JUNIPER 400G PORTFOLIO

Satish Surapaneni, Director, Product Management

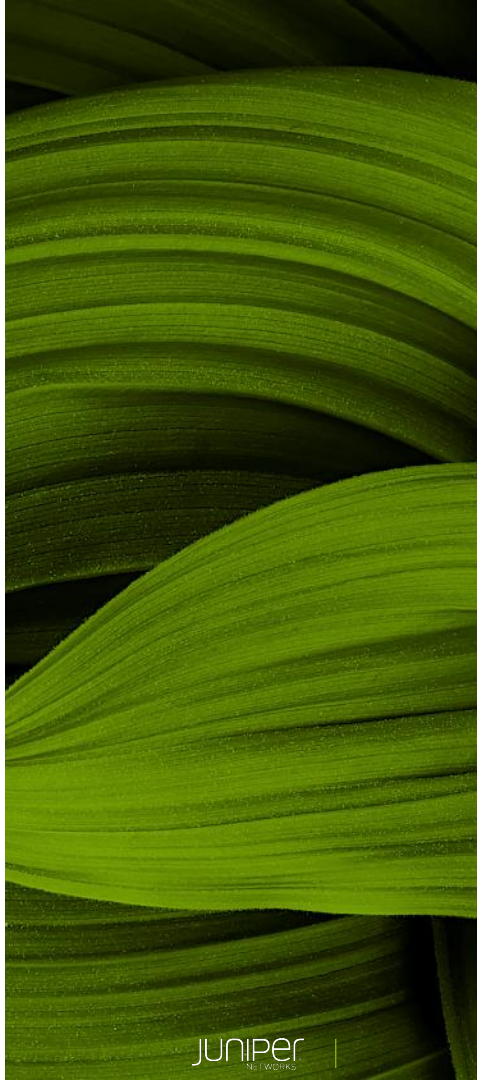
Dmitry Shokarev, Principal Product Manager

Juniper Networks | Engineering Simplicity

LEGAL STATEMENT

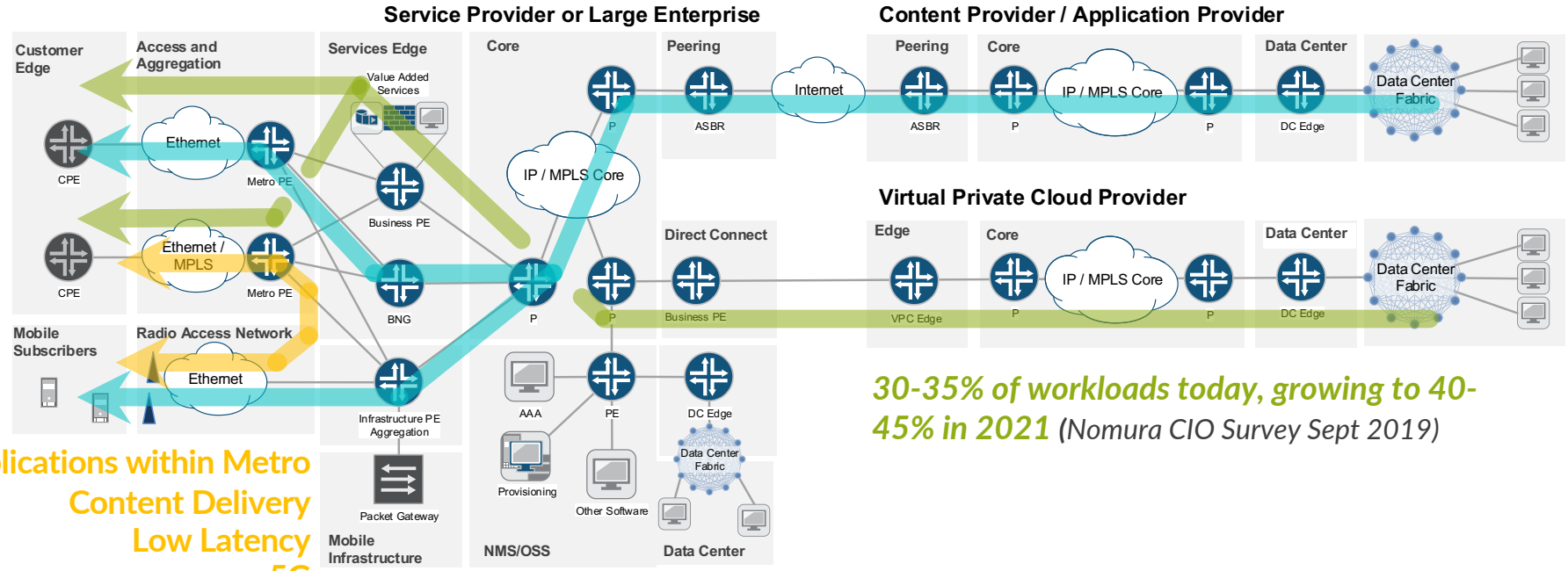
This statement of direction sets forth Juniper Networks' current intention and is subject to change at any time without notice.

No purchases are contingent upon Juniper Networks delivering any feature or functionality depicted in this presentation.



