



Possibilities

#CiscoLive

Introduction to Cisco 8000 Series

Service Provider-class routers

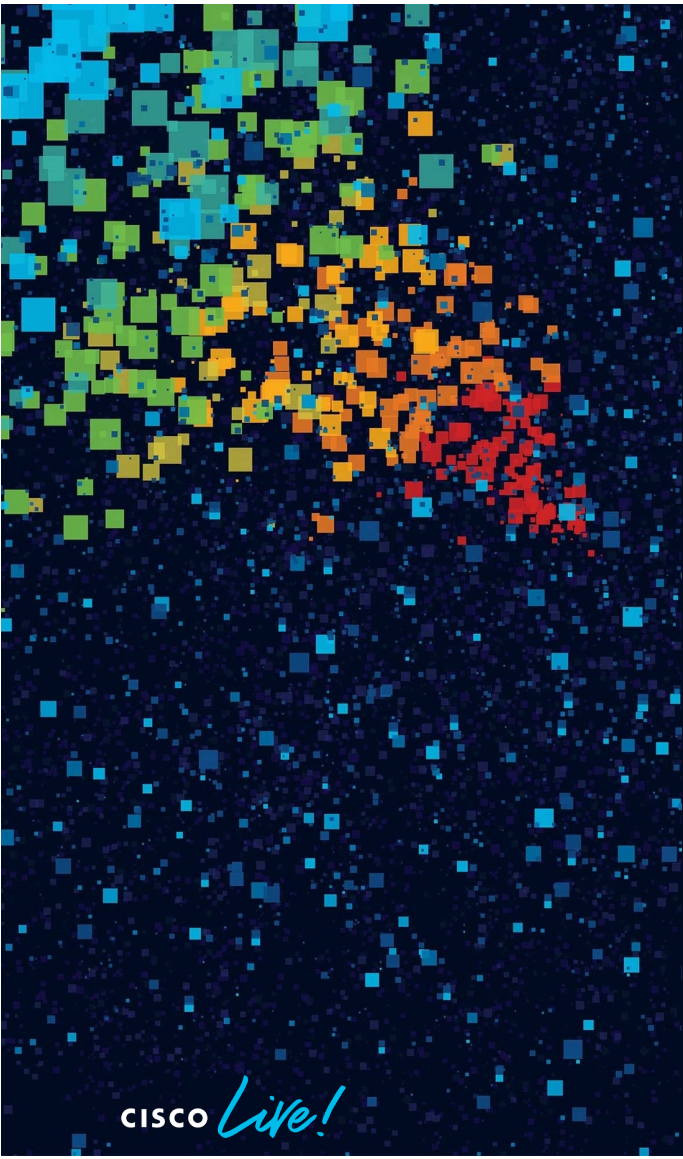
David Pothier
Syed Hassan
BRKARC-2103

CISCO *Live!*

Las Vegas, NV | May 31-June 4, 2020

#CiscoLive





Agenda

- Introduction to Cisco 8000 Series
- Hardware Architecture
- XR7 Software & Packaging
- Packet Flow & Operations
- Use Cases

Cisco Webex Teams

Questions?

Use Cisco Webex Teams to chat with the speaker after the session

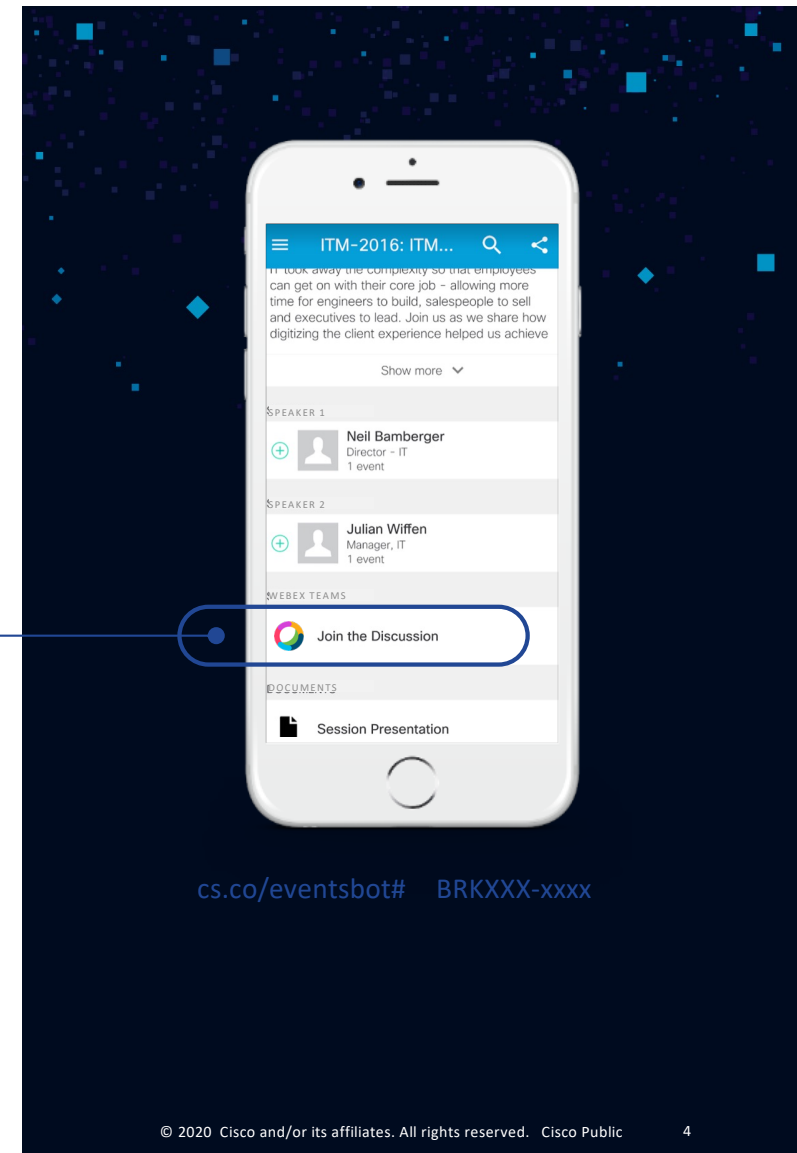
How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install Webex Teams or go directly to the team space
- 4 Enter messages/questions in the team space

Webex Teams will be moderated by the speaker until June 7, 2020.



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Internet Growth

By 2022, Massive Scale Grows Even Larger



3.4
Billion

4.8
Billion

2019



18
Billion

28.5
Billion

2019



2.8
PetaBytes

7.2
PetaBytes

2019

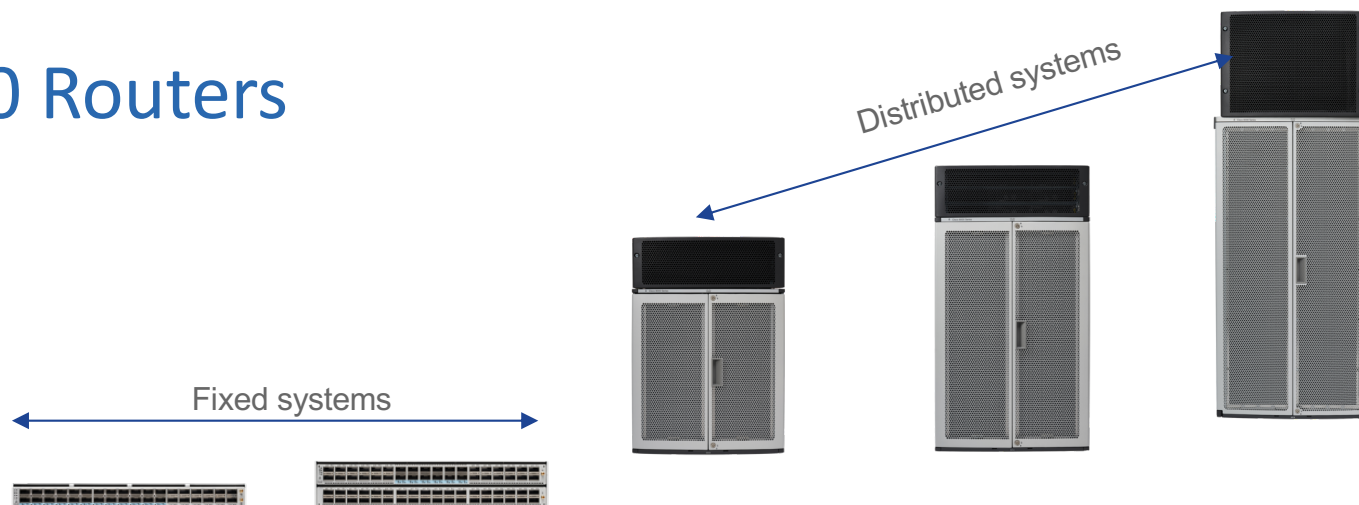
Introduction to Cisco 8000 Series



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Cisco 8000 Routers

Introduction...



	8201	8202	8802	8812	8818
FCS	Q3 CY2019	Q2 CY2020	Q4 CY2019	Q3 CY2019	Q2 CY2020
Rack Units	1RU	2RU	16RU	21RU	33RU
Slots	Fixed	Fixed	8	12	18
Ports & Line Cards	24x400GE + 12x100GE	12x 400GE + 60x100GE	 	48x100GE 36x400GE	
Total Throughput	10.8 Tbps	10.8 Tbps	115 Tbps	172 Tbps	260 Tbps
Typical Power	415W	750W	13KW	20KW	TBD

Cisco Silicon ONE



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Cisco Silicon ONE

Flexible Forwarding ASIC

Q100



2x Bandwidth - First routing silicon to break 10 Tbps barrier

3x Higher PPS Performance



High Route Scale

Deep Buffering



Power Efficient



P4 programmable



Cisco Silicon ONE Q100

- Comprehensive routing with switching efficiency
- Multiple segments: web and service provider
- Multiple functions:
 - System-on-a-chip,
 - Line card, and
 - Fabric Element
- Large on-die SRAM forwarding resources
 - TCAM
 - SRAM
- On-package FIB & buffer expansion via HBM



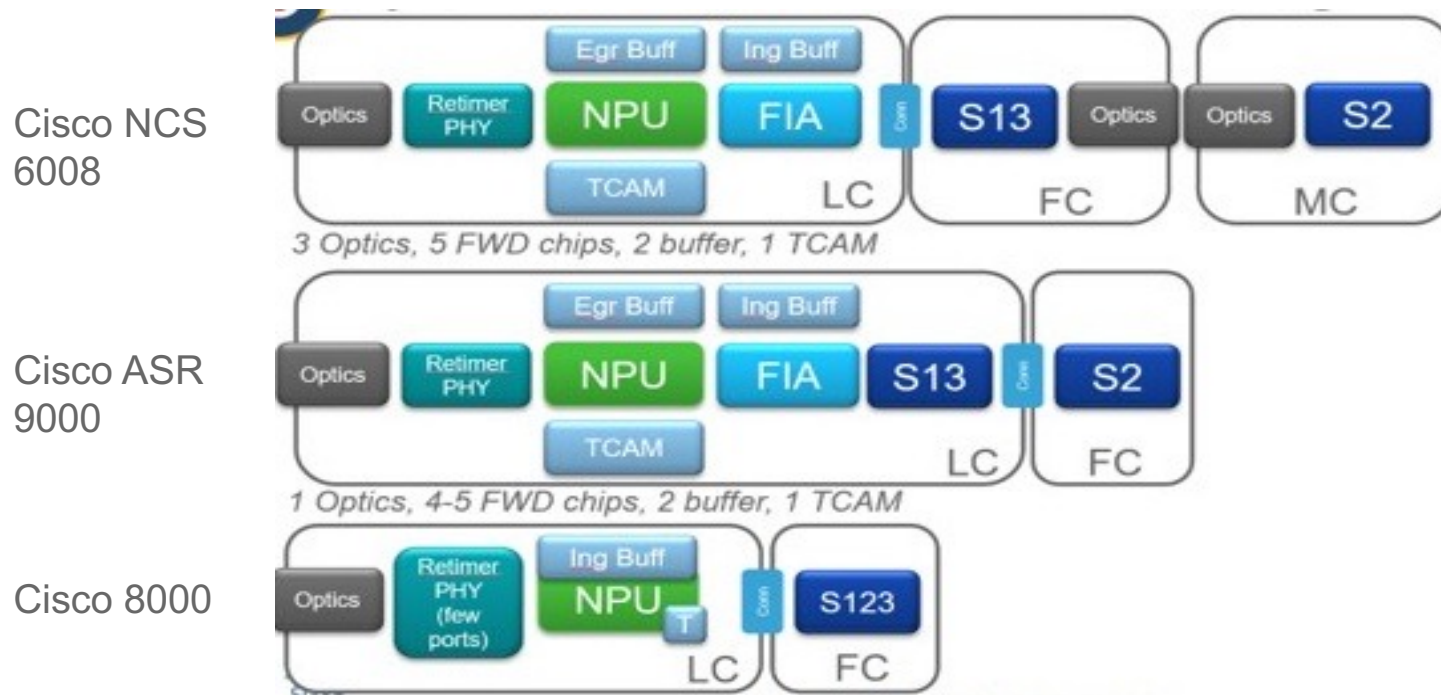
Cisco Silicon ONE Q100

Architecture

1. Run to Completion
Single processor does everything –
flexibility vs performance. Large buffers, stats, FIB
 - CRS, NCS 6000, ASR 9000 Lightspeed
2. Edge-optimized pipeline
Slow pipeline for large instruction set & scale
3. Rigid Pipeline – Merchant Silicon
Small FIB scale & limited functionality
4. Pipeline – Merchant Silicon
More instructions than Rigid, FIB scale with external memory
5. Network-optimized Run to Completion – Cisco Silicon One – Cisco 8000 Series
Combines Rigid Pipeline performance, with much better power than it and RTC per slice

