



## Networking Chips Buyer's Guide

A feature guide to selecting the best networking chip for your application.

# Considerations When Buying Networking Chips

When buying networking chips, technical specifications are critical and will be the focus for the rest of this guide. But a company's track record, ability to invest in leading-edge technologies, and history of delivering high-quality, mass-production products are critical factors.

## Considerations when selecting a networking chip vendor:

### **What's the vendor's delivery and execution track record?**

For over 30 years, Broadcom® has innovated, executed and delivered the #1 networking chips for the enterprise, service provider, and hyperscale data center environments.

### **What's the vendor's R&D investment?**

Broadcom's R&D spend is \$5B per year, with 25X R&D spending growth over the last 12 years.

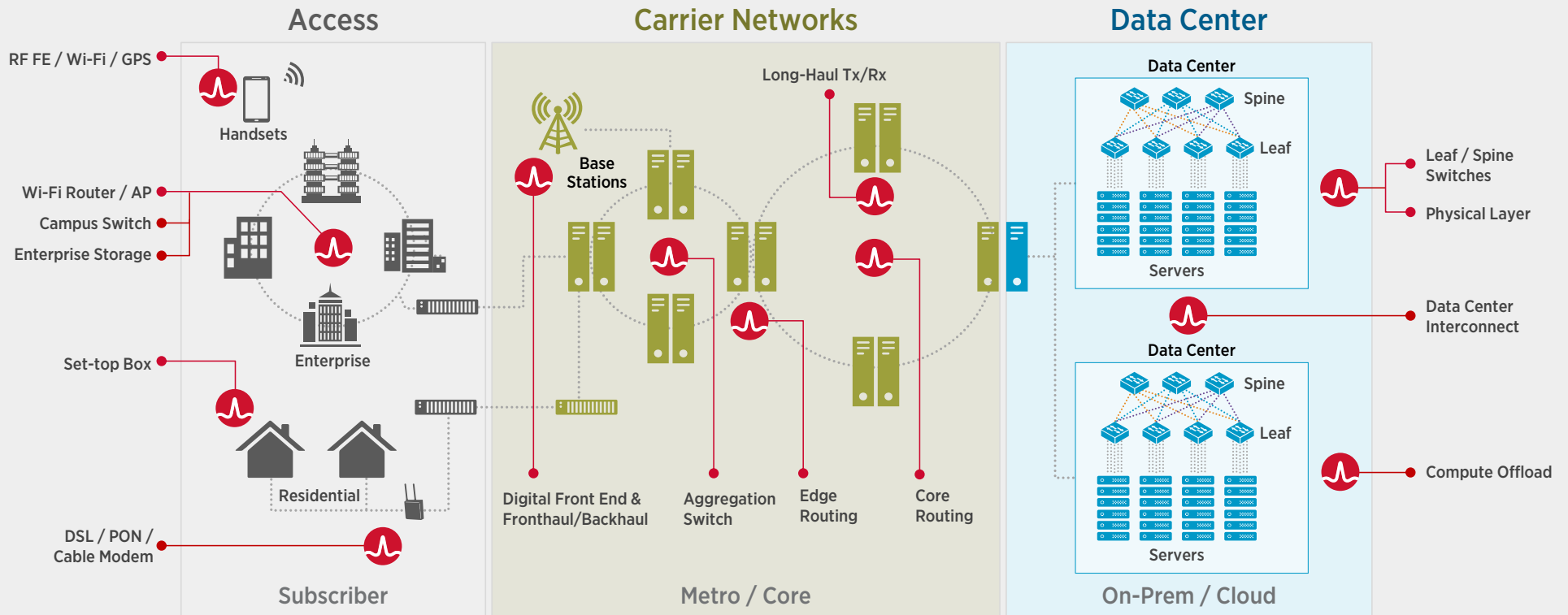
### **How much revenue does networking represent in the overall company?**

Networking within Broadcom represents 25% of consolidated company revenue.

### **How long has the company invested in the development and manufacturing of networking chips?**

Broadcom has been designing, innovating, and supplying networking chips for over 30 years.

# Connecting Everything<sup>®</sup> Across the Ecosystem



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

# PURPOSE-BUILT

## One Size Doesn't Fit All

The networking chip at the heart of the switch/router determines the effectiveness of the box. Broadcom realized over a decade ago that the networking market consists of three very different segments, each with its own unique requirements.

