Winning with Cloud Metro – ACX7K Update

SP Architect Meetup in Odawara

Journey into the Cloud + 5G + AI Era

Peter Chung, AWAN ACX7K PLM Team

December 2023 – ACX7KL

JUNIPER NETWORKS | Driven by Experience™

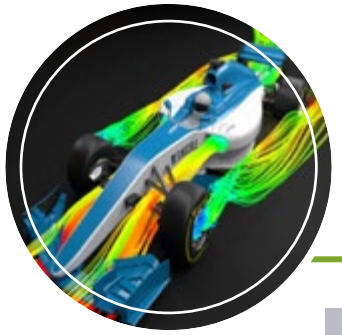
Forward-Looking Statements

This presentation contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which statements involve substantial risks and uncertainties. Except for historical information contained herein, all statements could be deemed forward-looking statements, including, without limitation, Juniper Networks' views concerning our business, economic and market outlook; our expectations with respect to market trends; our product development; the strength of certain use-cases and customer segments; the introduction of future products; the strength of our solution portfolio; the timing of recovery from COVID-19 on customer demand and resolution of supply challenges; and overall future prospects.

Actual results or events could differ materially from those anticipated in those forward-looking statements as a result of several factors, including: general economic and political conditions globally or regionally; the duration of the effects of the COVID-19 pandemic; business and economic conditions in the networking industry; changes in the financial stability of and overall technology spending by our customers; the network capacity requirements of our customers and, in particular, cloud and communication service providers; the timing of orders and their fulfillment; manufacturing and supply chain constraints, changes or disruptions in our business operations caused by, among other things, armed conflicts, cyberwarfare, political tensions, natural disasters and climate change; availability of product components; delays in scheduled product availability; adoption of regulations or standards affecting Juniper Networks' products, services or the networking industry; the impact of inflationary pressures; executive orders, tariffs, governmental sanctions, changes in laws or regulations and accounting rules, or interpretations thereof; and other factors listed in Juniper Networks' most recent reports on Form 10-Q and 10-K filed with the Securities and Exchange Commission. These forward-looking statements are not guarantees of future performance and speak only as of the date of this presentation. Juniper Networks undertakes no obligation to update the information in this presentation in the event facts or circumstances subsequently change.

Statement of Product Direction. Juniper Networks may disclose information related to development and plans for future products, features or enhancements, known as a Plan of Record ("POR"). These details provided are based on Juniper's current development efforts and plans. These development efforts and plans are subject to change at Juniper's sole discretion, without notice. Except as may be set forth in definitive agreements, Juniper Networks provides no assurances and assumes no responsibility to introduce products, features or enhancements described in this presentation. Purchasing decisions by third-parties should not be based on this POR and no purchases are contingent upon Juniper Networks delivering any feature or functionality depicted in this presentation.

