Cisco Catalyst 6500

Switching Innovations

Scale Performance and Services

With more than 700,000 chassis and more than 1.3 million supervisor cards shipped, the Cisco® Catalyst® 6500 Series of switches has a proven history of innovation with unrivaled investment protection.

The Cisco Catalyst 6500 family continues to promote campus core and distribution while focusing on innovative next-generation services.

With renowned research facilities and top-ranked faculty working with more than 44,000 students at its main campus, Penn State University is a recognized leader in higher education. Integral to the university's commitment to teaching, learning, and research are proven IT systems that reliably connect students, faculty, and administrators to the applications and information they need. Penn State currently has more than 20 Cisco Catalyst 6500 switches in its network core, connecting hundreds of departments and tens of thousands of faculty and students.

"The introduction of the Cisco Catalyst 6500 Supervisor Engine 2T will extend our investment in Cisco systems with impressive scalability and threefold performance gains so we can better manage increased demands from users wanting higher bandwidth services and greater mobility," says Ed Wilson, network test engineer and system design specialist at Penn State.

In particular, Wilson cites several enhancements to the Supervisor Engine 2T as aiding Penn State's network performance goals, highlighting several areas:

"I like the modularity and flexibility of Flexible NetFlow and its easy-to-use components, including sampler, exporter, and others."

According to Wilson, "Even simple things about the Supervisor Engine 2T and the latest Cisco IOS Software release, including the speed of a 'write memory,' are notably faster. This is also true for the power-up and rebooting speeds of 2-3 minutes versus approximately 8 minutes for the previous Supervisor Engine 720."

"The combination of the Supervisor Engine 2T and Cisco IOS Software enhancements, as well as the 6908 10-GB card with a 1:1 subscription rate for eight 10-gig. ports, meets our demands for high-density core switching."
— Ed Wilson, Network Test Engineer and System Design Specialist, Penn State University

True Internet is Thailand's leading ISP, providing a nationwide network of services that helps ensure its home and corporate customers have fast, reliable access to outstanding Internet-related services across the country. In addition to being Thailand's largest ISP, the company is the country's largest hosting company for local content.

As the largest ISP in Thailand, True Internet is looking to the Supervisor Engine 2T to take its network capacity to the next level. True Internet deputy director, Head of Network Operations Tanapon Chandavasu, outlined a few important capabilities in the latest evolution of the Cisco Catalyst 6500.

"The Supervisor Engine 2T supports an architecture that enables True Internet, as a service provider, to deliver video, data, and video services seamlessly. True Internet's ability to expand its 10 Gigabit offering and future-proof itself for 40 Gigabit interfaces makes transitioning to the Supervisor Engine 2T an easy choice," he says.

"We were the first ISP in the region to deploy 10 gigabit on Cisco Catalyst 6500s, and today we have more than a dozen of those switches at our network edge integrated with a Cisco Nexus 7000 in aggregation. With the introduction of the Supervisor Engine 2T, we are further leveraging our investment in the Cisco Catalyst 6500 with big gains in performance and scalability - which is essential as we see requirements for mobile, data, video, and other high-demand services skyrocket."

"An important factor in our adoption of the Supervisor Engine 2T is the high-speed interfaces, enabling us to go from 40 Gbps per slot to 80 Gbps per slot. The added capacity gives us a strong migration path to support new, high-bandwidth services for years to come."
— Tanapon Chandavasu, Deputy Director, Head of Network Operation, True Internet

HCL

HCL is a leading global IT consultancy offering R&D and technology services, enterprise and applications consulting, remote infrastructure management, BPO services, and a range of other services to corporations in 31 countries. The company employs more than 80,000 professionals around the world.

HCL has grown rapidly over the years and offers a wide range of high-performance IT services onsite and through the cloud. Because of this, there are tremendous pressures on HCL's network, particularly around the need for increased application performance and availability and resource utilization. The company currently has approximately 55 Cisco Catalyst 6500 switches in its network supporting critical functions in the aggregation and distribution layers that drive many internal operations, as well as support clients in industries such as healthcare, manufacturing, engineering, banking, and others.

For the dynamic company, existing and newly enhanced capabilities in the Cisco Catalyst 6500 Series Switches are integral to supporting everyday operations. "The Virtual Switching System (VSS) in the Cisco Catalyst 6500 Series increases our efficiency by giving us a single point of management, single routing instance, and single gateway IP address," says Shubham Tiwari, deputy manager, Network Design and Planning at HCL. "VSS not only reduces administration costs but also helps drive high availability across our networks, which is essential in meeting service-level agreements in industries such as healthcare and financial services. With VSS, we can manage upgrades with little or no downtime and keep services up and running."