Working with customers across the spectrum, Broadcom has delivered many generations of networking chips into these fundamentally different markets, giving Broadcom the unmatched experience necessary to build networking chips precisely optimized for each segment.



### Enterprise

Medium bandwidth

User mobility → policy & security

Heterogeneous mix of devices

Wired / wireless access



### Service Provider

High bandwidth

Hyper-shared infrastructure with SLAs

Oversubscribed

Long-distance interconnects



### Hyperscale Data Center

Hyper bandwidth

East-west traffic dominates

Latency sensitive

Load balancing



## PURPOSE-BUILT

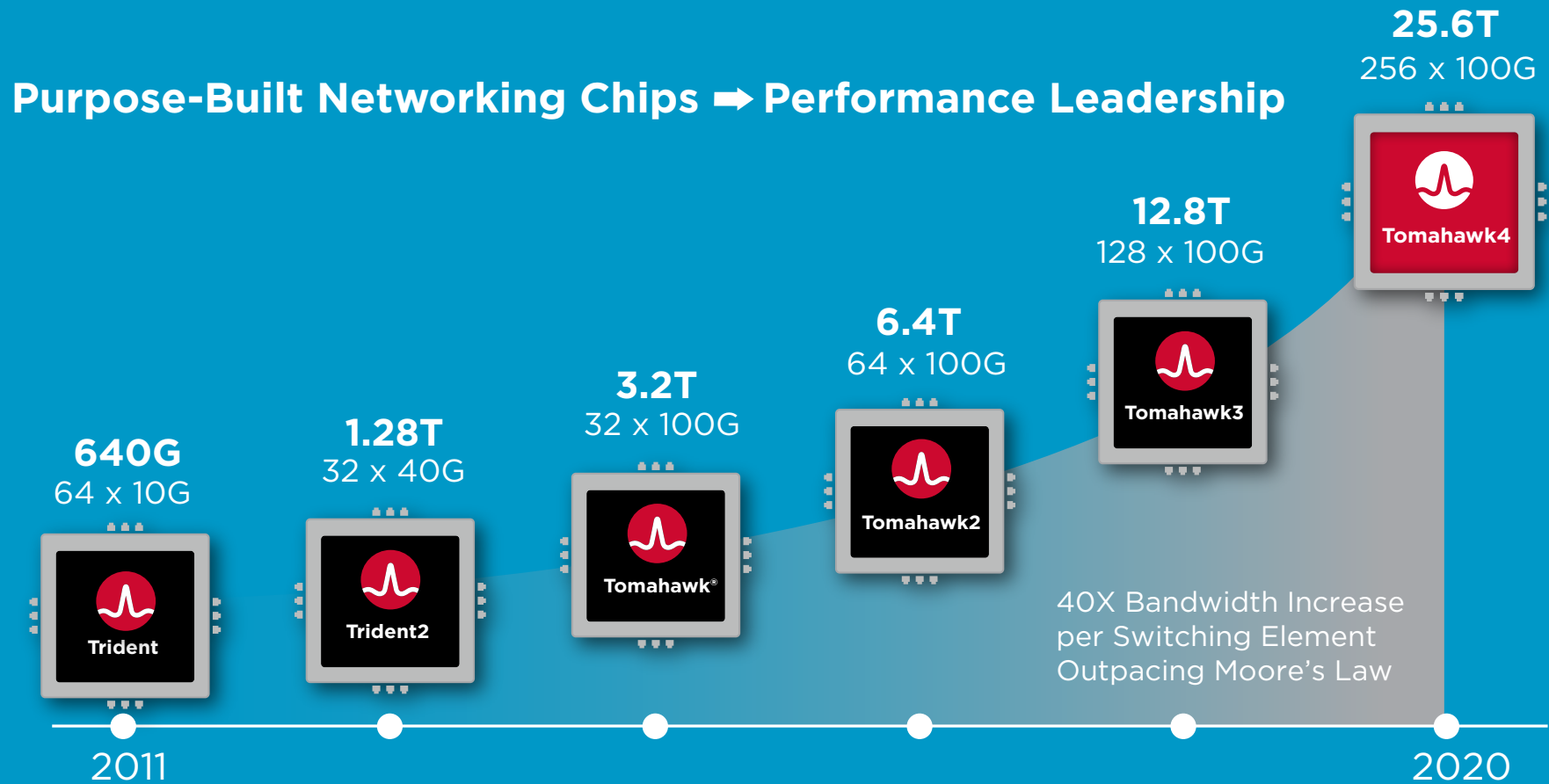
# 40X Bandwidth Increase

Purpose-built networking chips ensure performance leadership.




