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Novinky v Cisco vlajkových XR platformách 8000 a ASR 9000

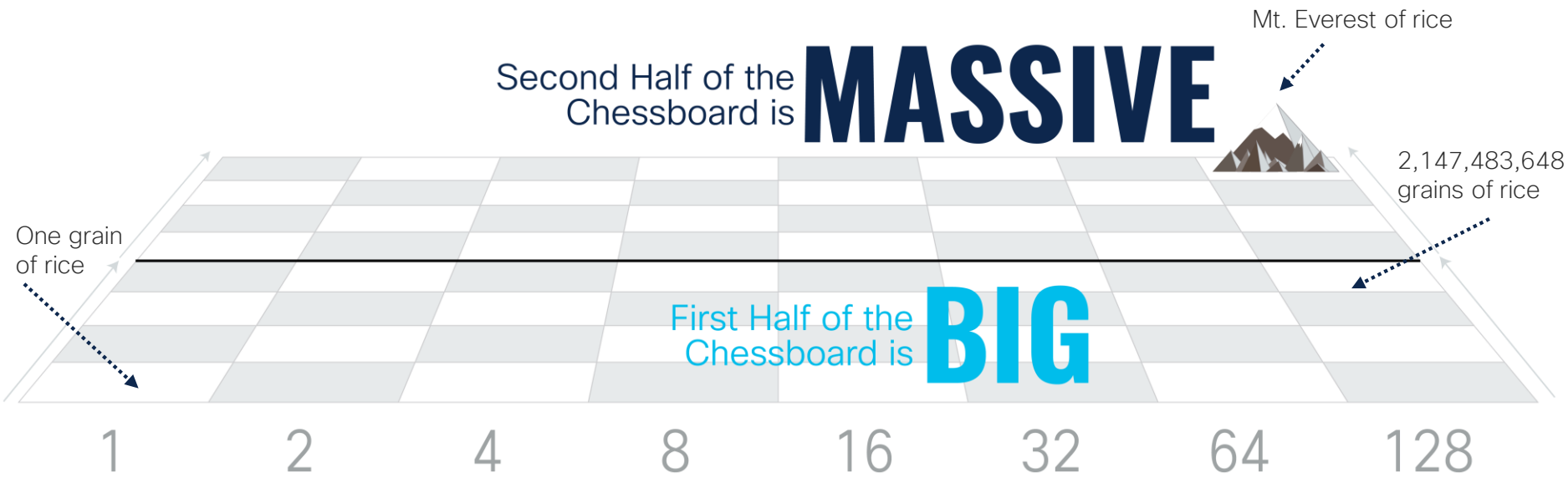
Martin Slinták

Peter Morvay

26. 5. 2020

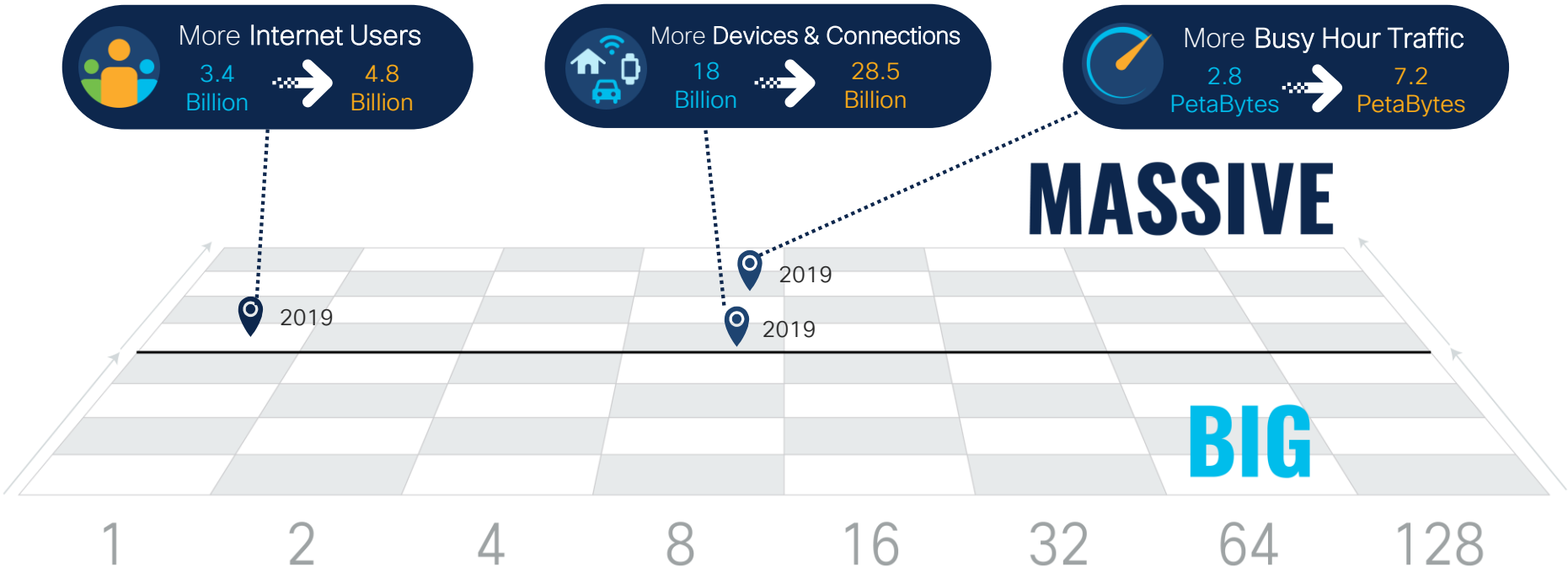
The Exponential Growth of the Internet

The Story of the Emperor, Inventor, and the Game of Chess



The Internet Enters the 2nd Half of the Chessboard

By 2022, Massive Scale Grows Even Larger



Service Provider Platforms

Addressing all Places in the Network

CapEx | OpEx | Security | Converged | Time to Market | Programmable

ASR 920/900
NCS 500
Access

NCS 5500
NCS 560
Aggregation

ASR 9000
Bus Ethernet
BNG Mobile
Edge

ASR 9000
Cisco 8000
Core

ASR 9000
DCI

ASR 9000
NCS 5500 SE
Peering

Cisco IOS XR Software

Cisco ASR 9000 Series

Your network's edge

Refined

- Cutting edge 7nm silicon delivering power savings upwards of 60%+ compared to previous generation hardware
- Enhanced port flexibility (1G,10G,25G,40G,100G and 400G) and new form factors

Retuned

- A simple, modern, and trustworthy network OS running IOS XR 7
- Automation ready with open APIs, native, Yang, and Open Config Models
- Real time telemetry, segment routing, and EVPN