Silicon One Q100 Comparison

System Evolution - Forwarding



Hardware Architecture



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Cisco 8200 Series

Fixed Models



Cisco 8201
24x QSFP56-DD + 12x QSFP28



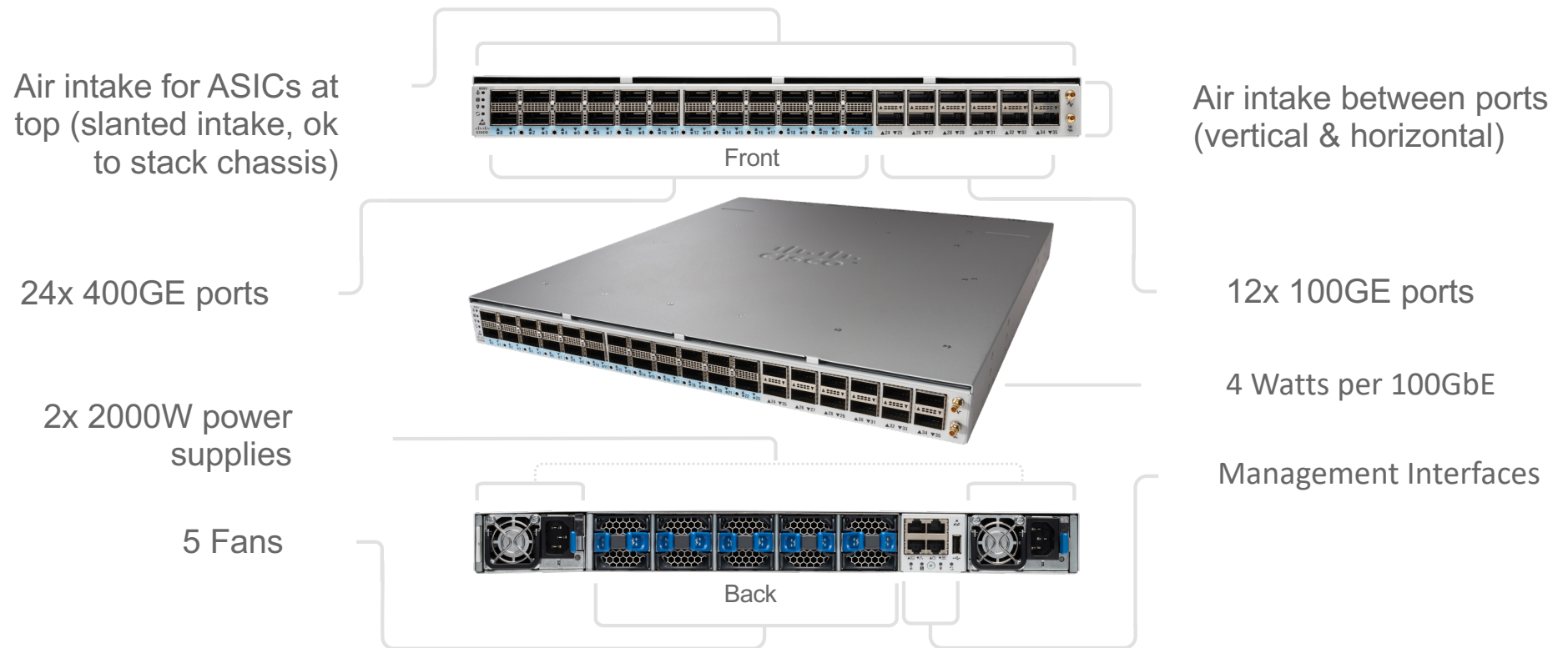
Cisco 8202
12x QSFP56-DD + 60x QSFP28

- System on a Chip (SoC) mode
 - 10.8 Tbps allocated to network ports
- Simple and efficient cooling with a single ASIC design
- Combination of QSFP56-DD & QSFP28 to utilize full bandwidth
- Fixed models maintain 36 ports per RU
- Bi-directional airflow

DC ToR/Spine

Cisco 8201

1RU 24x 400GE + 12x 100GE



Cisco 8201

1RU 24x 400GE + 12x 100GE

5 FRU Fan's in the rear 0/FT0-0/FT4

2 PEM's in the rear 0/PM0, 0/PM1

1 RJ45 console in the rear 115,200

1 RJ45 Mgmt port in the rear

Port Numbering

Start upper left
Top to bottom (2 ports)

FourHundredGigE0/0/0/0
FourHundredGigE0/0/0/1

FourHundredGigE0/0/0/22
FourHundredGigE0/0/0/23

HundredGigE0/0/0/34

HundredGigE0/0/0/35

HundredGigE0/0/0/24

HundredGigE0/0/0/25

RP/0/RP0/CPU0: Cisco-8201#show platform

Node	Type	State	Config state
0/RP0/CPU0	8201-SYS(Active)	IOS XR RUN	NSHUT
0/RP0/BMC0	8201-SYS	OPERATIONAL	NSHUT
0/PM0	PSU2KW-ACPI	OPERATIONAL	NSHUT
0/PM1	PSU2KW-ACPI	OPERATIONAL	NSHUT
0/FT0	FAN-1RU-PI	OPERATIONAL	NSHUT
0/FT1	FAN-1RU-PI	OPERATIONAL	NSHUT
0/FT2	FAN-1RU-PI	OPERATIONAL	NSHUT
0/FT3	FAN-1RU-PI	OPERATIONAL	NSHUT
0/FT4	FAN-1RU-PI	OPERATIONAL	NSHUT

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Cisco 8201

Port mapping to NPU

```
RP/0/RP0/CPU0:Cisco-8201#show controller npu voq-usage interface all
instance all location 0/rp0/cpu0
```

Node ID: 0/RP0/CPU0

Intf name	Intf handle (hex)	NPU #	NPU core	PP Port	Sys Port	VOQ base	Flow base	VOQ port type	Port speed
FH0/0/0/0	f000138	0	0	0	8	416	0	local	400G
FH0/0/0/23	f000140	0	1	0	192	4384	0	local	400G
FH0/0/0/22	f000148	0	1	0	184	4392	0	local	400G
FH0/0/0/21	f000150	0	1	1	176	6368	0	local	400G
FH0/0/0/20	f000158	0	1	1	168	6376	0	local	400G
FH0/0/0/19	f000160	0	2	0	160	8352	0	local	400G
FH0/0/0/18	f000168	0	2	0	152	8360	0	local	400G
FH0/0/0/17	f000170	0	2	1	144	10336	0	local	400G
FH0/0/0/16	f000178	0	2	1	136	10344	0	local	400G
FH0/0/0/15	f000180	0	3	0	128	12320	0	local	400G
FH0/0/0/14	f000188	0	3	0	120	12328	0	local	400G
FH0/0/0/13	f000190	0	3	1	112	14304	0	local	400G
FH0/0/0/12	f000198	0	3	1	104	14312	0	local	400G
FH0/0/0/1	f0001a0	0	0	0	16	424	0	local	400G
FH0/0/0/2	f0001a8	0	0	1	24	2400	0	local	400G
FH0/0/0/3	f0001b0	0	0	1	32	2408	0	local	400G
FH0/0/0/4	f0001b8	0	5	0	40	20256	0	local	400G
FH0/0/0/5	f0001c0	0	5	0	48	20264	0	local	400G

<snip>

```
RP/0/RP0/CPU0:Cisco-8201#show controller npu voq-usage interface all
instance all location 0/rp0/cpu0 (continued)
```

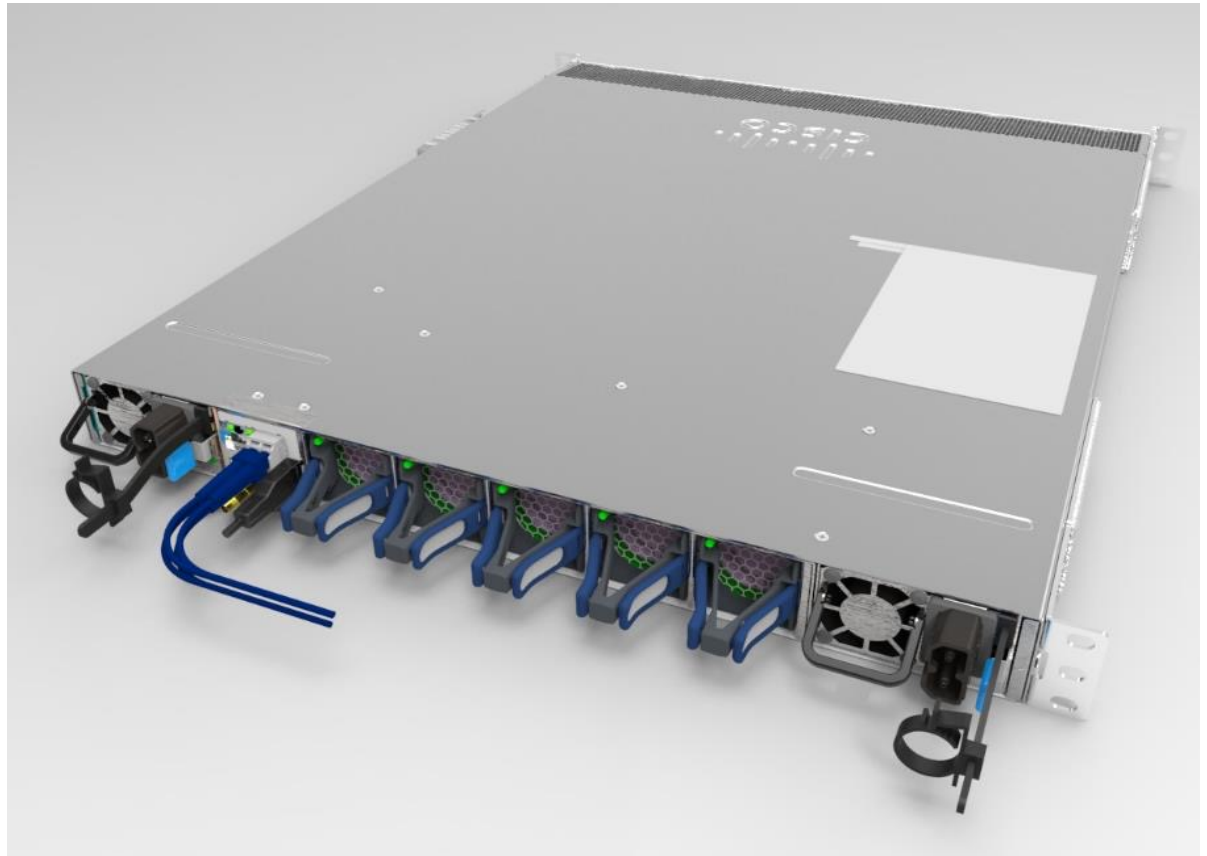
Node ID: 0/RP0/CPU0

Intf name	Intf handle (hex)	NPU #	NPU core	PP Port	Sys Port	VOQ base	Flow base	VOQ port type	Port speed
FH0/0/0/6	f0001c8	0	5	1	56	22240	0	local	400G
FH0/0/0/7	f0001d0	0	5	1	64	22248	0	local	400G
FH0/0/0/8	f0001d8	0	4	1	72	18272	0	local	400G
FH0/0/0/9	f0001e0	0	4	1	80	18280	0	local	400G
FH0/0/0/10	f0001e8	0	4	0	88	16288	0	local	400G
FH0/0/0/11	f0001f0	0	4	0	96	16296	0	local	400G
Hu0/0/0/24	f0001f8	0	3	0	200	12336	0	local	100G
Hu0/0/0/35	f000200	0	4	1	288	18288	0	local	100G
Hu0/0/0/34	f000208	0	4	0	280	16304	0	local	100G
Hu0/0/0/33	f000210	0	5	1	272	22256	0	local	100G
Hu0/0/0/32	f000218	0	5	0	264	20272	0	local	100G
Hu0/0/0/31	f000220	0	0	1	256	2416	0	local	100G
Hu0/0/0/30	f000228	0	0	0	248	432	0	local	100G
Hu0/0/0/29	f000230	0	1	1	240	6384	0	local	100G
Hu0/0/0/28	f000238	0	1	0	232	4400	0	local	100G
Hu0/0/0/27	f000240	0	2	1	224	10352	0	local	100G
Hu0/0/0/26	f000248	0	2	0	216	8368	0	local	100G
Hu0/0/0/25	f000250	0	3	1	208	14320	0	local	100G