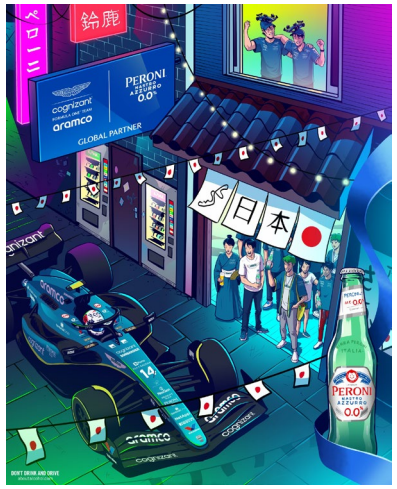
Balance is KEY for optimum performance



Optimized airflow and thermal design

Streaming Telemetry
Car health and Key System Metrics

Latest Engine
Power & Efficiency



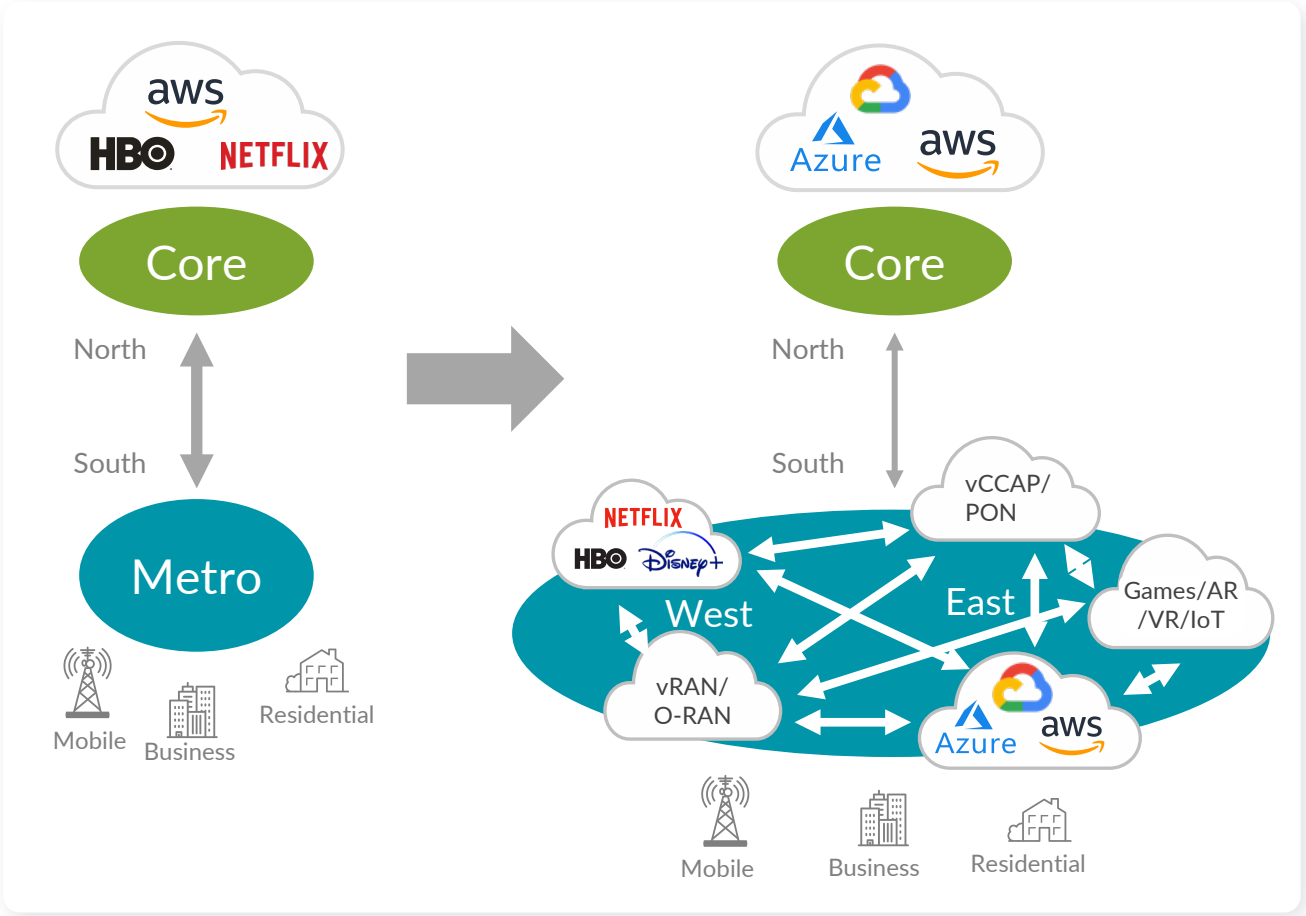
Innovative Architecture

Security

Optimized design for the maximum performance
(with standard tires)

Metro is the New Edge, Big Growth Opportunity

Where Connectivity, Cloud & Experience Converge

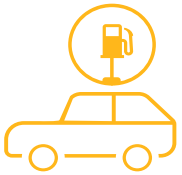


10%	Price premium for excellent experience by 1 in 4 subscribers
50%	Enterprise data will be distributed in edge clouds by 2025
500%	Metro transport traffic growth from 2021 to 2027
$500B	Edge computing TAM, growing at 49% CAGR thru 2030

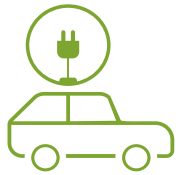
Sources: Forbes, Gartner, ACG Research, STL Partners

A New Approach Demands a New Category

Cloud Metro: New Category for Sustainable Business Growth



VS.



	Retro Metro	Cloud Metro
Operations	Focus on Devices	Focus on Service Experiences
	Manual, “DIY” Operations	Cloud-Delivered Automation
	Individual Expertise	AI-Enabled Collective Intelligence
Systems	Traffic Aggregation Only	“Smart” Rich Features & Scale + Aggregation
	Monolithic Power Design	Energy-efficient Adaptive Power Design
	Rip n Replace ~3 to 5 Years	PAYG, ~7 to 12 Years
Architecture	Scale Up	Scale Out + Scale Up
	Network Silos: Mobile vs. Biz vs. Consumer	Network Convergence with Network Slicing
	Passive Assurance	Embedded Active Assurance
	“Bolt-on” Security	Built-in Zero Trust Security

Juniper Cloud Metro Solution

Cloud Metro
Sustainable Operations
Sustainable Systems
Sustainable Architecture

Sustainable Operations

Sustainable Systems

ACX7000 Family

JUNOS EVOLVED

ACX7020 — WIP

ACX7024X — New

ACX7024

ACX7100-32C

ACX7100-48L

ACX7332 — New

ACX7348 — New

ACX7509

Sustainable Architecture — New

IP Services Fabric
Converged + NW Slicing
(SRv6, EVPN)