Reloaded

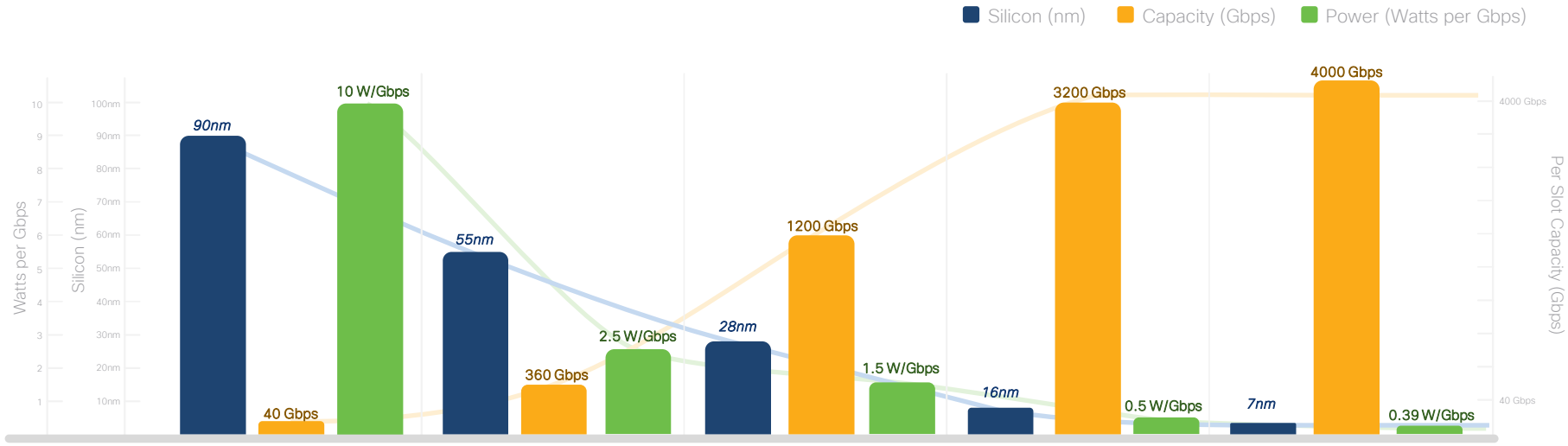
- 5th generation linecards supporting 400 GbE
- A commitment to forwards and backwards compatibility
- Expanded features and technology to drive the next level of simplification by converging IP and optical layers

Reinforced

- Enhanced security, including including Secure Boot, Cisco Trust Anchor, and Anti-counterfeit measures
- The value of your investment

Edge ready. Available today.

Cisco ASR 9000 Silicon Evolution



	2008	2012	2015	2018	2020
	1St Generation Trident, 90nm, 15 Gbps	2nd Generation Typhoon, 55nm, 60 Gbps	3rd Generation Tomahawk, 28nm, 240 Gbps	4th Generation Lightspeed, 16nm, 400 Gbps	5th Generation Lightspeed+, 7nm, 400 Gbps
Fabric Interconnect ASIC	Octopus 130nm, 60 Gbps	Skytrain 65nm, 60 Gbps	Tigershark 28nm, 200 Gbps	-	-
CPU	PowerPC Dual Core,1.2 Ghz	PowerPC Quad Core,1.5 Ghz	X86 6 Core, 2 Ghz	X86 8 Core, 2.2 Ghz	X86 8 Core, 2.2 Ghz

Commercial Offers

LightSpeed Plus

Flexible Consumption Model

A la Carte
(Scale Enhanced)

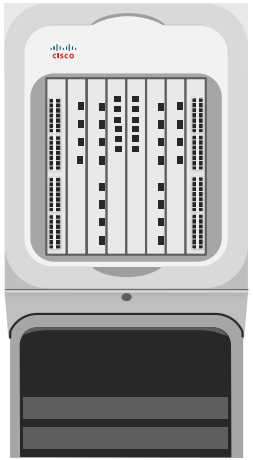
3 Year Mandatory

Advanced Software
(L3VPN – MPLS IPv4/IPv6, MACSec, TE, L3 Tunnel, SL-APIs)

Essentials Software
(Most of the transport oriented feature set with Automation, NSO)

Software Innovation Access (SIA)

Hardware Infrastructure



Traditional Model

A la Carte
(BNG, CGN, MACSec, 400G)

Advanced IP

Base – IVRF

Service Edge | Transport

Hardware Infrastructure

LICENSE PORTABILITY

PAYG

LICENSE POOLING

EASE OF USE

PERPETUAL

Innovations in Technology & Silicon

LightSpeed Plus

Edge Performance

- 300 Mpps at 400Gbps per ASIC
- Industry best performance for service edge profiles

Rich Feature Repertoire

- 3rd Gen Parity Day 0
- Most complete SR-MPLS, SRV6 and EVPN feature set & roadmap
- 10 Years of ASR9K XR Hardening; 8 Releases of LS hardening

Built for Scale

- Dynamic TCAM Carving
- Dynamic Buffer Pooling
- Increased TCAM & SRAM

Automation & Security

- Day 0 integration with Crosswork
- Native & Open-config model parity with Tomahawk
- MACSec on 10/25/40/100/400G; Secure boot & Trust Anchor Capability

LightSpeed Plus Portfolio

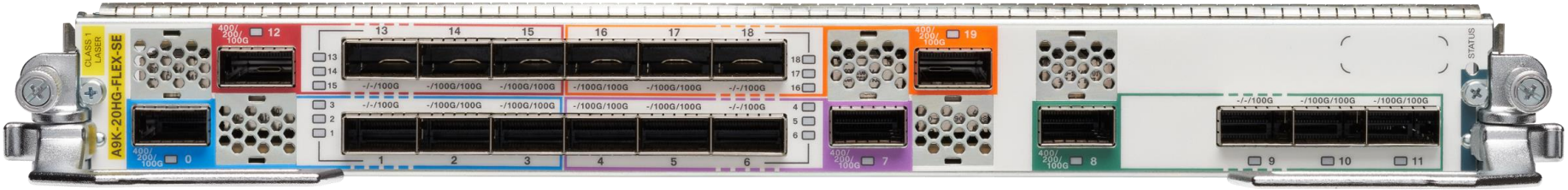
Phase-I Overview

	Ports	Bandwidth	Combo Ports	MACSec/FlexE*	Timing
A99-32X100GE 	32 Ports of QSFP28	3.2 Tbps	No	No	Class B
A9K-20HG-FLEX 	15 Ports QSFP28 5 Ports QSFP-DD	2 Tbps	Yes	Yes	Class C
A9K-8HG-FLEX 	6 Ports QSFP28 2 Ports QSFP-DD	0.8 Tbps	Yes	Yes	Class C
ASR-9903  A9903-20HG-PEC	16 Ports QSFP28 20 Ports SFP+	1.6 Tbps	No	Yes	Class C
	15 Ports QSFP28 5 Ports QSFP-DD	2 Tbps	Yes	Yes	Class C