Cisco 8201

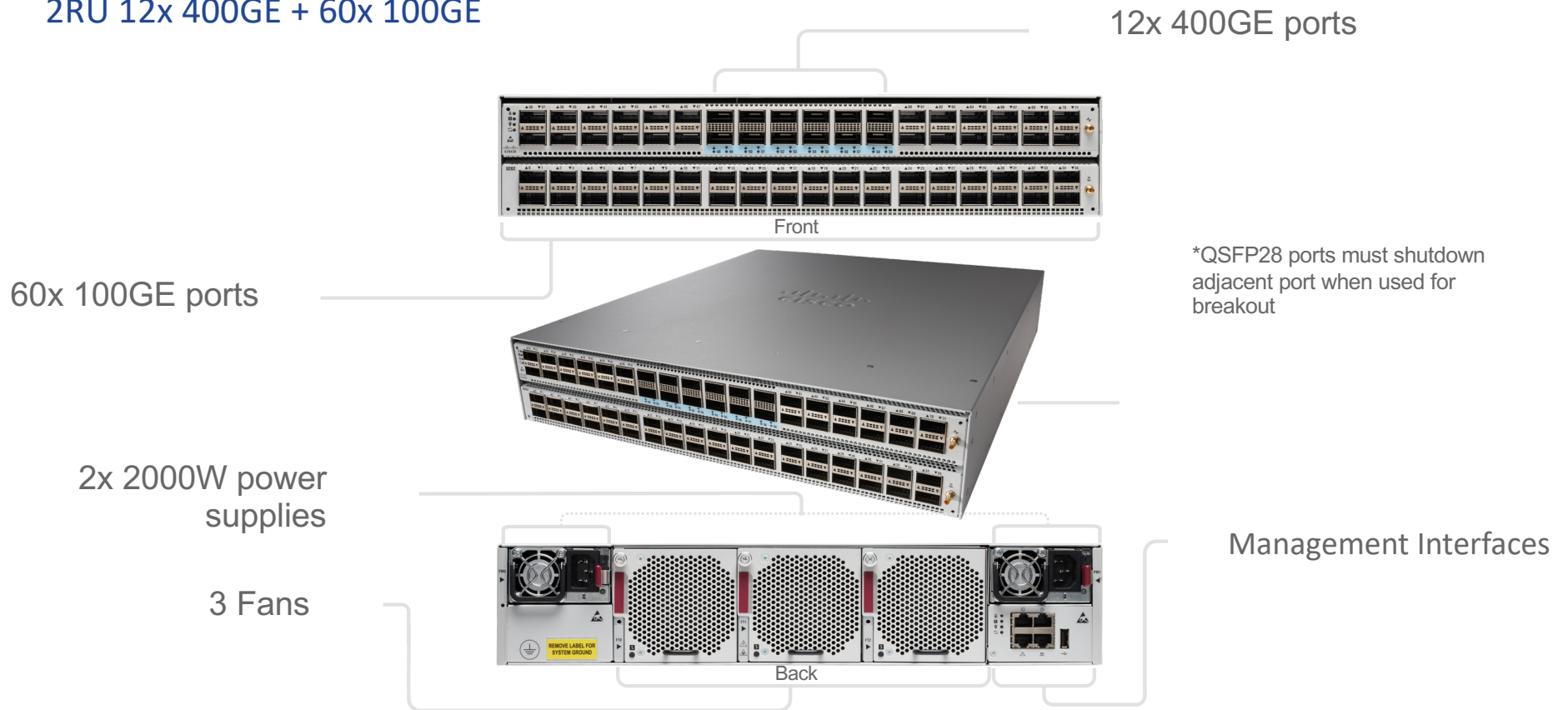
1RU 24x 400GE + 12x 100GE rear view

- 5 Fans
- 2x 2000W Power supplies
- Management ports



Cisco 8202

2RU 12x 400GE + 60x 100GE



Cisco 8800 Modular Systems

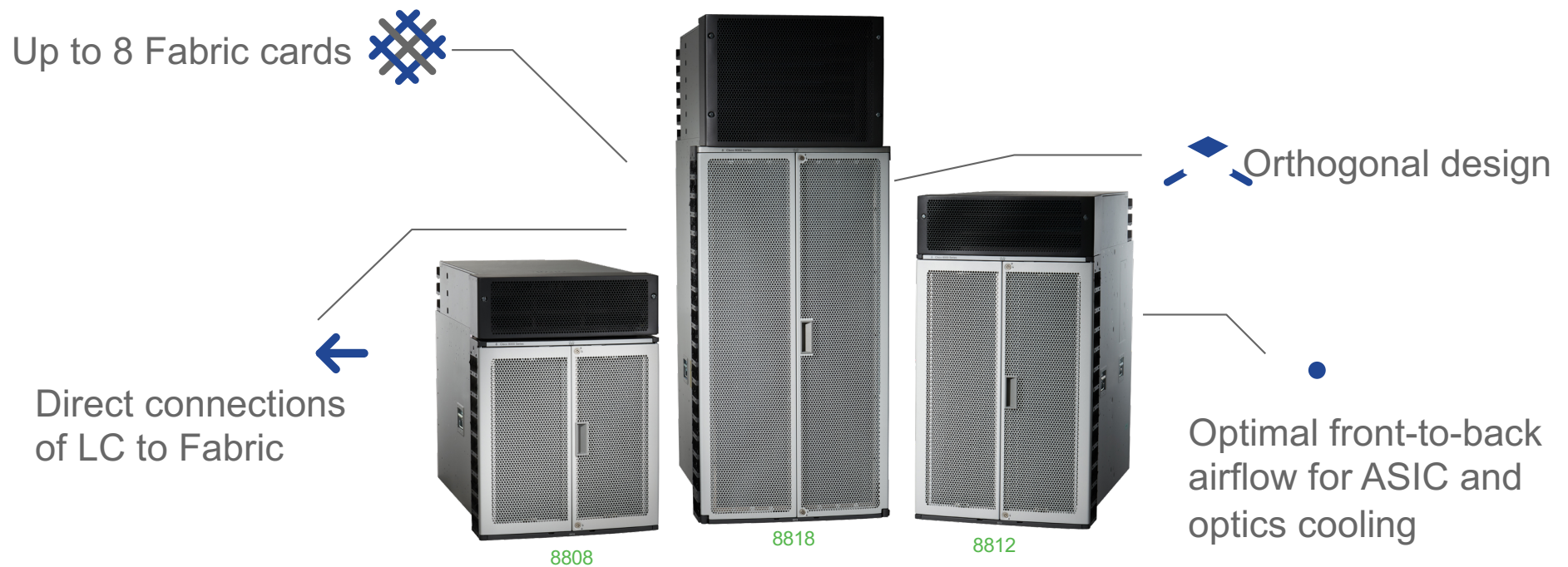
8808, 8012, & 8018

- Rack mountable in standard 19" rack
- Low unloaded weight
 - 200 lbs (90 kg) for 12 slot
- Direct mating of LCs and fabric at 90 degrees
 - No midplane or backplane in data path
 - Direct airflow through all components
- Lockable door with air filter
- Front-to-back airflow
- With 4.75" filter 12 & 18-slot have similar depth to CRS 8-slot (1040mm)
- Fiber management
- Rear power cabling



Cisco 8800 Modular Systems

8808, 8012, & 8018



Cisco 8800 Modular Systems

Common components for 8808, 8812, & 8818

Power supplies



- 60A 48V DC (4.2kW)
- 100A 48V DC (6.3 kW)
- AC & High Voltage DC (6.3 kW)

Route Processors (x2)



- 4-core Broadwell
- 32 GB (Default) to 128 GB DRAM

Line Cards



36x 400G QSFP56-DD



48x 100G QSFP28

Small midplane for EOBC
(10G from RP to each LC)

8808

8812

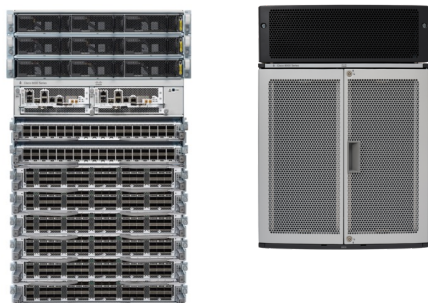
8818

Cisco 8800 Series

Platforms

8808

- 16 RU
- Port density
 - 288 400GE ports
 - 1152 100GE breakout ports
 - 384 QSFP28 ports



8812

- 21 RU (1/2 rack)
- Port density
 - 432 400GE ports
 - 1728 100GE breakout ports
 - 576 QSFP28 ports



8818

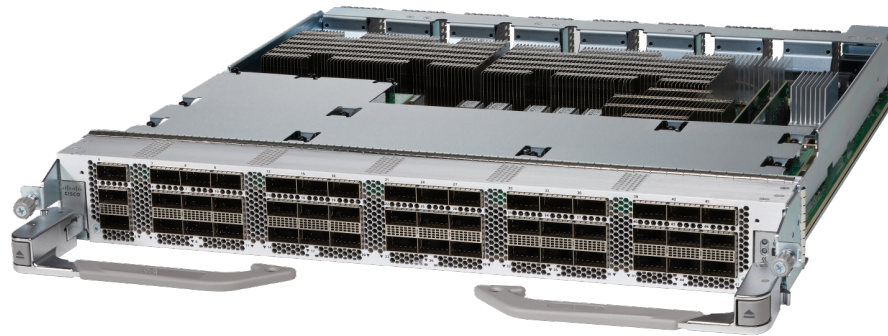
- 33 RU
- Port density
 - 648 400GE ports
 - 2592 100GE breakout ports
 - 864 QSFP28 ports



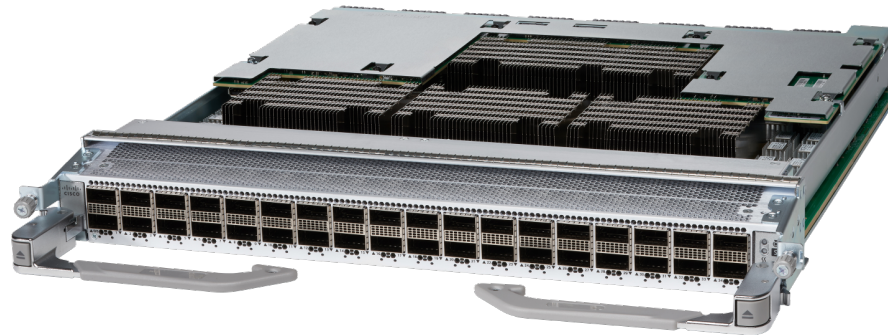
Cisco 8800 Series

Linecards

48-port 400 GbE
with/without
MACsec

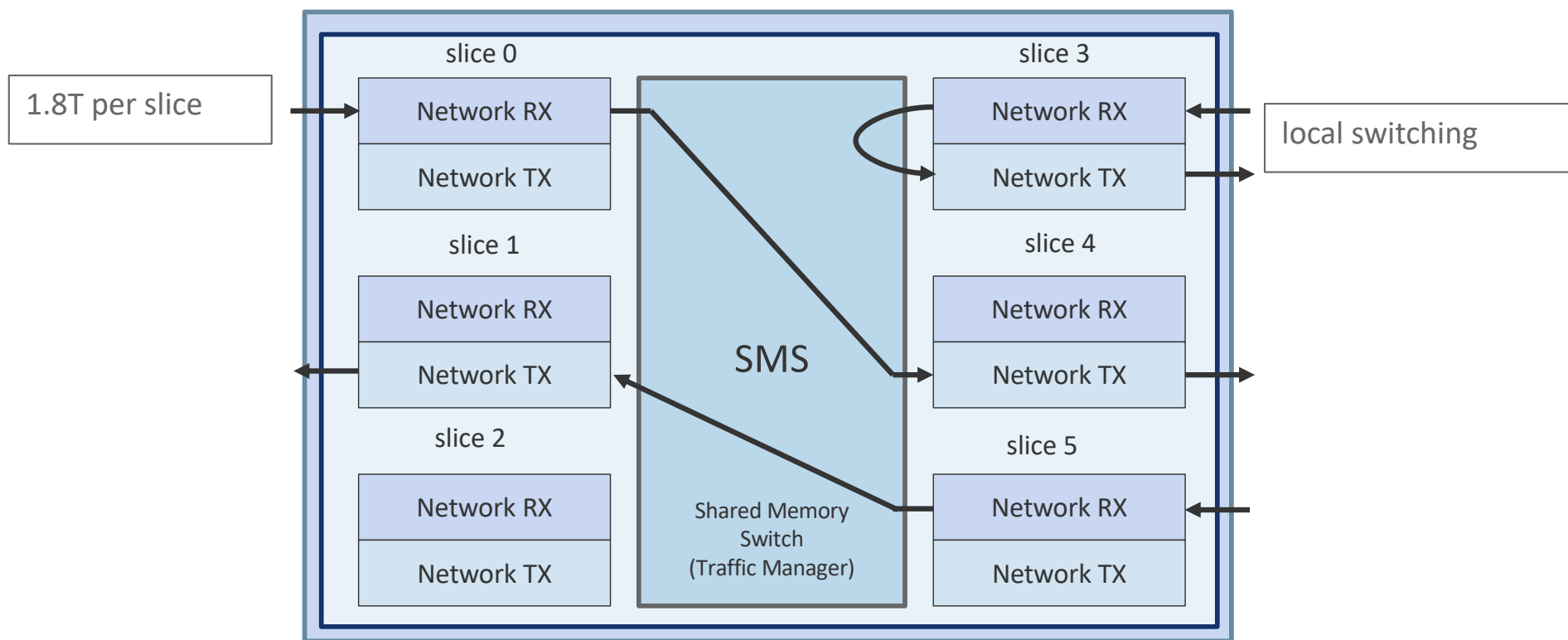


36-port 400 GbE



Q100 ASIC

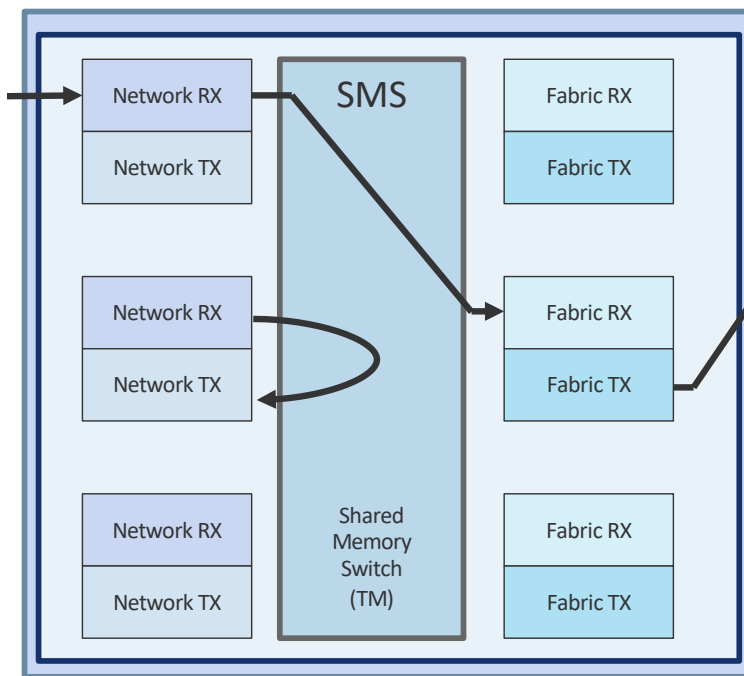
Six Network-facing Slices – fixed chassis



