



Networking Overview

J.P. Morgan 19th Annual Tech/Auto Forum

January 12, 2021

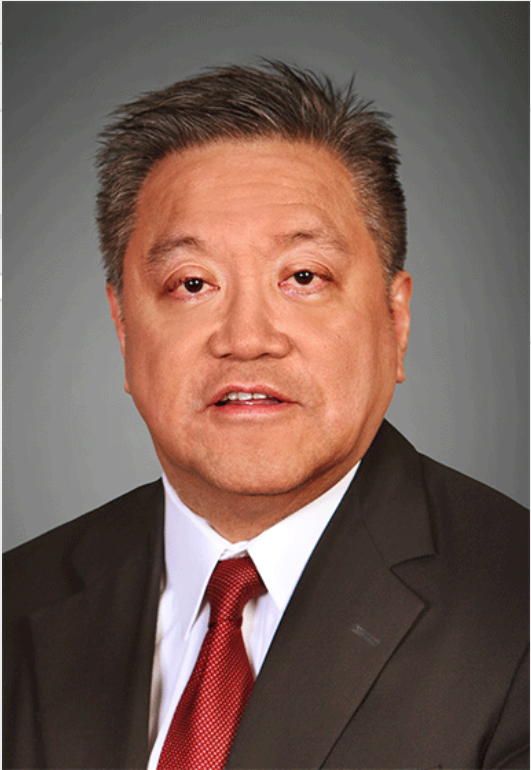


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This presentation contains forward-looking statements, including statements as to our priorities and goals, business strategy, performance and market opportunities, and products and technology development, that are based on our current expectations and beliefs of the management of Broadcom, as well as assumptions made by, and information currently available to, such management, current market trends and market conditions and involve risks and uncertainties, many of which are outside the Company's and management's control, and which may cause actual results to differ materially from those statements. Many of the foregoing risks and uncertainties are, and will be, exacerbated by the COVID-19 pandemic and any worsening of the global business and economic environment as a result.

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Broadcom Speakers



Hock E. Tan
President & CEO



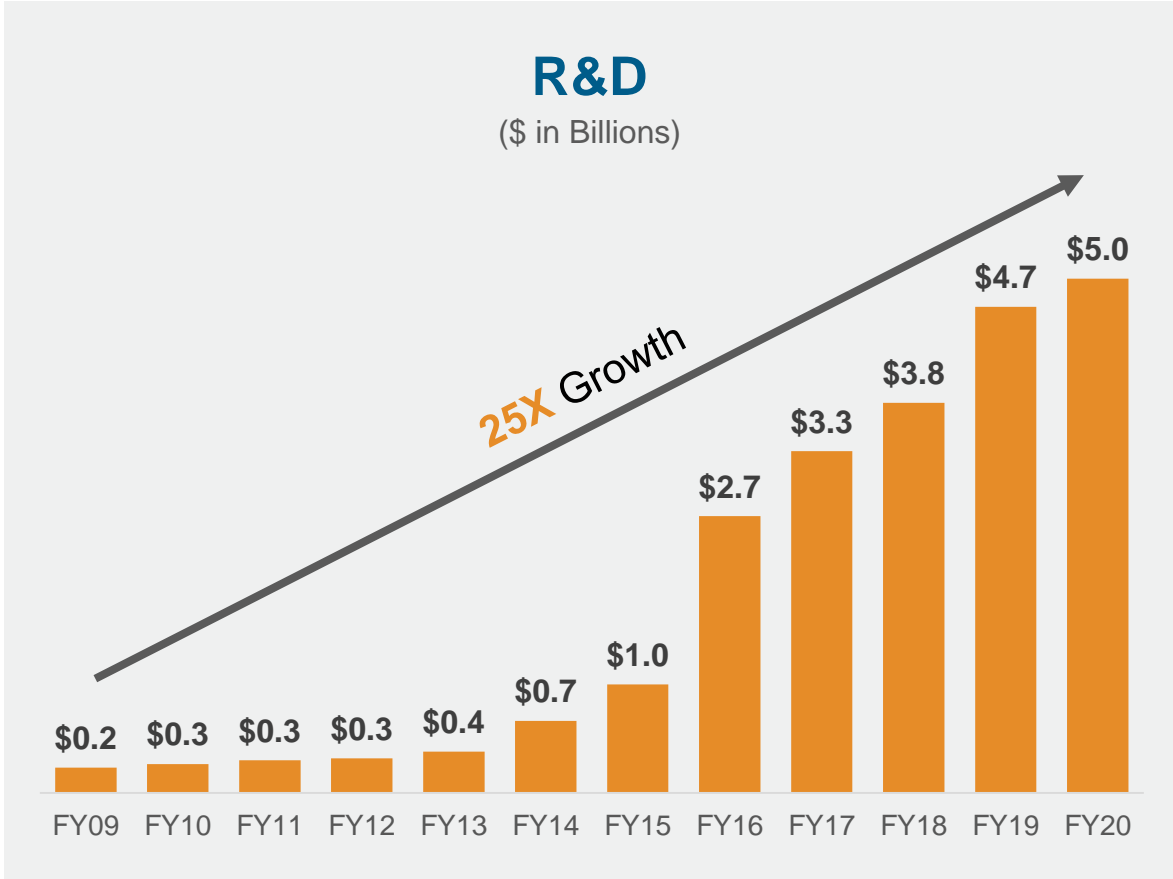
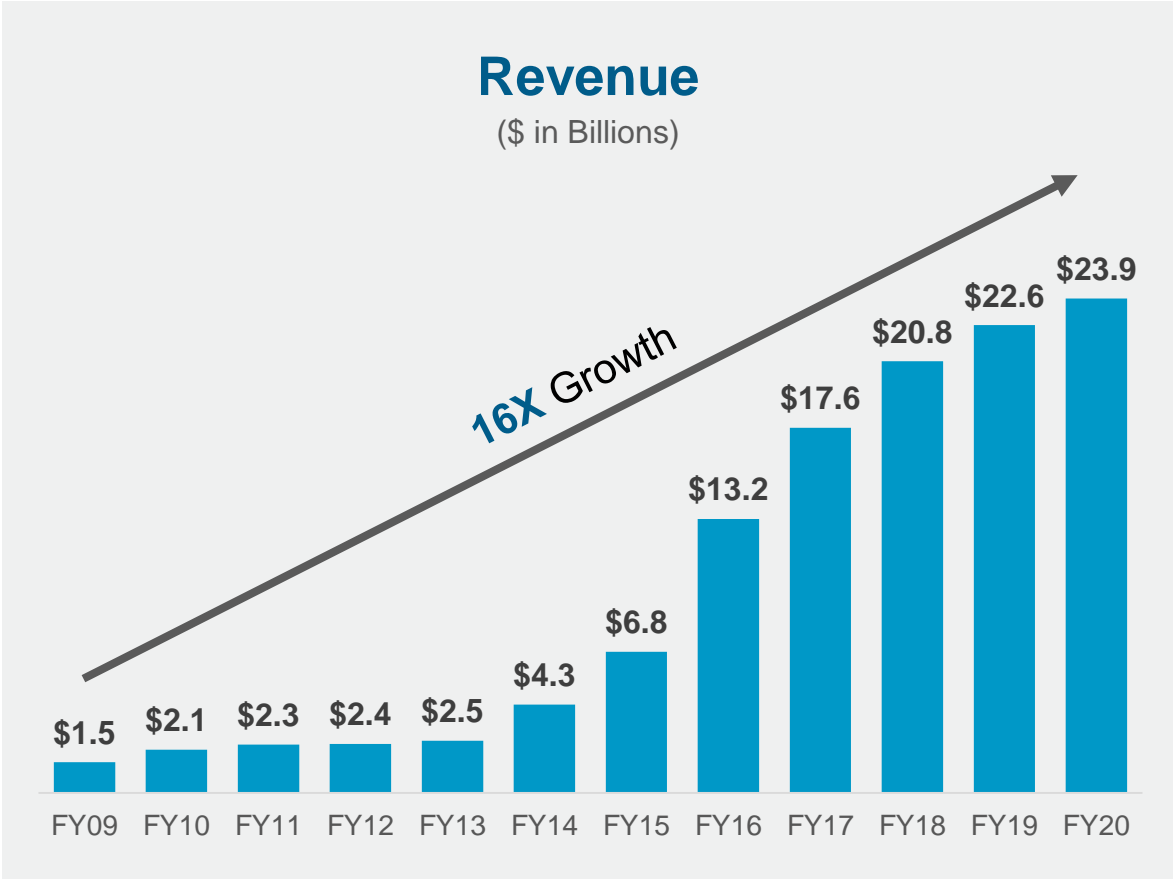
Ram Velaga
SVP & GM, Switch Products