NETWORKING TRENDS, TRAFFIC

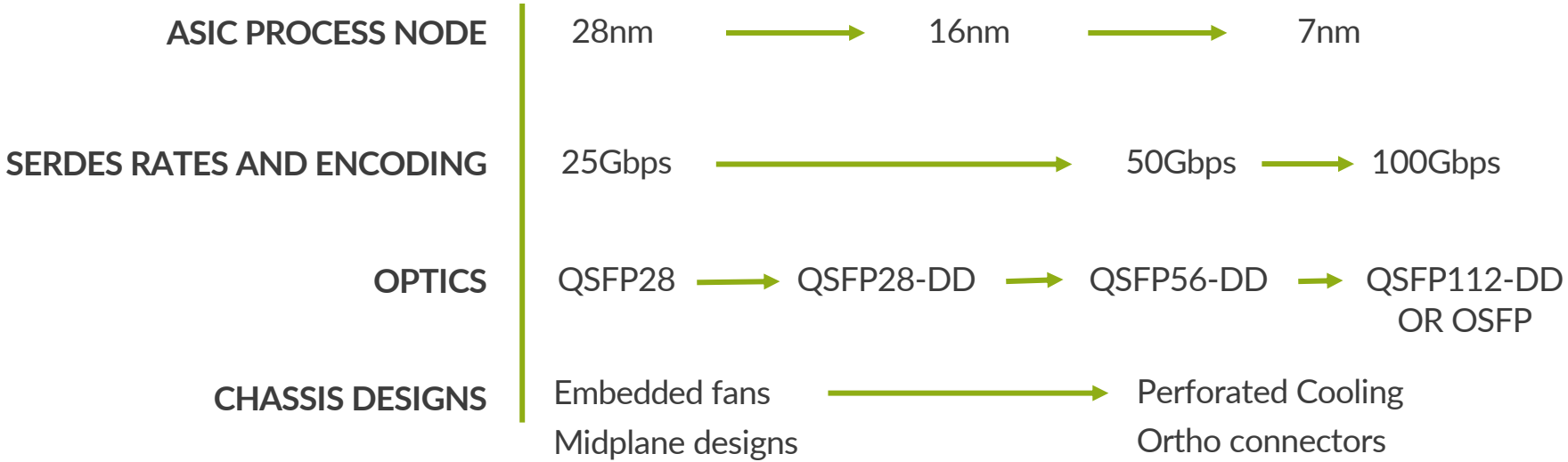
Continued Residential Traffic Increase



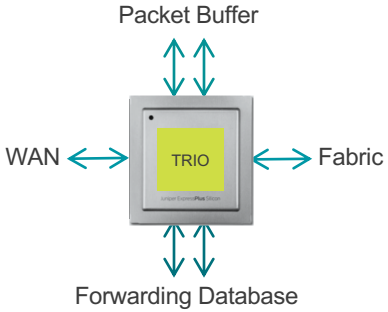
Applications within Metro
Content Delivery
Low Latency
5G

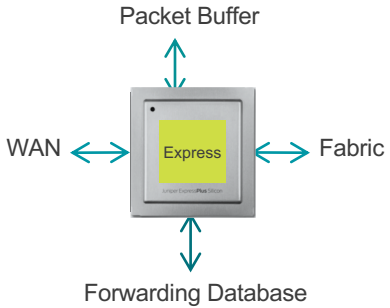
30-35% of workloads today, growing to 40-45% in 2021 *(Nomura CIO Survey Sept 2019)*

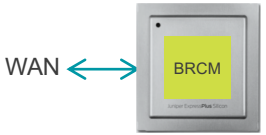
TECHNOLOGY ENABLERS TO KEEP UP WITH TRAFFIC INCREASE



FORWARDING SILICON





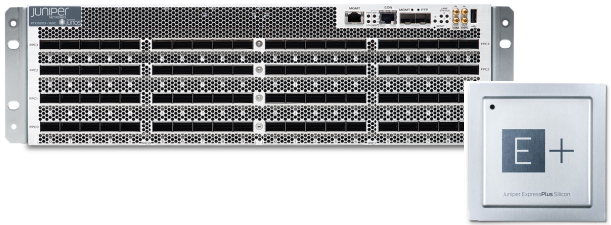


Trio	Express	Bufferless / Standalone
MX	PTX, QFX10K	QFX5K
Flexible, Fungible	Fixed Pipeline, Microcode stages	Fixed Pipeline
Very Large Scale, Fungible	Large Scale	Small Scale
Buffer: ~100ms	Buffer: ~50ms	Buffer: ~50us
“Rich” QoS	-	-

JUNIPER TECHNOLOGY LEADERSHIP

PTX10003

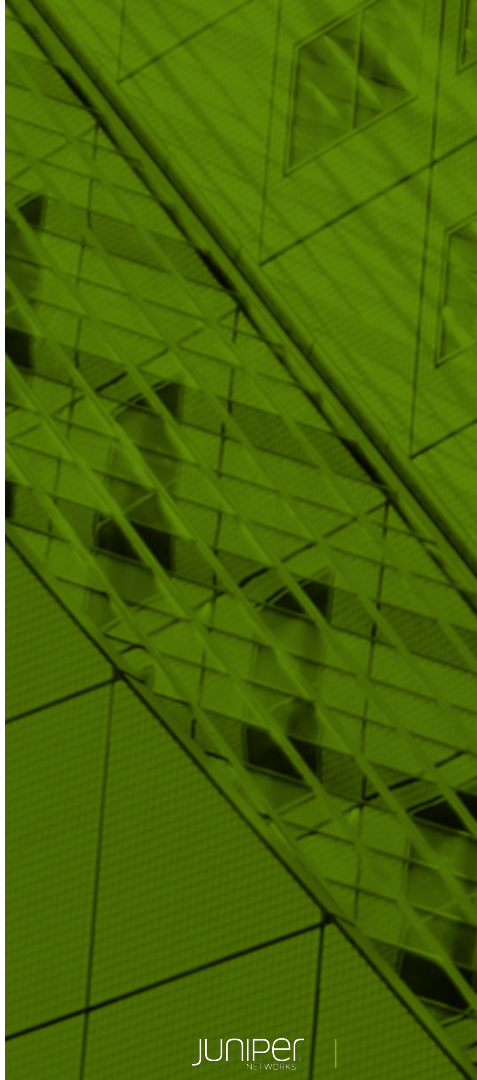
Industry first **400GbE native MACsec** core router