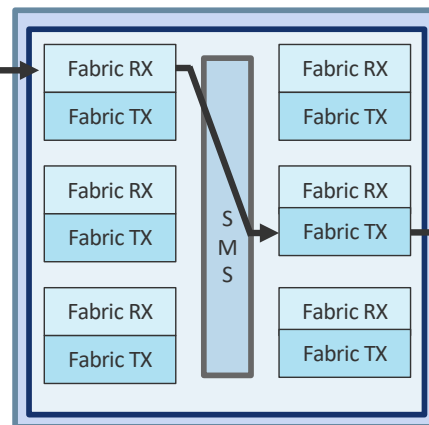
Q100 ASIC - Line Card and Fabric Modes

Modular Systems

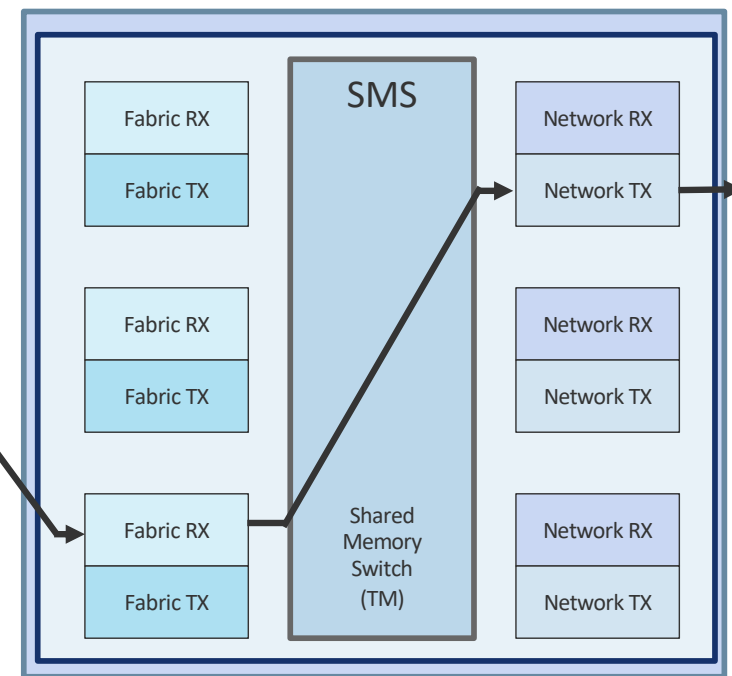
Linecard Mode



Fabric Mode



Linecard Mode



Cisco 8800 Modular Systems

Switch Fabric

- Orthogonal direct-connect removes the need for a mid-and/or back- plane.
- Up to 8 Fabric Cards between linecards and fan trays
 - 48x100G linecard requires 5 fabric cards for N+1 redundancy
 - 36x400G linecard requires 8 Fabric Cards for N+1 redundancy
- Cisco Silicon ONE Q100 ASIC in fabric mode
- Fabric cards are specific to each chassis and install vertically behind linecards



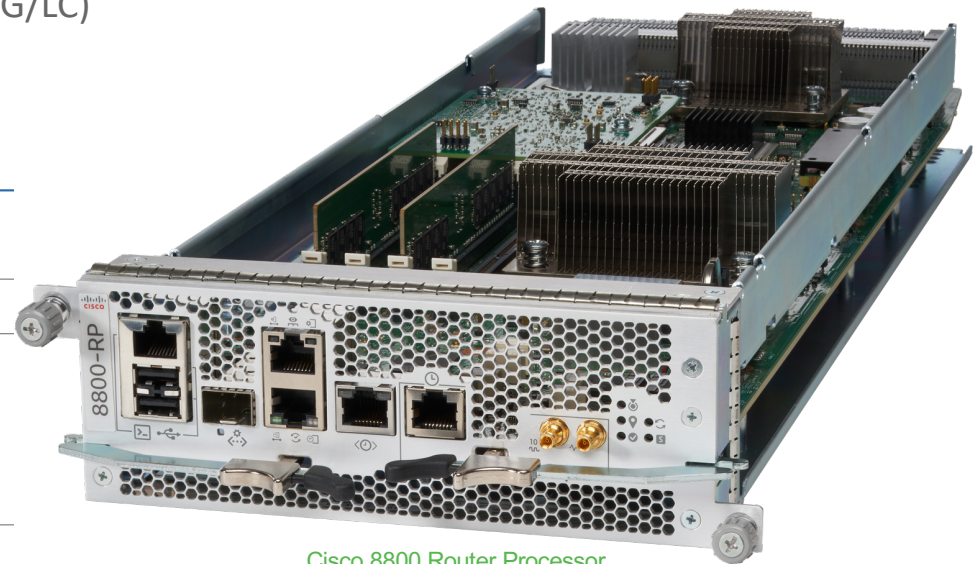
Cisco 8800 Series Route Processor

8800 RP

- Common across all Cisco 8000 modular systems
- Not connected to fabric (small EOBC midplane w/ 10G/LC)

RP 8800 Specs

Ports	• BMC & Management Ethernet port • 2x USB 2.0 1A ports for flexibility
Processor	• 4-core 2.4 GHz Broadwell CPU
Other Features	• Timing Class B • IEEE 1588 • Sync 0 • TOD • 10 MHZ / 1 PPS



Cisco 8800 Router Processor

Cisco 8800 Series Cooling

Cisco 8808, 8812, 8818 Fans

Air inlets above cards and between optics



Cisco 8812 without doors or filter



Optional filter



4 Fan Trays – unique to each chassis

Cisco 8800 Series

Linecards

48x QSFP28 100GE

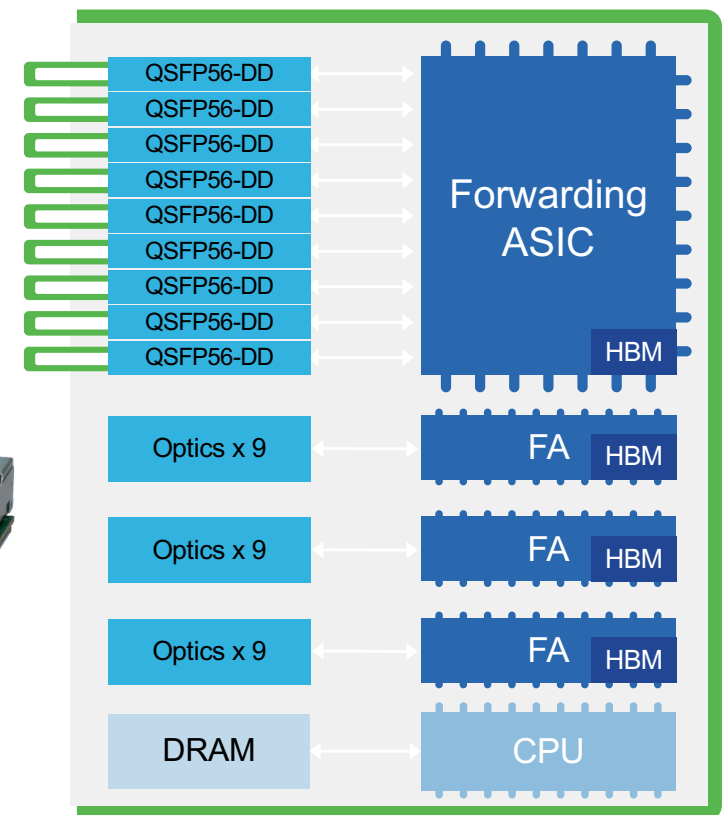
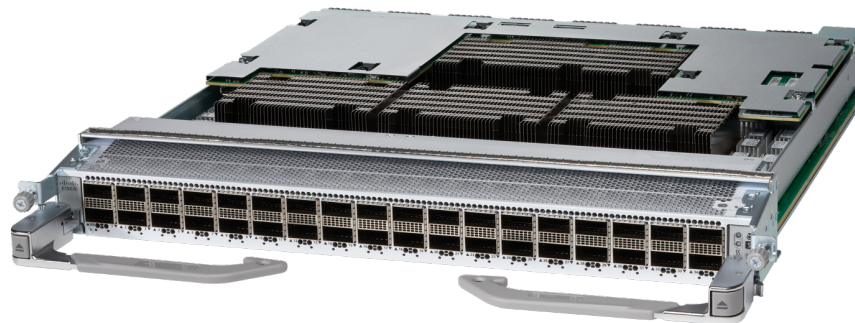


Software requirements	IOS XR	
Interfaces	48 QSFP28 ports - Supports QSFP+ optics for 10G and 40G compatibility	36 QSFP56-DD ports - Up to 144 ports of 100 GbE via breakout - Supports QSFP+, QSFP28, and QSFP28-DD modules.
Processor	4-core 2.4 GHz Intel Broadwell CPU	
NPU	2 NPUs @ 2.4 Tbps line bandwidth	4 NPUs @ 3.6 Tbps line bandwidth
Memory	8GB per NPU or 16GB per LC High Bandwidth Memory (HBM)	8GB per NPU or 32GB per LC High Bandwidth Memory (HBM)
Chassis compatibility	8808, 8812, 8818	
MACsec	Yes	No
ASIC	Cisco Silicon One forwarding ASICs	

Cisco 8800 Series

Linecard: 36x400G QSFP56-DD

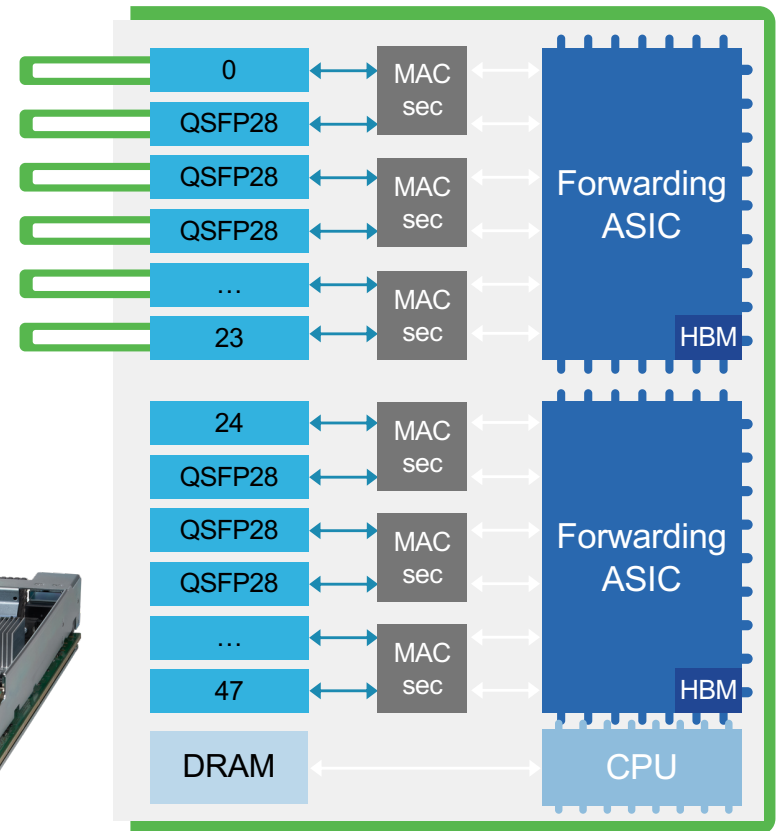
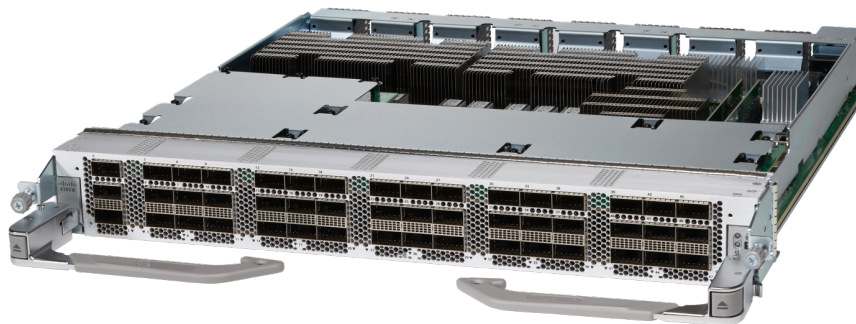
- 4 NPUs @ 3.6 Tbps line bandwidth
- Requires 8 Fabric Cards for N+1 redundancy
- 2 rows of 400GE optics
- 8x 56G SerDes per cage
- Full breakout support