Alexis Björlin, Ph.D.
SVP & GM, Optical Systems

How Broadcom Became a Global Technology Leader

Category-Leading Franchises: 8 in 2009 → 25 Today



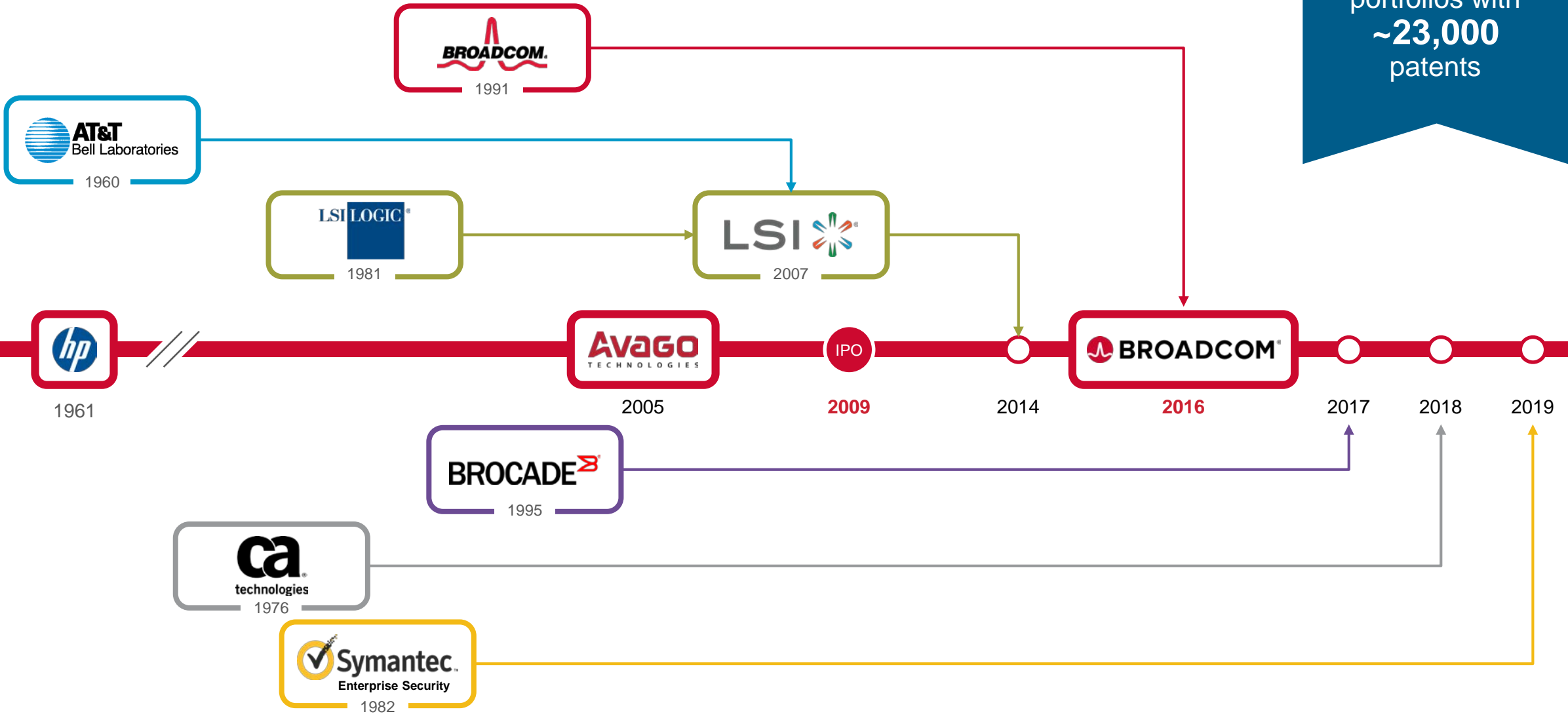
84X Growth in Operating Profit from 2009 → 2020

Heritage of Innovation

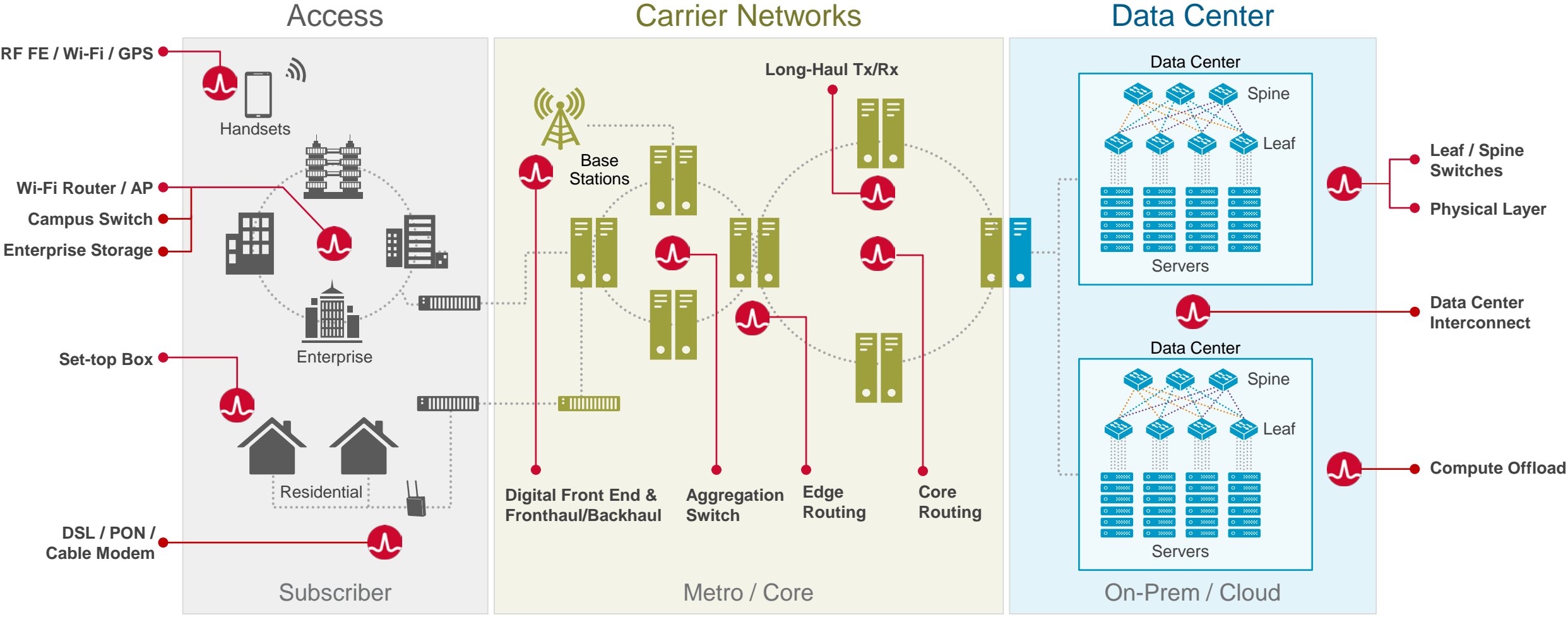
One of the industry's broadest IP portfolios with ~23,000 patents

