.0sec x3				UADP 2.0XL x3			
Capacity (chassis)	4.8 Tbps (full duplex)				960G (full duplex)			
Capacity (per slot)	480G (all chassis)				240G (9404R)/120G (9407R)/80G (9410R)			
1G max	96/240/384	96/240/384 4	96/240/384	96/240/384 4	96/192/384 4	96/192/384 84	48/96/192	96/192/384
5G max	96/240/384	—	96/240/384	—	96/192/384 4	48/96/192 2	—	—
10G max	96/240/384	96/240/384 4	96/240/384	96/240/384 4	48/96/192	48/96/192 2	48/96/192	—
25G max	40/100/160 + 4 (sup)	40/100/160 + 4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)
40G max	24/60/96 + 4 (sup)	24/60/96 + 4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)	4 (sup)

Catalyst 9400X vs. 9400 models — Features

	 Catalyst® 9400X (UADP 3.0sec)		 Catalyst 9400 (UADP 2.0XL)	
	Default (access)	Maximum (custom)*	Default (access)	Maximum (core)
MAC addresses	64,000	128,000	96,000	16,000
IP host routes	112,000 (LPM+host)	256,999 (LPM+host)	48,000	32,000
Multicast L2 groups	16,000	32,000	16,000	16,000
Multicast L3 routes	16,000	32,000	16,000	16,000
IP LPM routes	112,000 (LPM+host)	256,000 (LPM+host)	64,000	64,000
MPLS labels	16,000	64,000	12,000	16,000
SGT/OG labels	32,000	64,000	8000	8000
NAT sessions	2,000	16,000	2000	2000
Sec ACL entries	10,000 (input) + 16,000 (output)	27,000 (input) + 18,000 (output)	18,000 (shared)	18,000 (shared)
QoS ACL entries	8,000 (input) + 8,000 (output)	27,000 (input) + 18,000 (output)	18,000 (shared)	18,000 (shared)
PBR ACL entries	2,000	16,000	2000	2000

* Software roadmap (FCS+).

Catalyst 9400 Series SUP-2/2XL, SUP-1, and 4500 Series SUP8-E comparison

Features	SUP-2/2XL	SUP-1/1XL	SUP8-E
Bandwidth	4.8 Tbps	1.44 Tbps	928 Gbps
Throughput	3 Bpps IPv4/v6	900 Mpps IPv4/v6	250 Mpps v4 (125 Mpps IPv6)
Native wireless controller support	No	No	Yes
Uplinks	4x 1/10/25G + 3x 40/100G 4x 40/100G	2x 40G or 8x 10G	8x 10G
DRAM	16 GB	16 GB	4 GB
Flash	16 GB	16 GB	2 GB
Buffers	108 MB (36 MB per ASIC)	96 MB (32 MB per ASIC)	32 MB
Multicore CPU	2.4-GHz octo core (Intel® Broadwell x86)	2.4-GHz quad core (Intel Broadwell x86)	2-GHz quad core (freescale)
Blue beacon for serviceability	Yes (all components)	Yes (all components)	Yes (supervisor and chassis)
Operating system	Open Cisco IOS® XE	Open Cisco IOS XE	Cisco IOS XE

Catalyst 9400 Series hardware differentiators

		Catalyst 9400X models	Catalyst 9400 models	Catalyst 4500E Series
Foundational hardware	CPU	Intel® X86 8-core 2.4 GHz	Intel X86 4-core 2.4 GHz	Freescall quad core 2 GHz
	ASIC	UADP 3.0sec (Doppler ES)	UADP 2.0 XL (Doppler D)	K5/K10
	Memory	16 GB DDR4	16 GB DDR4	4 GB DDR3
	Flash	16 GB	16 GB	2 GB
	SSD storage (USB 3.0) — Removable	✓	✓	✗
Uplinks	Support 25G uplinks	✓	✓ (16.9.1)	✗
	Support Multigigabit uplinks	✓	✓ (16.6.2)	✗
	8x 10G, 2x 40G uplinks	✗	✓	SUP-9E with 2x 40G
	4x 1/10/25G, 4x 40/100G uplinks	✓	✗	✗
Wireless density	Number of access points	✗	✗	100
	Number of wireless clients	✗	✗	2000
Power supplies	Platinum-rated power supplies	✓	✓	Gold
	N+1, N+N	✓	✓	✗
Enabler for	NG stacking — StackWise® Virtual	✗*	✓ (16.9.1)	VSS
	256-bit MACsec	✓	✓	✗
	Audio Video Bridging (AVB)	✗	✗	✗
	Containers, app hosting	✓	✓	✗

