



Announcing Industry-First 50G PAM4 DSP Chipset for Next Gen 5G Optical Fronthaul

December 7, 2021

Overview

Company founded

1995

FY22 forecast

\$4.4B*

Employees

6,000+

Patents worldwide

10,000+

Located in **Santa Clara, CA**

R&D centers in **US, Israel, India, Germany, China**



 **Nasdaq-100**

*Based on Q2 and Q3 revenue run rates

Marvell offers

the most complete data infrastructure portfolio

- Data center
- 5G Carrier
- Automotive
- Enterprise



Processors

#1 in baseband and data processor units (DPUs)

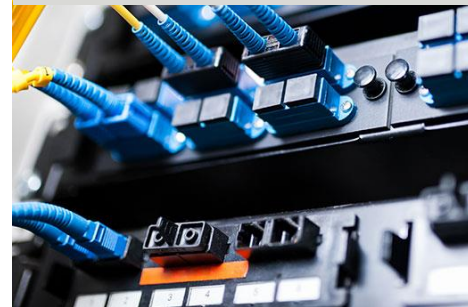


Storage

#1 in HDD, SSD and Fibre Channel controllers

Networking

#1 in PAM4 DSPs, linear TIAs and drivers
#2 in switches, copper PHYs and coherent DSPs



Security

#1 in security processors and cloud hardware security modules (HSM)



Connecting the wireless world



#1

in merchant
RAN silicon

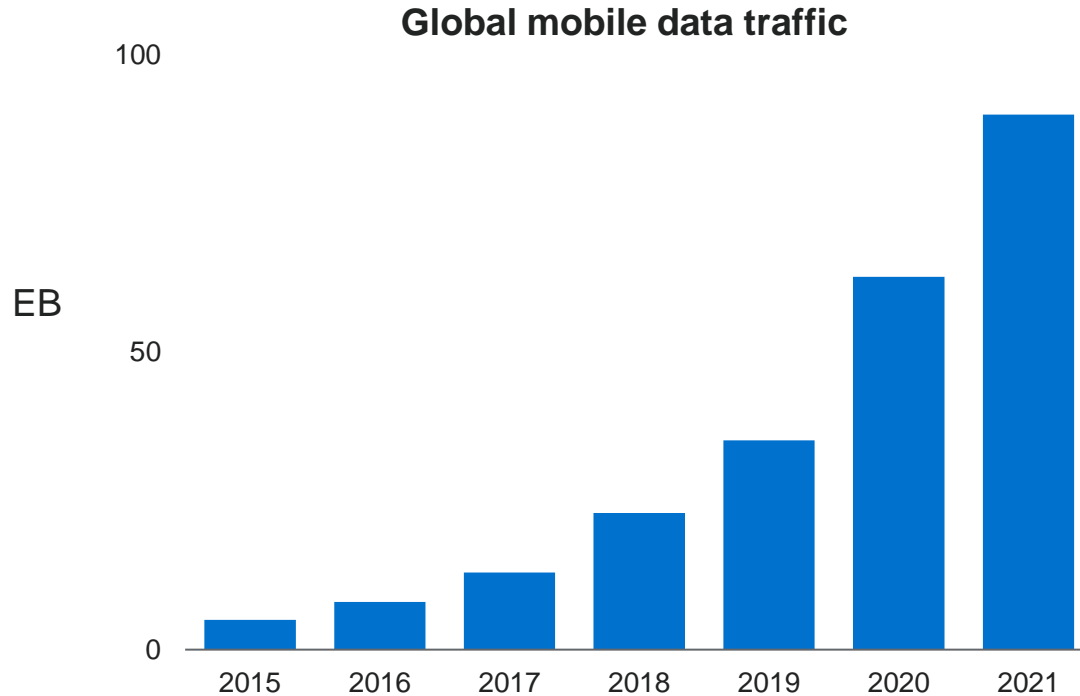
100M+
units shipped*

2B+
people
connected

15+ years of wireless infrastructure leadership

*Wireless products including baseband, ASIC and switch

5G RAN bandwidth driver



>60% CAGR
2015-2021 Y/Y

Source: Ericsson Mobility Report, June 2021

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5G radio unit upgrades driving 50G fronthaul