Cisco 8800 Series

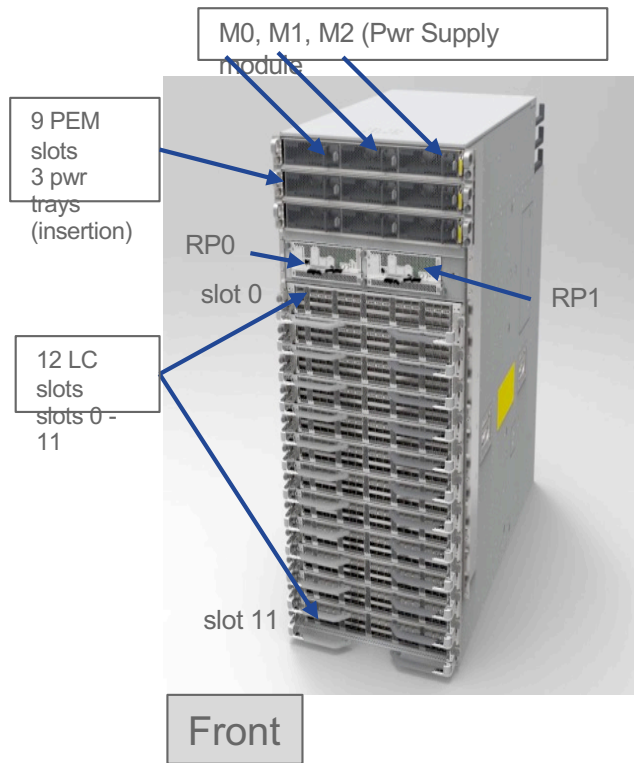
Linecard: 48x100G QSFP28

- 2 NPUs @ 2.4 Tbps line bandwidth
- Requires 5 FCs for N+1 redundancy
- 3 rows of 100GE optics
- MACsec on all ports
- 4x 25G SerDes per cage
- Full breakout support



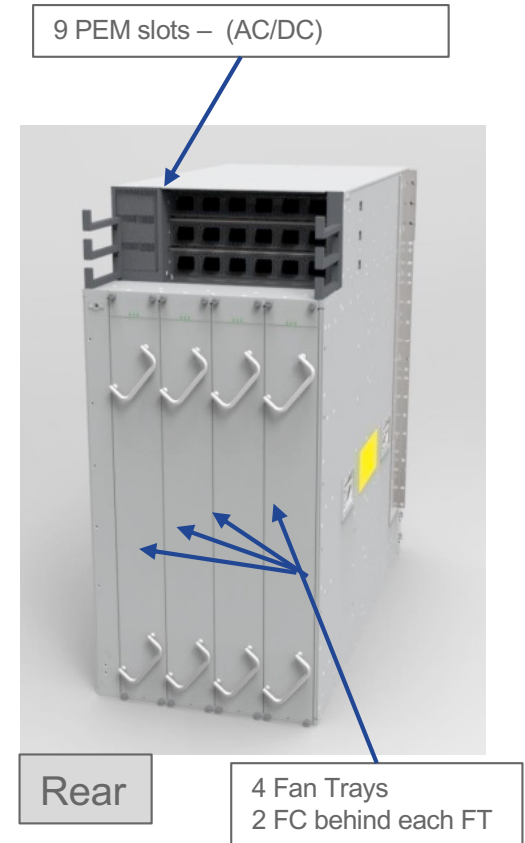
Cisco 8812 – 12 Slot Modular Platform

CLI mapping to components



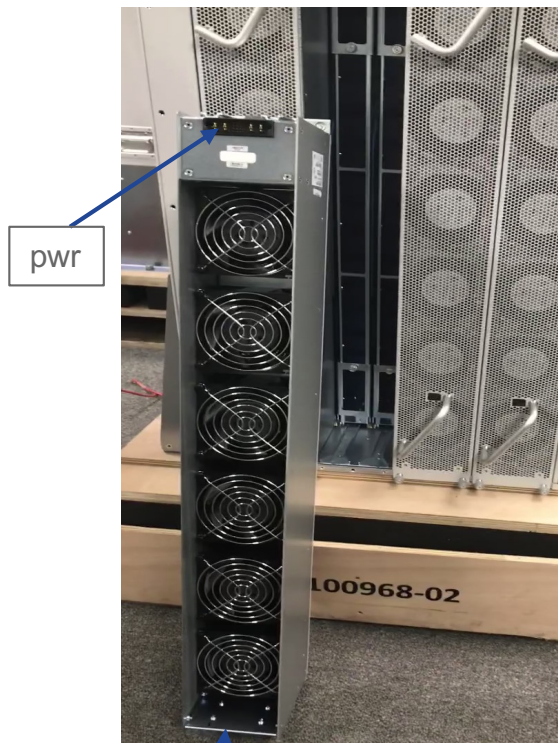
```
RP/0/RP0/CPU0:Cisco-8812#show platform
```

Node state	Type	State	Config
0/RP0/CPU0	8800-RP(Active)	IOS XR RUN	
NSHUT			
0/RP0/BMC0	8800-RP	OPERATIONAL	
NSHUT			
0/RP1/CPU0	8800-RP(Standby)	IOS XR RUN	
NSHUT			
0/RP1/BMC0	8800-RP	OPERATIONAL	
NSHUT			
0/0/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/1/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/2/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/3/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/4/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/5/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/6/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/7/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/8/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/9/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/10/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/11/CPU0	8800-LC-48H	IOS XR RUN	
NSHUT			
0/FC0	8812-FC	OPERATIONAL	



Cisco 8812 – 12 Slot Modular Platform

Modular cooling



```
RP/0/RP0/CPU0:Cisco-8812#show environment fan
```

Location	FRU Type	Fan speed (rpm)					
		FAN_0	FAN_1	FAN_2	FAN_3	FAN_4	FAN_5

0/FT0	8812-FAN	6660	6600	6600	6600	6630	6630
0/FT1	8812-FAN	6660	6600	6600	6630	6600	6630
0/FT2	8812-FAN	6690	6660	6660	6630	6660	6690
0/FT3	8812-FAN	6810	6900	6870	6840	6900	6900
<snip>							

```
RP/0/RP0/CPU0:Cisco-8812#show platform
```

```
<snip>
```

0/FT0	8812-FAN	OPERATIONAL	NSHUT
0/FT1	8812-FAN	OPERATIONAL	NSHUT
0/FT2	8812-FAN	OPERATIONAL	NSHUT
0/FT3	8812-FAN	OPERATIONAL	NSHUT
<snip>			

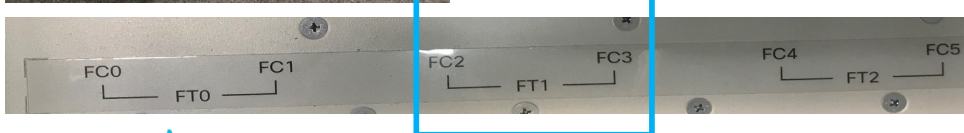
4 Fan Trays – each with 6 fans

Cisco 8812 – 12 Slot Modular Platform

Fabric placement



2 Fabric Cards (FC) behind each fan tray. FC2 and FC3 shown.

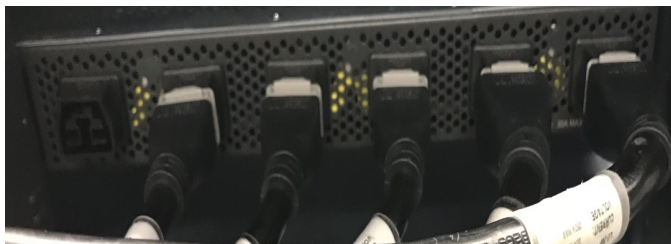


```
RP/0/RP0/CPU0:Cisco-8812#show platform
```

Node	Type	State	Config state
0/RP0/CPU0	8800-RP(Active)	IOS XR RUN	NSHUT
0/RP0/BMC0	8800-RP	OPERATIONAL	NSHUT
0/RP1/CPU0	8800-RP(Standby)	IOS XR RUN	NSHUT
0/RP1/BMC0	8800-RP	OPERATIONAL	NSHUT
0/0/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/1/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/2/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/3/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/4/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/5/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/6/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/7/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/8/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/9/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/10/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/11/CPU0	8800-LC-48H	IOS XR RUN	NSHUT
0/FC0	8812-FC	OPERATIONAL	NSHUT
0/FC1	8812-FC	OPERATIONAL	NSHUT
0/FC2	8812-FC	OPERATIONAL	NSHUT
0/FC3	8812-FC	OPERATIONAL	NSHUT
0/FC4	8812-FC	OPERATIONAL	NSHUT
0/FC5	8812-FC	OPERATIONAL	NSHUT
0/FC6	8812-FC	OPERATIONAL	NSHUT
0/FC7	8812-FC	OPERATIONAL	NSHUT
0/FT0	8812-FAN	OPERATIONAL	NSHUT
0/FT1	8812-FAN	OPERATIONAL	NSHUT
0/FT2	8812-FAN	OPERATIONAL	NSHUT
0/FT3	8812-FAN	OPERATIONAL	NSHUT
0/PT0	8800-HV-TRAY	OPERATIONAL	NSHUT
0/PT1	8800-HV-TRAY	OPERATIONAL	NSHUT
0/PT2	8800-HV-TRAY	OPERATIONAL	NSHUT

Cisco 8812 – 12 Slot Modular Platform

AC + DC Wiring – chassis rear



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Cisco 8812 – 12 Slot Modular Platform

AC + DC Wiring – chassis rear



on/off toggle switch under yellow lever

M0	M1	M2	PS0 (on/off switch)
M0	M1	M2	PS1 (on/off switch)
M0	M1	M2	PS2 (on/off switch)

Power Tray
numbering
top-to-bottom

PEM numbering left-to-right

The background is a dark blue field filled with numerous small, semi-transparent squares and dots in various colors including light blue, green, yellow, orange, and red. These elements are scattered across the frame, with a higher concentration of orange and red squares forming a diagonal streak from the upper right towards the lower right.

XR7 Software & Packaging

CISCO *Live!*

IOS XR – Evolution

Designed for Scalability and Performance

Pre-Emptive Multitasking and Multithreaded Architecture

Process segregation – better resiliency

DLL and Protected Memory

Designed for High Redundancy, Scalability and Performance

Proven IOS XR architecture with virtualization

Scalability beyond physical limitations

CP/DP Separation

Admin Plane Separation

Lightweight, Scalability and Performance with High Redundancy

Proven IOS XR architecture with containers

Evolved Programmability

Visibility & Telemetry

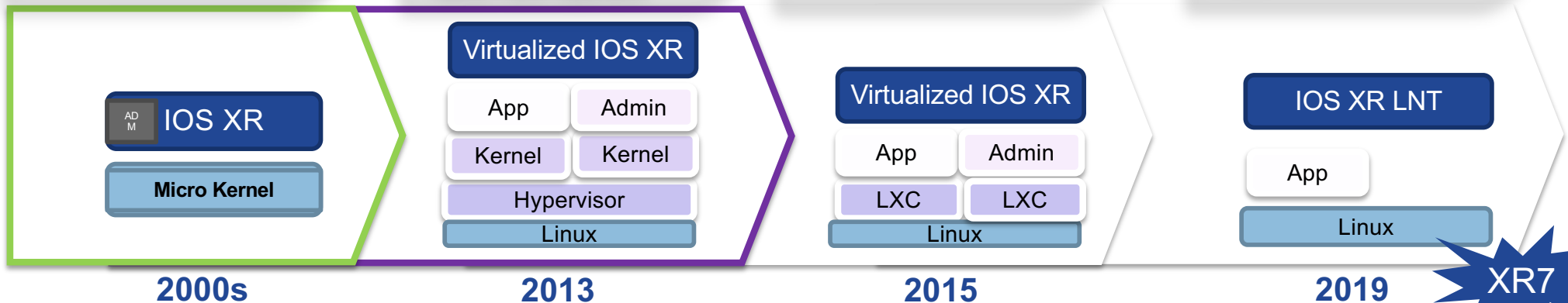
Extremely Lightweight, High Performance, Native or Containerized with HA

Proven IOS XR architecture as application

Modular

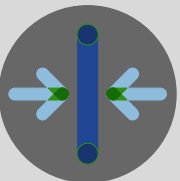
Programmable

Faster



IOS XR – Evolution – XR7

7.0.11 For Spitfire : 918M
7.0.1 For NCS6000: 1128M

Innovation	 Software Delaying	 Reduced Memory Footprint	 Thin Stack and Modularization	 Faster Boot Times
	 API-driven Advanced Routing	 One OS for the Network	 Deployment-matching Code	 Less Downtime, Faster Upgrades



IOS XR 7

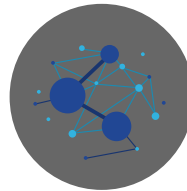
Flexible architecture for all deployments



Elastic



Cost Optimized



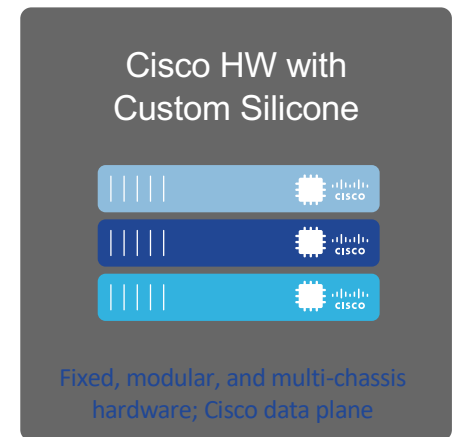
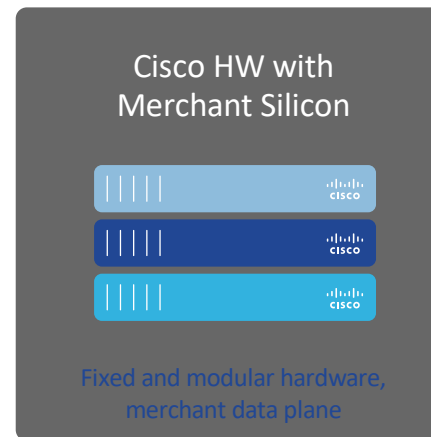
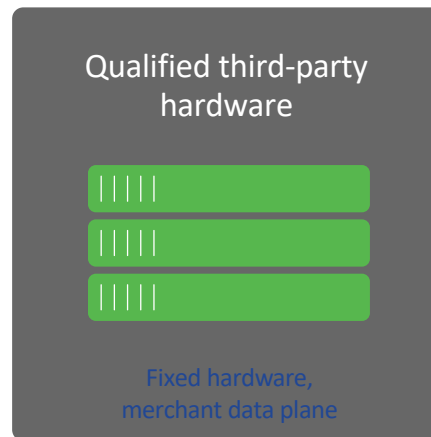
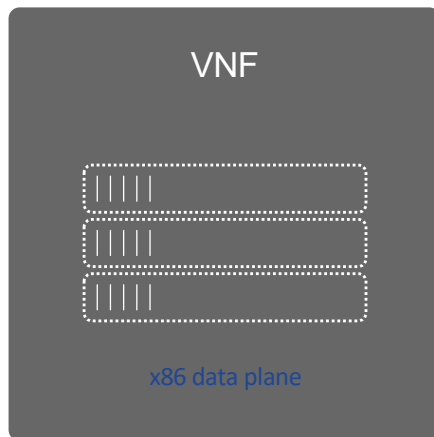
Ultra-high Density