* roadmap

LightSpeed Plus Line Card Faceplates

A99-32X100GE-X-SE/TR



A9K-20HG-FLEX-SE/TR

A9K-8HG-FLEX-SE/TR

Combo Card Port Configuration Modes

- Each port group (slice) consists of one QSFP-DD and three QSPF28 ports
- Each slice can independently be configured in one of this three port combinations:

Configuration	QSFP-DD 12	QSFP28 13	QSFP28 14	QSDP28 15
1 (default)	100G	100G	100G	100G
2	400G	disabled	disabled	disabled
3	200G	disabled	100G	100G

QSFP-DD port can hold a QSFP28 optic when running in 100G mode

- Color code:
  - Full colored: QSFP-DD port
  - Solid line: QSDP28 port which is enabled when QSFP-DD runs at 200G
  - Dashed line: QSDP28 port which is disabled when QSFP-DD runs at 200G

400G: hw-module location 0/x/cpu0 port <0-19> breakout 1xFourHundredGigE
100G: no hw-module location 0/x/cpu0 port <0-19> breakout

LightSpeed Plus Hardware Compatibility

Support of:	A99-32X100GE-X-SE A99-32X100GE-X-TR (7-fabric)	A9K-20HG-FLEX-SE A9K-20HG-FLEX-TR (5-fabric)	A9K-8HG-FLEX-SE A9K-8HG-FLEX-TR (5-fabric)
ASR 9922, 9912, 9910, 9906 & 9904 chassis	✓	✓	✓
ASR 9010 & 9006 chassis	✗	✓	✓
RP3, SFC3, RSP5	✓	✓	✓
RP2	✗	✓	✓
RSP880/RSP880-LT	✗	✗	✓*
SFC2	✗	✗	✓

NOTE: Do not forget that ASR 9922 requires the V3 Fan tray!

*Exception: 9010, 9006 & 9904 requires RSP5 if fabric redundancy is required

ASR 9903 Overview

Compact High Dense Service Edge 3RU Chassis

3 RU, 600 mm Depth | 400GE & 25GE | Front 2 Back Airflow | Redundancy | MACSec, FlexE*

- Delivers 5th Generation 3.6T Service Edge scale in small form-factor for compact edge, 5G Aggregation, Peering, cloud edge roles

- 400G QSFP-DD, ZR for long reach
- FlexE*, MACSec
- Class C Timing
- Support for10/25/40/100/200/400G
- Investment protection

- Redundant Route Processors
- Power, Cooling redundancy

- 3.6T in 3RU
- Front-to-back airflow
- Under 600mm in Depth
- 0.4W/G power usage

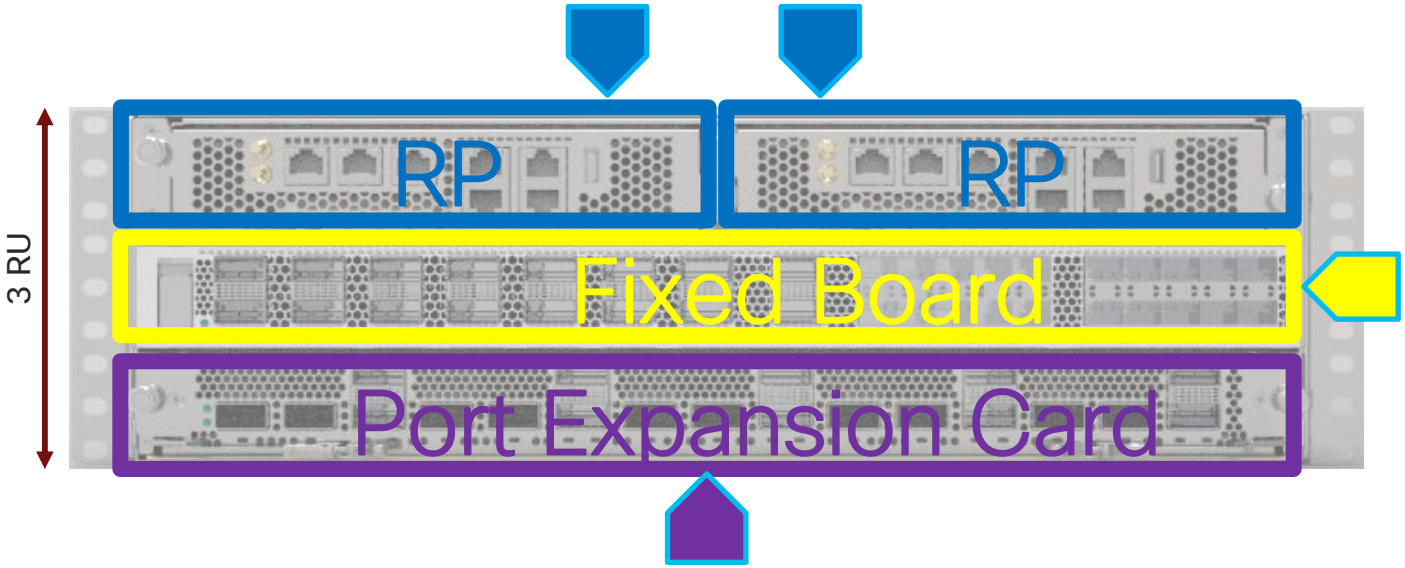
* roadmap

ASR 9903 – External look

Height 5.25 in (133.4 mm)
Width 17.50 in (444.5 mm)
Depth 23.62 in (600 mm)

ASR 9903 – Hardware design (Front side)

Two redundant Route Processors



Fixed Board with integrated Switch Fabrics and fixed ports:

- 16x100GE QSFP28
- 20x10GE SFP+

Port Expansion Card (PEC) – two options:

