Broadcom Introduces Industry's First Switch With On-Chip Neural Network

November 30, 2023

The New Trident 5-X12 Doubles Bandwidth, Reduces Power By 25%, and Adds Neural Network To Enable Next-Generation Telemetry, Security and Traffic Engineering

SAN JOSE, Calif., Nov. 30, 2023 (GLOBE NEWSWIRE) -- In a world's first for switching silicon, Broadcom Inc. (NASDAQ:AVGO) today announced a novel on-chip, neural-network inference engine called NetGNT (Networking General-purpose Neural-network Traffic-analyzer) in its new, software-programmable Trident 5-X12 chip.

NetGNT works in parallel to augment the standard packet-processing pipeline. The standard pipeline is one-packet/one-path, meaning that it looks at one packet as it takes a specific path through the chip's ports and buffers. NetGNT, in contrast, is an ML inference engine and can be trained to look for different types of traffic patterns that span the entire chip.

For example, NetGNT can look for a traffic pattern common in AI/ML workloads called "incast" in which many packet flows all converge on the same port and buffer at roughly the same time causing congestion. NetGNT can recognize this pattern in real-time as it begins and invoke congestion-control techniques to avoid degraded network performance. And since NetGNT runs in hardware at full line rate— there is no impact to throughput or latency.

"We continue to push the envelope and introduce brand-new technologies such as NetGNT to the market. We also listen very closely to our customers who have made it clear that one size does not fit all. They rely on us to deliver a broad portfolio of chips, customized for different applications," said Ram Velaga, senior vice president and general manager, Core Switching Group, Broadcom. "Trident 5-X12 is the most power-efficient ToR (Top of Rack) on the market, while still adding cutting-edge new features that our customers have come to expect from an innovator such as Broadcom."

Trident 5-X12 is software-programmable, field-upgradable and provides 16.0 Terabits/second of bandwidth, which is double that of the market-leading Trident 4-X9. It also adds support for 800G ports, allowing direct connection to Broadcom's leading-edge Tomahawk 5, which is used as the spine/fabric in the newest compute and AI/ML data centers. This chip is uniquely positioned to enable a 1RU data center ToR supporting 48x200G downlink ports and 8x800G uplink ports.

Additional Trident 5-X12 Key Benefits

- Uses 25% less power per 400G port than current market-leading Trident 4-X9
- Adds support for 800G ports using Broadcom's industry-leading 100G-PAM4 SerDes, enabling up to 4m DAC and Linear Optics
- Supports the transition to next-generation CPU & GPU servers using 400G NICs
- Adds NetGNT to enable new capabilities along with improved network efficiency and performance
- Adds enhanced telemetry capabilities allowing deeper real-time insights into network operations, which can then be used to train NetGNT
- Increases forwarding/policy scales to support ever-expanding network sizes
- Maintains legacy API compatibility with current Broadcom switch chips
- Fully-programmable using NPL (Network Programming Language), allowing in-field upgrades to add features such as new telemetry, security and traffic engineering
- NPL-compatible with current Trident 4 family, which is already in use by a large number of customers to develop their own customized switch applications
- Support for Enterprise SONiC and SAI promote rapid and seamless integration into data center operations frameworks

Availability

Broadcom is now shipping Trident 5-X12 devices to qualified customers. For more information on the Broadcom Trident 5-X12 Ethernet switch please click here.

About Broadcom

Broadcom Inc. (NASDAQ: AVGO) is a global technology leader that designs, develops, and supplies a broad range of semiconductor, enterprise software and security solutions. Broadcom's category-leading product portfolio serves critical markets including cloud, data center, networking, broadband, wireless, storage, industrial, and enterprise software. Our solutions include service provider and enterprise networking and storage, mobile device and broadband connectivity, mainframe, cybersecurity, and private and hybrid cloud infrastructure. Broadcom is a Delaware corporation headquartered in San Jose, CA. For more information, go to www.broadcom.com.

Broadcom, the pulse logo, Tomahawk, and Connecting Everything are among the trademarks of Broadcom. The term "Broadcom" refers to Broadcom Inc., and/or its subsidiaries. Other trademarks are the property of their respective owners.