Critical Infrastructure



Programmable and Automatable



IOS XR — Common SP Operating System across physical and virtual data planes

IOS XR 7

Flexible software consumption options



1

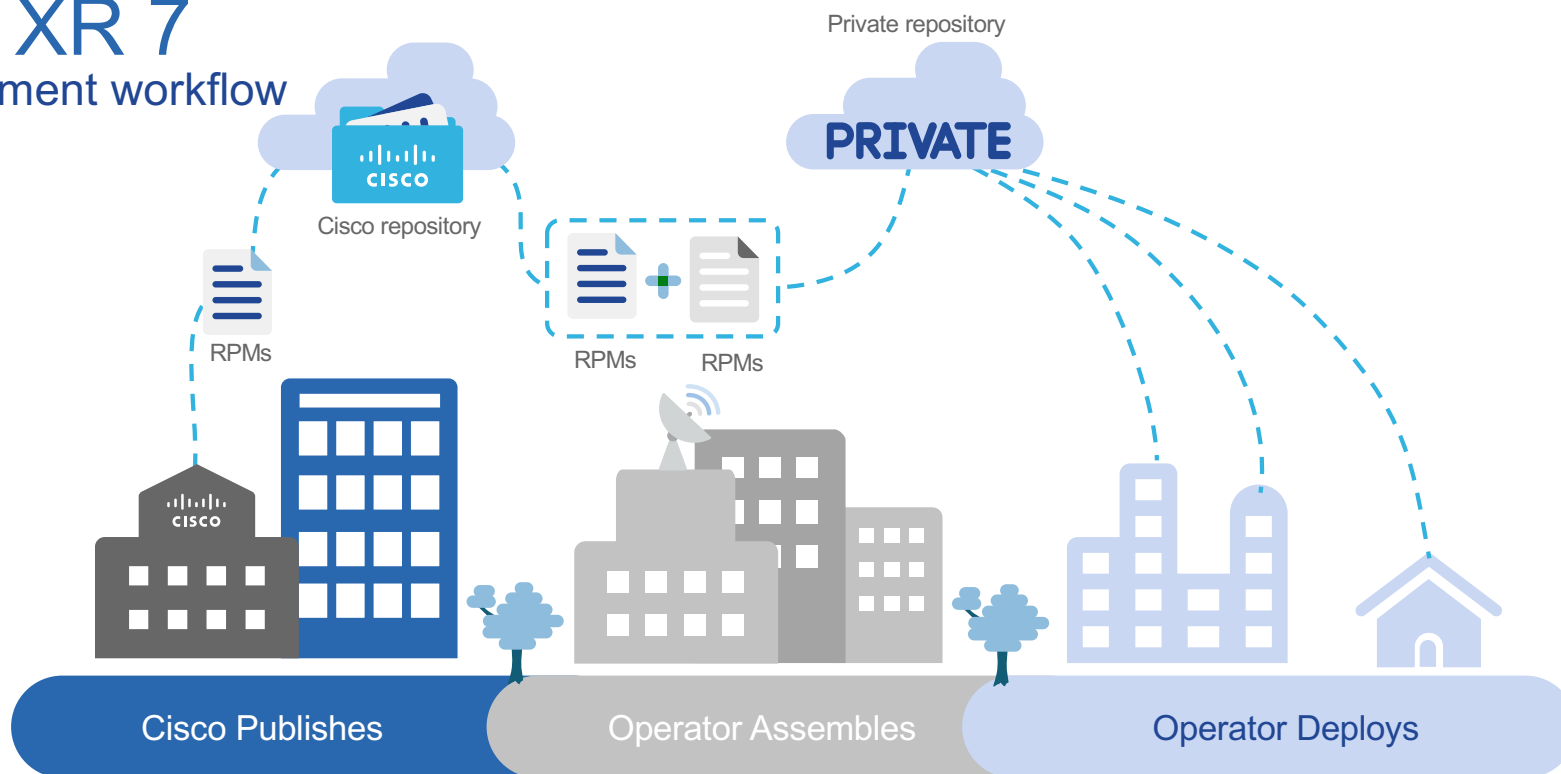


2



IOS XR 7

Deployment workflow



- Operator retrieves RPMs from DevHub
- Combines with own RPMs, qualifies for deployment
- Publishes to a private repository (e.g. hosted on mgmt. network)

- During installs, routers running IOS XR 7 fetch packages from the private repository

Cisco Highly Confidential

IOS XR 7

Software Packaging

```
RP/0/RP0/CPU0:Cisco-8000#show install active summary
Active Packages:   XR: 170    All: 1188
Label:             7.0.14.-EFT_7
Software Hash:     67fb7ea9989d48016c49fba08aaadf97

Optional Packages                                     Version
-----
xr-8000-mcast                                         7.0.14.v1.0.0-1
xr-8000-netflow                                       7.0.14.v1.0.0-1
xr-bgp                                                7.0.14.v1.1.0-1
<snip>
xr-is-is                                             7.0.14.v1.0.1-1
xr-k9sec                                             7.0.14.v1.0.0-1
xr-lldp                                              7.0.14.v1.0.0-1
xr-mcast                                             7.0.14.v1.0.0-1
xr-ospf                                              7.0.14.v1.0.0-1
<snip>
```

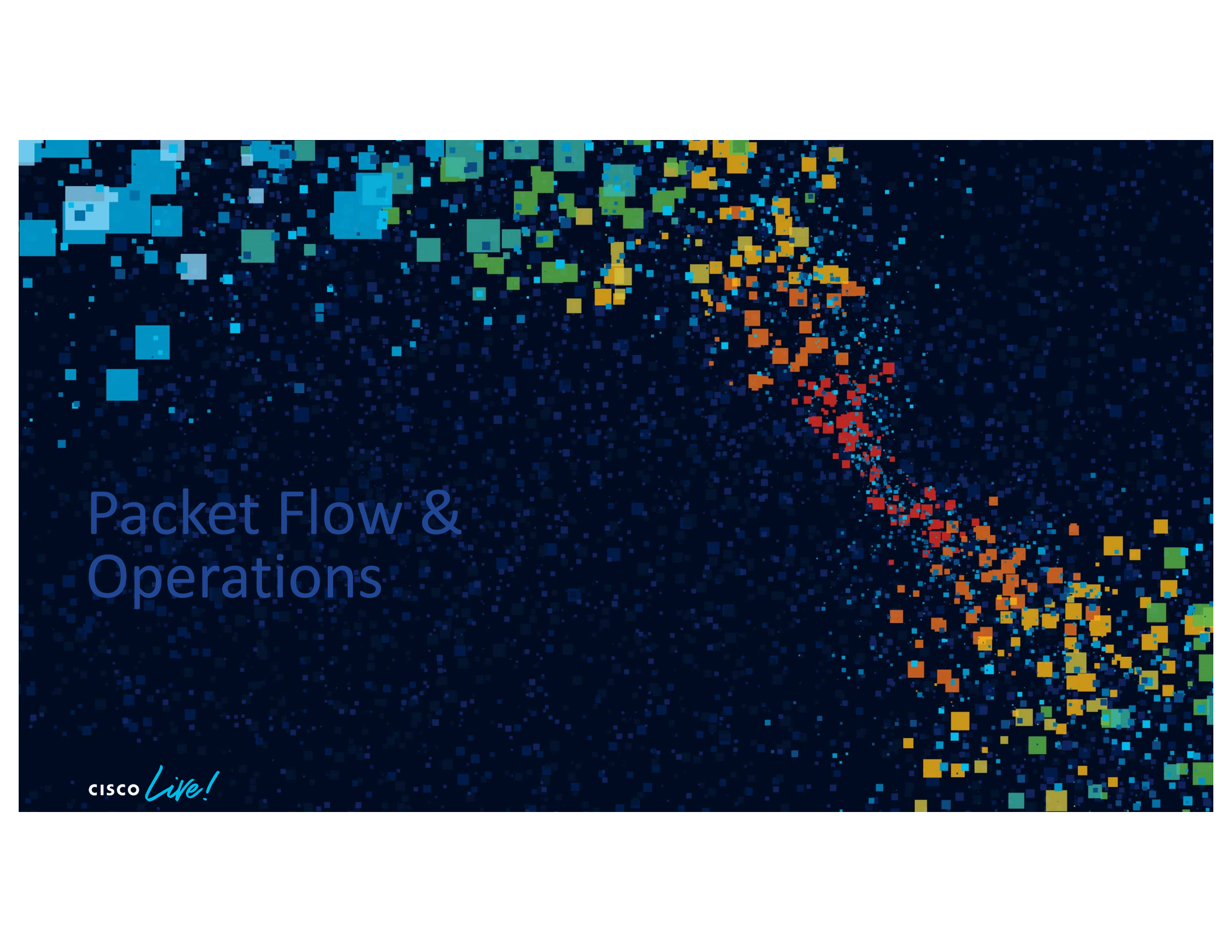
Each feature & component has it's own package for SW patches

IOS XR 7

Software Packaging – default packages included in base .iso

Can select additional feature packages and SW patches and build a specific gISO image (Golden ISO) with a Label for ease of operational monitoring of images across network base

Spitfire - 8000	
Spitfire Optional RPM's	Included in ISO
8000-netflow	Yes
8000-mcast	Yes
BGP	Yes
IS-IS	Yes
OSPF	Yes
LLDP	Yes
MCAST	Yes
NETFLOW	Yes
MPLS-OAM	Yes
Perfmgmt	Yes
Track	Yes
SSH is part of the base ISO – no RPM required	Yes

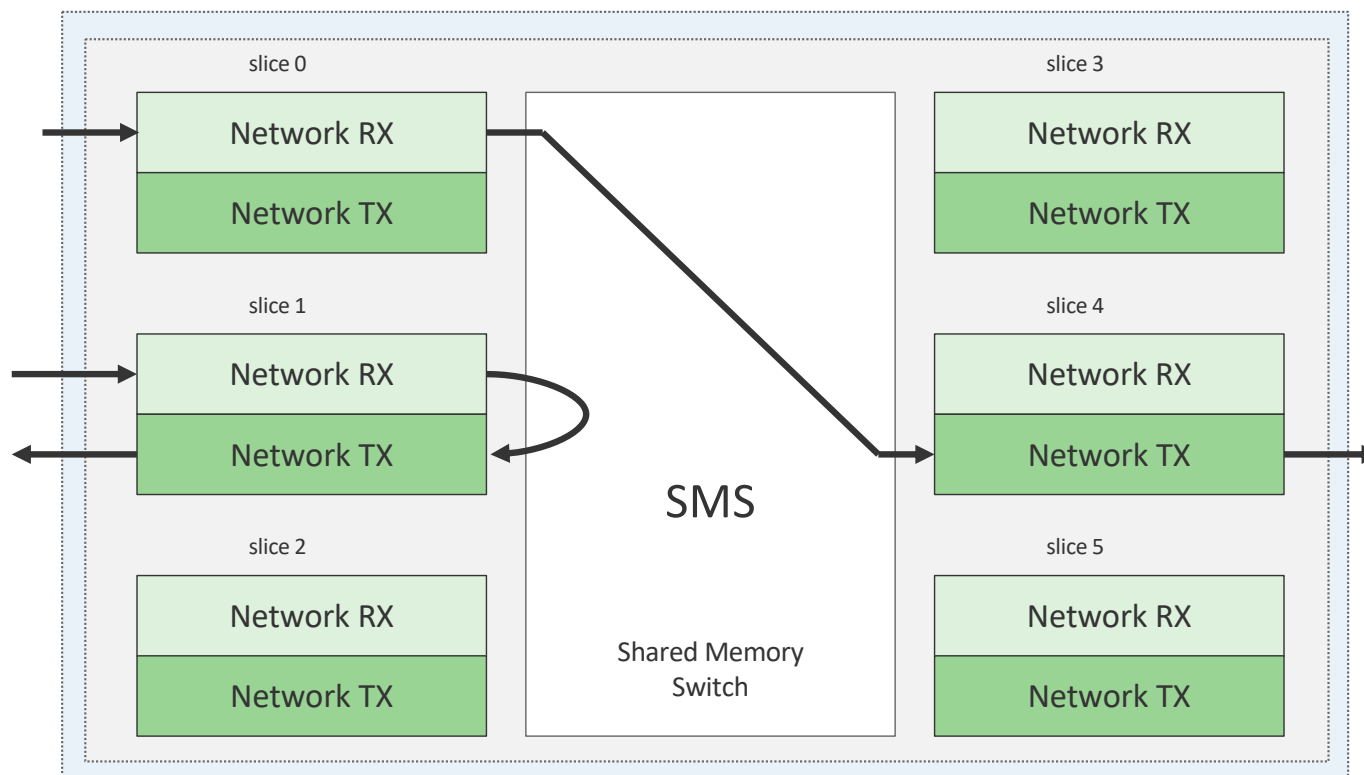
The background of the slide is a dark blue field filled with numerous small, semi-transparent squares and dots in various colors including light blue, green, yellow, orange, and red. These elements are scattered across the slide, with a higher concentration of orange and red squares forming a diagonal streak from the upper right towards the lower right.