In 10 years, our highest-bandwidth chips have gone from 640Gb/s (64 x 10 Gb/s ports) to 25.6Tb/s (256 x 100 Gb/s ports) in our industry-leading Tomahawk4.


The Tomahawk product line pushes the absolute technical limits of what bandwidth can fit into a single die in the latest process node, to achieve maximal bandwidth without sacrificing power efficiency.

To date, only Broadcom has been able to release a 25.6Tb/s chip into mass production.




# Optimizing for the Enterprise


Key Criteria	 Enterprise	 Service Provider	 Hyperscale Data Center
Radix/IO/BW	✓	✓	✓✓
Latency	✓	✓	✓✓
Load Balancing	✓	✓	✓✓
Telemetry	✓✓	✓✓	✓✓
Programmability	✓	✓✓	
Deep Buffering & Shaping	✓	✓✓	
Large Access Control Lists	✓	✓✓	
Large Switching/Routing Tables	✓	✓✓	
Large-Scale Tunneling	✓	✓✓	



**StrataXGS<sup>®</sup>  
Trident**



**StrataDNX<sup>™</sup>  
Jericho**



**StrataXGS<sup>®</sup>  
Tomahawk<sup>®</sup>**

## Optimizing for the Enterprise

# Meet Trident

## Broadcom's New Trident SmartToR

### Converged Switching, Routing, and L4-L7 Services

Trident SmartToR brings unmatched performance and scale along with merchant-silicon economics to disrupt a market that has, until now, relied on low-performing and expensive processors and FPGAs.

Routing

L4-L7  
Services

Switching



Trident  
SmartToR

## 100x Performance Increase

Trident SmartToR dramatically increases increases throughput vs. CPU-based approaches.

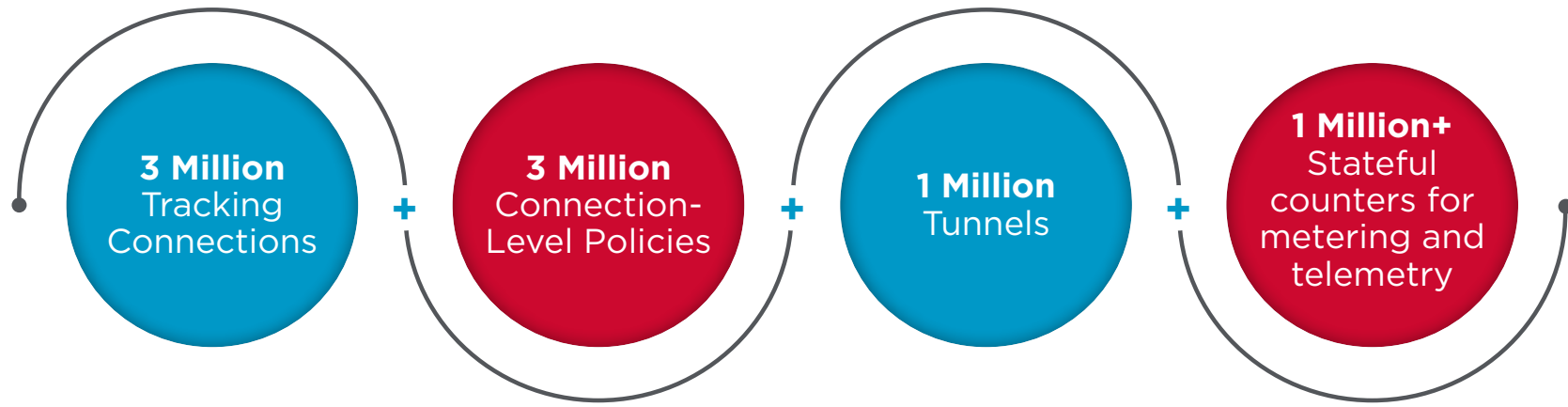
Service	CPU*	SmartToR	Performance Increase
Virtual Switching	<100Gb/s	8Tb/s	>80x
Load Balancer	<100Gb/s	8Tb/s	>80x
Large Scale NAT	<50Gb/s	8Tb/s	>160x
DDoS	<50Gb/s	8Tb/s	>160x
Packet Broker	<30Gb/s	8Tb/s	>250x