\+ **Embedded Active Assurance**

\+ **Zero Trust Security**

Juniper Optics — New

TDM

10G XGS & EPON

400G ZR/ZR+

Paragon Automation — New

Outcomes Driven

\+

Use Case Based

JUNIPER NETWORKS

Juniper WAN Portfolio

Strategy: Use the best tool (Routing ASIC) for the job

Merchant (DNX) | Trio | Express

ACCESS & AGGREGATION / LEAN EDGE

ACX5448-M
ACX5448
ACX710
ACX5448-D
ACX7100-48L
ACX7509
ACX7024
ACX7100-32C

MULTISERVICE EDGE

MX10K4/8
MX2K
MX240
MX480
MX960
MX304
MX204
MX10003

MX10k Line Cards
24x 400GE
48x 1GE/10GE

CORE, PEERING

Fixed
PTX10003
PTX10001-36MR

Modular
PTX10016
PTX10008
PTX10004

PTX10k Line Cards
36x 400GE
LC1202-36MR

2023 Onwards

ACX7024X — 2H 23
ACX7300 — 2H 23
ACX7020 — 1H 24

4x 400GE, 40x 1-100GE Linecard

28.8T Fixed (800GE)
28.8T Linecard (800GE)

Juniper Networks Routing ASIC Strategy
https://youtu.be/878v7XyumSk

ACX7000 Family Cloud Metro Portfolio

Cloud Metro
Sustainable Operations
Sustainable Systems
Sustainable Architecture

Sustainable Systems: Most Sustainable, High-Performance Systems for Today and Future

JUNOS® EVOLVED

FUTURE-PROOF PERFORMANCE, SCALE & FLEXIBILITY

- ✓ Wide Portfolio
- ✓ Port Flexibility/Density: 1/10/25/40/50/100/200/400 and ZR/ZR+
- ✓ Power efficient: Single Chip Fixed & Centralized Modular Architectures
- ✓ Highest Timing Precision Accuracy: Class-D verified
- ✓ ~4 to 7 Years Longer System Life

61-77% Lower Power Consumption

29-64% More Space Efficient

53-71% Lower TCO

Source: ACG Research TCO Study, 2022

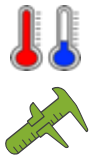
ACX7000 Portfolio Metro Positioning

ACX7K HW "Fantastic 6"
- Industrial Grade
- Security
- MACSec
- High PWR Optics
- Timing
- Small Depth

Access Pre-Aggregation Aggregation

Aggregation – Lean Edge – Metro Core

i-temp / <300mm depth



ACX7024
(Ultron)
(360G Q2U)

Gamora S
Compact 1.6T

ACX7348
(Gamora-M)
(2.4T Q2C)

ACX7332
(Gamora-L)
(2.4T G Q2C/OP2)

Nebula
1RU 800G-1T

ACX7020
(Antman)
(80G Q2N)

ACX710
(Odin)
24x10GE
4x100GE
(320G/QAX)

ACX7024X
(Ultron XL)
(360G Q2U)

ACX7100-32C
(Storm)
32x 100GE
4x400GE
(4.8T/J2)

ACX500, 1K, 2K, 4K
(60G)

ACX5448/M/D
(Rio)
48x10GE
4x100GE
(800G/QMX)

ACX7100-48L
(Wolverine)
48x50GE
6x400GE
(4.8T/J2)

Next Gen FEB
FPC

ACX7509
(Guardian)
9 slot (5RU) chassis
20x1-50GE
16x100GE
4x400GE
(4.8T/J2C)

Cloud Metro Fixed Systems:
ACX7000, ACX7100, ACX7300 Lines

ACX7000 80 - 360G Leaf for 1G, 10G, 25G

ACX7100-48L 4.8T Leaf for 10G, 25G, 50G

ACX7100-32C 4.8T Spine or Leaf for 100G

ACX7300 line 2.4T, Compact, Flexible

Second-generation silicon foundation enabling differentiated logical service scalability with Junos Evolved OS

Single Forwarding ASIC for lowest power & latency

Segment Routing (SR), SRv6 and EVPN

100G ZR and 400G ZR/ZR+ optics support

Juniper Advanced Timing

Product options for deployment in:
- Commercial, Extended, Industrial temperature
- <300mm depth, 600mm depth

New

Juniper ACX7000 Line Overview

Feature	ACX7024 Support
Use Cases	CE and Small WAN Edge
FIB Table Size	128K FIB MD Scale ; 768K FIB 1D validated
Firewall Scale	New firewall profile to double the term size (FY23)

2H 23

Feature	ACX7024X Support
Use Cases	High scale SP/Enterprise WAN CPE, Pre-Aggregation, Full ACX7K Lean Edge roadmap
FIB Table Size	Full routing table : Up to 1.5M
	Roadmap to support FIB compression