Packet Flow & Operations

CISCO *Live!*

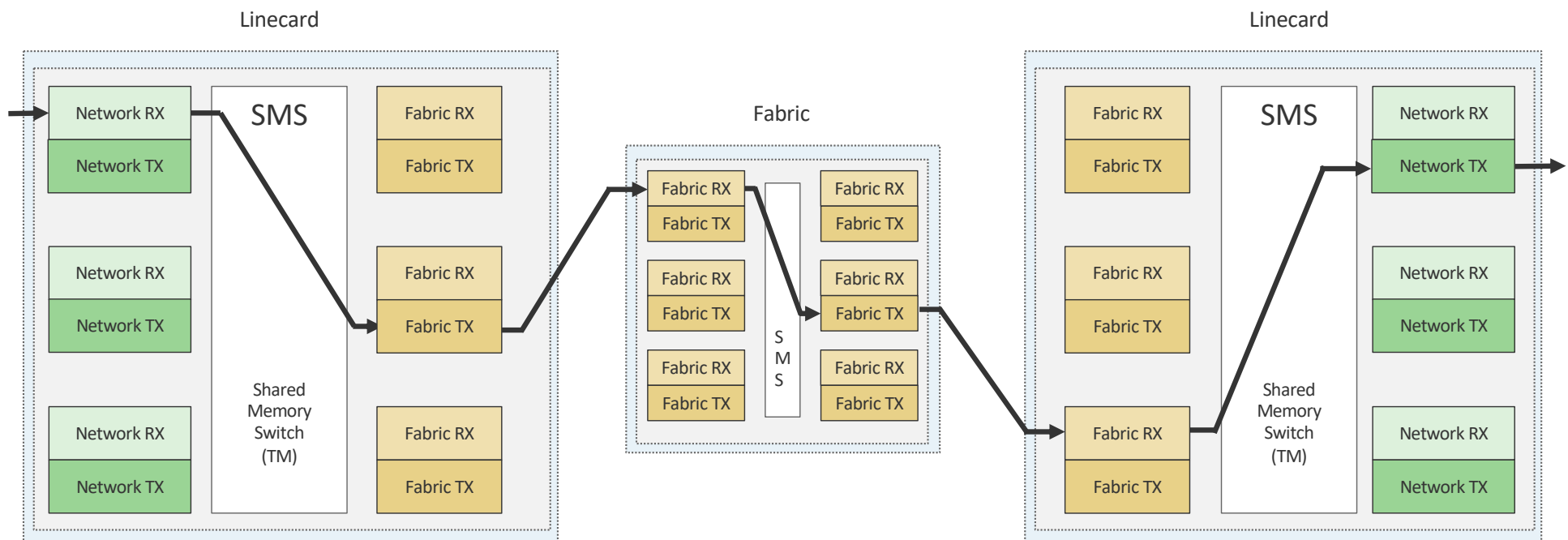
Packet Flow & Operations

Fixed Platforms – All NPU's (Q100) are network facing



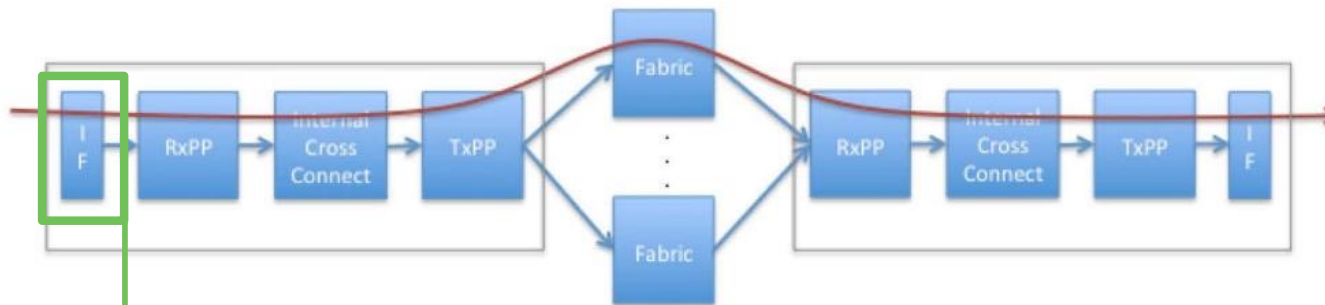
Packet Flow & Operations

Modular Platforms – Some NPU's (Q100) are network facing and some are fabric facing



Packet Flow & Operations

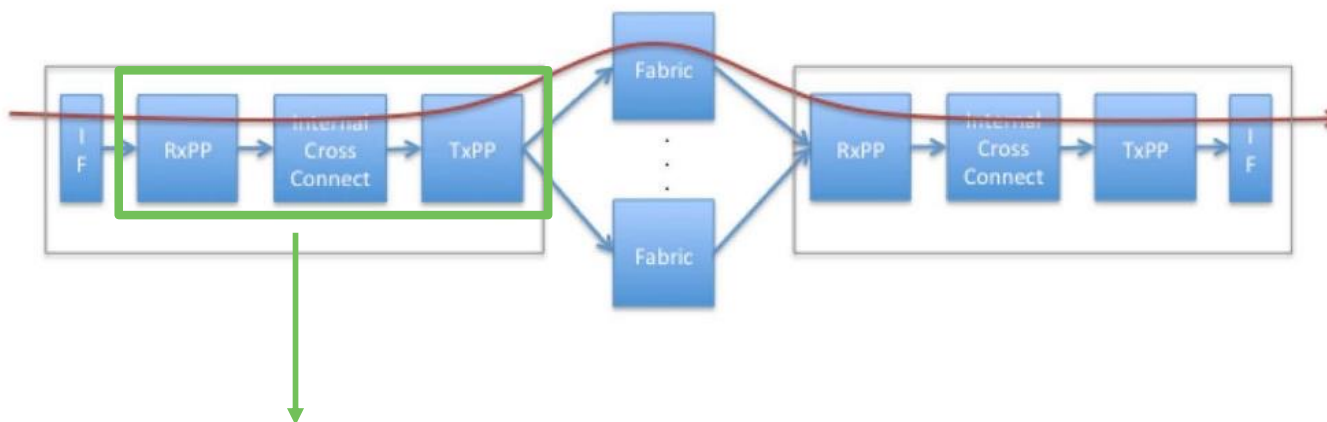
Ingress Interface



- show interface hu/fh 0/0/0/0
- show controller hu/fh 0/0/0/0 all (statistics, packet size, CRC's, DB levels, etc)
- show controller optics 0/0/0/0

Packet Flow & Operations

Ingress Interface - NPU



- “show controller npu” CLI
- show controller npu statistics instance all location 0/0/cpu0 (to look for drops in NPU)
- show controller npu resources all location 0/0/cpu0 (for memory and HW resources if the FIB is fully loaded)
- show controller npu slice info slice all location 0/0/cpu0 (for slice status)
- show controller npu voq-usage interface all instance all location 0/0/cpu0 (to map a physical port to an NPU)
- show ofa resources (“open forwarding abstraction” NPU tables, v4, v6, etc)

Packet Flow & Operations

Interface port - to – NPU mapping

```
RP/0/RP0/CPU0:Cisco-8000#show controller npu voq-usage interface all instance all location 0/4/CPU0
```

```
-----  
Node ID: 0/4/CPU0
```

Intf name	Intf handle (hex)	NPU #	NPU core	PP Port	Sys Port	VOQ base	Flow base	VOQ port type	Port speed
--------------	-------------------------	----------	-------------	------------	-------------	-------------	--------------	---------------------	---------------

FH0/4/0/0	2000130	2	2	1	772	22512	0	local	400G
-----------	---------	---	---	---	-----	-------	---	-------	------

FH0/4/0/1	2000138	0	2	1	776	20208	0	local	400G
-----------	---------	---	---	---	-----	-------	---	-------	------

```
<snip>
```

```
RP/0/RP0/CPU0:Cisco-8000#show controller npu voq-usage interface hu 0/0/0/0 instance all loc 0/0/cpu0
```

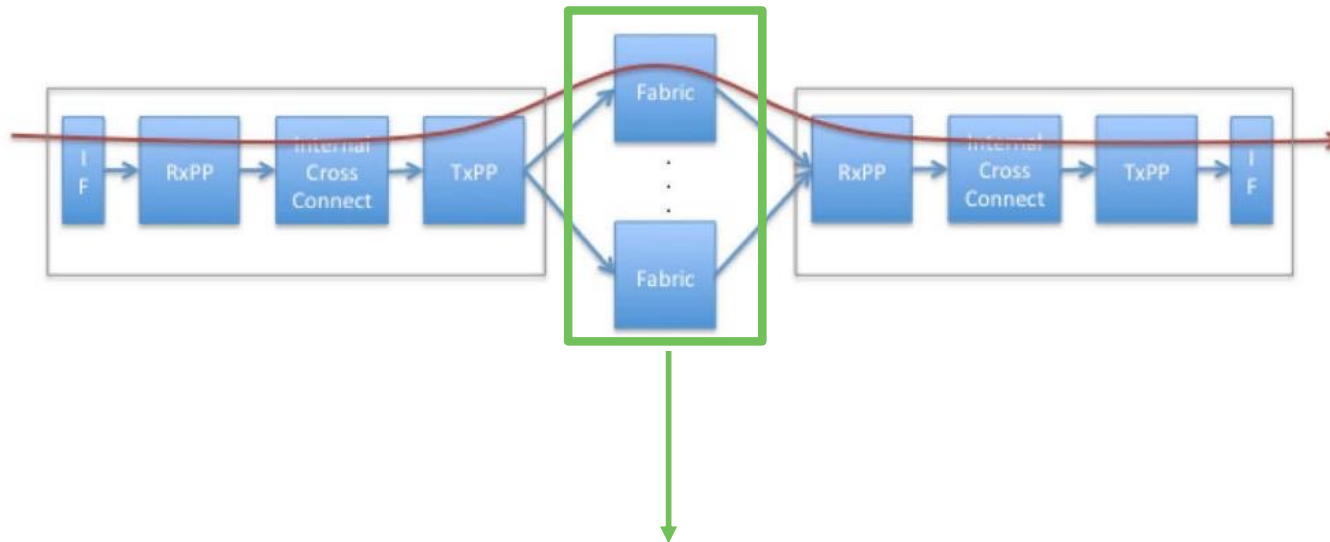
```
-----  
Node ID: 0/0/CPU0
```

Intf name	Intf handle (hex)	NPU #	NPU core	PP Port	Sys Port	VOQ base	Flow base	VOQ port type	Port speed
--------------	-------------------------	----------	-------------	------------	-------------	-------------	--------------	---------------------	---------------

Hu0/0/0/0	190	0	1	0	4	1296	0	local	100G
-----------	-----	---	---	---	---	------	---	-------	------

Packet Flow & Operations

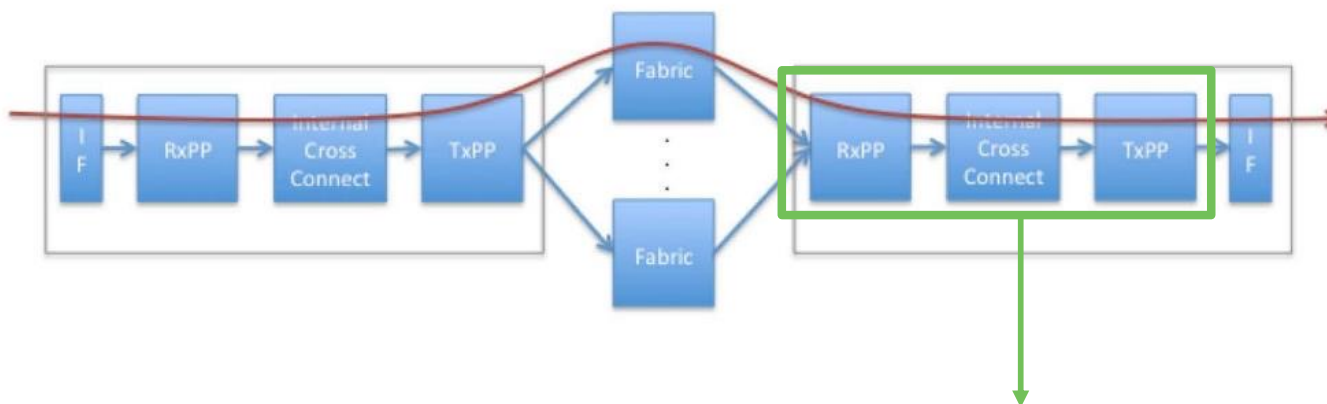
Ingress Interface - Fabric



- “show controller fabric” CLI
- show controller fabric health
- show controller fabric plane all
- show controller fabric plane all statistics
- show controller fabric fgid statistics all brief