MIMO

10s of MHz

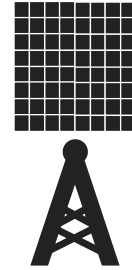
10G



Massive MIMO

100 MHz

25G

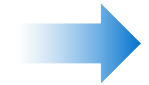
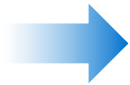


Higher order massive MIMO
MU-MIMO (spatial layers)

200 MHz+

50G

Fronthaul:



Emerging ORAN architecture

Radio Unit

Distributed Unit

Vendor 1



Vendor 2

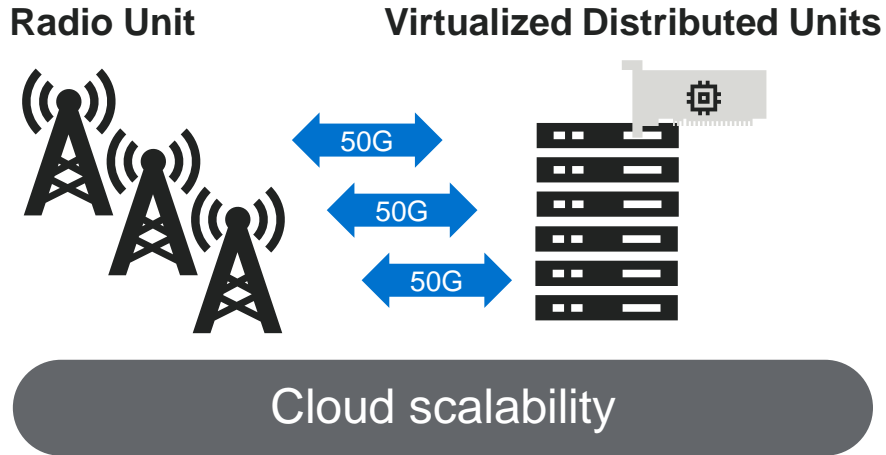


Interoperability

- Accelerate e2e upgrades
- Mix and match vendors
- Best-in-breed RAN solutions

Enabling first-to-market with 50G fronthaul

Emerging vRAN architecture



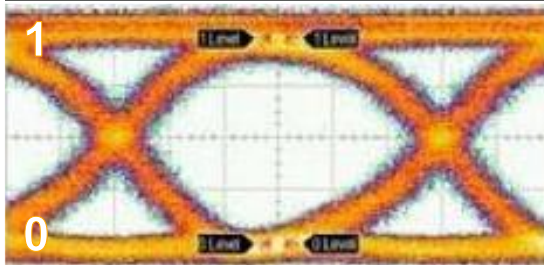
- Centralize resources at DU
- Shift RU capacity as needed
- Dynamic load balancing