- CPU: Intel Denverton 8C
- RAM: 64GB DDR4 /Storage – eMMC 32GB

- 1 RU, 240mm depth, 19” rack compatible
- 24x 1/10/25GE (SFP28), 4x100GE (QDD)
- Timing (Juniper HW/SW): SyncE, PTP and Class C/D
- Cooling:
  - 6 Fans - Fixed (N+1 redundant)
  - Front-to-back airflow
- Power: 1+1 AC or DC (FRU)
- PFE: Q2U (BCM88282) – 360 Gbps, GDDR6 deep buffer
- Storage – eMMC 32GB
- Secure Boot, Trusted Platform Module 2.0, DevID
- 2x Flash boot devices - Primary & Golden BIOS images

New

Juniper ACX7300 Line Overview

2H 23

ACX7332 (Gamora L) _ (2.4T Q2C/OP2)
Fixed ports: 32x 1-25GE, 8x 100GE
3x I/O bays

ACX7348 (Gamora-M) _ (2.4T Q2C)
Fixed ports: 48x 1-25GE, 8x 100GE
3x I/O bays

- 3 RU, 290mm depth, 19” rack compatible
- I/O Bays: 2x 800G + 1x 400G
  - 16x SFP56 FPC
  - 2x QSFP56 + 4x QSFP28 FPC
- SFP, SFP+, SFP28/56, QSFP+, QSFP28, QSFP28/56-DD
- MACSec
- Cooling
  - 8 Fans (4 Fan Trays - FRU), N+1
  - Temperature Hardened (-40C to +65C)
  - Front-to-back airflow (AFO)

Feature	ACX7348/7332 Support
Use Cases	High Scale SP Aggregation, Enterprise WAN, L2/L3 Service Lean Edge and CUPS BNG
FIB Table Size	Full routing table : ACX7348 Up to 2.2M / ACX7332 Up to 8M
	Roadmap to support enhanced FIB on ACX7348 up to 4.8M
CUPS BNG	1st merchant silicon based compact BNG in the industry ACX7332 with OP2/eTCAM : 32K CUPS BNG sessions

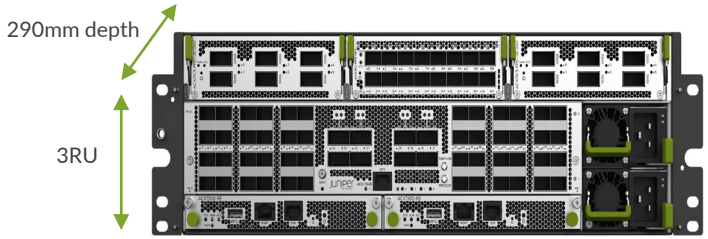
- Power: 1+1 redundant, AC or DC (FRU)
- Timing (Juniper HW/SW): SyncE, PTP and Class C
  - 1PPS & 10MHz, BITS
  - GNSS

- PFE: Q2C/OP2, Q2C : 2.4Tbps
- Redundant RE (optional)
  - CPU: Intel Ice Lake 4C
  - RAM: 64 GB DDR4 (2x 32GB SODIMM)
  - Mass Storage – 100GB SATA/NVME SSD
  - TPM 2.0

Improved Operations with Innovative Designs

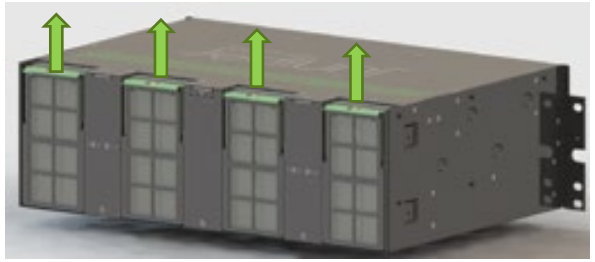
Compact Footprint

Bigger isn't always better!
Easy fit in tight spaces, quick setup, less power yet no compromise on performance



Vertical Fan Pull off

Convenient vertical fan module extraction for easy access to do day-to-day operations



Filter Door with Cable Management

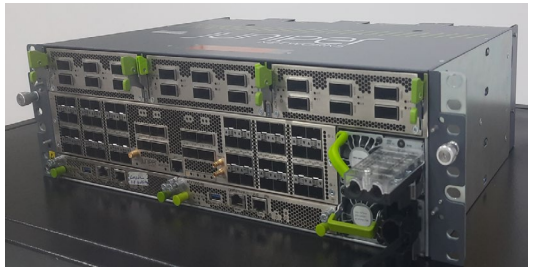
Filter with clean cable handling prevents ventilation obstruction, excessive bending, insulation damage, dust and related unexpected failures