Packet Flow & Operations

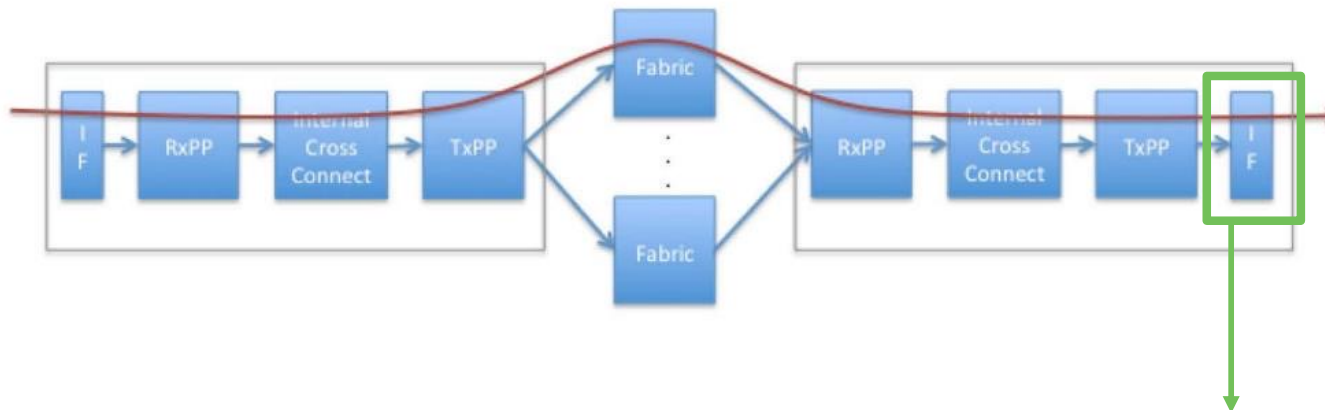
Egress Interface - NPU



- “show controller npu” CLI
- show controller npu statistics instance all location 0/0/cpu0 (to look for drops in NPU)
- show controller npu resources all location 0/0/cpu0 (for memory and HW resources if the FIB is fully loaded)
- show controller npu slice info slice all location 0/0/cpu0 (for slice status)
- show controller npu voq-usage interface all instance all location 0/0/cpu0 (to map a physical port to an NPU)
- show ofa resources (“open forwarding abstraction” NPU tables, v4, v6, etc)

Packet Flow & Operations

Egress Interface



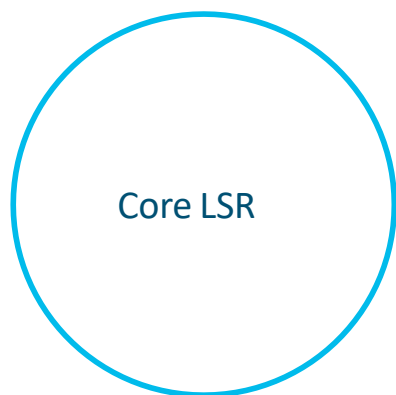
- show interface hu/fh 0/0/0/0
- show controller hu/fh 0/0/0/0 all (statistics, packet size, CRC's, DB levels, etc)
- show controller optics 0/0/0/0

Use Cases

Cisco 8000 & Silicon One

Use Cases – 100G to 400G transition

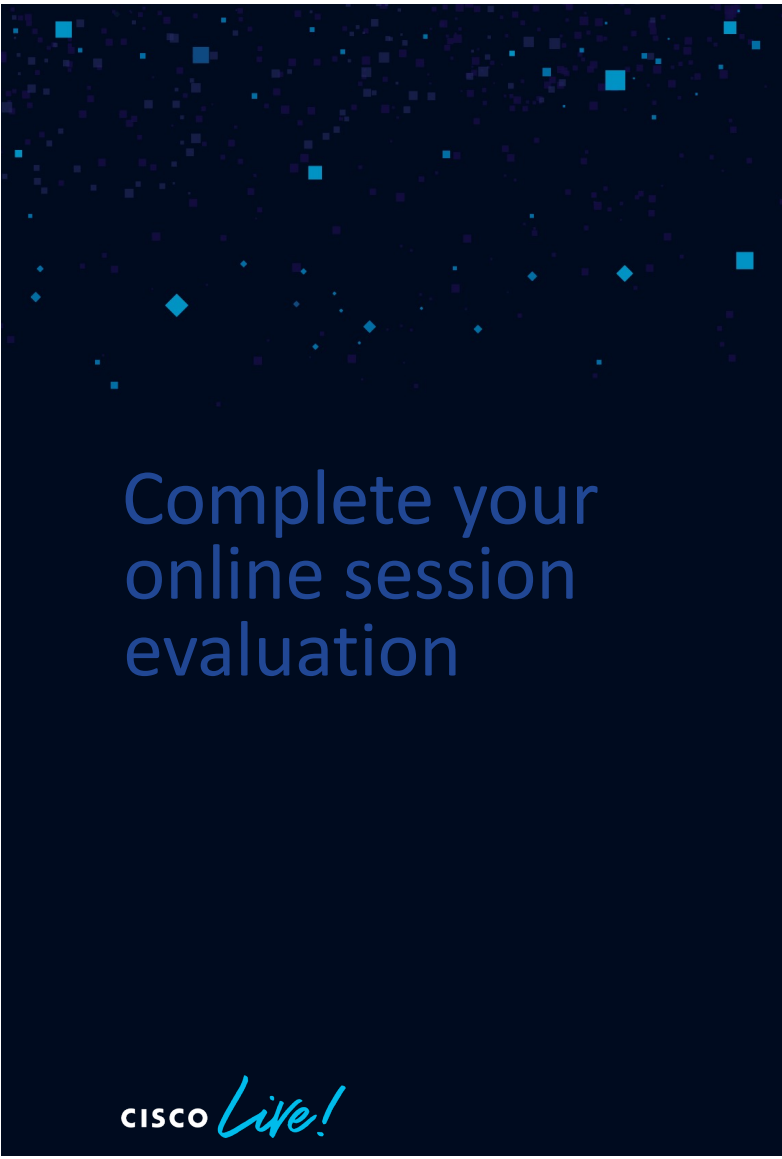
Select web-scale data center roles



Cisco 8000 & Silicon One

Potential use Cases

Role (SP)	Cisco 8818	Cisco 8812	Cisco 8808	Cisco 8202	Cisco 8201
SP Core	X	X	X		
SP Aggregation	X	X	X	X	X
DCI	X	X	X	X	X
Peering	X	X	X	X	
Access Aggregation/ Transport				X	X
Light Edge(MPLS/SR)				X	X



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- Complete a minimum of 4 session surveys and the Overall Conference survey (starting on Thursday) to receive your Cisco Live socks.
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Cisco Live sessions will be available for viewing on demand after the event at ciscolive.com/us.

Continue your education



Thank you

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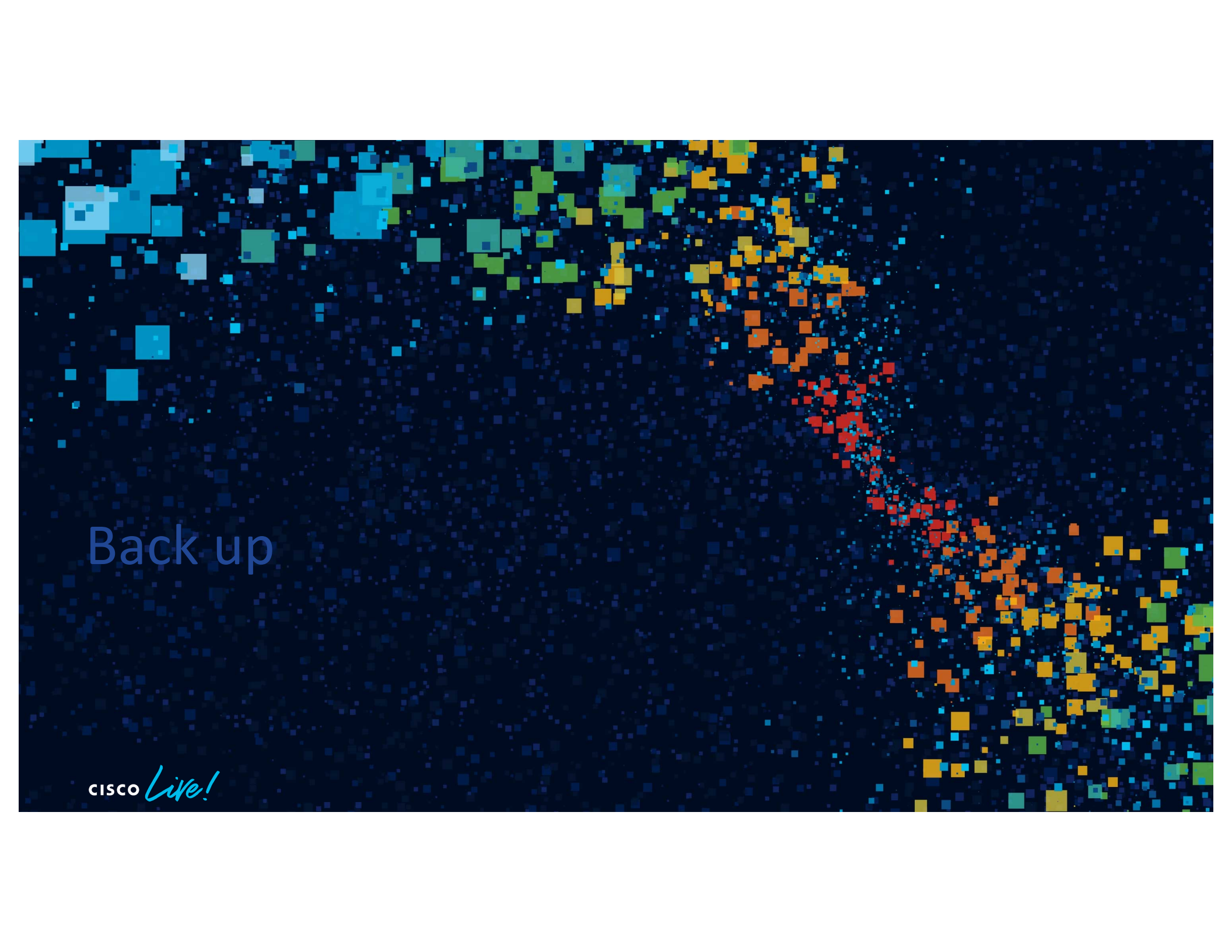
#CiscoLive





Possibilities

#CiscoLive

The background is a dark blue field filled with numerous small, semi-transparent squares and dots in various colors including light blue, green, yellow, orange, and red. These elements are scattered across the frame, with a higher concentration of orange and red squares forming a diagonal streak from the upper right towards the lower right.

Back up

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Cisco 8800 Series Power

References

Cisco 8000 Documentation

<https://www.cisco.com/c/en/us/products/routers/8000-series-routers/index.html>

Cisco 8000 Under the Hood – LJ Wobker

<https://www.youtube.com/watch?v=KIGct1QOtdI>

Cisco 8000 Under the Hood – Najeeb Haddad

<https://www.youtube.com/watch?v=I4cF-VyzwpM>

Cisco Silicon One

<https://www.cisco.com/c/en/us/solutions/service-provider/innovation/silicon-one.html>

Cisco Silicon One

<https://www.youtube.com/watch?v=P5QwOKaxRtI>

Cisco 8000 Routers

IOS XR 7.0.X software features

IOS XR

7.0.11

Cloud Aggregation

- L3 Routing (BGP & IGP)
- BGP PIC (core)
- 100G MACSec SW
- IPinIP decap
- Multicast (SSM, ASM)
- Platform security
- Netconf/YANG
- ZTP & iPXIE
- ECMP
- QoS
- ACLs
- Netflow
- ERSPAN
- ECN
- PFC
- UDF

IOS XR

7.0.12

Cloud Aggregation & Core LSR

- Segment Routing (LSR)
- FAT PW Label (LSR)
- BGP PIC (core)
- RSVP-TE (Midpoint)
- Dark bandwidth
- Entropy Label (LSR)
- 32 Class map
- RSVP-TE (Headend)
- MPLS
- BGP-LU
- 6PE
- mLDP
- P2MP (LSR)
- MoFRR
- BGP FS
- sFlow
- SR-TE

Cisco 8000 Routers

Optics support

7.0.11	7.0.12
• 400G - QDD-400G-CU1M - QDD-400G-CU2M - QDD-400G-FR4-S - QDD-400G-LR8-S • 2 x100G - QDD-2x100G-CWDM4 - QDD-2x100G-SR4 • 100G - QSFP-100G-SM-SR - QSFP-100G-LR4-S - QSFP-100G-CWDM4-S - QSFP-100G-SR4-S (+BO) • 40G - QSFP-40G-SR-BD - QSFP-40G-SR4 (4x10G BO) - QSFP-4x10G-LR-S (4x10G BO)	• 400G - QDD-400G-DR4-S • 100G - QSFP-100G-PSM4-S (+ BO) - QSFP-100G-AOC (multiple distances) • 40G - QSFP-40G-LR4-S • 40G - QSFP-H40G-AOC (multiple distance)

Cisco 8800 Series Power

Modular system, 8808, 8812, 8818 Power Supplies

- 4x 48V DC supplies / tray (4.2 kW)
- 3x AC/HVAC/HVDC / tray (6.3 kW)



	Supply / Tray	Inputs / Supply	Power with ½ inputs	Connector	Voltage	Notes
60A DC	4	2	2.1kW / 4.2kW	4-6 AWG	40 to 72V	5/8" stud spacing 1/4" diameter
100A DC	4	2	3.5kW / 4.8kW	2 AWG	40 to 72V	5/8" stud spacing 1/4" diameter
AC/HVAC /HVDC	3	2	4.8kW / 6.3kW	Saf-D-Grid	180-305V AC 192-400V DC	Same supply for HV DC and all AC voltages

Cisco 8800 Series Power

Modular system, 8808, 8812, 8818 Power Supplies

- QSFP-DD for 400 GbE
- 3-4x 100G power