Semiconductors

Infrastructure Software



Connecting Everything[®] Across the Ecosystem

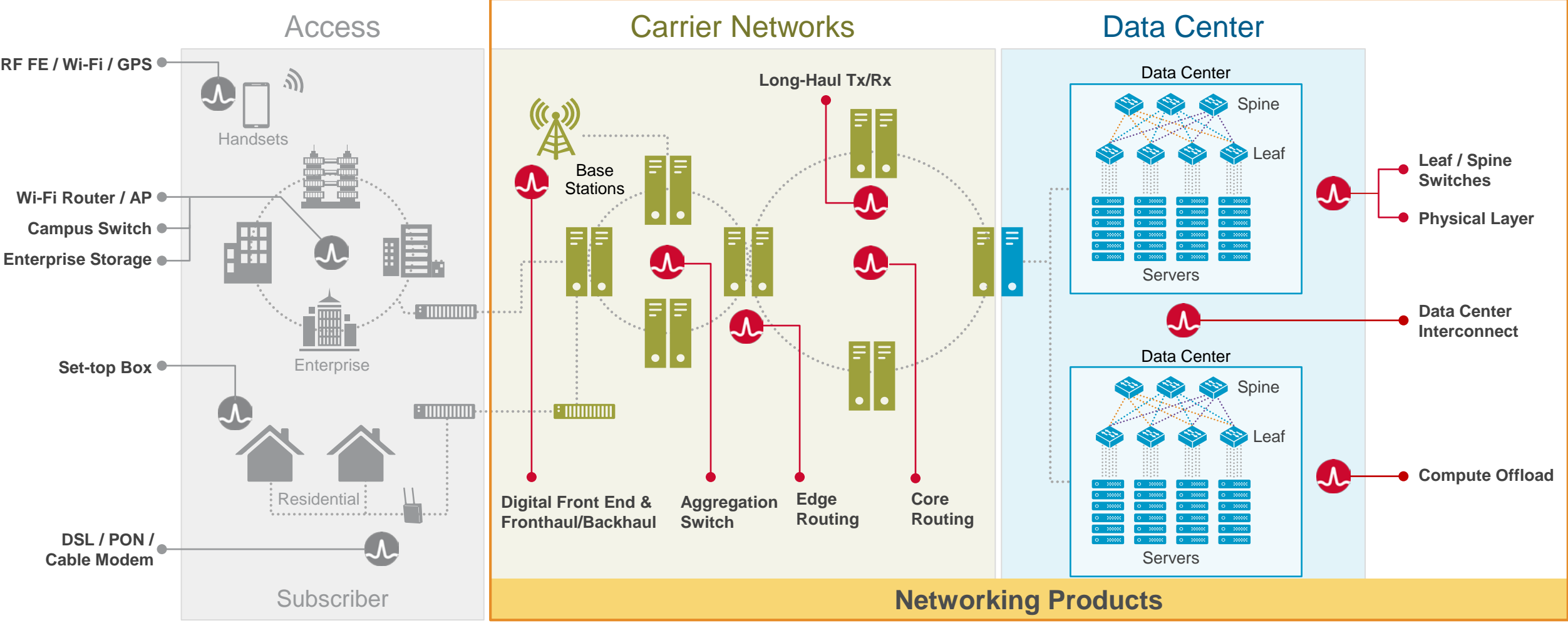


99.9% of All Internet Traffic Crosses at Least One Broadcom Chip

Source: Broadcom Internal Estimate



Connecting Everything[®] Across the Ecosystem – Networking

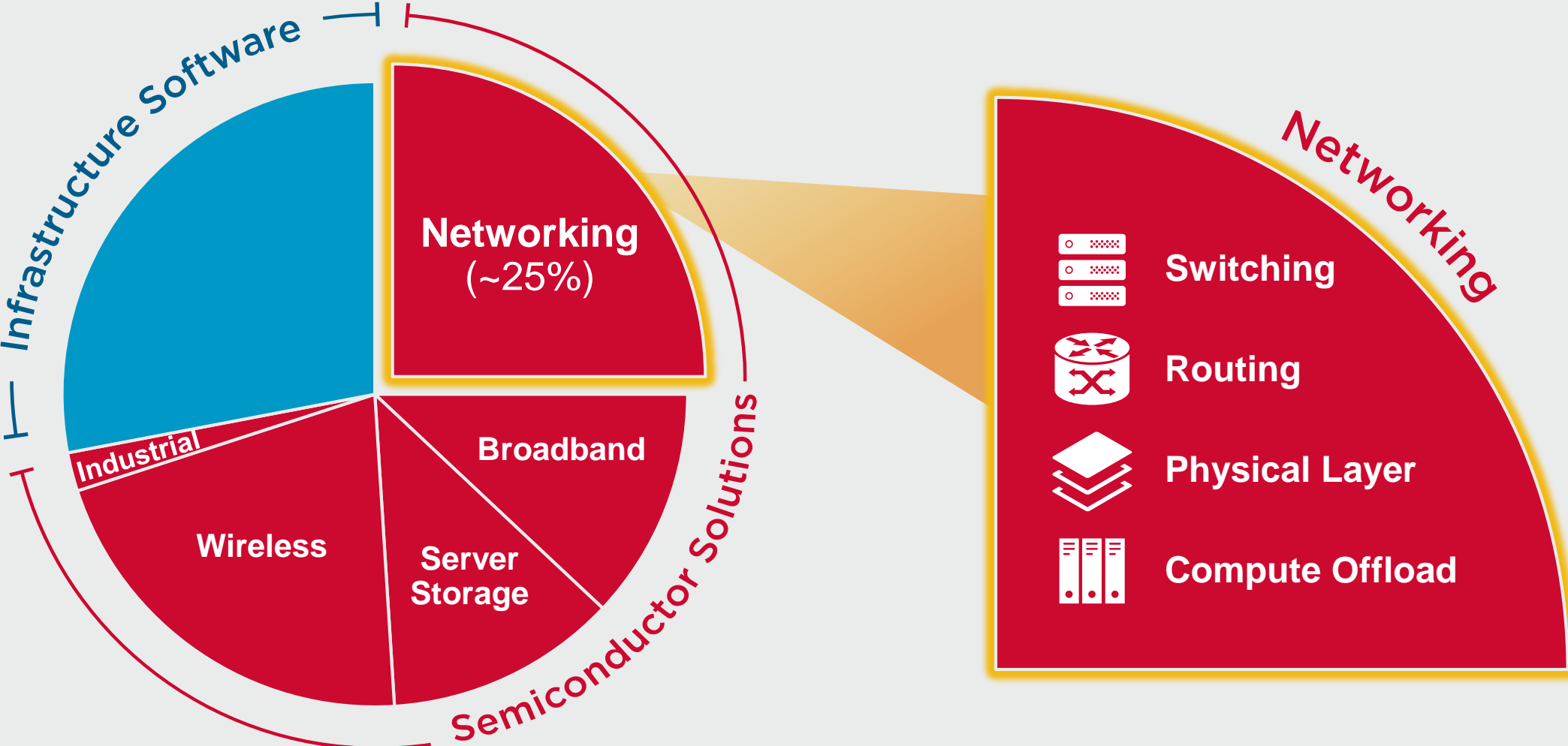


99.9% of All Internet Traffic Crosses at Least One Broadcom Chip

Source: Broadcom Internal Estimate



Category-Leading Franchises in Diverse End Markets





Core Switch Products

Ram Velaga

Senior Vice President and General Manager,
Switch Products



Connecting Everything[®]

Different Networks, Different Needs

Enterprise



- Medium bandwidth
- User mobility → policy & security
- Heterogeneous mix of devices
- Wired / wireless access

Service Provider



- High bandwidth
- Hyper shared infrastructure
- Oversubscribed
- Long-distance interconnects