4-post Telescopic Rail Option

Slide the router in and out of rack for easy operations

2-post Ear Mount Bracket Option

Stationary Mount Bracket



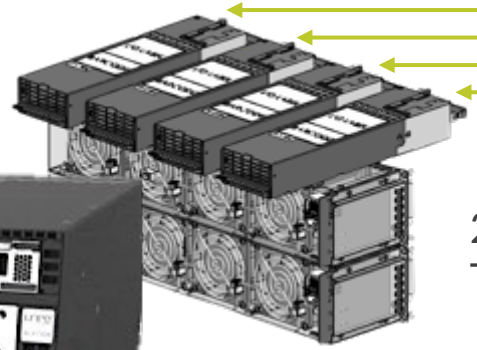
Cloud Metro Modular Systems:
Juniper ACX7500 Overview

- 5RU, 19” Rack, Chassis Depth 24” (600 mm)
- Redundant (optional) Routing Engine (RE)
  - Intel Hewitt Lake 6C
  - 64GB RAM, 2 x 100GB SATA/NVME SSD
- Redundant (optional) Forwarding Engine Board (FEB)
  - 2x Jericho2C for 4.8T Throughput (6.2T over-subscribed)
  - Future J3 (14.4T) or Q4 (25.6T) variant
- 9x FPC Slots
  - 20x 1/10/25/50GE (SFP/SFP+/SFP28/SFP56)
  - 16x 100GE (QSFP+/QSFP28)
  - 4x 400GE (QSFP56/QSFP56-DD)
- N+N Redundant Power
  - 4x 3KW PSM
  - AC/HVAC/HVDC, DC.
  - Max power: 2.2kW (non redt., no optics), 3.5kW (redt., w/ optics)
- Redundant Fan Trays, Front-to-back airflow
- Operating (0-40C), Short Term (0-55C), GR-63 NEBS L3
- MACSec
- Timing (Juniper HW/SW): Sync-E, PTP, Class-C
  - 1PPS & 10MHz input & output, ToD, BITS

Juniper ACX7509 Detailed

Routing & Control Board
2x REs for Redundancy

Power Supply Unit (PSU)
4x 3KW PSU



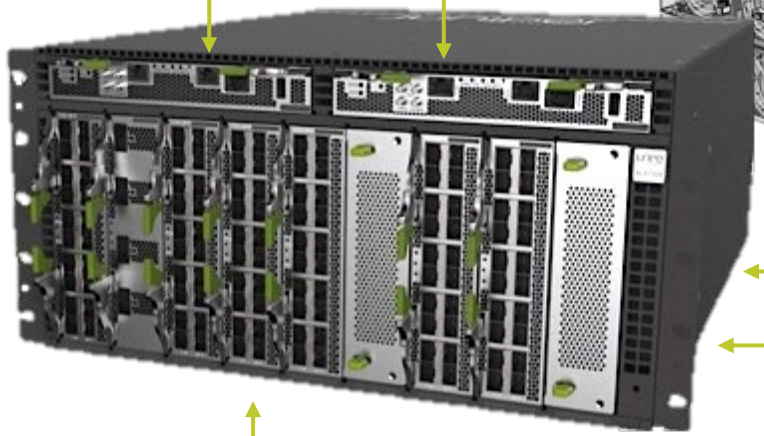
2x FEB Slots, behind Fan Trays

20x 1G, 10G

4x 400G

16x 100G

5U



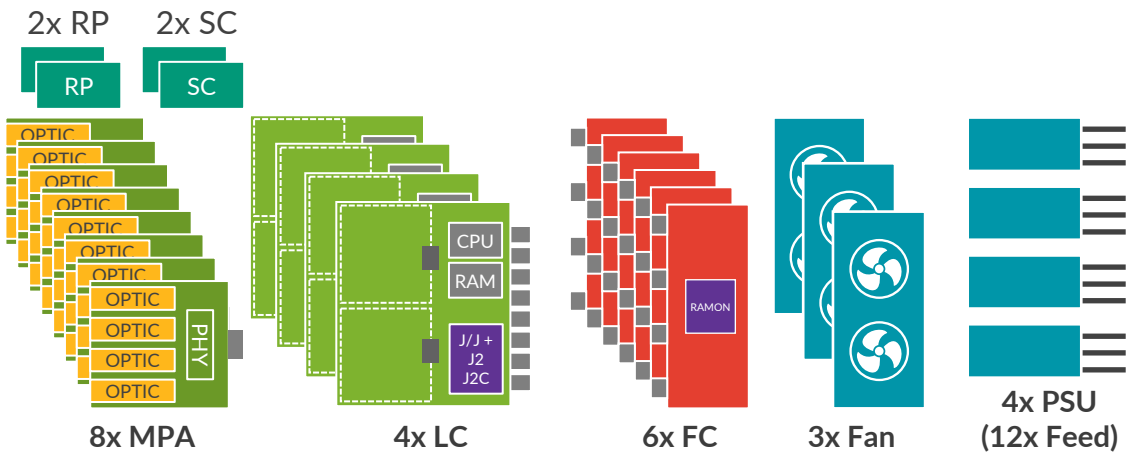
Flexible Port Connector (FPC)
9x FPC card Slots