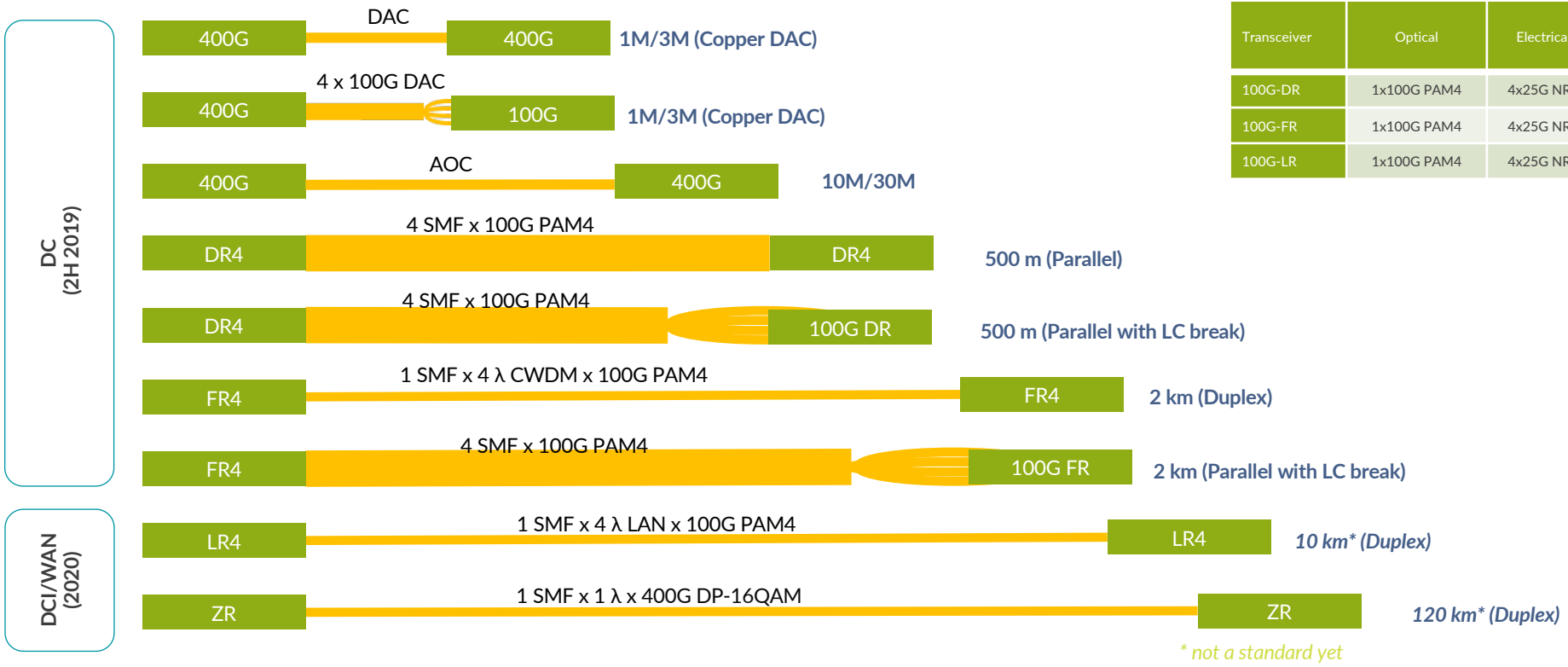
- **Lowest cost per bit**
- **Integrated security without performance penalty**
- **Simplified core operations**
- **Industry leading density**
- **Economic advantages**

AGENDA

- 400G OPTICS
- QFX - DATA CENTER FABRIC PORTFOLIO
- PTX - CORE ROUTING PORTFOLIO
- MX - EDGE ROUTING PORTFOLIO



400G GENERATION –OPTICS AND DAC



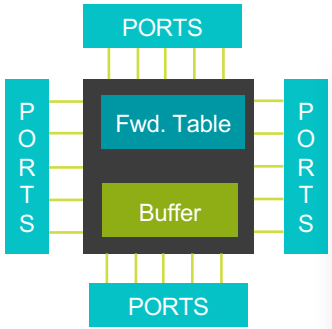
Transceiver	Optical	Electrical
100G-DR	1x100G PAM4	4x25G NRZ
100G-FR	1x100G PAM4	4x25G NRZ
100G-LR	1x100G PAM4	4x25G NRZ

DATA CENTER
QFX UPDATE

NETWORK SPEED TRANSITIONS

		2017-2020	2019-2022
Hyper Scale	TOR	25G with 100G splitter	100G with 400G splitter
	Spine	100G	400G
Service Providers	TOR	10G → 25G	25G → 50G
	Spine	40G → 100G	100G (Some 400G)
Large Enterprise	TOR	10G → 25G	25G → 50G
	Spine	40G → 100G	100G
Rest of Enterprise	TOR	10GT, 10G, 25G	10GT, 10G, 25G
	Spine	40G → 100G	100G

CONTINUED INVESTMENT IN MERCHANT



Cost & Power Optimized Fixed Systems

Shallow Buffer

Low Scale

- Switch-on-chip design
- Lock-step with Broadcom
- TOR and Lean Spine Roles

QFX52XX

TH - 25/100G

TH2 - 25/100G

TH3 - 50/100/400G

QFX51XX

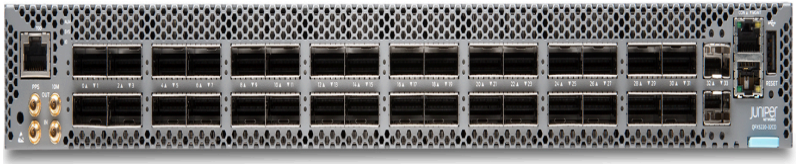
TD2/TD2+ - 10/40/100G

TD3- 25G/100G

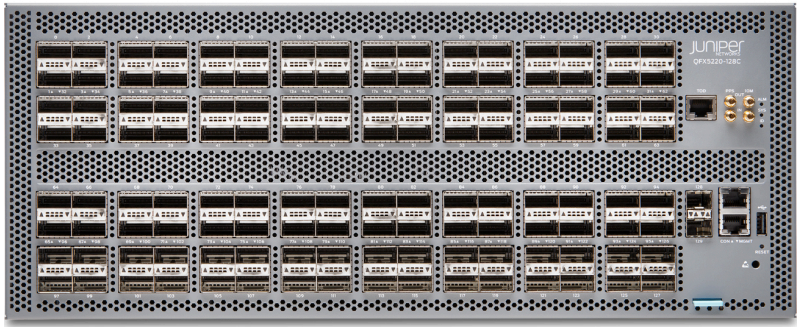
TD4 - 50/100/400G

QFX5220 SERIES – 50G/100G/400G (12.8 TBPS)