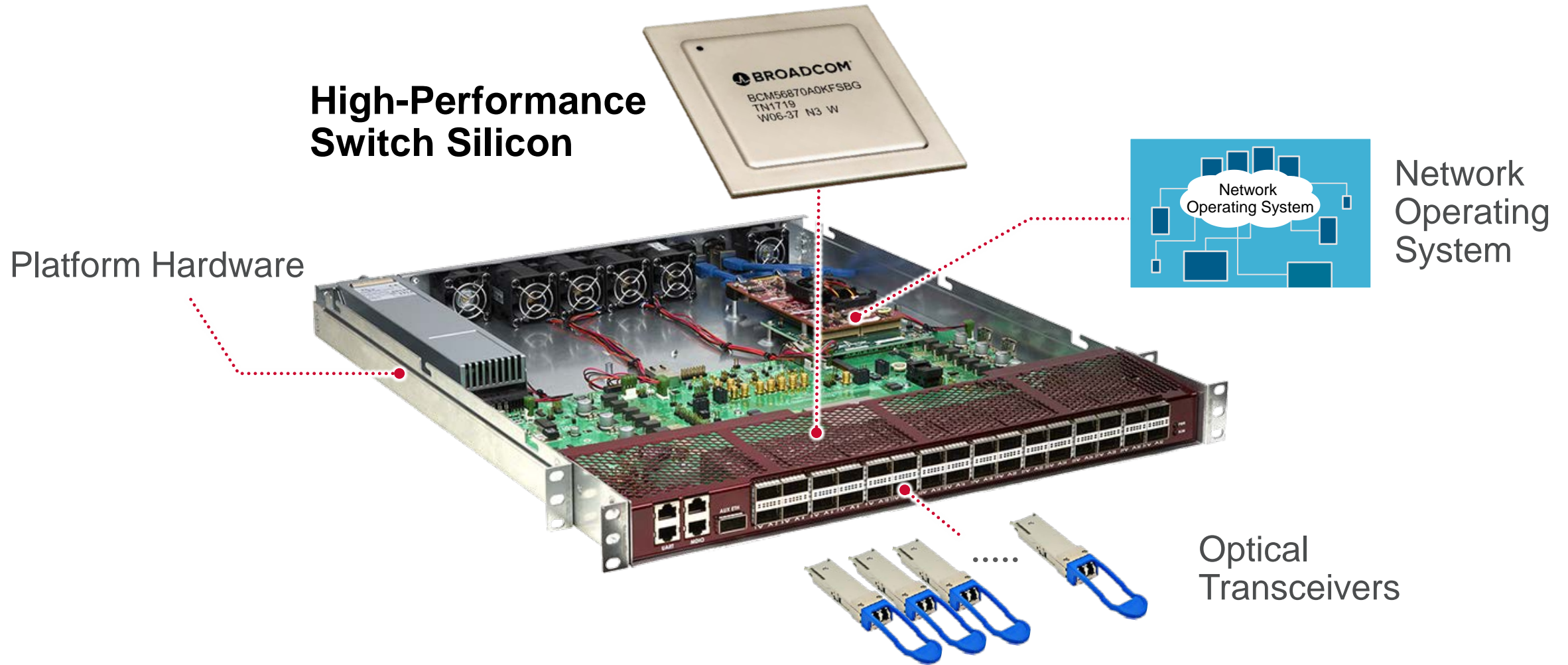
Hyperscale Data Center



- Hyper bandwidth
- East-west traffic dominates
- Latency sensitive

Enabling > \$50 Billion per Year Systems Market

Anatomy of a Switch / Router



Powered by Broadcom Silicon

Broadcom Builds the Right Tools for Each Network

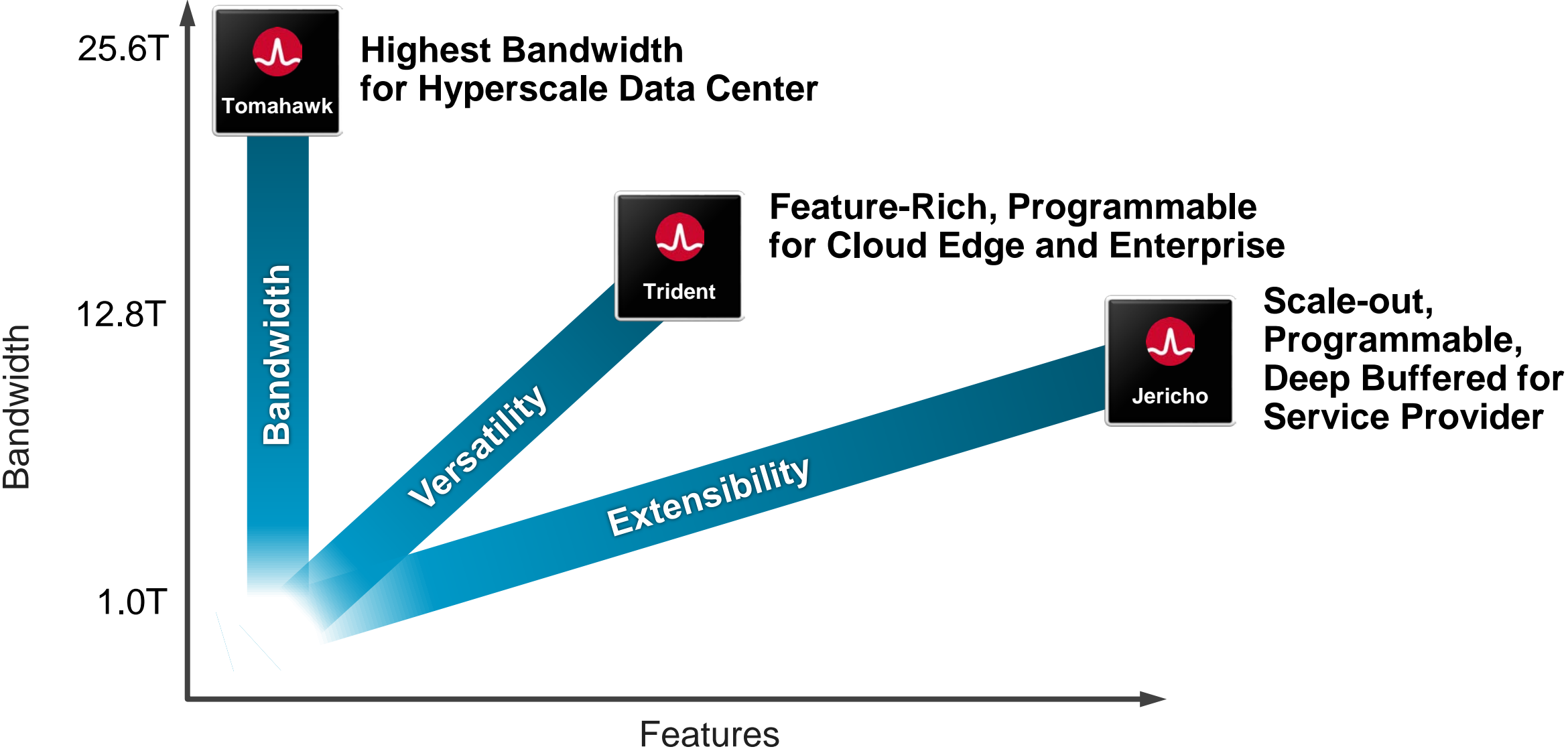


VS.



Optimized Silicon for Different Network Needs

Three Product Lines Serving All Networks ...



... with Consistent Programming Interface

Layer 2 APIs

Layer 3 APIs

QOS APIs

Telemetry APIs

Port APIs

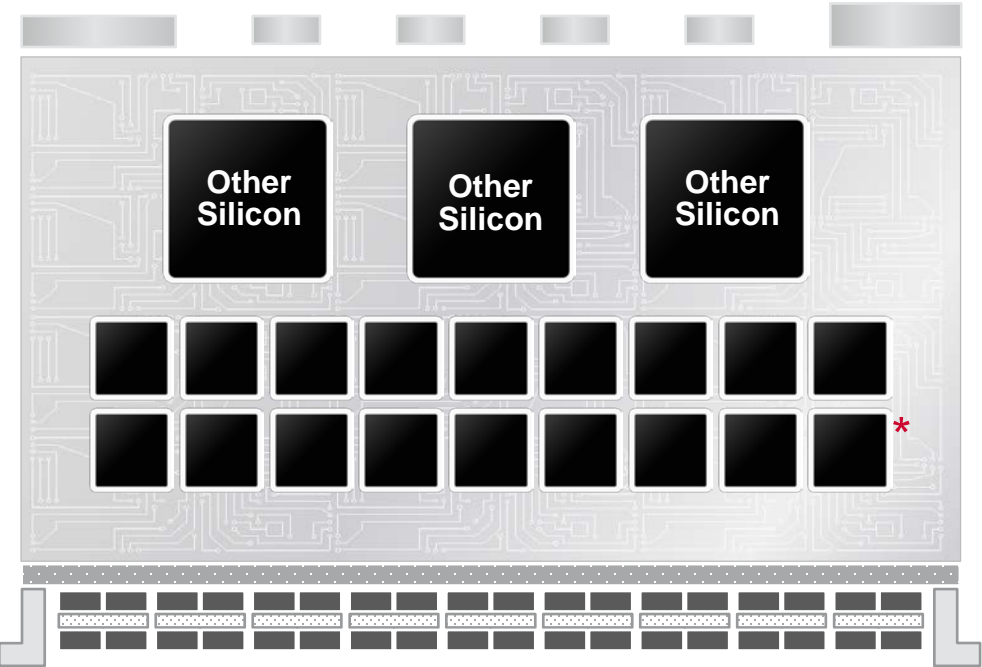
Broadcom Software Development Kit (SDK) with Open APIs



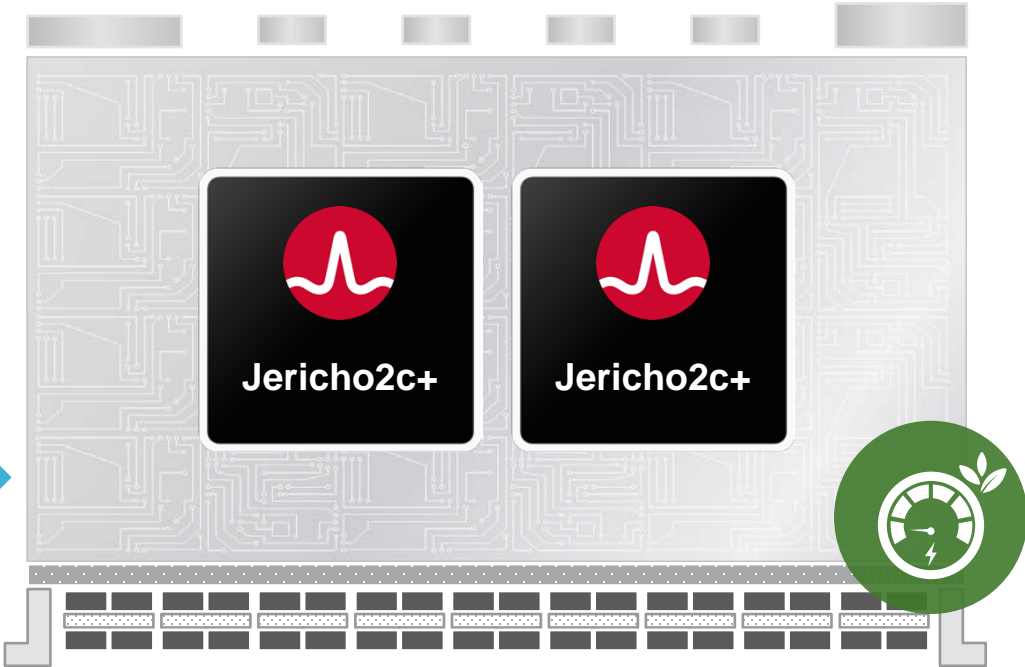
Single SDK Accelerates Development and Time to Market