Forwarding Engine Board (FEB)
2x FEB for Redundancy

Sustainable Systems: TCO of Cloud Metro Aggregation

Centralized forwarding with high density fan-out

Traditional Distributed System: Costly, Power Hungry, Large



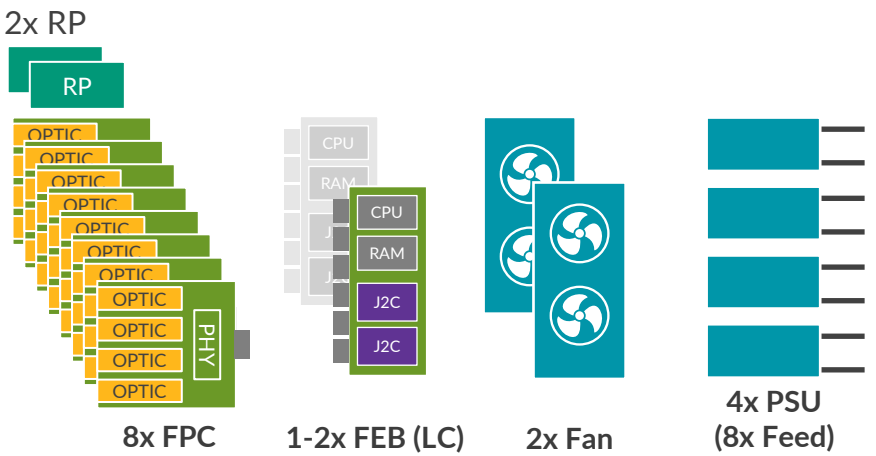
128 x SFP 8x QSFP-DD	7RU Height 842mm Depth	~3kW Typical Power (Excluding Optics)

Total CPUs: 6	Total Forwarding Engines: 8 to 16
Switch Fabric: 6	3 Fan Trays, 4 PS

Greater height & depth
>2X power usage as compared to ACX 7509
Slower convergence and higher latency

Upgrade to Next Gen silicon requires changing LC , FC, Fans, Power…

Centralized System Design (Juniper ACX7509)



120 x SFP 8x QSFP-DD	5RU Height 600mm Depth	1.2 (1xFEB) – 1.5kW (2xFEB) (Excluding Optics)

Total CPUs: 4	Total Forwarding Engines: 2 to 4
Switch Fabric: 0	2 Fan Trays, 4 PS

50% Less active components (higher sustainability)
>50% CapEx savings | >50% OpEx power savings

Upgrade to NG requires only FEB change
Fans and PS compatible with future generations of silicon

Winning with Confidence

Cloud Metro for Any Deployment

1. Fastest Growing in Juniper SP Portfolio
2. Rapid Adoption in Worldwide Customers
3. Ready Today & Leading Tomorrow - Substantiality
4. **Business Outcomes Based Automation**
5. New ACX7K Era for Lean Edge, Enterprise and BNG

We Are Winning...

ACX7K Innovation – We Control Our Own Destiny

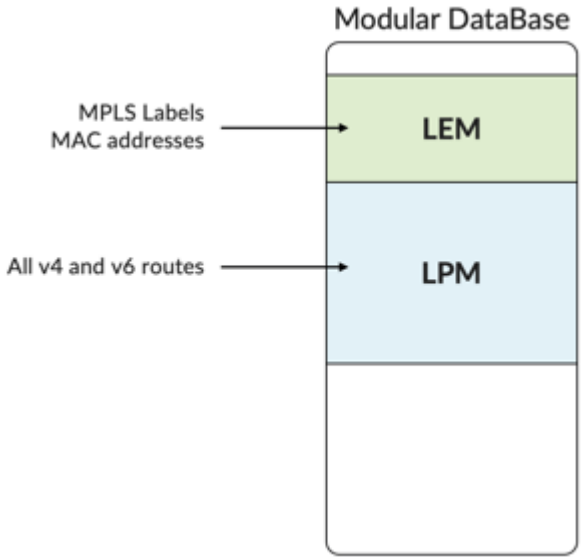
1 PKT Recycling	To have 2nd lookup for encapsulation rewrite
2 MDB & FIB Compression	Scalability optimization & doubling the FIB size
3 Elastic Pipeline	Invest protection for new features ; C++ API
4 DBAL / Microcode	By passing the BRCM standard SDK

You control your destiny — you don't need magic to do it. And there are no magical shortcuts to solving your problems.

