

Shenzhen University Creates New 10 Gigabit Campus Network with Force10 E-Series Switch/Routers

Customer PROFILE

Customer
Shenzhen University City

Industry
Education



Applications
Campus backbone network;
core nodes; network security

Highlights
Force10 Networks provides the scalability, resiliency and security for a next-generation 10 GbE network in a large new multi-university campus project.

As China continues to develop economically, its government is looking for innovative ways to develop its best and brightest individuals. In several parts of the country, municipal projects called "university cities" are being built from scratch to house satellite programs from many different universities. To support large campus populations and attract high-caliber educational institutions, many university cities are being designed from the ground up with cutting-edge information infrastructures.

One such project is Shenzhen University City, located in China's Guangdong province. Currently housing subsidiary campuses for Tsinghua University, Beijing University and the Harbin Institute of Technology, Shenzhen University City has deployed the Force10 E-Series as the foundation for its next-generation switching and routing backbone architecture. The Force10 E-Series will provide Internet connectivity and shared resource applications to students, researchers and faculty throughout Shenzhen University City.



Scalability for the Future

Located on the mid-southern coastline of China's Guangdong province, Shenzhen contains China's first special economic zone and is one of the country's most economically advanced cities. Due in part to its proximity to Hong Kong, from which it is separated by a river in the south, Shenzhen has also become China's major export

production base. As it grows, its municipal leaders are sponsoring projects like Shenzhen University City to help the city expand beyond manufacturing into high technology.

At full build-out, projected for 2005, Shenzhen University City will house more than 10 universities and colleges and enough networking drop points to support well over 40,000 undergraduate and graduate students, faculty and research. Its network infrastructure, therefore, must be able to scale with future growth while providing the same levels of performance and reliability.

After looking at solutions from several vendors and talking to other Force10 customers such as Tsinghua University, Shenzhen University City purchased eight E600 switch/routers for its new network. The Force10 E-Series delivers unmatched scalability for Shenzhen University City's future needs: each E600 supports up to 48 Gigabit Ethernet (GbE) ports or four 10 Gigabit Ethernet (10 GbE) ports per each line card slot. With up to 7 line card slots per chassis, the E600 can scale to 336 GbE or 28 10 GbE ports in each chassis.

The Shenzhen University City network is divided into two distinct infrastructure elements in order to provide maximum scalability and manageability. First, two E600 systems are installed in the network's backbone node to connect individual campuses over 10 GbE and provide local aggregation of shared campus facilities' services. Security features can also be enabled through each campus network through the E600's hardware-enabled security features.

These E600 systems in the backbone node are configured with two 2-port 10 GbE line cards for connectivity with the 10 GbE core network, and one 24-port GbE line card for connectivity with common facility networking services.

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Professor Yong Jiang
Director, Network Operations Center
Shenzhen University City

Second, two E600s are installed in each of the three campus nodes. These systems each house one 2-port 10 GbE line card for connectivity into the core university city network, as well as one 24-port GbE line card to connect to campus clusters and provide backbone connectivity for the individual buildings within a particular university campus.

Throughout Shenzhen University City’s network, the E600’s fully distributed hardware and modular software guarantee line rate GbE and 10 GbE throughput across all ports regardless of traffic conditions, providing large campus networks such as Shenzhen’s with a high level of predictability. In addition, the E600’s E-Series switch fabric provides 900 Gbps of non-blocking connectivity, enabling Shenzhen University City to provide greater bandwidth and new services throughout the city.

“Our RFP specified 800 Gbps of switching capacity for each system,” says Professor Yong Jiang, Director of Shenzhen University City’s Network Operations Center (NOC). “Force10 Networks was one of the few vendors who provided the capacity we needed. In fact, their