50G fronthaul facilitates 5G vRAN efficiencies

5G following same transition as data center

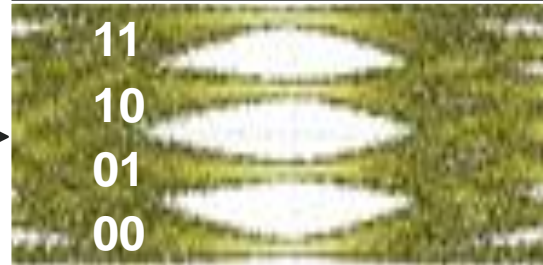
25Gbps

NRZ – 1 bit
Analog preferred



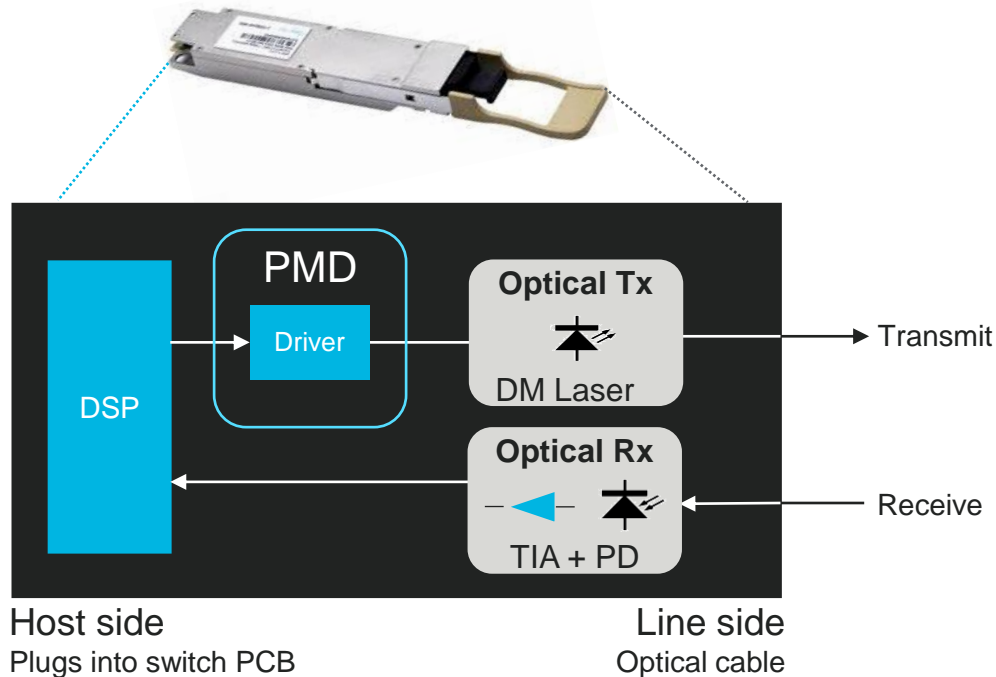
50Gbps

PAM4 – 2 bits
DSP preferred



PAM4 DSP delivers 2X bandwidth and lower cost / power per bit

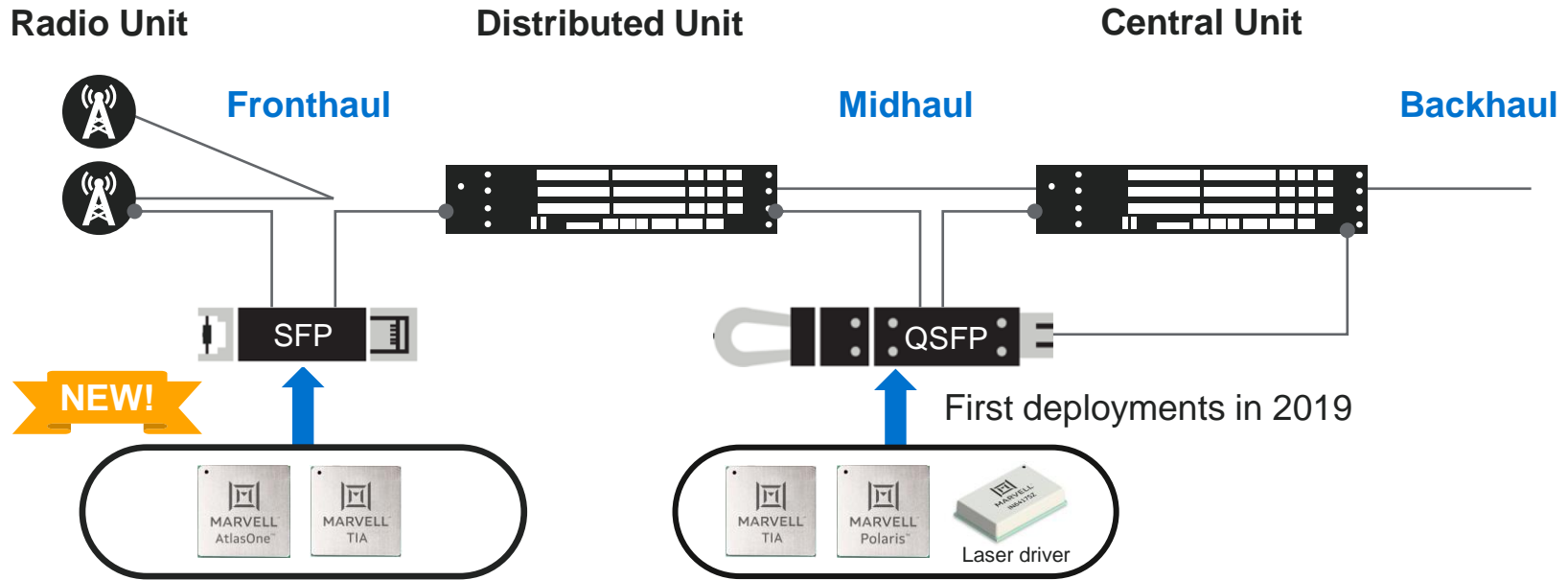
Telecom optical module architecture



- DSP – Signal integrity
- PMD – Electrical to optical
- Optics – Laser and detector