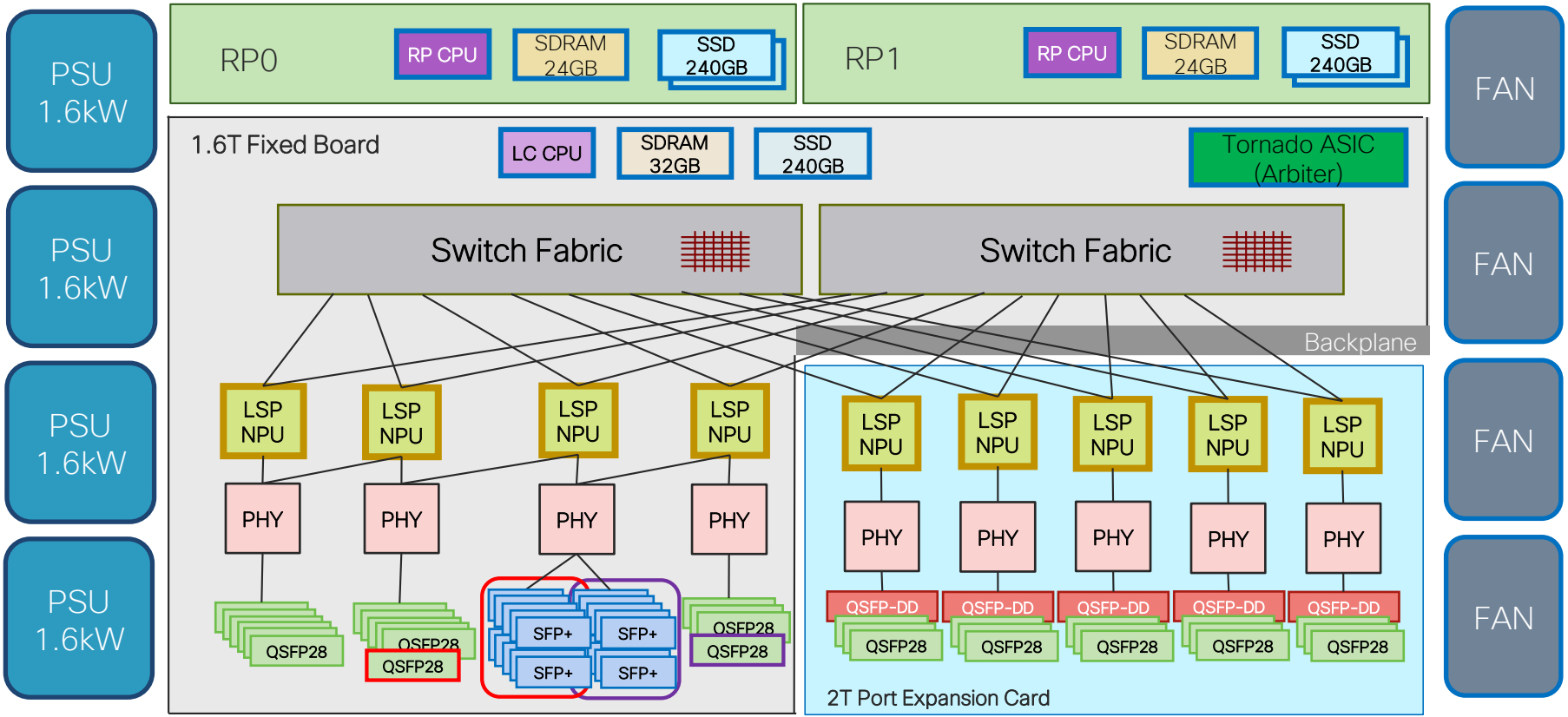
- 2T – up to 3.6T per chassis (Maximum capacity, high rate ports):
  - 5x400/200/100GE QSFP-DD and
  - 15x100GE QSFP28
- 800G – 2.4T per chassis (High density of low rate ports):
  - 32x10/25GE SFP+/SFP28 and
  - 16x10GE SFP+

ASR 9903 vs ASR 9901

	ASR9901	ASR9903
Control Module	Single RP	Redundant RP
Switch Fabric	Single Fabric	Redundant Fabric (see Architecture section)
Form-factor	2RU	3RU
Airflow	Front to Back	Front to Back
RP/LC Memory	RP: 32G, LC: 16G	RP: 24/48G, LC: 32G
Throughput (# of NPUs)	456Gbps (2 TH)	1.6Tbps – 2.4Tbps – 3.6Tbps (4-6-9 LSPs)
Depth	600 mm	600 mm
Power Supply (# of PSU)	AC or DC (2)	AC or DC (4)
400G QSFP-DD	N/A	Up to 5 (using 2T PEC)
Ports (1GE/10GE/25GE/100GE)	• 2x 100GE • 24x 10GE/1GE • 16x 1GE	• 16x 100GE + 20x 10GE fixed ports • 20x 100GE or 10x 200GE or 5x 400GE (using 2T PEC) • 32x 25GE/10GE + 16x 10GE or 48x 10GE (using 800G PEC) • Mix of 10GE, 25GE, 100GE
MACSec support	All 100GE,10GE, 1GE ports	All 400G, 100GE, 40GE, 25GE, 10GE ports
FlexE	N/A	Yes*
Timing, G.8273.2	Class B	Class C