\* Typical performance for 10-core 5.0GHz CPU

# Optimizing for the Enterprise

## Meet Trident

### Massive Scale on Trident SmartToR



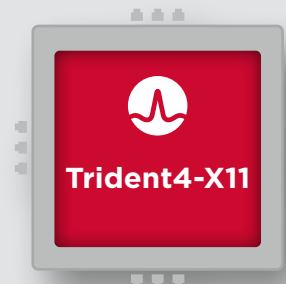
### Programmable Instrumentation and Analytics

High resolution and high throughput connection monitoring. Telemetry filtering, deduplication, and summarization.

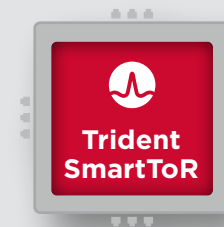


### The Trident Family

The world's highest throughput, lowest power devices for the enterprise.






256 x 50G PAM4  
**SHIPPING IN VOLUME**




Smart Top of Rack Switching, Routing, L4-L7 Services  
**SHIPPING IN VOLUME**




# Optimizing for the Service Provider

Key Criteria			
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Programmability	✓	✓✓	
Deep Buffering & Shaping	✓	✓✓	
Large Access Control Lists	✓	✓✓	
Large Switching/Routing Tables	✓	✓✓	
Large-Scale Tunneling	✓	✓✓	


  



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# Optimizing for the Enterprise

## Meet Jericho

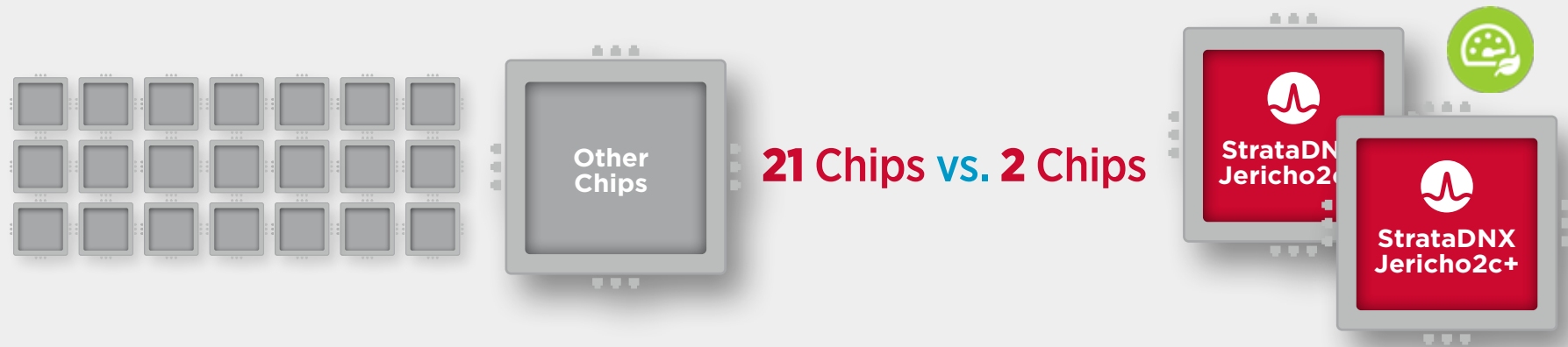
Service Providers run their business on SLAs and shared networks. Jericho is purpose-built to handle deep buffering in the event of high network congestion.

While power consumption has always been an important metric for switch/router silicon, it is quickly becoming one of the most critical factors in network system design. Over the last decade, power consumption has progressed from a factor related mainly to cost (Will I have to use a heat sink? What type of fan will I need?) to a deciding factor on whether new network equipment can be deployed at all, considering infrastructure and rack-level power supply or cooling limitations. Recognizing the importance of power efficiency, Broadcom has been at the forefront of low power network chip design and has consistently led the industry in terms of throughput per Watt.