1U: QFX5220-32CD
Tomhawk3
12.8 Tbps
Optics: QSFP56-DD
PTP



4U: QFX5220-128C
Tomhawk3
12.8 Tbps
Optics: QSFP28
PTP



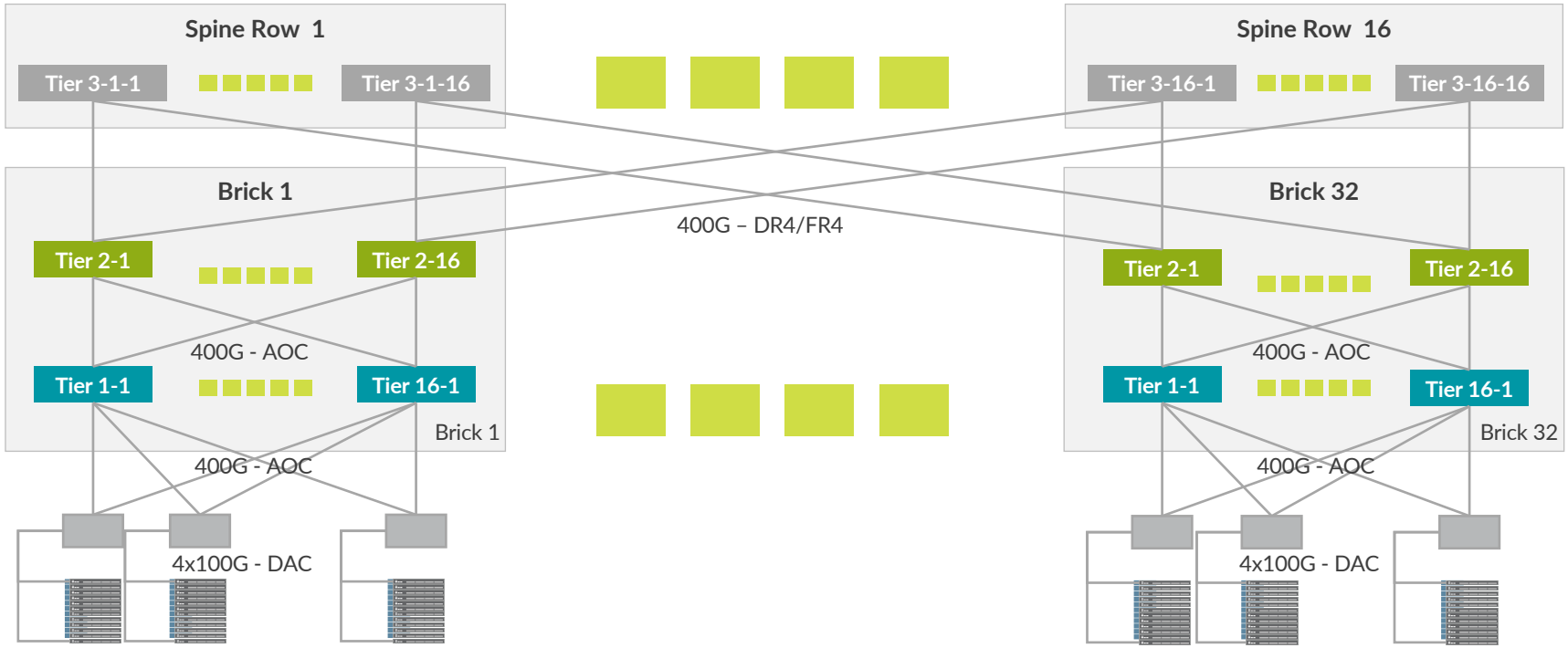
Q2 2019
19.1R1 (EVO)

- IP Underlay features (Spine + TOR)
- Telemetry, ZTP

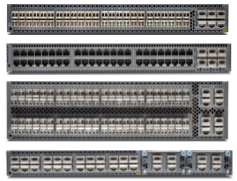
Q3 2019
19.2R1 (EVO)

- L2/L3 Multicast
- QMON*
- PTP*

400G IP FABRIC WITH QFX5220-32CD



QFX5K –SWITCHING PORTFOLIO



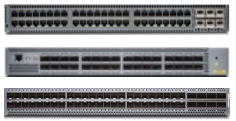
QFX5100-48S
QFX5100-48T
QFX5100-96S
QFX5100-24Q

QFX5110-48S
QFX5110-32Q

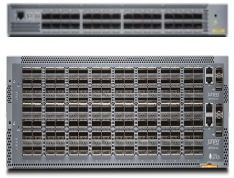
QFX5200-32C

QFX5200-48Y

QFX5210-64C



QFX5120-48T*
QFX5120-32C
QFX5120-48Y



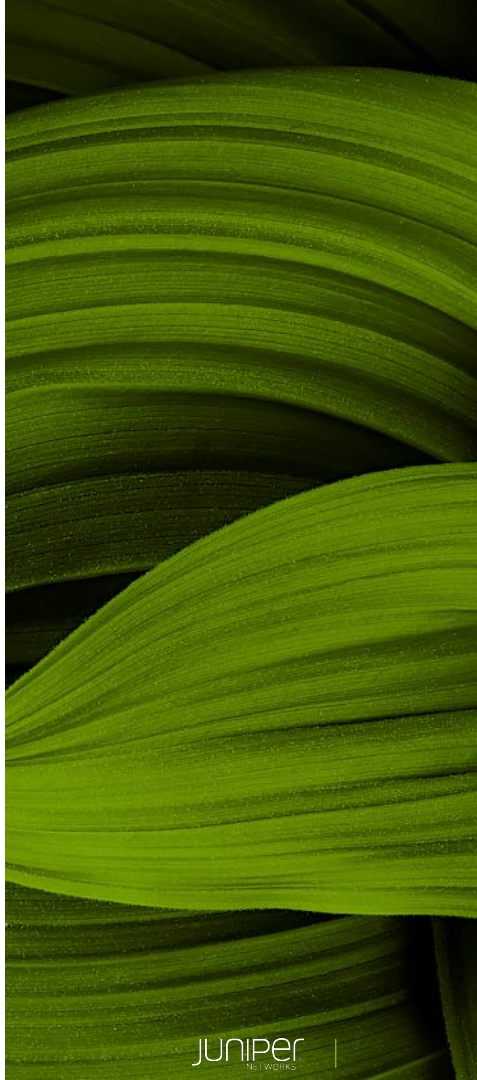
QFX5220-32CD (EVO)
QFX5220-128C (EVO)