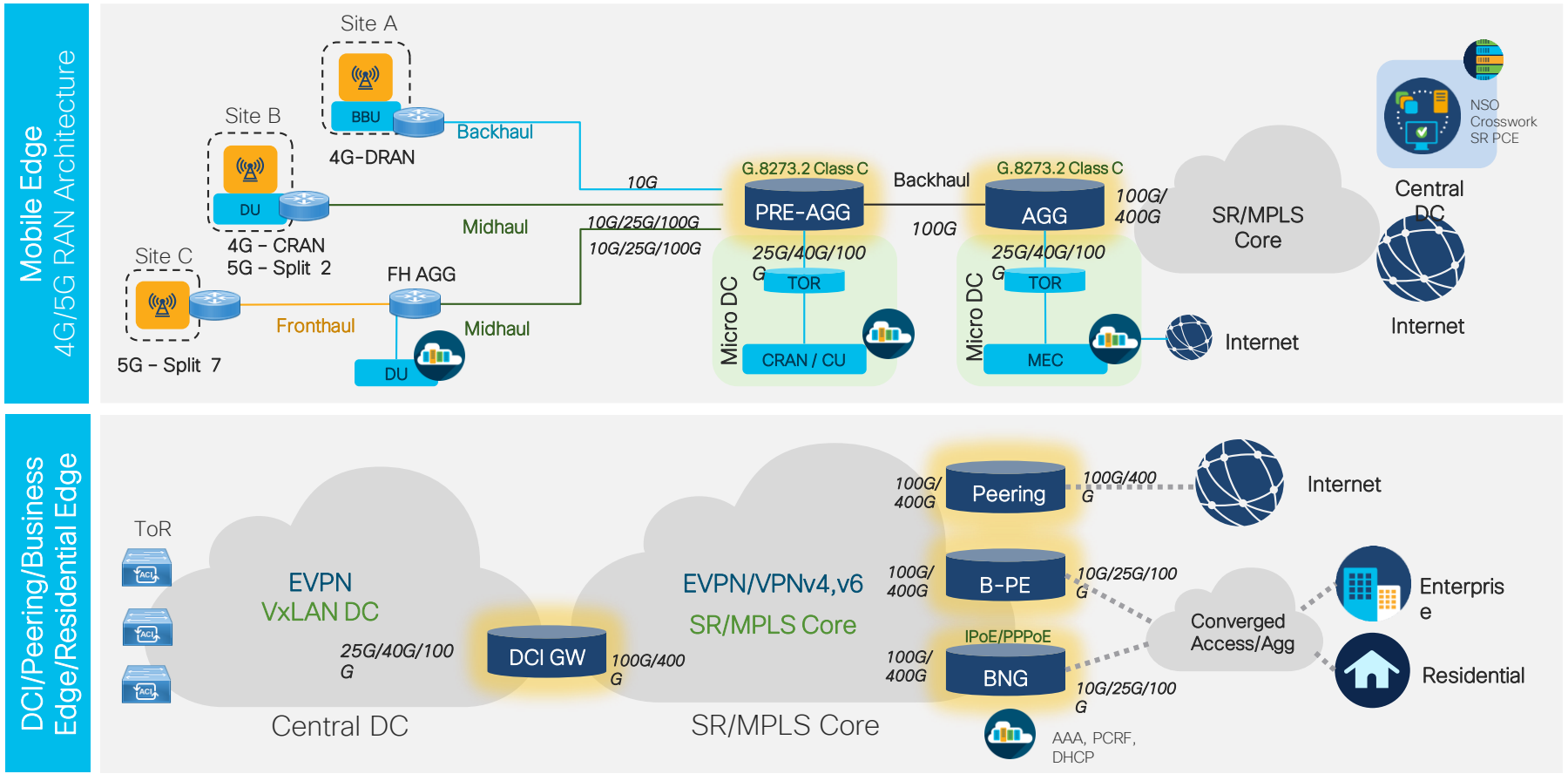
* roadmap

ASR 9903 Hardware Architecture

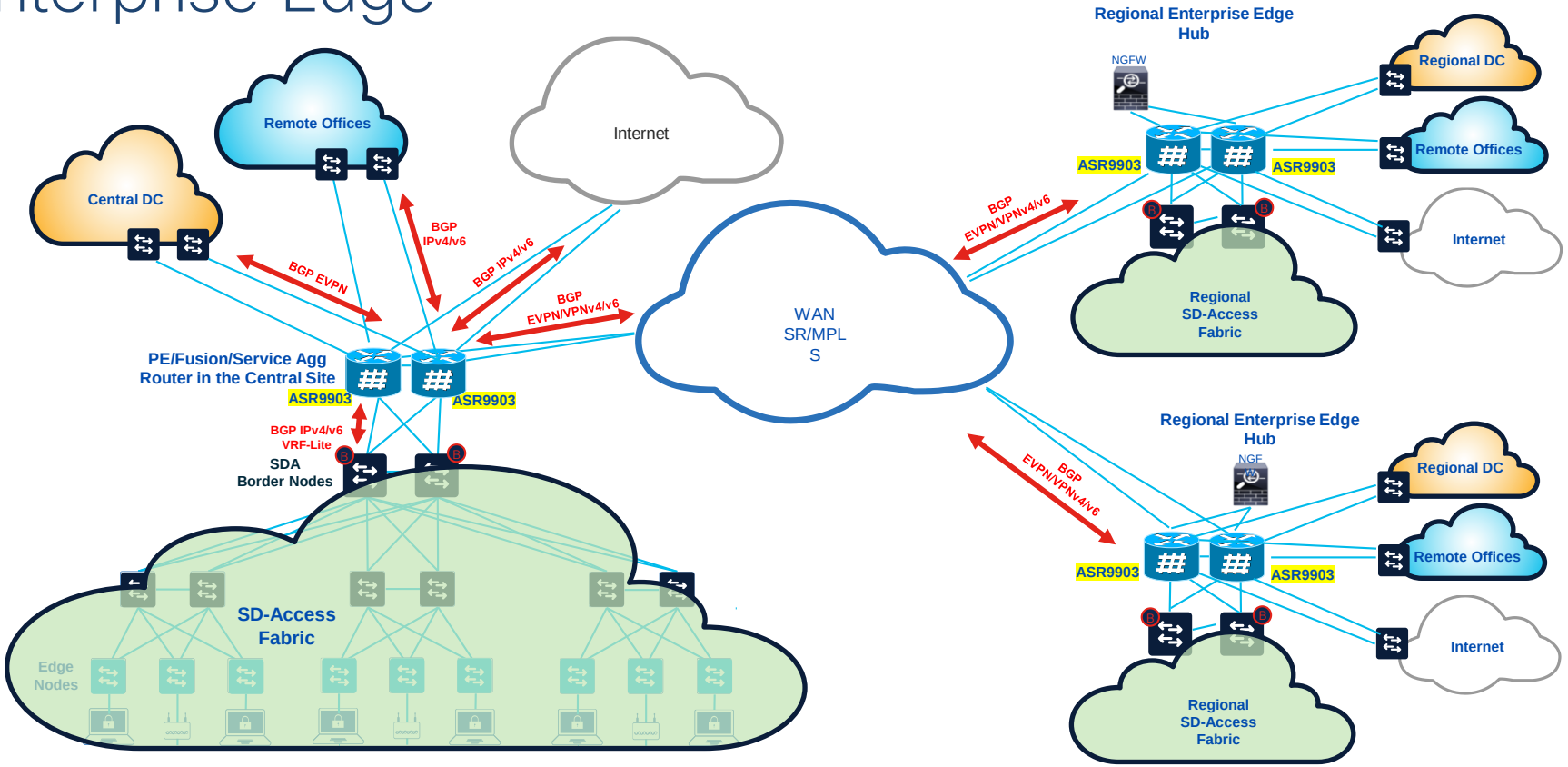


ASR 9903 SP Use Case

ASR 9903



ASR 9903 as a Massive Aggregation Point for Enterprise Edge



Optics Roadmap for Ph-I* Lightspeed Plus Portfolio

7.1.15 (FCS)

- 400G
  - QDD-400G-DR4-S
  - QDD-400G-FR4-S
  - QDD-400G-LR8-S
- 100G
  - QSFP-100G-SR4-S
  - QSFP-100G-PSM4-S
  - QSFP-100G-CWDM4-S
  - QSFP-100G-FR-S
  - QSFP-100G-LR4-S
  - QSFP-100G-ER4L-S
  - QSFP-100G-SM-SR
- 40G
  - QSFP-40G-SR4
  - QSFP-40G-SR-BD
  - QSFP-40G-LR4
  - QSFP-4X10G-LR-S
  - QSFP-40G-ER4

7.1.2

- 100G
  - QSFP-100G-FR-S
  - QSFP-40/100-SRBD
- 40G
  - QSFP-40G-SR4-S
  - QSFP-40G-LR4-S

7.1.3

- 100G
  - QSFP-100G-LR-S

7.3.1

- 400G
  - QDD-400G-SR4-BD
  - QDD-400G-ZR-S
  - QDD-400G-ZRP-S

Roadmap

- 400G
  - QDD-400-CUxM
  - QDD-400G-AOC-10M
  - QDD-4X100G-LR-S
- 100G
  - QSFP-100G-AOC10m
  - QSFP-100G-CU
  - QSFP-100G-4W40-I
- 2x100G
  - QDD-2X100-LR4-S
  - QDD-2X100-CWDM4-S
  - QDD-2X100-SR4-S
- 40G
  - QSFP-40GE-CSR4
  - QSFP-H40G-ACU7M
  - QSFP-H40G-ACU10M

*Ph- I includes 0.8T,2T,3.2T Linecard

Agenda

- Introducing the Cisco 8000 Series
- Cisco Silicon One
- Technical Challenges and 8000 Series Solutions

Why do we need new a ASIC architecture?