Catalyst 9400 Series software differentiators

		Catalyst 9400X models	Catalyst 9400 models	Catalyst 4500E Series
Modern OS	Containers, app hosting	✓	✓	✗
	Graceful Insertion and Removal (GIR)	✓	✓	✗
	Patching	✓	✓	✗
	Fast software upgrade	✓	✓	✗
	StackWise® Virtual	✗*	✓	VSS
SD-Access	Wireless controller (eWLC) hosting on switch	✗	✗	✓
	Fabric-enabled wireless	✗	✗	✓
	Subtended node support	✓*	✓*	✗
Security	Encrypted Traffic Analytics (ETA)	✓	✓	✗
	Predictive threat analysis (SLN)	✓	✓	✗
	Fabric sec encryption	✗	✗	✗
Visibility	FabricFlow	✗	✗	✗
	Application Visibility and Control (AVC)	✗	✓	✗

Cisco Catalyst 9400 templates (for Sup-1XL, 1XL-Y)

	16.6 to 16.8	16.9 and beyond			
	Access	Access	Core	SD-Access	NAT
Longest prefix match (LPM)	64,000	64,000	64,000	64,000	64,000
Host	48,000	48,000	32,000	80,000	48,000
Layer 2 multicast	16,000	16,000	16,000	16,000	16,000
Layer 3 multicast	16,000	16,000	32,000	16,000	32,000
MAC addresses	64,000	64,000	16,000	16,000	16,000
SGTs	8000	8000	8000	8000	8000
Flexible NetFlow entries	128,000 per ASIC	128,000 per ASIC	128,000 per ASIC	128,000 per ASIC	128,000 per ASIC
Security ACLs	18,000	18,000	18,000	18,000	18,000
QoS ACLs	18,000	18,000	18,000	18,000	3000
PBR/NAT	2000	2000	2000	2000	16,000
Tunnels	1000	1000	1000	1000	1000
LISP	1000	1000	1000	1000	1000
MPLS L3VPN VRFs	256	256	256	N/A	256
MPLS labels	8000	16,000	24,000		16,000
MPLS L3VPN routes VRF	16,000	32,000	32,000		32,000
MPLS L3VPN routes prefix	4000	4000	4000		4000
MVPN MDT tunnels	256	1000	1000		1000
L2VPN EoMPLS attachments	256	1000	1000		1000

C9400X-SUP-2XL / 2

SDM template

	17.7
	Access
Longest prefix match (LPM)	115,000
Layer 2 multicast	16,000
Layer 3 multicast	16,000
MAC addresses	64,000
SGTs	32,000
Input Flexible NetFlow entries	49,000 per ASIC
Output Flexible NetFlow entries	49,000 per ASIC
Input Security ACLs	10,000
Output Security ACLs	16,000
Input QoS ACLs	8,000
Output QoS ACLs	8,000
MPLS L3VPN VRFs	256
MPLS labels	16,000
MPLS L3VPN routes VRF	112,000
MPLS L3VPN routes prefix	32,000
MVPN MDT tunnels	1,024
L2VPN EoMPLS attachments	1,024

	17.7
	Access
VRF	1024
Input Flow SPAN ACEs	512
Output Flow SPAN ACEs	512
Control Plane Entries	512
PBR/NAT	2000
Tunnels	1000
LISP	2000

SUP-1 / SUP-2 ACL allocation

ACL type	Default template (SUP 1, 1XL)	Default template(SUP 2 / 2XL)
Security ACLs	18,000	10,000 (in) 16,000 (out)
QoS ACLs	18,000	8,000 (in) 8,000 (out)
Service ACLs — PBR/NAT	2000	2048
Service ACLs — tunnel	1000	1024
Service ACLs — CoPP	1000	512
Service ACLs — MACsec	1000	1024
Service ACLs — SPAN	1000	1024
Service ACLs — NetFlow	1000 ingress, 2000 egress	1024 ingress, 1024 egress
Service ACLs — LISP	1000	2048
Service ACL — client_LE	4000	4000
Service ACL — input_group_LE	1000	1000
Service ACL — output_group_LE	1000	1000