TOR/Leaf/Lean Spine

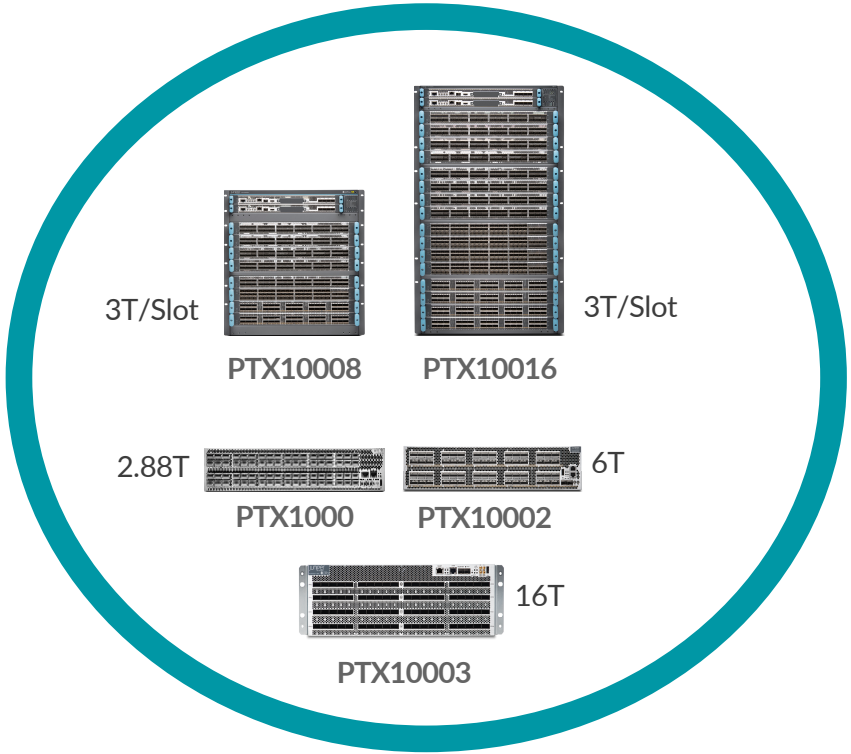
TD2	TD2+	TH	TH+	TH2	TD3	TH3
720G-1.2T (10G/40G)	880G-1.2T (10G/100G)	3.2T (100G)	1.8T (25G)	6.4T (100G)	1T -3.2T	12.8T (100G/400G)
	10G TOR 40G Spine	100G Spine		100G Spine	25G TOR 100G Spine	100G Spine 400G Spine