Press Contact:
Jon Piazza
Corporate Communications
press.relations@broadcom.com
Telephone: +1 310 498 5254

Industry Quotes:

Michael KT Lee, Senior Vice President of Research & Development Center, Accton Technology
“Broadcom continues to innovate in Ethernet Networking with the introduction of NetGNT technology to its leading Trident 5 product line. Accton is proud to work closely with Broadcom to expediently bring the Trident 5 solution into the market and enable an open networking product with SONiC that is fully-tested and well supported.”

Dennis Cai, Head of Global Network Infrastructure, Alibaba Cloud
“Broadcom's Trident product family has long been an integral part of our Predictable Network Infrastructure, the foundation of reliable and secure service worldwide. We are strongly encouraged by the new Trident 5 introduction with increased performance, density and newly introduced NetGNT AI Engine. Trident family's NPL in-pipeline programmability helps us leverage existing investment while quickly delivering new robust and innovative services. Alibaba Cloud is a global leader in cloud computing and artificial intelligence providing services in over 200 countries and regions.”

Feng Luo, Head of Network Systems, ByteDance
“ByteDance Network Infrastructure serves hundreds of millions of active daily users with unparalleled quality and stability. We are excited to embrace the launch of Broadcom Trident-X5, a product that not only fulfills our 800G network requirements but also doubles the access density. Its programmable pipeline adapts seamlessly to a multitude of user scenarios, enhancing our operational flexibility and efficiency.”

Steve Dorwart, Vice President of Service Provider Solutions, Celestica
“Celestica is proud to continue our long-standing collaboration with Broadcom in bringing leading-edge Ethernet switching technology to market. With the introduction of Trident 5-X12, Broadcom yet again demonstrates its commitment to bringing innovative, power-efficient products to networking solutions.”

Auston Tsemg, General Manager, Delta Electronics
“Delta is proud to work closely with Broadcom in enabling the next generation Trident 5-X12 family that will set the standard for next generation ToR switches for Cloud and AI/ML data centers. Delta's Ethernet switch portfolio has continued to grow from generation to generation with Broadcom's market leading portfolio of Trident, Tomahawk, and Jericho product lines.”

Richard Li, Vice President and General Manager, Switching Group, H3C
“We are excited to see Broadcom keeping the impressive pace of doubling the bandwidth of the Trident family to address all the needs of AI/ML data centers, hyperscaler networks, service providers, and enterprise customers. The leading-edge Trident 5-X12 will definitely enable H3C to broaden our switch product line portfolio by providing 800G readiness, flexible 200G/400G configuration with high radix, best-in-class power efficiency, and industry-leading programmable architecture with feature rich innovations.”

Stephen Cheng, Vice President and General Manager, Data Center Infrastructure Business Unit, Huaqin Technology
“We are very happy to join Broadcom’s hardware ecosystem for Trident 5-X12 as many of our data center and enterprise customers are already major users of the Trident product line. We look forward to delivering many more differentiated systems to the market with Broadcom.”

Patrick Tian, CEO, Micas Networks Inc.
“As a newcomer in the Ethernet switching market, time-to-market is a critical success factor. Working with Broadcom enables us to get to market first with the Trident 5-X12 platform offering best-in-class power efficiency, full-programmability, enhanced telemetry, and a SONiC-qualified solution to the market.”

Ken Kutzler, Vice President of Hardware, IP Products, Nokia
“Trident5 represents continued focus on the specific needs of the data center market and will be of value as networks evolve into the AI era.”

Zhongdong Liu, President and CEO, Ruijie Networks
“Broadcom’s ability to roll out leading-edge technologies across multiple product lines at a very quick pace is unparalleled. And now with the introduction of the Trident 5-X12 the tradition continues enabling us to offer a wide range of products across multiple market segments, while maximizing reuse of our R&D investments.”

Vincent Ho, CEO, UfiSpace
“Broadcom continues to provide the broadest networking portfolio in the market, which allows Ufispace to address a wide range of market segments. For us time-to-market is critical. We can leverage our long investment in Broadcom’s portfolio to quickly bring new products to market, while delivering the cutting-edge technologies our customers demand.”

William Lin, President of Enterprise and Networking B.G., Wistron
“AI/ML workloads continue to grow at a rapid pace, which requires the need for ever increasing intelligence in the network. With the introduction of NetGNT, we are thrilled to see Broadcom innovate in networking by using AI/ML technology within its switching products. Wistron is excited to help bring the new Trident5-X12 switch to market.”