Purpose-Built Silicon → Unmatched Efficiency

14.4Tbps Routing Line Card with Integrated Security



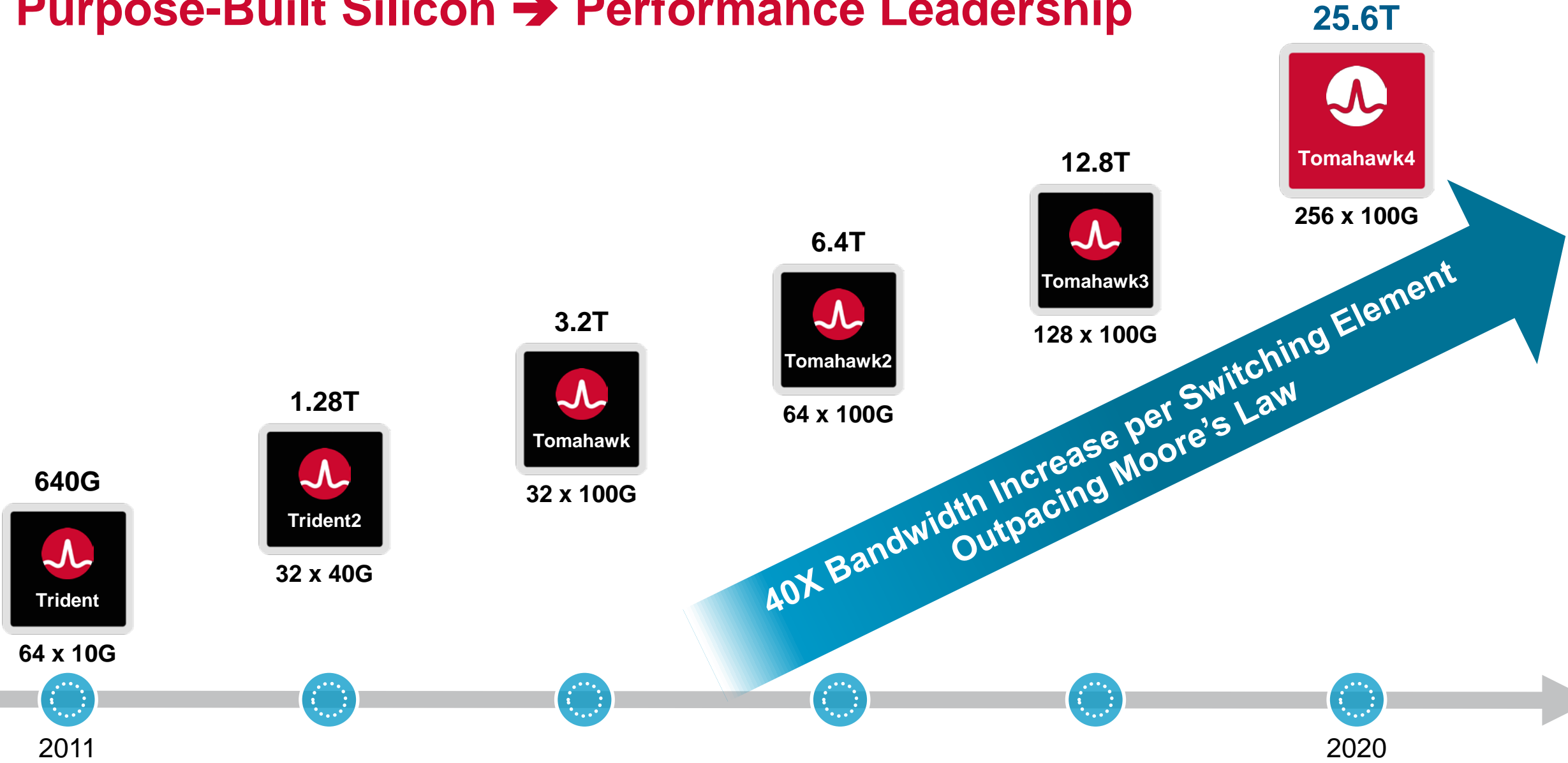
50%
Power
Reduction



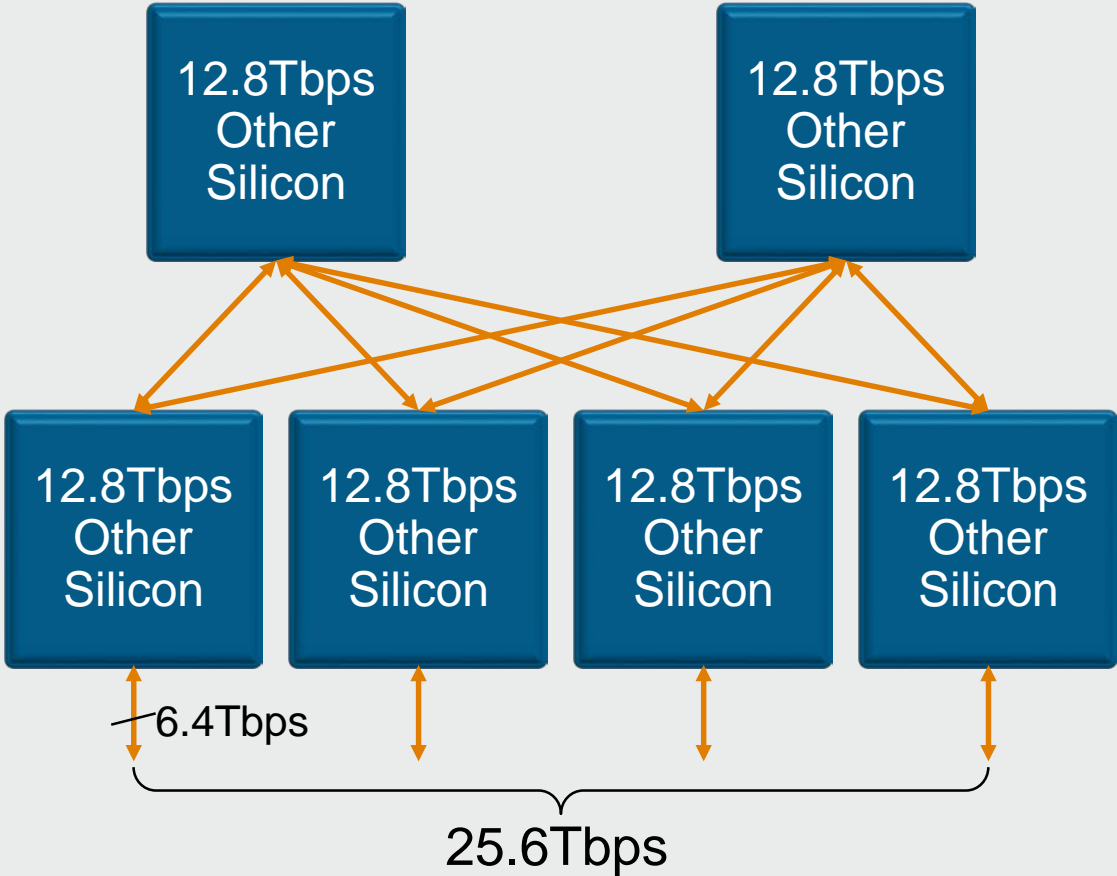
21 Chips vs. Two Chips

* 18x 800GE external MACSec devices

Purpose-Built Silicon → Performance Leadership



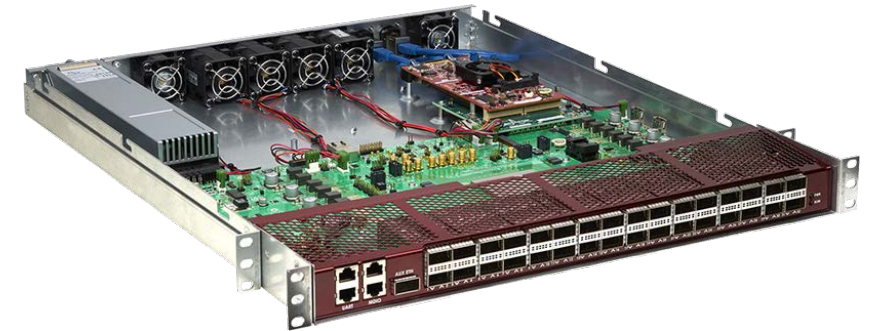
Doubling Bandwidth Delivers 6x Performance Improvement



Purpose-Built Silicon → Simplifies Hardware and Software ...