 Marvell content

Marvell® PAM4 DSPs in the 5G network



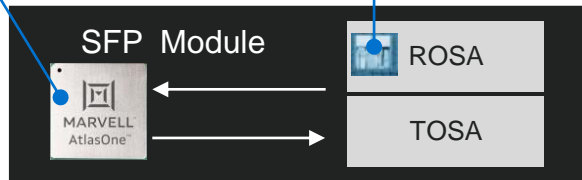
Extending 50G to meet fronthaul cost, power, temp demands

AtlasOne™ 50G PAM4 DSP fronthaul solution

Sampling now

AtlasOne
50G DSP with laser driver

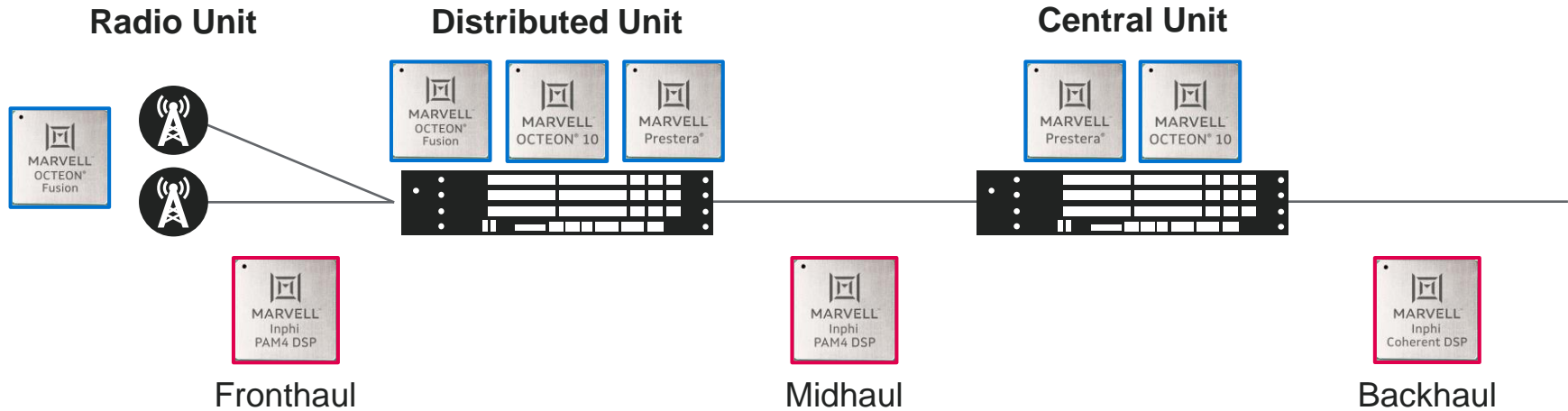
IN5662 TIA
High-performance / I temp



- Industry's 1st
- Integrated direct modulated laser driver
- Saves up to 25% power
- Optimizes BOM and supply chain
- Industrial temperature range

Proven technology for advanced 5G networks

Industry-leading end to end 5G RAN portfolio



Advanced features for traditional, ORAN and vRAN architectures

Marvell 5G RAN market leadership

Integrated RAN

OEM customers



NOKIA

SAMSUNG

ZTE中兴

FUJITSU

vRAN DU card – 5 design wins

Cloud and OEM customers



- Proven RAN baseband
- Superior performance
- Production software

Diversifying, growing customer base across all RAN architectures

Key takeaways

1 Traffic growth, RU upgrades driving 50G PAM4 transition

2 Delivering industry-first 50G PAM4 DSP for 5G fronthaul

3 Extends end-to-end RAN silicon portfolio leadership



Thank You



Essential technology, done right™