Continued enhancements to the Cisco Catalyst 6500 switches better enable HCL to respond to changing business demands. "As our network traffic grows, I'm looking forward to taking advantage of the performance and scalability gains in the Supervisor Engine 2T," he says. "The higher performance platform and big increases in bandwidth with 40 Gigabit Ethernet will let us scale our network to support more demand from our own internal users and respond to escalating demands from clients using our services.

We can easily extend our existing investment in the 6500 Series with Supervisor Engine 2T to address new performance and bandwidth requirements and connectivity models. For us, the latest 6500 Series enhancements further strengthen our platform for delivering high-quality, reliable services that can exceed our comprehensive SLAs with clients."

He adds, "We don't need to overhaul our internal systems to accommodate large performance or scalability demands, and we also have the flexibility to incorporate new services as needed." In addition, Tiwari highlights further enhancements in the Cisco Catalyst 6500 with the Supervisor Engine 2T that will benefit network operations. "Within Supervisor Engine 2T and the latest Cisco IOS Software release, the support for up to 13 million NetFlow entries is impressive. We can also use the enhancements to further optimize the use of CPU resources to improve our network performance." He comments further that "IPv6 support in the Cisco Catalyst 6500 with Supervisor Engine 2T gives us the scalability and flexibility to support greater demands on our network."
— Shubham Tiwari, Deputy Manager, Network Design and Planning at HCL

VeriSign is the trusted provider of Internet infrastructure services for the networked world. The company has world-class expertise in managing the .com and .net infrastructure, as well as several other top-level domains with 100 percent operational accuracy and stability for more than a decade. Billions of times every day, VeriSign helps companies and consumers worldwide to connect online with confidence. Each day, VeriSign works to deliver flawless network performance to enable the full potential of the Internet, now and in the future.

Cisco has been one of VeriSign's primary vendors for over a decade, integrated into the company's multiplatform environment. Within its multivendor network, VeriSign is committed to providing customers with unmatched risk management and robustness, making sure its services remain available 100 percent of the time.

According to VeriSign CSO Danny McPherson, the company continues to integrate Cisco solutions into its environment for a few simple reasons. "We have chosen Cisco time and again during bakeoffs. For us it's all about performance, scalability, reliability, and security, and you can't beat Cisco's performance and scalability," he says. "Our biggest challenge is the astounding growth of Internet traffic and load on the systems and services we provide. Whatever we project Internet traffic growth will be, we build our networks and services to handle - at a minimum - two orders of magnitude that projection. Cisco helps us maintain that very high standard."

Helping drive its long-term adoption of Cisco solutions is Cisco's continued innovation. Adds McPherson, "Cisco keeps bringing powerful new capabilities to its existing platform, and we're happy that we don't have to deal with a forklift of upgrades. We can simply get another blade and upgrade and come away with more speed, more power, and more functionality.

Going with the Cisco Catalyst 6500 Supervisor Engine 2T gives us more modern technology, and in some ways, it forces us to upgrade certain key systems - replacing many generations of line cards with more robust and more powerful systems."

In particular, McPherson highlights some critical enhancements within the Supervisor Engine 2T for their team. "The jump from 40 gig slots to 80 gig slots is phenomenal. There's no oversubscription, and we can use these aggregation routers more efficiently than in the past," he explains. "We don't need to initiate a huge undertaking or deploy a new vendor and can more easily build on our existing investment.

Before Supervisor Engine 2T, we could feel the limitation of using a switch as a router. With Supervisor Engine 2T in the equation, we now have the true functionality of switches and routers for things such as ASRs."

With its commitment to exceptional, unparalleled reliability, VeriSign continues to push the envelope of speed for data center connections and colocation. "A box can be as fast as possible, but it's useless if it crashes, so the stability of the solution is critical," says McPherson. "With the Cisco Catalyst 6500 and Supervisor Engine 2T, we have a solid mix of performance, scalability, and stability to support our ambitious infrastructure goals."
— Danny McPherson, CSO, VeriSign

![Loughborough University logo]

Loughborough University is a large, research-intensive university within the 1994 group in the UK. It is the largest single campus university in the UK, covering more than 437 acres. After implementing the Cisco Catalyst 6500 platform 11 years ago, Loughborough University is sponsoring a £4.2 million project to refresh its networking platform. The Cisco Catalyst 6500 remains at the heart of this refresh.

Matthew Cook, network security manager in IT Services at Loughborough University, explains, "The University has a substantial, invested experience with the 6500 platform and its ability to provide a stable IP delivery platform for the business."