– Merida, Brave

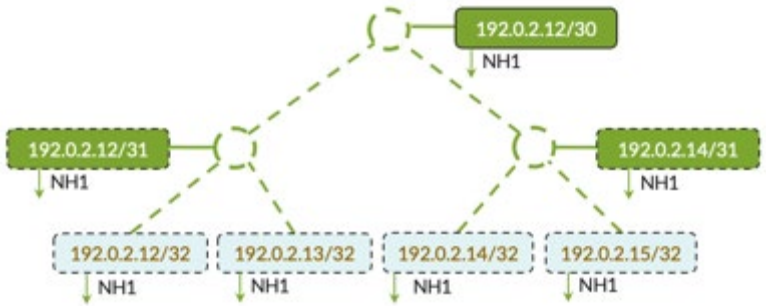
ACX7K MDB (Modular Database) – Profile Selections

Scalability Optimization

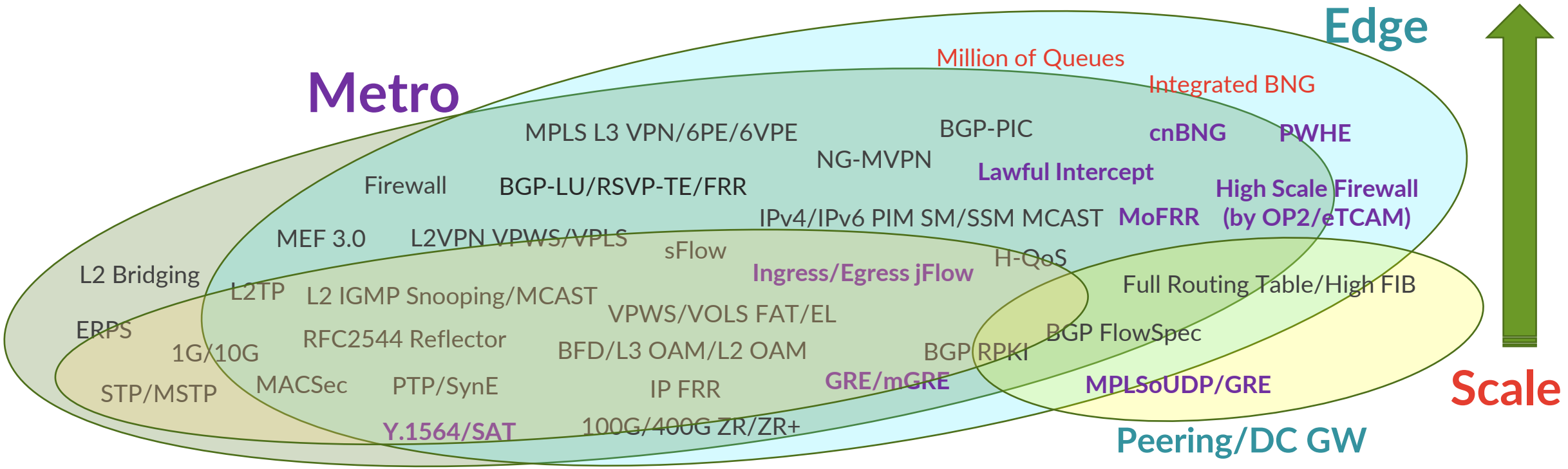


	Cloud Metro	Metro Ethernet	Lean edge	• Custom
FIB IPv4	1.2M	64K	2.2M	x
FIB IPv6	600K	32K	1.1M	x
MAC	700K	1.18M	155K	x
ARP	57K	61K	57K	x

JunOS EVO **FIB Compression** to double the FIB size



ACX7K Metro Service



ACCESS	AGGREGATION	SERVICE EDGE / Core Peering
ACX7024 (Hardened)	ACX7100-48L, ACX7100-32C, ACX7509	MX304, MX10K4, PTX, MX960, MX480, MX10008

NG Cloud Metro Fabric : Leading EVPN + SR/SRv6 (TI/FLA, TE)

*All ACX7K features commonly supported in FY22; Feature marked with **purple** in FY23