Image Source: Facebook, OCP



75%+ Reduction in System Power and Cost

... Democratizing Networking

Network Control & Automation



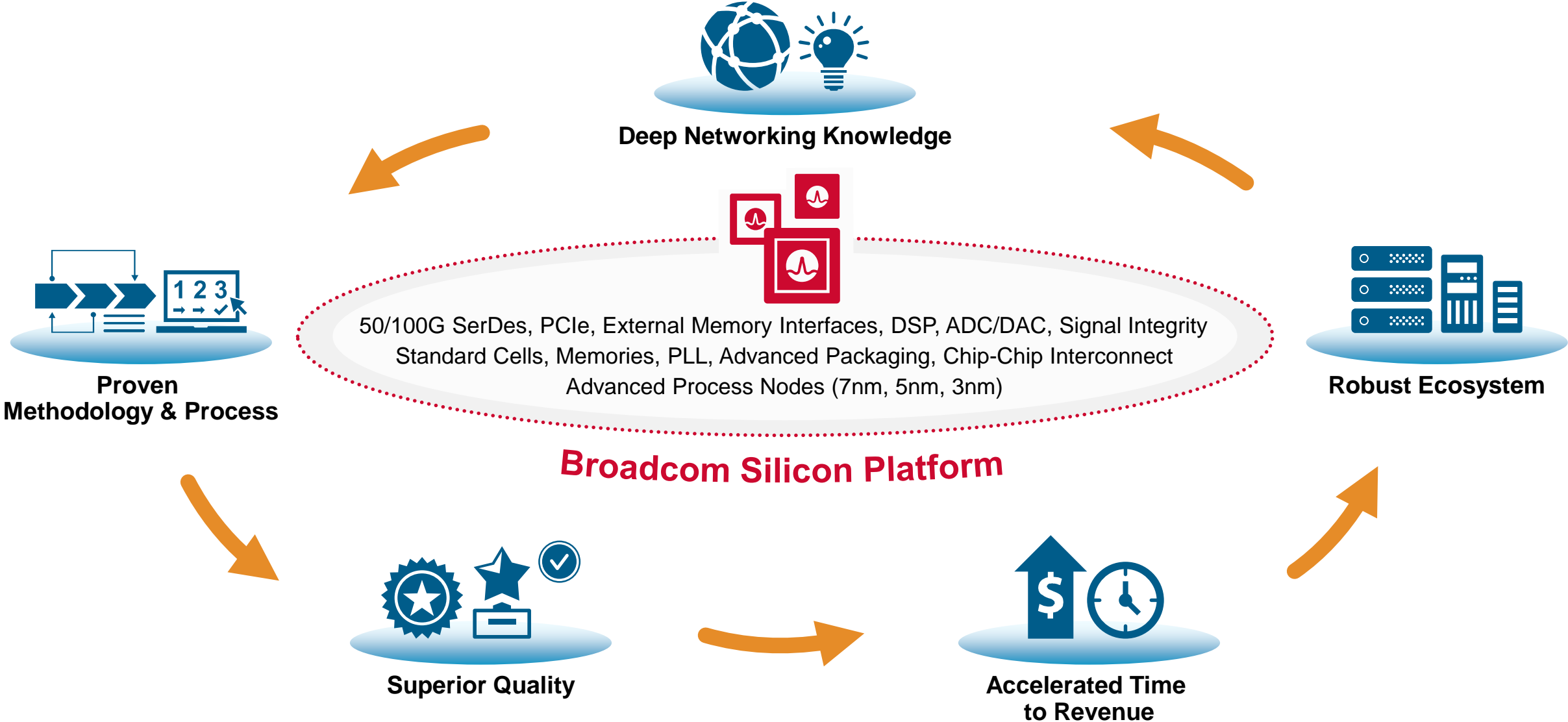
Operating System



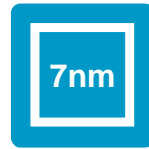
Hardware Platform



Operating at Scale: 6-8 New Chips Per Year



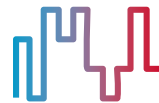
World's Largest Networking Silicon



Monolithic 7nm Implementation



30+ Billion Transistors



512 X 56G PAM4 SerDes



256 X 100G PAM4 SerDes*

* Also available

End-to-End Portfolio



Monterey

Fronthaul Gateway



Qumran2c



QumranAX



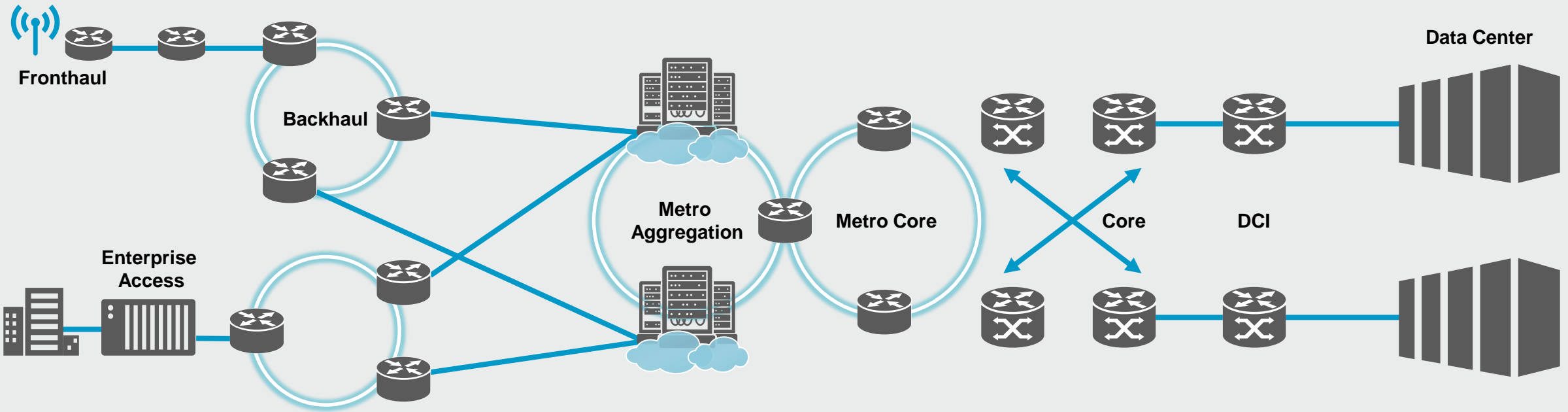
QumranUX

Cell Site Router



Jericho2

Metro Access



Trident3-X3

Trident3-X2

uCPE



QumranAX

OLT



Jericho2c

vBNG



Jericho2

Metro Edge



Jericho2

Metro Core



Ramon



Jericho2

DCI



Tomahawk4

Data Center Spine



Trident3

Data Center Leaf



Trident4



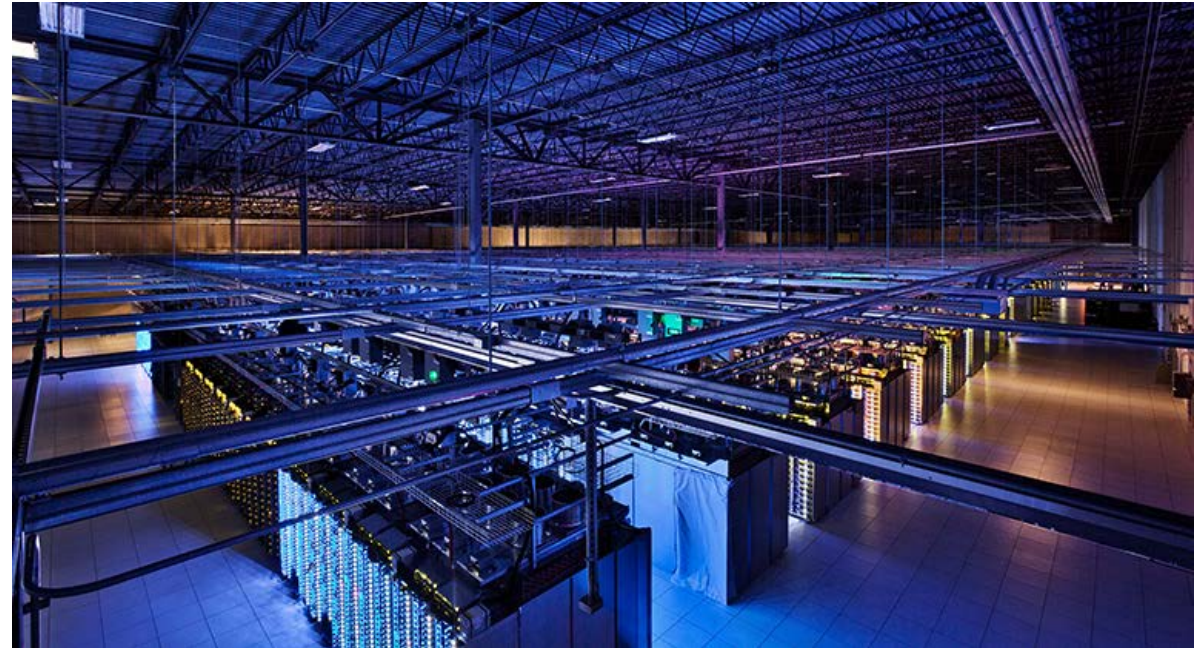
Silicon Photonics Platform Solutions

Alexis Björlin, Ph.D.

Senior Vice President and General Manager,
Optical Systems



The Present and Future of Data Infrastructure



\$100B Annual Capex Spend
by Cloud with 15% CAGR¹

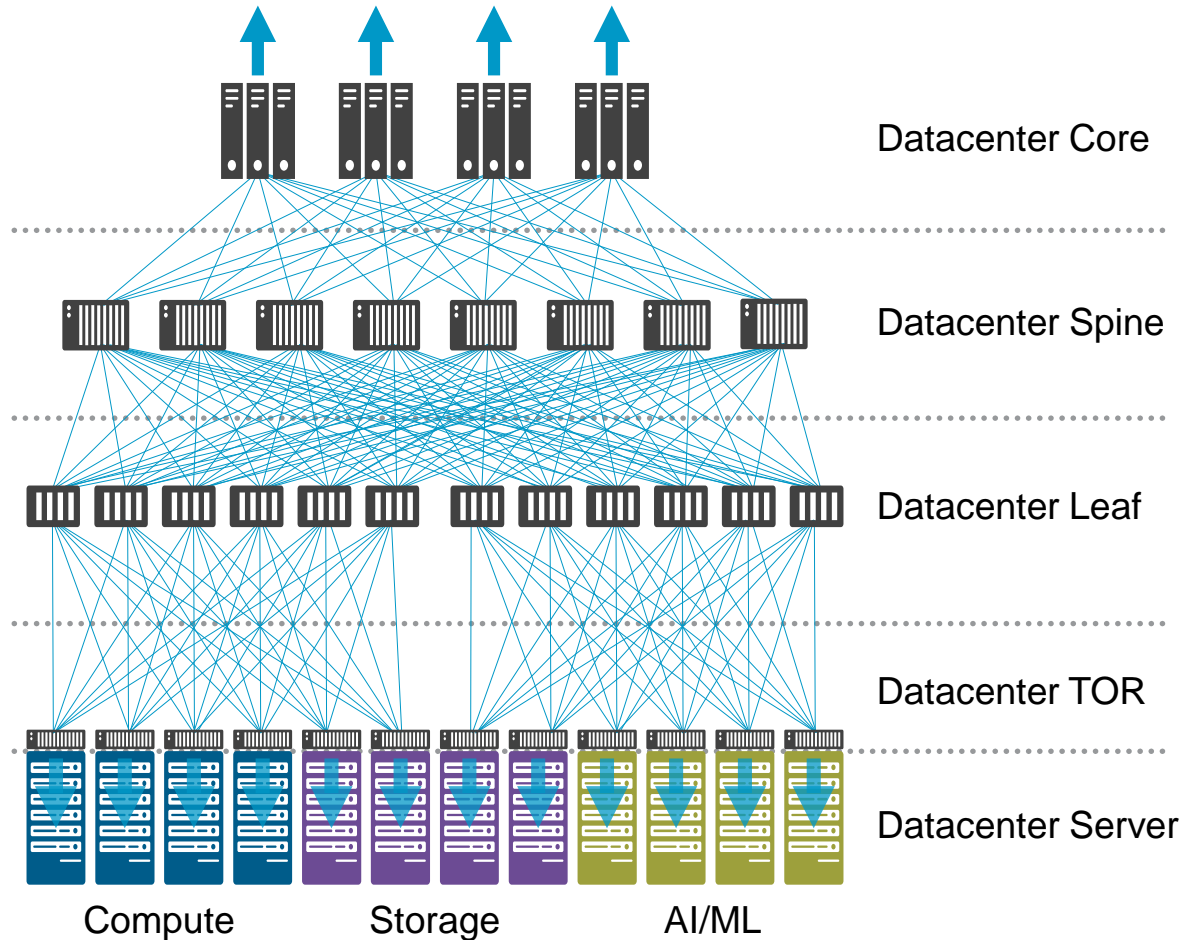
19.5 Zettabytes of
Cloud Data Movement²

Per hyperscale datacenter
> 100k Servers
> 10k Switches
> **1M Optical Interconnects**

Source:

1. 650 Group, Cloud Total Market and Forecast Report
2. Cisco Global Cloud Index, <https://blogs.cisco.com/news/acceleration-of-multicloud-era>
3. Left: Digital Realty's Loudoun Three campus in Ashburn, Virginia. Photo courtesy of Digital Realty
4. Right: Google's Council Bluffs, Iowa Data Center. Photo courtesy of Google