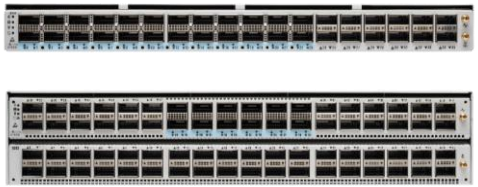
- Requirements change
  - Increased focus on bandwidth and power
  - Hyperscale Cloud
- Underlying component technologies change
  - SerDes, SRAMs, DRAMs, Silicon processes, Optics
- ASIC architectures usually last around 10–15 years
  - Focused deployment
  - Feature parity – broader deployment
  - Iterative evolution
  - Maturity and investment protection
  - End of Sale/Maintenance/Life
- Adoption curve for chips and systems

Target 8000 Series Roles

- Bandwidth requirements – 5-200+ Tbps
- Initially provider core and aggregation
- Select web-scale data center roles
- 100-400 Gigabit Ethernet
- IOS XR

Cisco 8200 and 8800 Routers

8201



8202

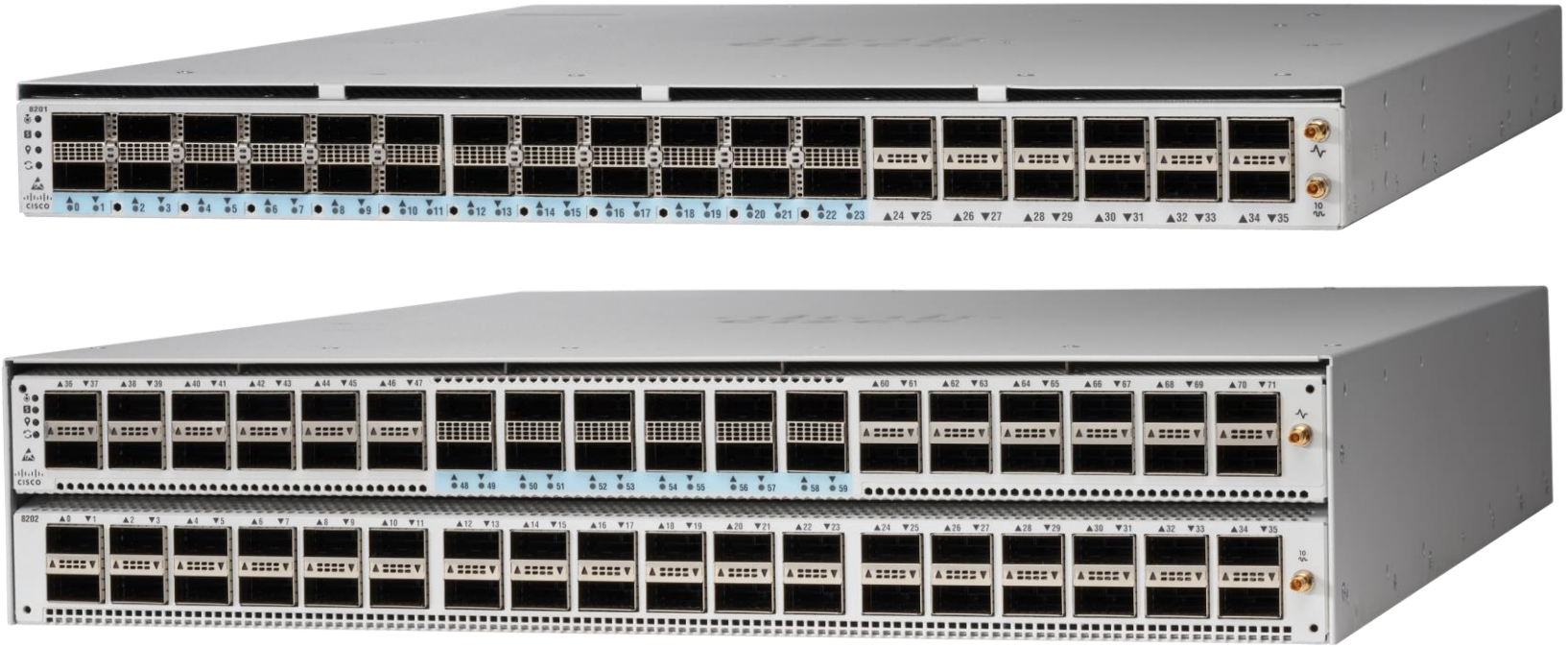
8808

8812

8818

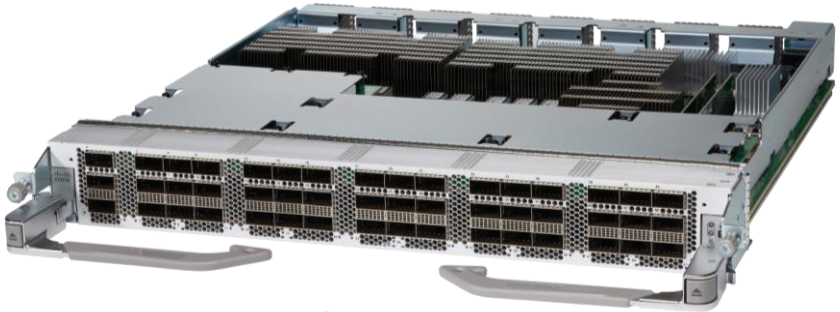
8201 and 8202

100 GbE and 400 GbE Fixed Systems



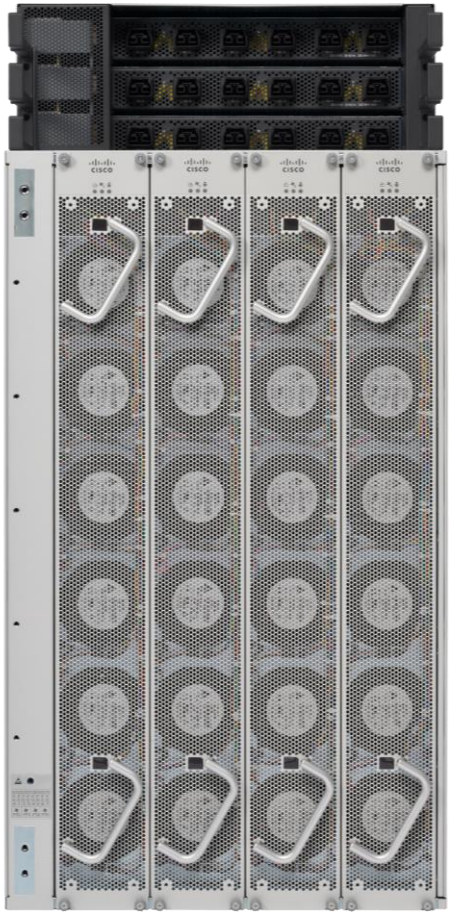
8800 (Front)