**Purpose-built networking chips provide unmatched efficiency.**

### 14.4Tb/s Routing Line Card with Integrated Security



# Optimizing for the Hyperscale Data Center



## Key Criteria

	Enterprise	Service Provider	Hyperscale Data Center
Radix/IO/BW	✓	✓	✓✓
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## Optimizing for the Hyperscale Data Center

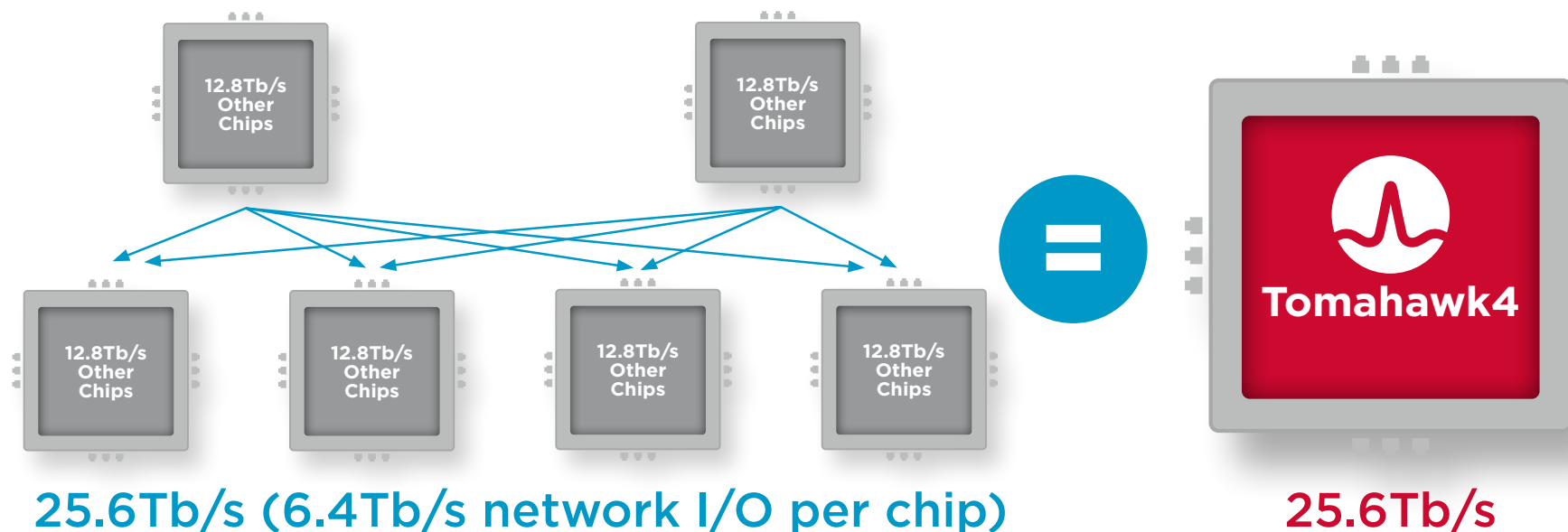
# Meet Tomahawk4

The world's only 25.6Tb/s switching/routing silicon in mass production today.

Implemented in 7nm technology, Tomahawk 4-50G provides 2x bandwidth versus competing solutions.

Now shipping in volume.

## Broadcom's 25Tb/s Tomahawk Delivers >6x Improvement vs. Other Networking Chips



# Optimizing for the Hyperscale Data Center

## Tomahawk4 Benefits

### Tomahawk Family Benefits

01

Fully shared packet buffers, providing up to 10x the burst absorption vs other architectures.

02

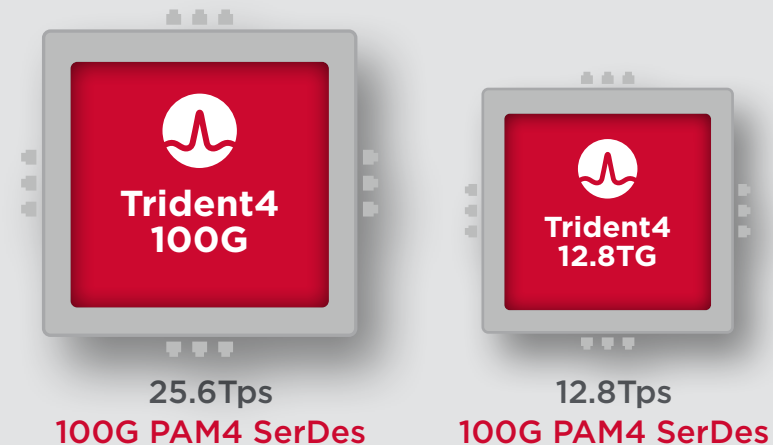
Twice the efficiency, on a per-chip basis, versus any other switch/routing silicon, enabling a 75% reduction in system power and latency.