Datacenter Scale-out Requires Massive Fabric Connectivity



> 25%

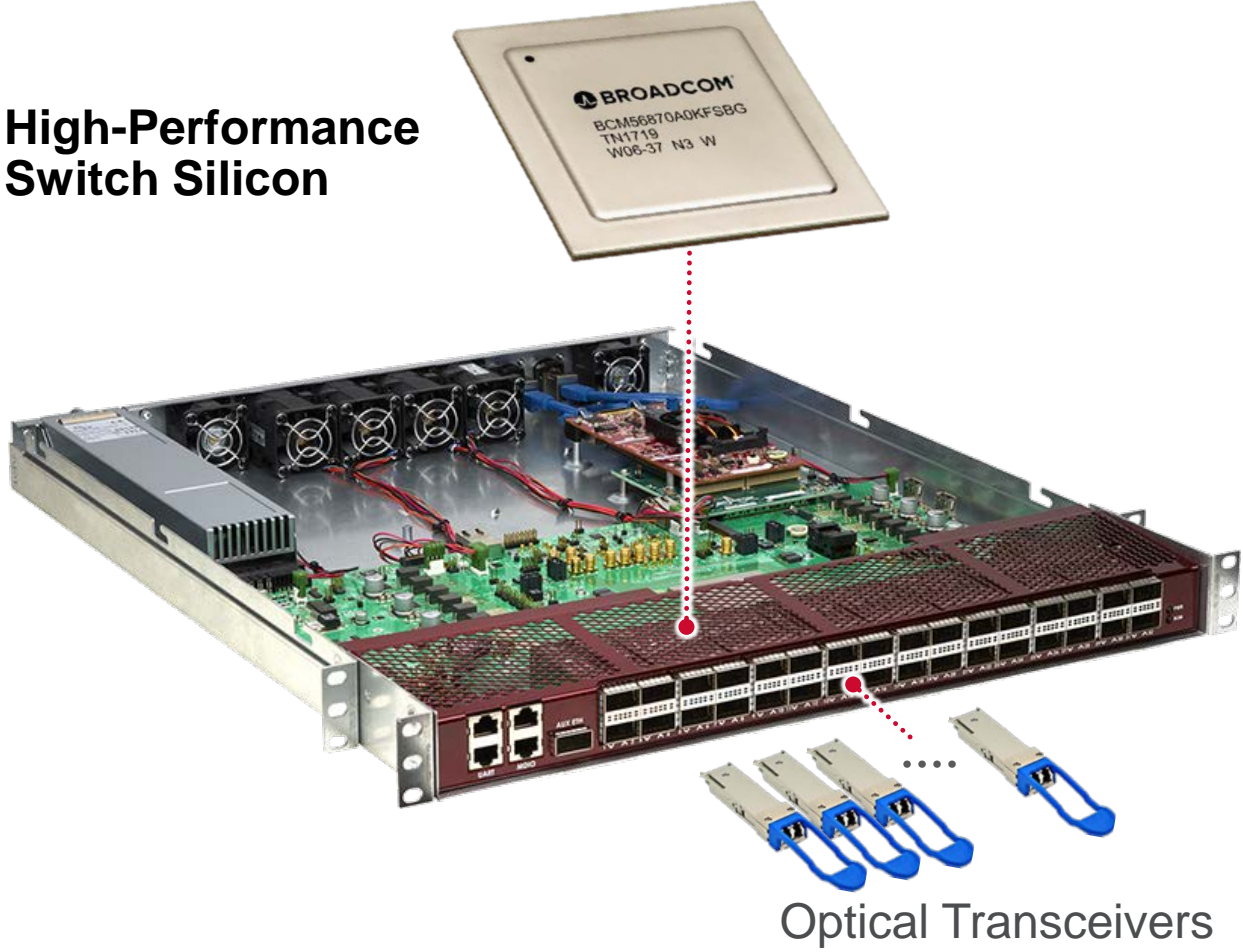
annual growth for intra-datacenter traffic*



	<p>Compute and storage resources pooled within datacenter and across regional zones</p>
	<p>Requires long-reach, low-latency interconnects</p>
	<p>Fabric increasing as % spend and power consumption of infrastructure</p>

* Source: CRN, <https://www.crn.com/news/data-center/why-public-cloud-data-center-spending-is-at-an-all-time-high>

Optical Interconnect Dominates Fabric Silicon Spend



Current Customer Spend*

10x\$

Switch

Optics

Opportunity for Step Function Improvement in Optical Connectivity

* Source: LightCounting, Dell'Oro, 650 Group and Broadcom internal estimates

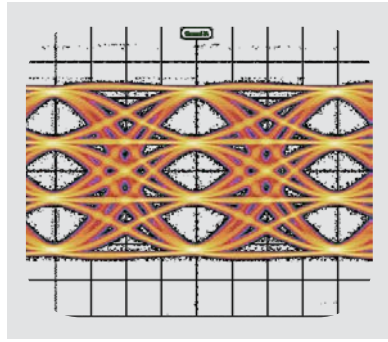


Broadcom's Unmatched Integration Capability Meets This Need



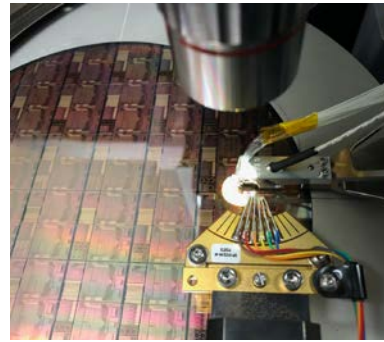
Switch Silicon

- Core switch, SerDes and DSP in leading node
- Sustained generational differentiation



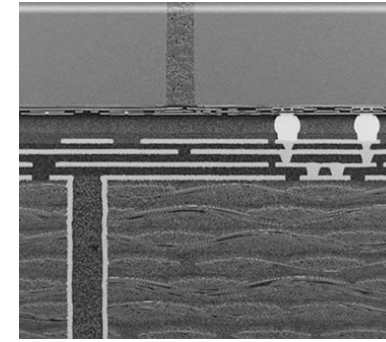
Mixed Signal IC

- Power and performance optimized in both SiGe and CMOS



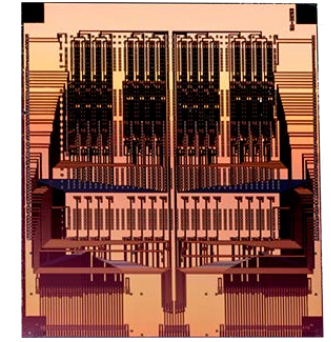
Optical Devices & Fabs

- 50M lasers/year from internal fabs
- High-volume optical manufacturing
- High-power, multi-wavelength sources



Advanced Packaging & Test

- Wafer-level test
- TSV
- 2.5D/3D integration



Silicon Photonics

- High-density PIC design
- Modulators and PDs in silicon
- Low-loss SOI waveguides

Industry-Leading Economics, Volume, Power Efficiency at Scale

Broadcom's Purpose-Built Silicon Photonics Platform ...



Industry's Highest Power Efficiency

- Direct drive from switch to photonics enables interconnect power < 1 pJ/bit
- System thermal management handling $>$ than 100 W/cm²