Sup 1XL — Resource utilization

[C94_Dist#show platform hardware fed 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	65536	35	0.05%	0	0	0	35
Mac Address Table	TCAM	I	1024	21	2.05%	0	0	0	21
L3 Multicast	EM	I	16384	0	0.00%	0	0	0	0
L3 Multicast	TCAM	I	1024	9	0.88%	3	6	0	0
L2 Multicast	EM	I	16384	1	0.01%	1	0	0	0
L2 Multicast	TCAM	I	1024	11	1.07%	3	8	0	0
IP Route Table	EM	I	49152	17	0.03%	16	0	1	0
IP Route Table	TCAM	I	65536	21	0.03%	12	6	2	1
QOS ACL	TCAM	IO	18432	85	0.46%	28	38	0	19
	TCAM	I		45	0.24%	15	20	0	10
	TCAM	O		40	0.22%	13	18	0	9
Security ACL	TCAM	IO	18432	131	0.71%	26	60	0	45
	TCAM	I		88	0.48%	12	36	0	40
	TCAM	O		43	0.23%	14	24	0	5
Netflow ACL	TCAM	I	1024	38	3.71%	14	22	0	2
PBR ACL	TCAM	I	2048	22	1.07%	16	6	0	0
Netflow ACL	TCAM	O	2048	44	2.15%	16	26	0	2
Flow SPAN ACL	TCAM	IO	1024	13	1.27%	3	6	0	4
	TCAM	I		5	0.49%	1	2	0	2
	TCAM	O		8	0.78%	2	4	0	2
Control Plane	TCAM	I	512	281	54.88%	130	106	0	45
Tunnel Termination	TCAM	I	1024	18	1.76%	8	10	0	0
Lisp Inst Mapping	TCAM	I	2048	1	0.05%	0	0	0	1
Security Association	TCAM	I	512	4	0.78%	2	2	0	0
CTS Cell Matrix/VPN Label	EM	O	8192	0	0.00%	0	0	0	0
CTS Cell Matrix/VPN Label	TCAM	O	512	1	0.20%	0	0	0	1
Client Table	EM	I	4096	0	0.00%	0	0	0	0
Client Table	TCAM	I	256	0	0.00%	0	0	0	0
Input Group LE	TCAM	I	1024	0	0.00%	0	0	0	0
Output Group LE	TCAM	O	1024	0	0.00%	0	0	0	0
Macsec SPD	TCAM	I	1024	2	0.20%	0	0	0	2

Example output from
Cisco® Catalyst® 9400 Series

Sup-2 / 2XL – Resource utilization

C9400X#show platform hardware fed active fwd-asic resource tcam utilization

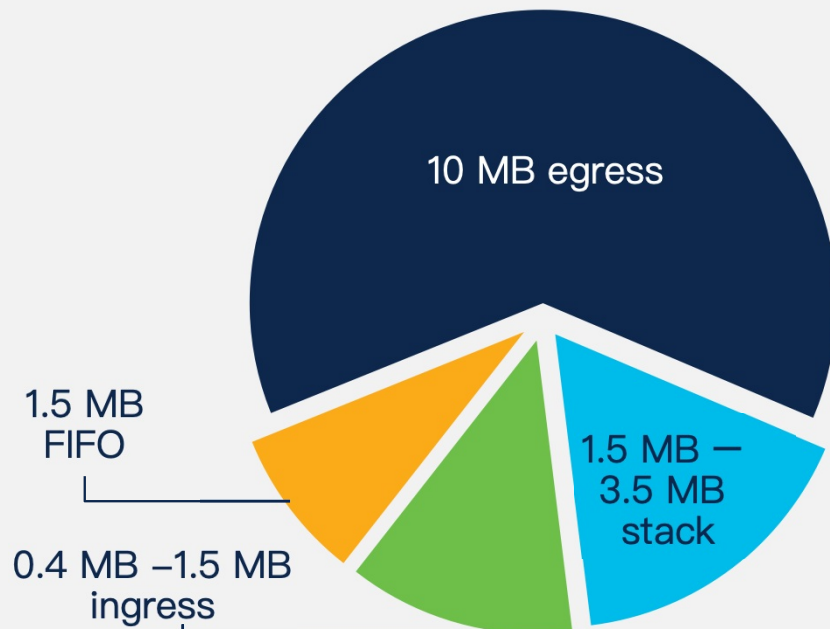
CAM Utilization for ASIC [0]