03

Common APIs shared with all Broadcom switch/routing silicon families is freedom to focus on choosing the best architecture for a particular application.

### Choice.

Broadcom Tomahawk expands the family to include two new Tomahawk chips to enable your system designs. These products demonstrate the benefits of Broadcom's strategy and commitment to providing optimized chips for specific network needs, delivering twice the efficiency of any other alternatives.



## “ “ The Linley Group

*“By advancing the 25.6Tb/s Tomahawk4 from samples to volume shipments in less than one year, Broadcom has once again demonstrated its ability to deliver first on the highest performance switch/router silicon. The expansion of the Tomahawk family to include 50G PAM4 and 100G PAM4 SerDes variants means that hyperscalers can fully optimize their data centers with their choice of optical and electrical interconnect.”*

Bob Wheeler, principal analyst, The Linley Group

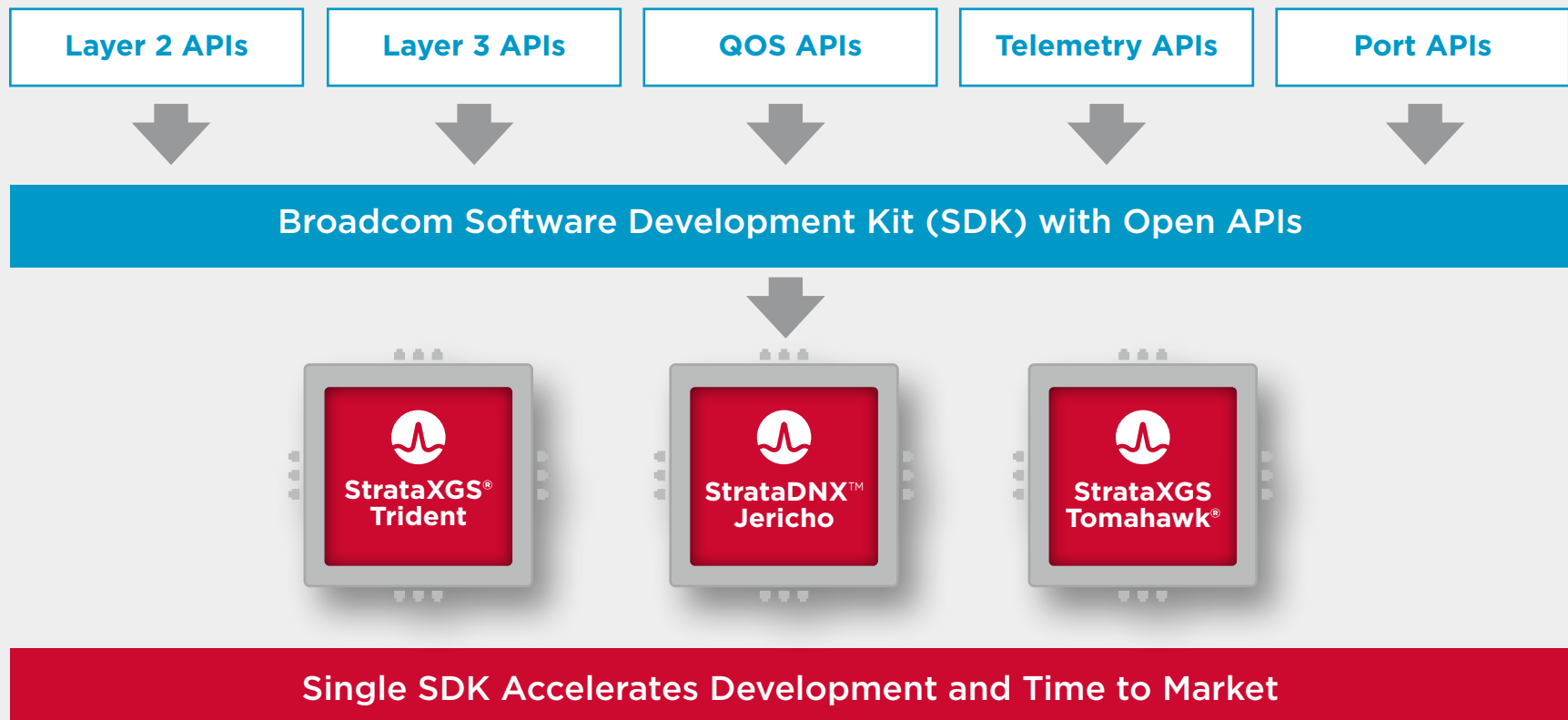
# Unified API

## Single Development Platform

Flexibility to design in different Broadcom networking chips requires a single, unified development environment.