* Q2 2020

CORE ROUTING
PTX UPDATE



PTX – PURPOSE BUILT FOR THE CORE



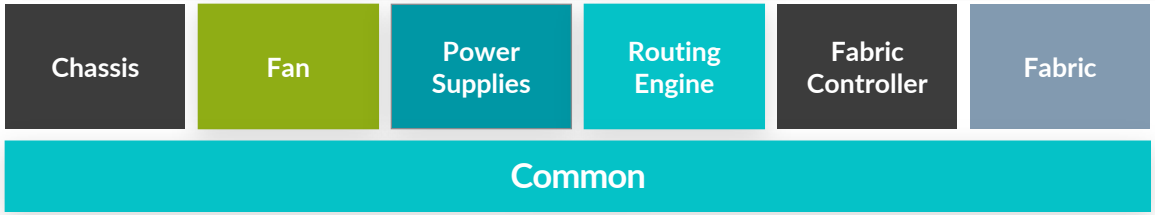
CONTINUOUS CAPACITY GROWTH

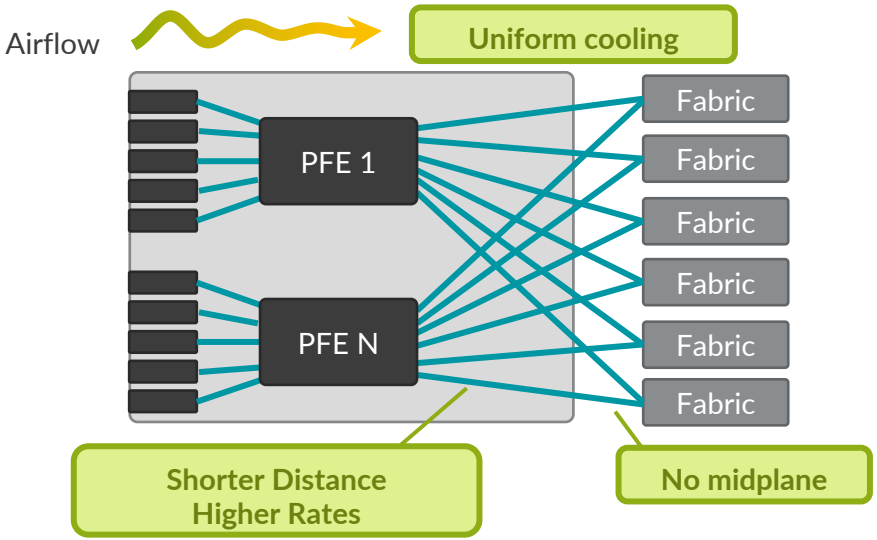
UNPRECENDENTED TCO SAVINGS

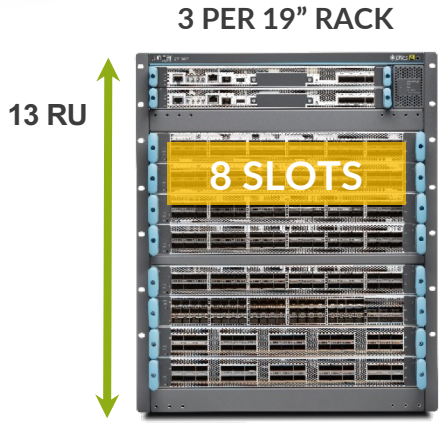
SIMPLE & RESILIENT SUPERCORE

ANYWHERE DEPLOYABLE PORTFOLIO

NEW CHASSIS DESIGNS



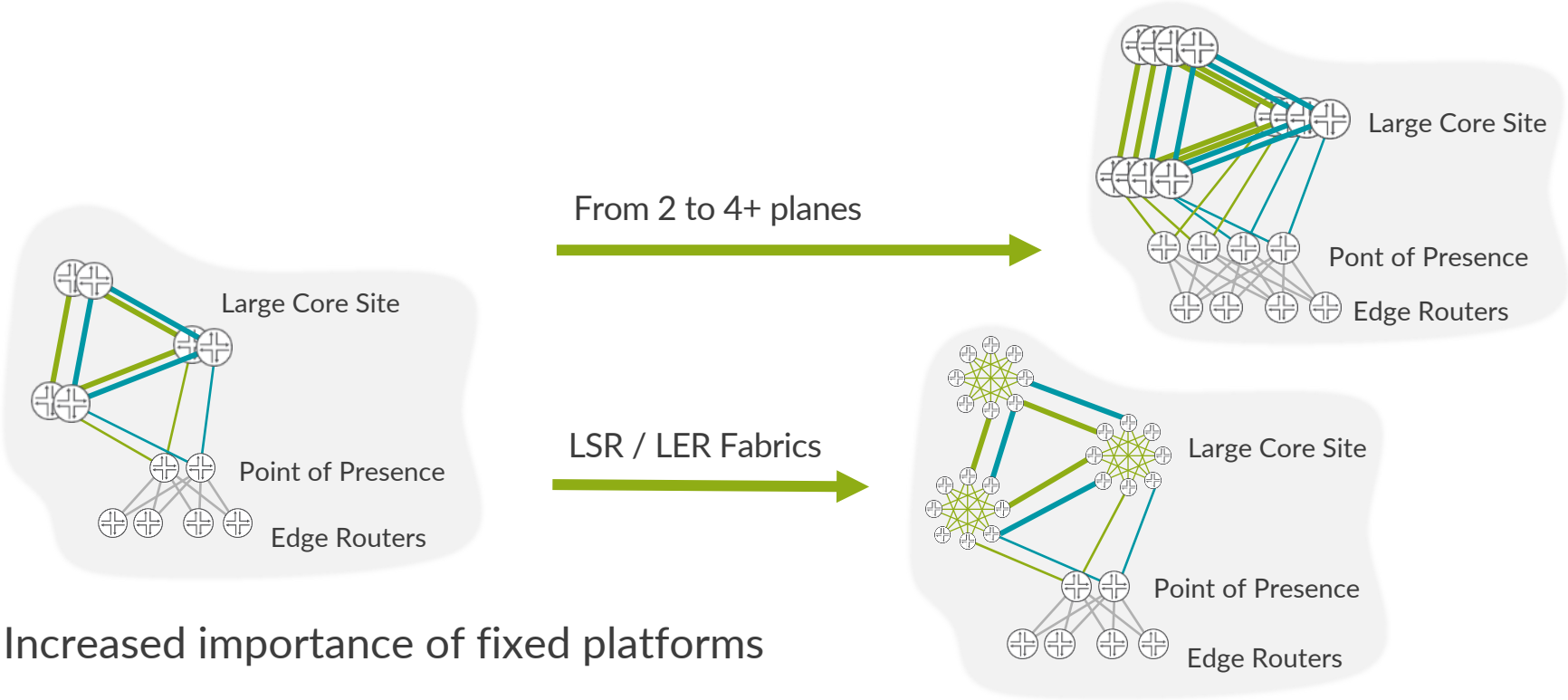




JNP10008

Scales to 14.4T per slot and beyond

NETWORK DESIGN CHANGES DRIVEN BY HIGH AVAILABILITY



Increased importance of fixed platforms

8T : Shipping now
16T : Shipping now

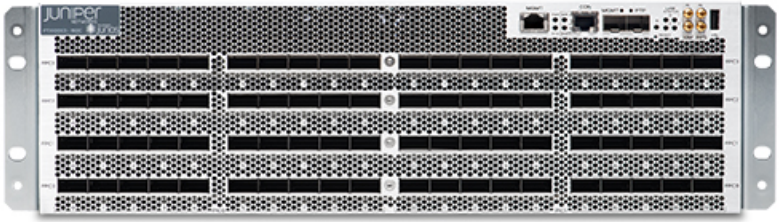
PTX10003-160C & PTX10003-80C

PTX10003-80C

3 RU

PTX10003-160C

3 RU



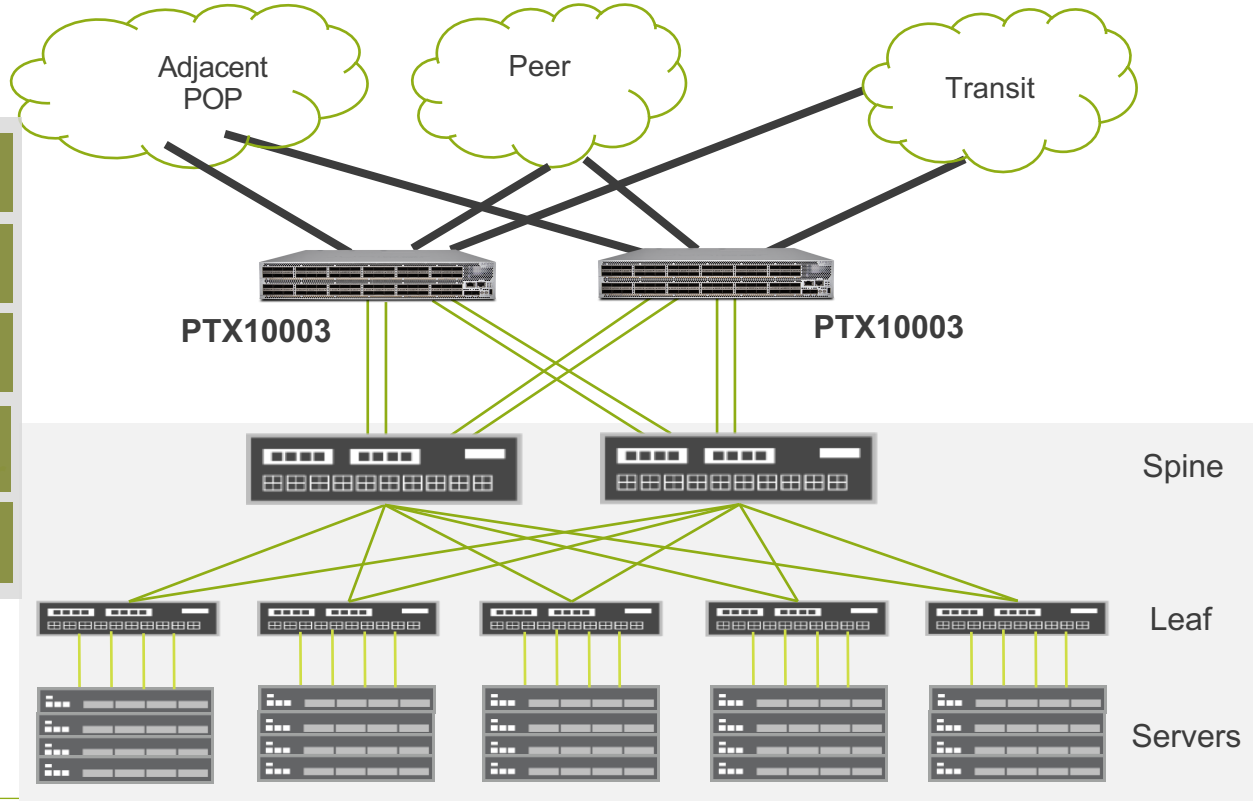
High Density 8T & 16T Router in 3RU
Low Power, 0.2W/G
Secure Connectivity with MACsec
Universal multi-rate QSFP-DD for 100GE/400GE
Core Applications parity across PTX platforms