Table	Subtype	Dir	Max	Used	%Used	V4	V6	MPLS	Other
Mac Address Table	EM	I	65536	19	0.03%	0	0	0	19
Mac Address Table	TCAM	I	1536	22	1.43%	0	0	0	22
I3 Multicast	EM	I	16384	0	0.00%	0	0	0	0
I3 Multicast	TCAM	I	768	6	0.78%	3	3	0	0
I2 Multicast	EM	I	16384	0	0.00%	0	0	0	0
I2 Multicast	TCAM	I	768	7	0.91%	3	4	0	0
IP Route Table	EM/LPM	I	114688	3	0.00%	2	0	1	0
IP Route Table	TCAM	I	2304	11	0.48%	6	3	2	0
QOS ACL	TCAM	I	8192	45	0.55%	15	20	0	10
QOS ACL	TCAM	O	8192	40	0.49%	13	18	0	9
Security ACL	TCAM	I	10240	88	0.86%	12	36	0	40
Security ACL	TCAM	O	16384	43	0.26%	14	24	0	5
Netflow ACL	TCAM	I	1024	6	0.59%	2	2	0	2
EBR ACL	TCAM	I	2048	22	1.07%	16	6	0	0
Netflow ACL	TCAM	O	1024	6	0.59%	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
Control Plane	TCAM	I	512	281	54.88%	130	106	0	45
Tunnel Termination	TCAM	I	1024	24	2.34%	9	14	0	1
Disp Inst Mapping	TCAM	I	2048	1	0.05%	0	0	0	1
Security Association	TCAM	I	512	4	0.78%	2	2	0	0
CTS Cell Matrix/VPN Label	EM	O	32768	0	0.00%	0	0	0	0
CTS Cell Matrix/VPN Label	TCAM	O	768	1	0.13%	0	0	0	1
Client Table	EM	I	8192	0	0.00%	0	0	0	0
Client Table	TCAM	I	512	0	0.00%	0	0	0	0
Input Group IE	TCAM	I	1024	0	0.00%	0	0	0	0
Qu	TCAM	O	1024	0	0.00%	0	0	0	0
Macsec SPD	TCAM	I	1024	2	0.20%	0	0	0	2

Example output from
Cisco® Catalyst® 9400X
Series

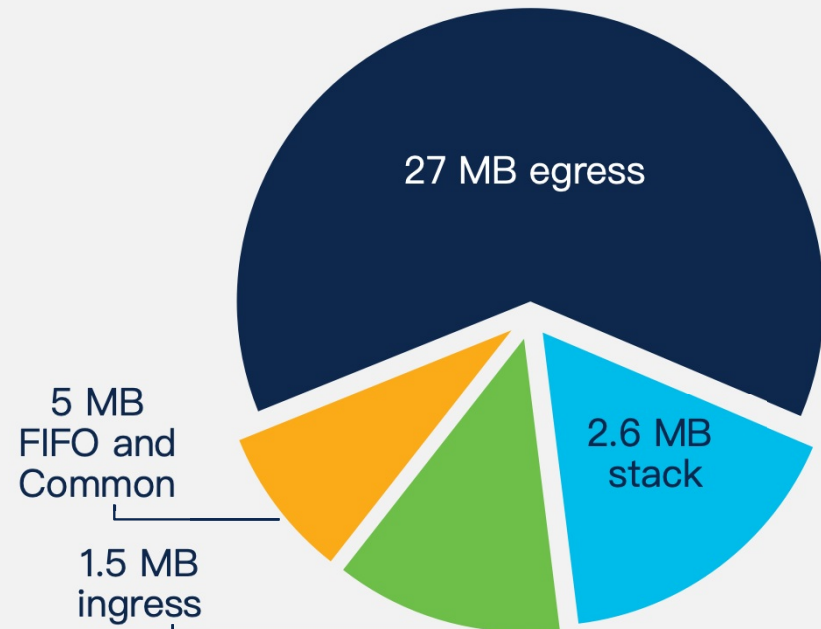
Buffer size comparison C9400 and C9400X

Cisco Catalyst 9400 (per Core)



Per core: 16 MB | Per ASIC: 16 and 16 MB

Cisco Catalyst 9400X Series (per ASIC)



Shared between cores: 36 MB | Per ASIC: 18+18 MB

Bandwidth boost with Gen 2 supervisors



	Type	9404R	9407R	9410R	9404R/9407R/9410R	9404R/9407R/9410R
NEW C9400-LC-24XY	Fiber	Not supported			240	480
NEW C9400-LC-12QC	Fiber				240	480
C9400-LC-48HX	UPOE+	Not supported			240	480
C9400-LC-48XS	Fiber				240	480
C9400-LC-48UX	UPOE	80/240	80/120	80	240	240
C9400-LC-24XS	Fiber	80/240	80/120	80	240	240
C9400-LC-48HN	UPOE+	80/120	80/120	80	240	240

3x bandwidth uplift for Gen 1 line cards (80G → 240G) on 10-slot chassis with SUP-2XL

2x bandwidth uplift for Gen 1 line cards (120G → 240G) on 7-slot chassis with SUP-2XL



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