Customers can maximize the reuse of their software development to target a broad set of markets that the business is serving.

Features that are developed on the Trident product line are easily ported to the Jericho product line or to our Tomahawk products. And this also applies to all generations of our chips, current and future.



# Why Broadcom

## Democratizing the Network & Operating at Scale

A large ecosystem of partners built around Broadcom technology.

### Network Control & Automation



### Operating System

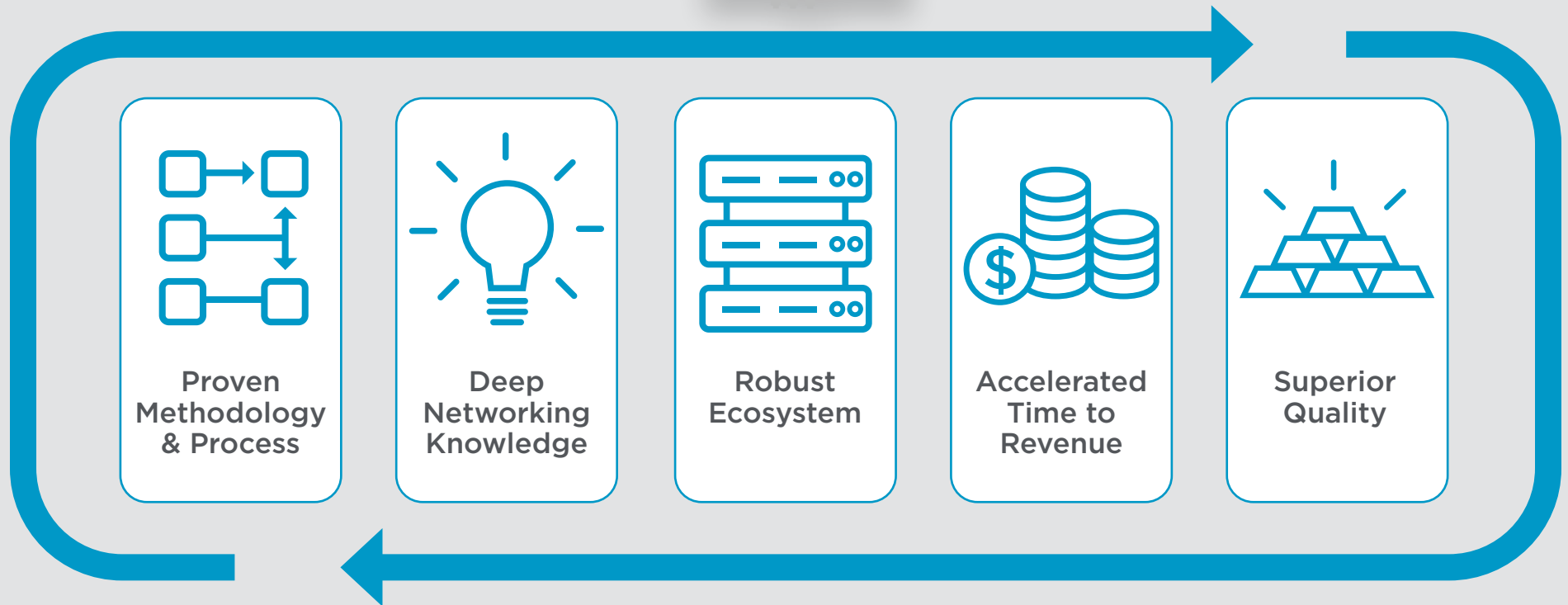


### Hardware Platform



## Why Broadcom

# Broadcom Networking Chips Development Releasing 6-8 new chips per year



50/100G SerDes, PCIe, External Memory Interfaces, DSP, ADC/DAC, Signal Integrity Standard Cells, Memories, PLL, Advanced Packaging, Chip-Chip Interconnect Advanced Process Nodes



Broadcom

# #1 IN NETWORK CHIPS

Merchant Silicon Optimized  
to Each Market

[Learn more](#)