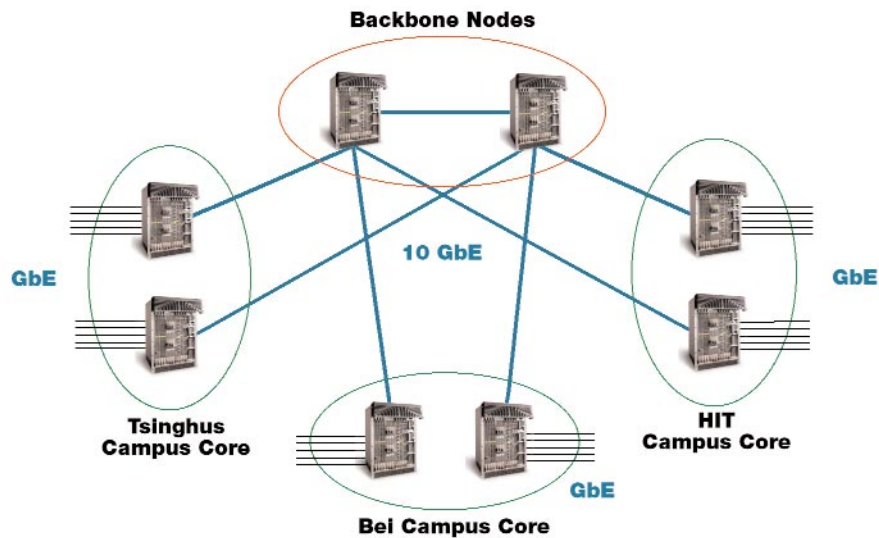
solution exceeded our requirements. When we take into account the stability we’ve observed in other Force10 installations, Force10 gives us peace of mind that our network will scale well with our future needs and beyond.”

Resilient Architecture

Another reason that Shenzhen University City chose Force10 was due to the E-Series’ proven architecture, which provides a new level of network and system resiliency. Given Shenzhen University City’s current population and expansion plans, it is essential that its network be both highly resilient and predictable.

“Shenzhen University City is deploying a network that will support thousands of students and researchers, much like a carrier network would support thousands of subscribers,” says Chris Zhang, China country manager at Force10 Networks. “It thus requires the same resiliency and performance that carriers demand.”

Force10’s E-Series architecture achieves this through distinct data and control planes. The system control plane is augmented with three processors on each Route Processor Module



The new Force10 Networks 10 GbE core enables Shenzhen University City a scaleable future.

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(RPM); each RPM divides processing functionality among the three CPUs — one for Layer 3 routing functionality, one for Layer 2 switching functionality, and the third for overall system management. Distributing CPU load for specific tasks increases overall system stability, adds greater scalability and provides higher levels of network availability.

In addition, Force10's FTOS™ operating system is customized for high availability and fault tolerance. It supports graceful RPM failover capabilities to minimize recovery times in case of an RPM failure. Hitless forwarding for both Layer 2 switching and Layer 3 routing allows the E-Series to continue forwarding traffic even during an RPM failover.

Security Against DoS Attacks

Another benefit of Force10's multiple-CPU architecture is that it safeguards the system from malicious traffic generated by Denial of Service (DoS) attacks. These attacks may try to corrupt the contents of the switch/router's forwarding table, or attempt to consume all the available processing resources on the switch/router, leaving no resources to handle legitimate traffic.

The E-Series' architecture allows faults to be contained while protecting other parts of the system, which will continue to operate even during an attack. It also monitors and filters traffic that exceeds predetermined thresholds. The E-Series architecture and Force10 ASICs also support thousands of Access Control Lists (ACLs) on every line card, which can filter and limit CPU-bound traffic while still providing line-rate performance.

The Shenzhen University City team also spoke with Tsinghua University, and learned that the Force10 systems at that school's Beijing campus had even withstood the Blaster virus without a hitch. "All in all, we decided that Force10 had a much better system than any other we saw," Professor Jiang says.

Strong Routing Capabilities

A final key factor that led to Shenzhen University City choosing Force10 was the E-Series' strong switching and routing architecture. The E-Series provides support for BGP, IS-IS, OSPF (Open Shortest Path First), and RIP routing protocols; each line card features a prefix-based distributed forwarding table. Designed to meet the needs of Internet-scale networks, the E-Series' system control plane supports millions of routing table entries and up to 1024K forwarding table entries. The control plane delivers both scalability and security through the multiprocessor-based RPM, control packet filtering and rate-limiting mechanisms, and independent high-speed switched control paths to each line card.

"We would like to have each campus running its independent IGP (Interior Gateway Protocol) using OSPF, so our routing requirements are fairly sophisticated," says Professor Jiang. "As a combined switch/router, the E600 gives us a cost-effective solution."

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