36-port 400 GbE, 48-port 100 GbE w/ MACsec

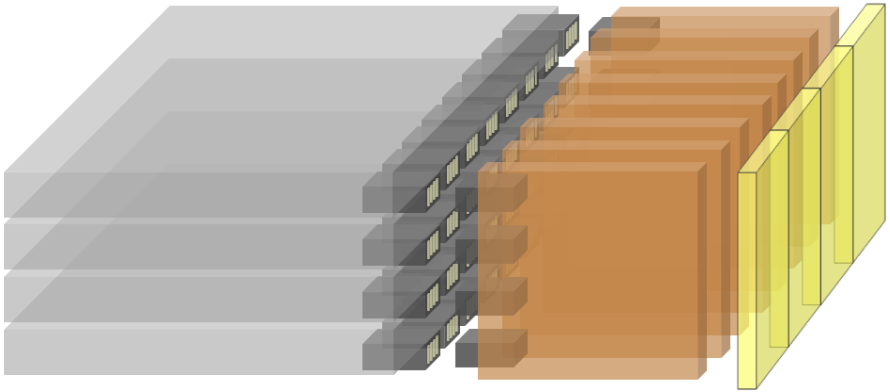


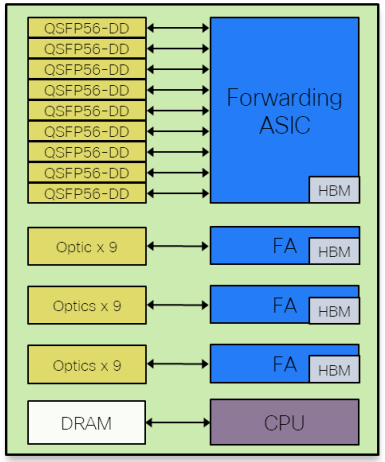
8800 Series (Rear)

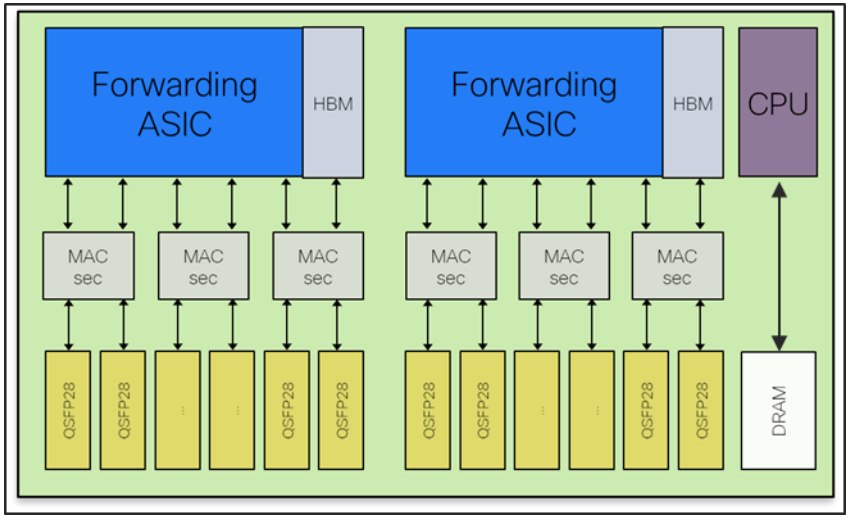
- 4 fans
- 8 fabric cards
- Power connections



8800 Chassis and Line Card Layouts







Cisco Silicon One

Cisco Silicon One

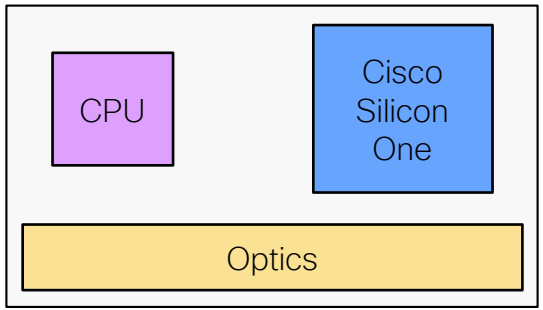
- Blends routing and switching capabilities
- Clean sheet design
- Extensive optimizations for bandwidth and performance
- First device is the 10.8 Tbps Q100
- Single chip for multiple roles
  - Router on Chip
  - Line card NPU
  - Switch fabric

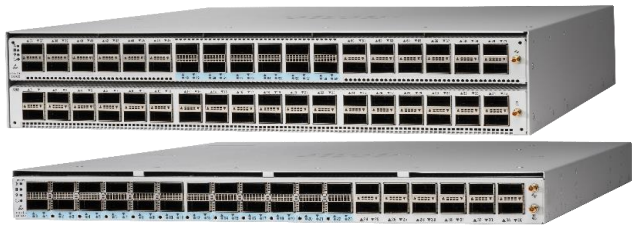
Silicon Innovation

- The industry's best silicon teams

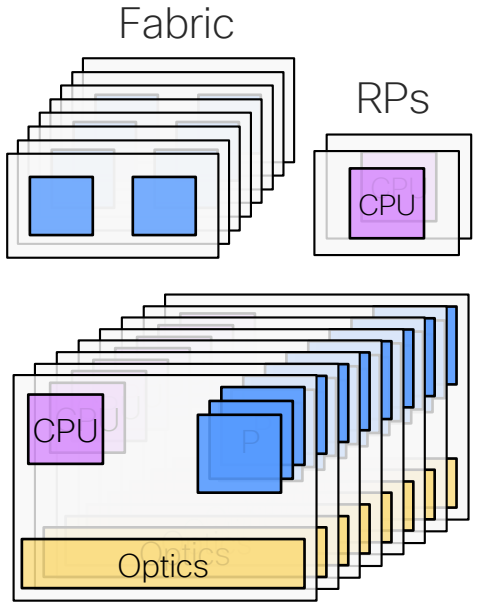
- Routing capabilities at (better than) switching power and performance
- Eliminates off-chip memories
- On-chip High Bandwidth Memory for FIB and deep buffers
- Flexible run to completion engines supporting over 6 billion pps
- Advanced data structures and lookup algorithms
- Scalable, flexible multi-slice architecture