	PTX10003-160C	PTX10003-80C
Physical QSFP cages	80	40
100GE using QSFP28	80	40
100GE using QSFP28DD	**160**	**80**
100GE using QSFP56DD BO	128 + 32	64 + 16
400GE using QSFP56DD	32	16

USE-CASE: PEERING ROUTER

BRINGING CONTENT CLOSER TO THE USERS

- Worldwide PoPs interconnect
- 2M+ BGP routes to transit/peer
- 100K LSPs to adjacent PoPs
- Same family; deployable sizes
- PAYG licensing model



PTX10K LINE CARD

Planned for 1H 2020 onwards

Low power consumption, 0.14W/G typical
Secure Connectivity with MACSec
Universal multi-rate QSFP & QSFP-DD for 100GE/400GE
Core Applications parity across PTX platforms
Interoperability with SF3 fabric between 14.4T and 4.8T

14.4T Switching Capacity

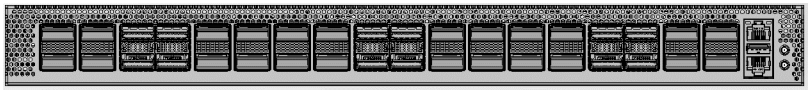
PTX10008 - 1H 2020

4.8T Switching Capacity

PTX10008 - 2H 2020

PTX10001

Planned for ▪ 1H2020



1 RU

9.6T Switching Capacity

AC | DC | HVDC

Secure MACSec connectivity

Filter scale and flexibility

High packet performance

Statistics collection at scale

Target Deployments

Peering

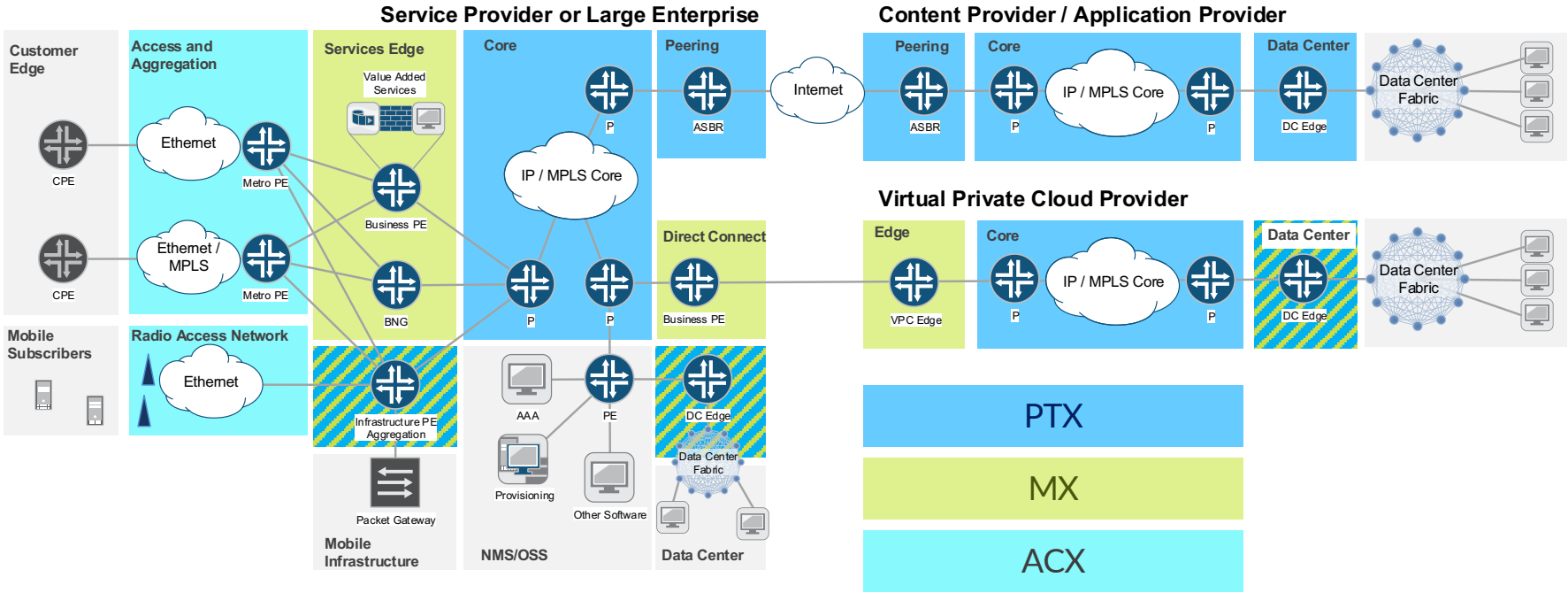
Aggregation

Content Delivery Networks Gateway

And… metro, enabled by **400GE QSFP ZR** and **ZR+**

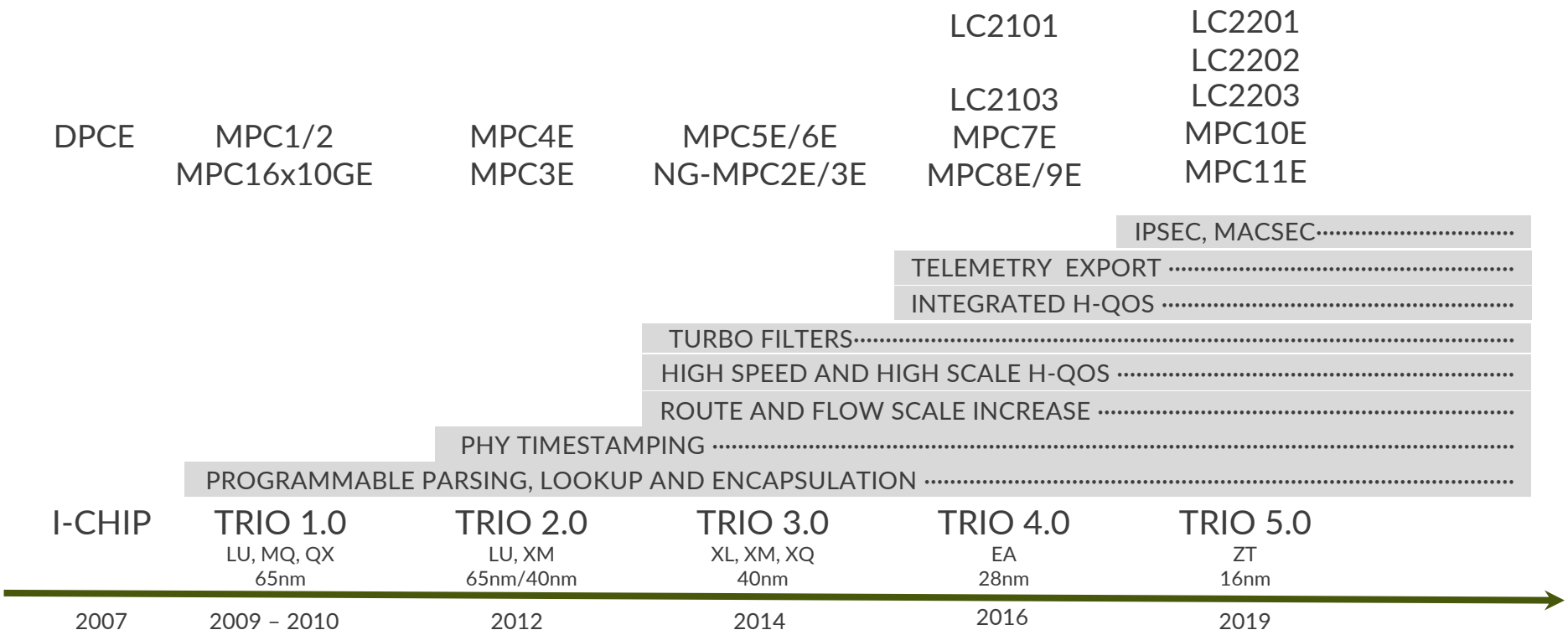
MX UPDATE

NETWORK TAXONOMY AND PRODUCT MAPPING



Represents typical product mapping

TRIO ASIC EVOLUTION



ZT: FIFTH GENERATION TRIO ASIC

LESS THEN 0.25W/G

INLINE L2 / L3 CRYPTO (Industry First)

100GE and 400GE OPTIMIZED

FLEXE LINK BONDING

MX240, MX480, MX960 MPC

- 1.5T target per slot
- 100GE optimized
- Backward compatible with all Trio MPCs

MX2008, MX2010, MX2020 MPC

- Targeting 4T per slot
- Less than 0.25W/G
- Fully backward compatible

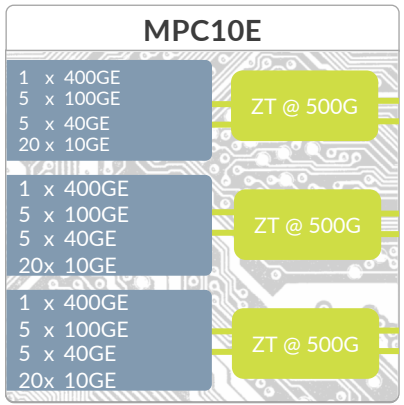
Packet Forwarding Engine