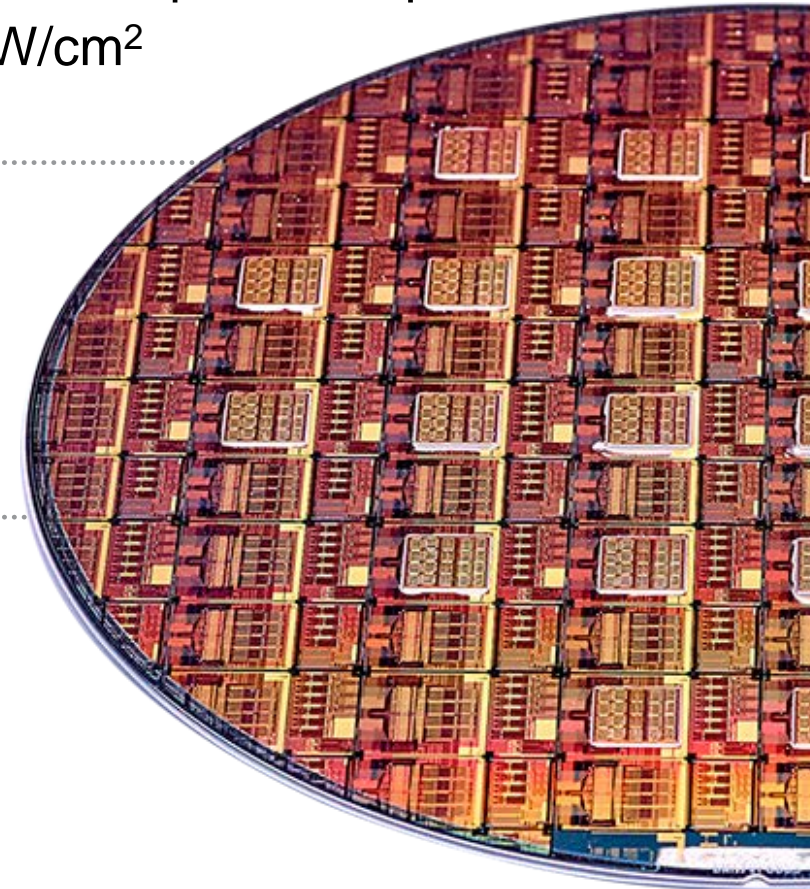
Industry's Highest Bandwidth Density

- 500 Gbps/mm die edge
- 64 single mode fiber attached to a single die

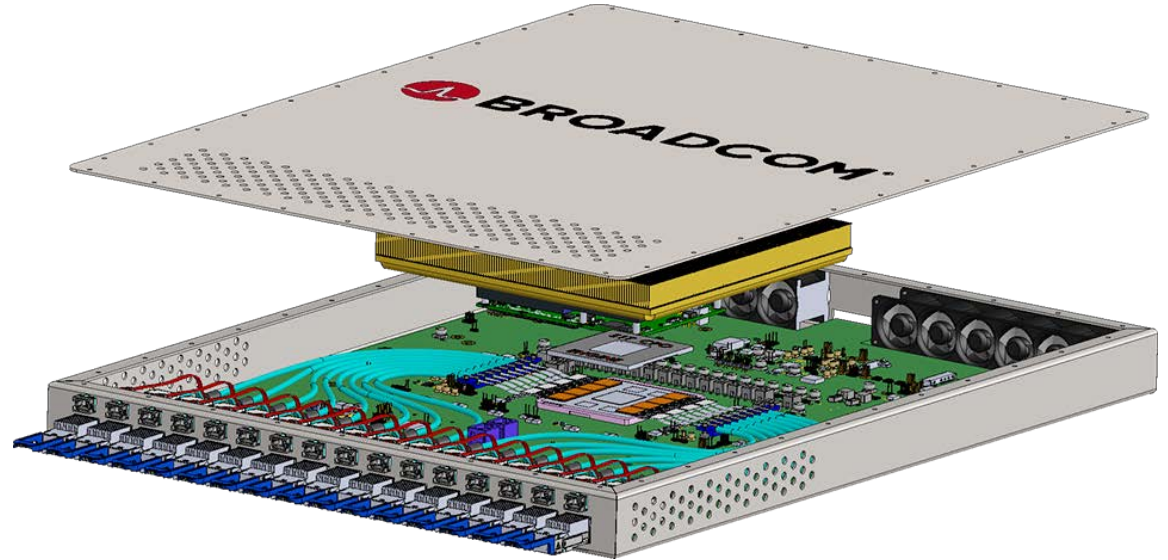
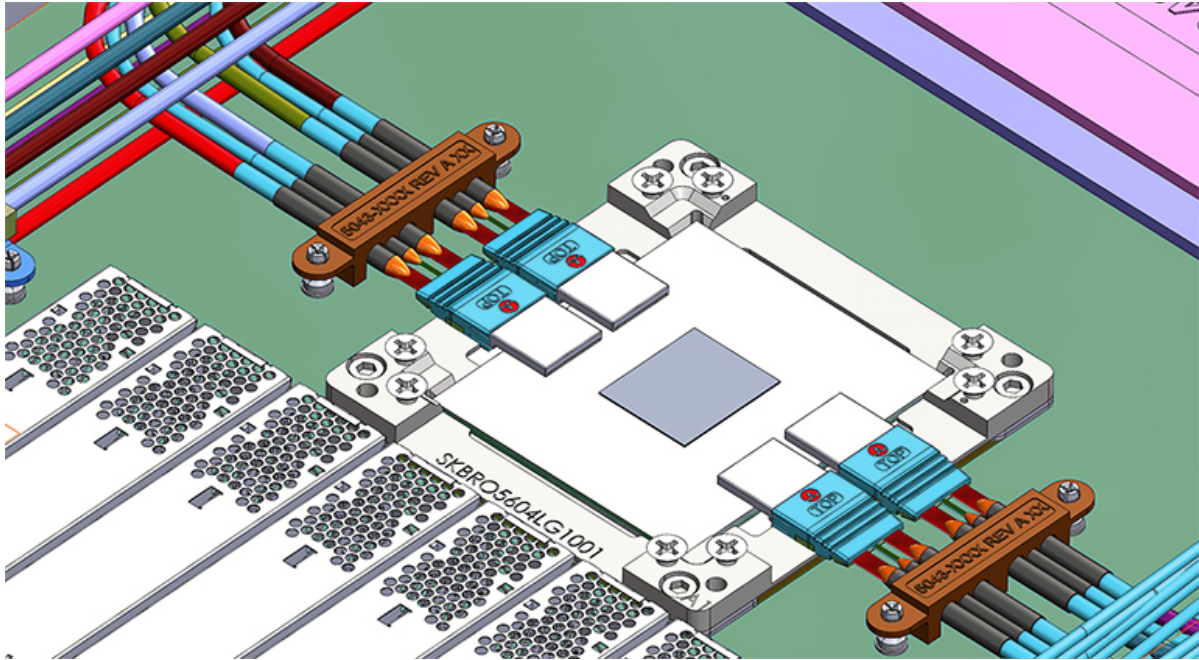


Designed for Reliability and Operational Efficiency

- Remote, pluggable laser source
- No electrical connectors



... Delivers Disruptive System Value ...



30% Power
Consumption Savings

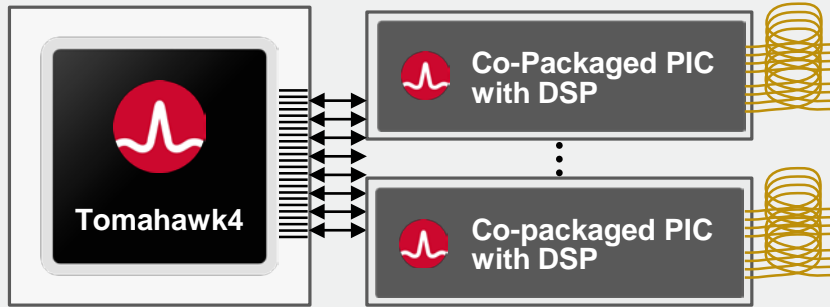


50% Improvement in Rack
Density and Integration Time

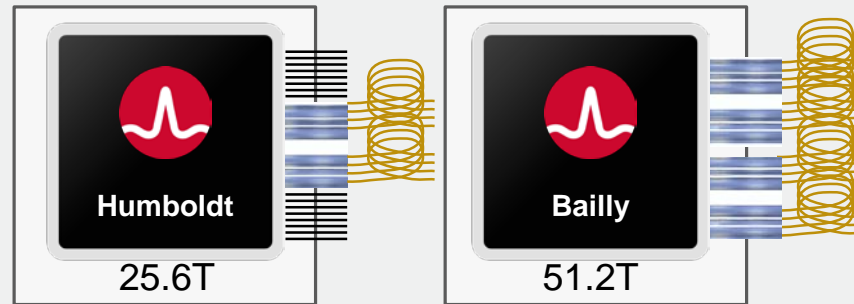
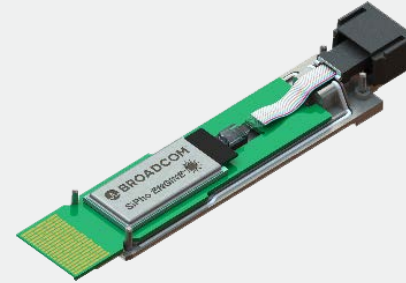


40% Lower
Optics Cost/Bit

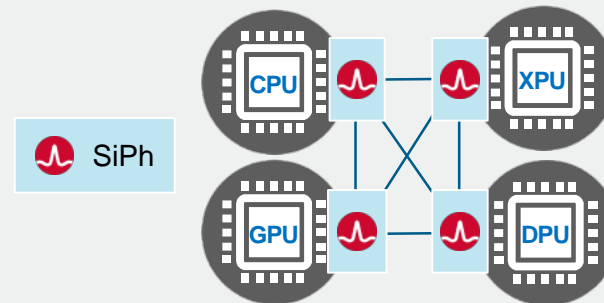
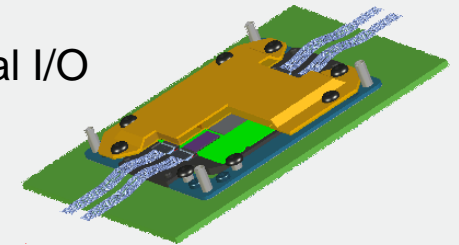
... with Multiple Use Cases Across the Broadcom Portfolio



Thebit: 800G DR8 integrated transceiver
Optimized performance;
lower cost



Bailly: Switch with optical I/O
30% lower power
40% lower cost/bit



Janssen:

Silicon Photonics platform for
optical I/O
scale-up/out interconnect

2021

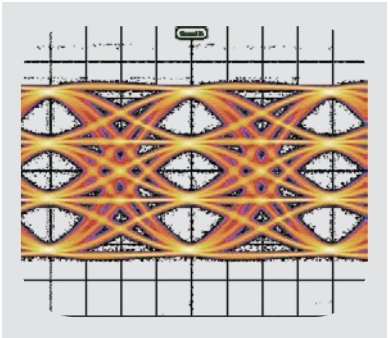
2023

2025

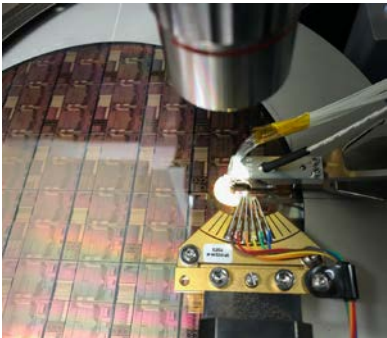
Broadcom's Disruptive Silicon + Photonics Platform ...



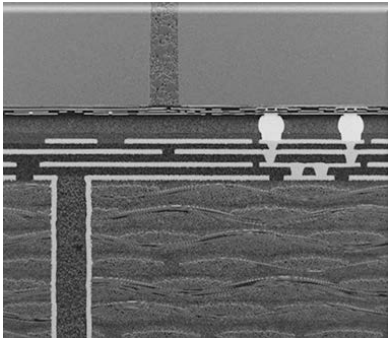
**Switch
Silicon**



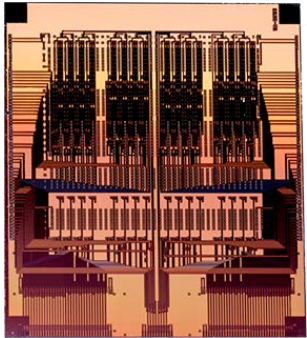
**Mixed Signal
IC**



**Optical Devices
& Fabs**



**Advanced
Packaging & Test**



**Silicon
Photonics**



... Expands our SAM by \$3B+*

*Source: Data estimates from a combination of market research (650 Group, LightCounting, Dell'Oro) and Broadcom internal estimates



Q&A





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connecting everything®