One ASIC – Two Router Architectures





8200 Series

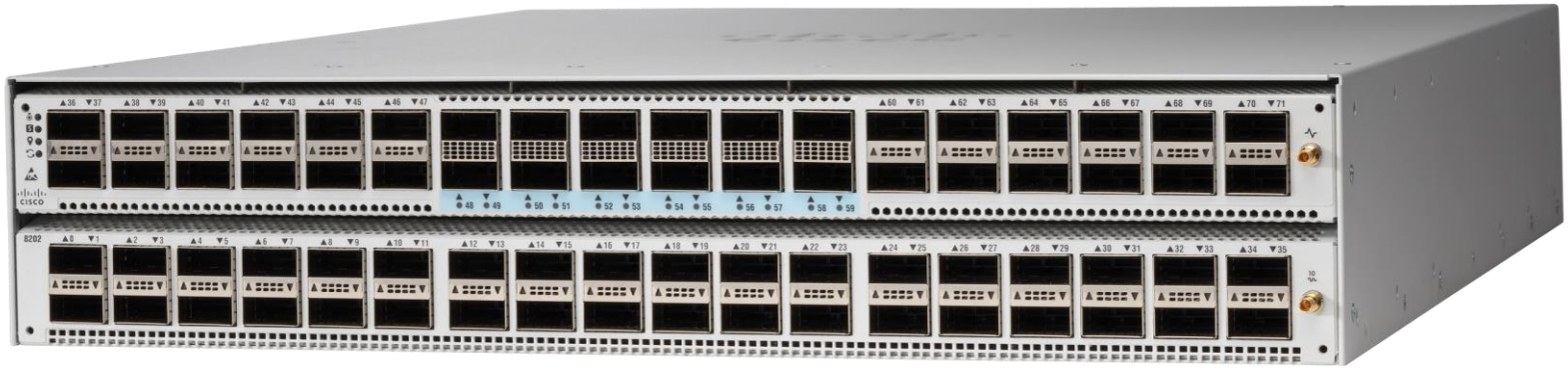


Line Cards

8800 Series

Router on Chip in 8200 Series

- All slices in network mode
- 8201 typical host power under 4 Watts per 100 G
- Separating optics power to allow for range of modules

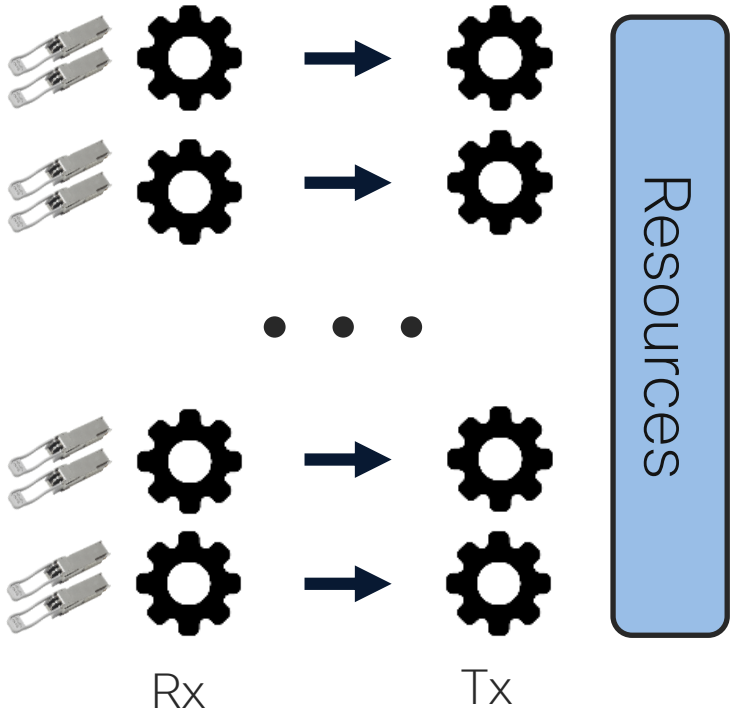


8200 Series Power

First true routers with power under 4W / 100G

- Single ASIC
- Single CPU
- 8201 – 415W Typical (less than a coffee maker!)
- 8202 – 750W Typical

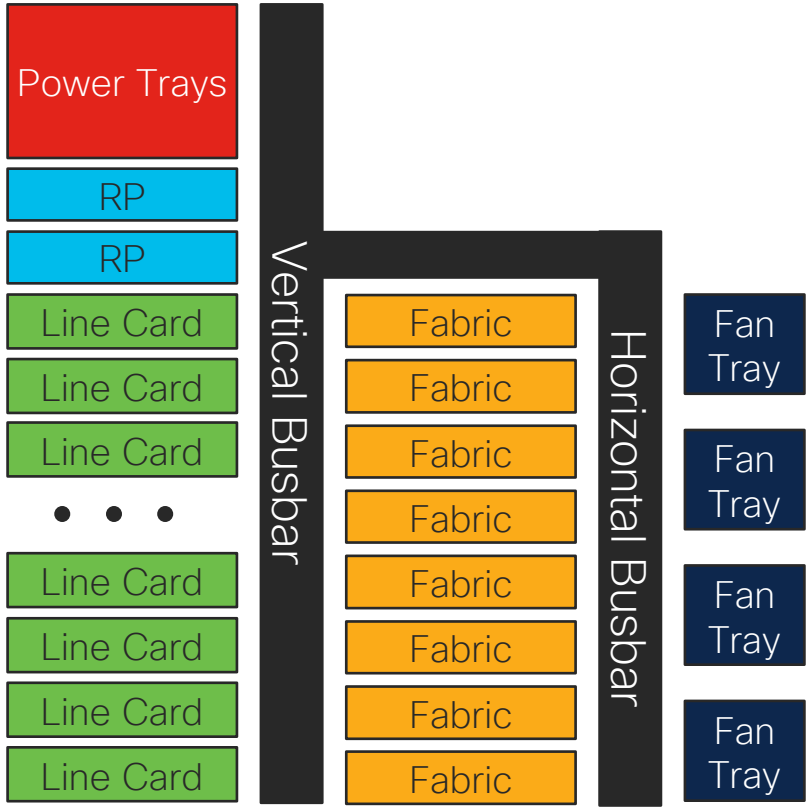
Cisco Silicon One Architecture



- Run to completion stages
  - Traditional programmability model
  - Higher performance
  - Lower power for simple features
- Multiple slices with common resources
- Relatively large on-chip resources
- Single shared buffer pool

8800 Series Power Design

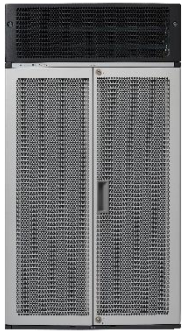
- High max capacity for investment protection
- High-power, high efficiency PSUs
- Busbars
- Feed redundancy model
- Point of Load (POL) innovation
- Rear power cabling

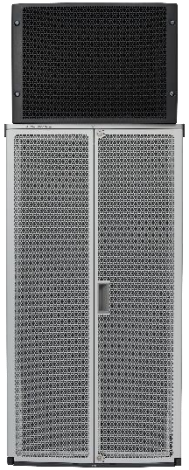


Cisco 8000 Routers

Portfolio

Industry's only platform optimized for 100G & 400G with no compromise for High Availability





	8201	8202	8808	8812	8818
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

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Next TechClub: 28.5.2020

Automatizace v cloudové službě Meraki pomocí rozhraní API

By Milan Rášo

You make possible


CISCO