- Very high capacity security with inline encryption/decryption
- Full HQoS and inline services

Upgrade

- No change to existing fans and power supply
- New Fabric and Line Card only

MX240/480/960: MPC10E LINE CARD



Dense 10GE/40GE/100GE/400GE aggregation, triple MX960 per slot capacity

Low power consumption, 0.5W per gigabit at system level, typical

Secure Connectivity with MACSec[1] and IPSec[1]

Universal multi-rate 10GE/25GE/40GE/100GE/400GE[1] ports to reduce spares

Flexible software-enabled queueing options

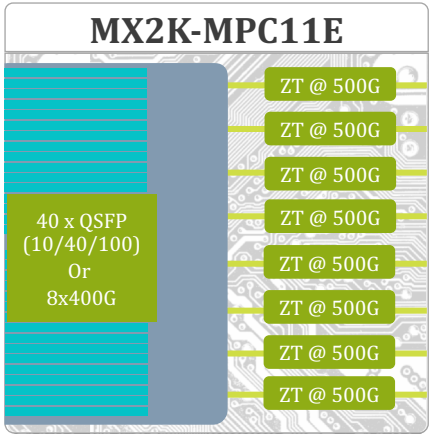
Seamless deployment, no power / cooling subsystem upgrade required

[1]Post FRS capability

CAPACITY INCREASE	LEVERAGE	FEATURES
1.5T: ENHANCED MIDPLANE 816G: REGULAR MIDPLANE	EXISTING SYSTEMS	INTEGRATED IPSEC / MACSEC ALL TRIO

MX2K: MPC11E LINE CARD

2H 2019



Dense 100GE aggregation, 800 interfaces per rack, 40x100G per slot

400GE ready with multi rate QSFP56DD interfaces

Low power consumption, 0.25W per gigabit at system level, typical

Secure Connectivity with MACSec[1] and IPSec[1]

Universal multi-rate 10GE/40GE/100GE/400GE[1] ports to reduce spares

Flexible software-enabled queueing options

Seamless deployment, no power / cooling subsystem upgrade required

[1]Post FRS capability

DENSITY	LEVERAGE	FEATURES
4.0T SERVICE EDGE	**EXISTING SYSTEMS**	**INTEGRATED IPSEC / MACSEC ALL TRIO**

SUMMARY

- Leadership in 400G and beyond with combination of custom & Merchant silicon
- Comprehensive portfolio
  - 8-slot Modular chassis
  - Fixed systems
- Use case driven silicon choices
  - DC Spine
  - Core Router
  - Data Center Interconnect
  - Internet Peering
  - Data Center Edge
  - Services Edge
  - Cloud Provider Edge

THANK YOU