"Reliability is key and helps us realize the mission of the university, as well as playing a part in achieving awards such as the Times Higher Education (THE) Best Student Experience for five consecutive years," he describes.

In summary, Cook says, "We are excited to be working with Cisco to receive some of the first shipments of the eagerly awaited Supervisor Engine 2T modules. Loughborough's IT service provision requires the cutting-edge technology these new modules provide, complementing the new functions on Cisco's IPv6 roadmap. We look forward to working with Cisco for many years to come."

Loughborough University works closely with Cisco and is represented on the European IPv6 Deployment Council, European Mobility Higher Education Customer Advisory Board, Wireless Assurewave Program, with direct interactions with the IPv6 Wireless Network Business Unit and Remote Access/Security Business Unit.
— Matthew Cook, Network Security Manager, Loughborough University IT Services

![Lancope — Network Performance + Security Monitoring logo]

Lancope is a leading provider of flow-based monitoring to provide global enterprises with high-performing and secure networks. The company is a long-term Cisco partner that integrates its StealthWatch system into Cisco Catalyst 6500 environments to offer enterprises unmatched visibility into their critical network operations.

Facing an unprecedented number of applications, services, and access types, enterprise managers are dealing with extremely complex networks and often struggle to gain a complete view into all aspects of use and security.

"Whether it's analyzing IPv4 versus IPv6 traffic or tracking the performance of video traffic or other network traffic, enterprise managers can use the latest enhancements to the Cisco Catalyst 6500 Series combined with NetFlow analysis from StealthWatch by Lancope to gain deep traffic visibility and quickly determine the exact type and volume of traffic moving through their networks, without affecting performance," says Adam Powers, CTO at Lancope.

"With the new Supervisor Engine 2T hardware capabilities, including CPU-friendly export, we were impressed by the volume of flows we could export - it tested the limits of our StealthWatch system. Enterprises can now consume less CPU and export more data, freeing critical computing resources while improving insight into everyday network operations. Further improvements around Distributed Direct Export make it possible to export and analyze millions of NetFlow entries to provide enterprise managers with faster and more comprehensive insight into performance," he says.

In addition, Powers addresses the vital role of security in today's enterprise networks. "Security is now top of mind for every enterprise," he explains. "The reality is that IT managers don't always know who is on their networks and what they are doing. With Lancope StealthWatch collecting and analyzing NetFlow from the Cisco Catalyst 6500 family, enterprises have a compelling solution to successfully track all user activity end to end."
— Adam Powers, CTO, Lancope

Arbor Networks is a leading provider of network security and management solutions for next-generation data centers and carrier networks, including the vast majority of the world's Internet service providers and many of the largest enterprise networks in use today. For years, Arbor Networks has collaborated closely with Cisco to help grow and protect customer networks, businesses, and brands. Cisco Catalyst 6500 switches have been integral to providing customers with high-performance, highly scalable services. The innovation and flexibility of the 6500 series has delivered solid returns to Arbor Networks and its customers.

The introduction of the Supervisor 2T delivers many new NetFlow features to the 6500 platform: Egress NetFlow; VPN aware NetFlow to monitor a virtualized network infrastructure; NetFlow on the control plane interface to provision control plane policing, and much more.

According to Jim Meehan, consulting engineer at Arbor Networks, several of these enhancements are important. "We really liked egress NetFlow, as it will allow our customers to gain new insight into multicast traffic definitions," he says. "The latest Cisco release also offers the most scalable Flexible NetFlow feature set by far. With our Peakflow solution and the NetFlow enhancements supported by the Supervisor 2T engine, customers have unmatched visibility into their networks and can address security challenges in ways previously not possible. They can manage and monitor more traffic and achieve new levels of scalability to respond to huge increases in demand for bandwidth."

Meehan was also impressed by the performance boosts in flow monitoring, as well as enhanced protection controls in the Supervisor 2T. "The performance gains are huge - now up to 13M NetFlow entries. This is clearly best-in-class flow switching," he explains. "And with packet-based NetFlow sampling now supported in hardware, customers can scale security and monitoring to the largest networks."

With regard to helping mitigate attacks against Internet-facing services, Meehan sees enhancements such as TCP flags collection and packet-based NetFlow sampling going a long way in protecting customers against DDoS attacks. The enhancements offer more complete monitoring with better visibility into network anomalies and support streamlined security detection.

In the end, the partnership between Cisco and Arbor Networks continues to deliver great value to network service providers. "For our customers, the bottom line is that the continued innovation from Cisco and Arbor gives them unmatched insight into the performance and security of their networks and services," says Meehan.
— Jim Meehan, Consulting Engineer at Arbor Networks

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