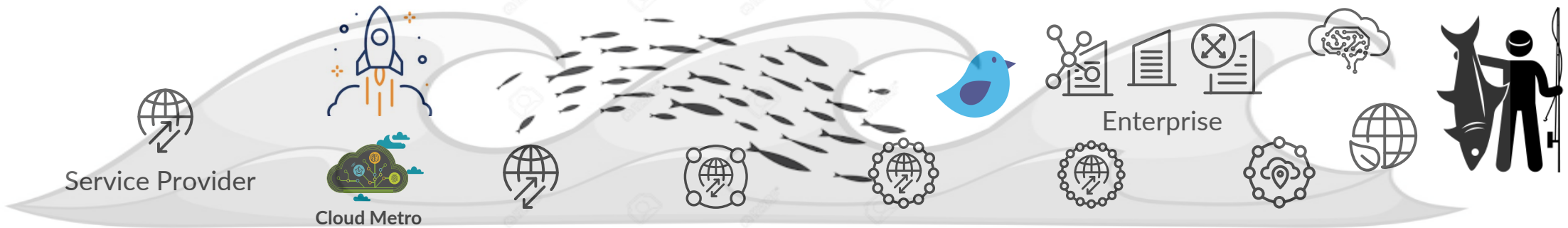
USE CASE COMPLETION PROJECTIONS

Common PFE SW across all ACX7K platforms

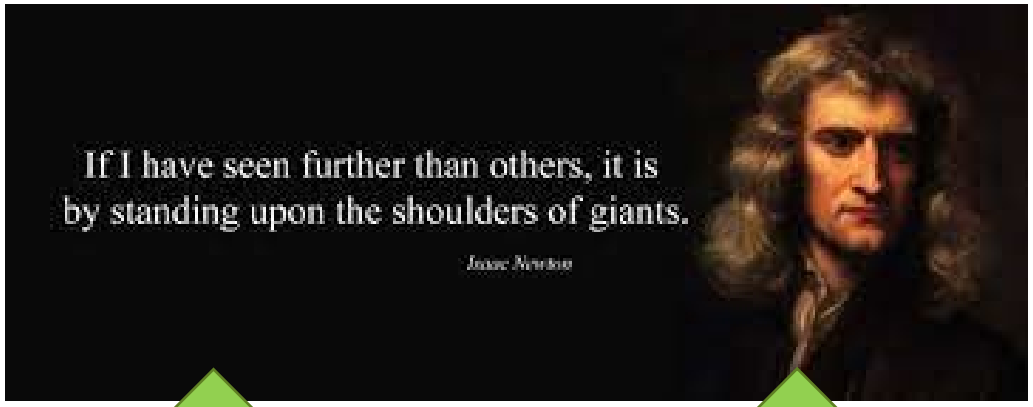
In general, NPIs align to parity with common train at FRS + 1Q (Feat/Optics)

FRS to pick -1 Common ACX7K content (Feat/Optics)

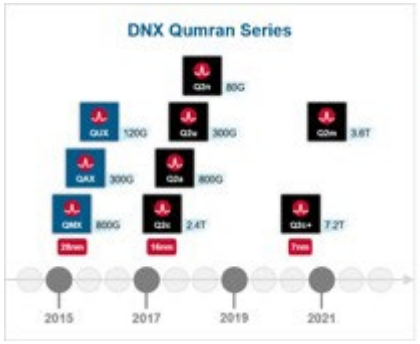
Common PFE Infrastructure	Common ACX7K Software Roadmap Planning									
ACX7K HW Platforms	22.3R1	22.4R1	23.1R1	23.2R1	23.3R1	23.4R1	24.1R1	24.2R2	24.3R1	24.4R1
ACX7100-48L (X-MEN-Wolverine)	L2/L3 Metro/Business VPN					Enterprise →				
ACX7100-32C (XMEN-Storm)		DC VXLAN	5G MBH + Network Slicing				Lean Edge →			
ACX7509 (Guardian)		Cable R-PHY	Peering	FIB Compression		DC GW			CUPS BNG →	
ACX7024 (Ultron/Ultron-XL)	L2 CE + MEF 3.0		SRv6 L3VPN		SRv6 uSID	SRv6 EVPN/VPWS/ELAN			BIER	
ACX7348 (Gamora-M/L)						FRS → ✓				

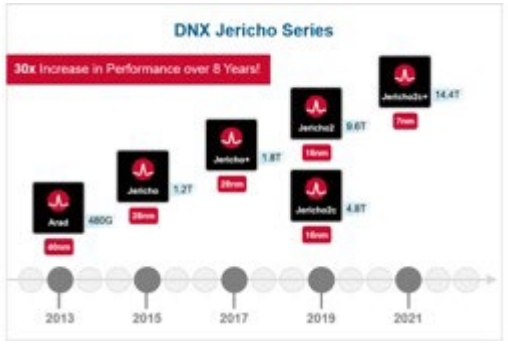


White What ?



BROADCOM





JUNIPER NETWORKS

ACX7K Cloud Metro Hardware Roadmap

JunOS EVO RLS	21.1R1	21.2R1	21.3R1	21.4R1
Hardware SKU	 ACX7100-48L		 ACX7100-32C	 ACX7509

JunOS EVO RLS	22.1R1	22.2R1	22.3R1	22.4R1
Hardware SKU			 ACX7024 (DC)	 ACX7024 (AC)

JunOS EVO RLS	23.1R1	23.2R1	23.3R1	23.4R1
Hardware SKU				 ACX7348  ACX7024X

JunOS EVO RLS	24.1R1	24.2R1	24.3R1	24.4R1
Hardware SKU	 ACX7332			

JunOS EVO RLS	25.1R1	25.2R1	25.3R1	25.4R1
Hardware SKU	 ACX7020			 ACX7040

THANK YOU

JUNIPER NETWORKS | Driven by Experience™