

LAUNCHING A NEW ERA OF CAMPUS CONNECTIVITY IN CHINA

Summary

Industry: Education

Challenges: Overburdened campus network required capacity, security, and reliability upgrade without high capital cost, complexity, or increased administrative overhead

Selection Criteria: Performance, carrier-class reliability, security, simple network topology, user access and management control, Web-based authentication, access charging, seamless integration with existing network

Network Solution: Juniper Networks E120 Broadband Services Router, SRC Series Session and Resource Control Modules with C2000 Controller, SA6500 SSL VPN Appliance, and NetScreen-5200 firewall/VPN security system

Results: Successful integration with core products and protection of existing assets; enhanced user experience; resolution of authentication, access charging, and control problems; enhanced security for remote users; high scalability; cost-reduction

China University of Mining and Technology (CUMT) is one of China's leading polytechnic universities. CUMT emphasizes the engineering disciplines, with a focus on mining engineering. The university currently enrolls over 40,000 students—including over 5,000 graduates, 25,000 seniors, and over 100 correspondence students abroad. CUMT is a key national university under the direct administration of China's Ministry of Education and belongs to the national "211" and "985" projects—government programs designed to support and improve top-level institutions of higher education in China.

Challenges

Institutions of higher education in China pay close attention to their campus networks because they are crucial to improving the quality of teaching and learning, access to teaching resources, campus culture cultivation, and quality of campus life. CUMT is no exception and recognized the need to upgrade its legacy network so that the university had an infrastructure capable of supporting advanced research and education applications and services on a very large scale.

The challenge was to upgrade CUMT's legacy network without adding undue complexity, administrative overhead, or high cost. CUMT primarily wanted to remove network bottlenecks and maximize campus network efficiency and functionality—empowering faculty and students with safe, highly efficient, and convenient network services.

The CUMT campus network was based on outdated Cisco routers, firewalls, and business packages. This legacy portfolio could not cope with the university's evolving requirements, and lacked the ability to support more than 8,000 concurrent subscribers logging in to the CUMT network. The university was especially mindful of the need for better security, since it had multiple ports connected to the Internet and the nationwide academic network, which links up other research and education institutions—a topology with potentially serious, and difficult to pinpoint, security risks.

Overall network performance, access control, access charging, and network management optimization were other high-priority issues that CUMT contemplated for its upgrade.

Selection Criteria

Redesigning a campus network is an extremely complex task, as multidisciplinary issues will be encountered and must be handled appropriately. Juniper Networks® extensive experience in carrier-class deployments—and the widespread use of Juniper solutions in education networks—led the CUMT team to seriously consider upgrading with the Juniper portfolio.

CUMT's "recipe" for creating its next-generation campus network was designed in consultation with Juniper professionals, and eventually included the following items:

1. Upgrade performance by installing a router that featured high-performance, high reliability, and high subscriber scale.
2. Optimize network infrastructure to allow a merger of the business logic with network access control.
3. Achieve effective control and management of user access, with Web-based authentication, access charging, and controlling functions.
4. Provide safe remote and internal access to campus resources.
5. Provide Network Address Translation (NAT) and network edge security.

CUMT examined how various products could meet its requirements, and considered Juniper's solutions for high-performance routing, access control, remote access, firewalling, and other products. The objective was to achieve seamless interoperability with the existing network, and to protect the university's investment. High performance and expandability were also essential to laying a solid foundation for the future development of the CUMT campus network.

Solution

Juniper Networks E120 Broadband Services Router is a perfect fit for the CUMT campus network. The E120 is a high-performance router that supports up to 16,000 concurrent users, which more than satisfies CUMT's concurrent users' requirements with plenty of capacity for expansion. The E120 provides the performance and scale needed to support the high volume of traffic generated by audio and Internet access, VPN, IPTV, games, music, and other popular applications that are typical of campus networks at institutions of higher education.

The E120 combines carrier-grade hardware and software with comprehensive support for IPv6, which provides CUMT with a flexible, large-scale addressing scheme. Furthermore, the E120 supports a unique IPv4/IPv6 "dual-stack" configuration that helps CUMT achieve smooth, non-disruptive operation to protect its existing investments as it transitions to IPv6—and also ensures interoperability with China's major next-generation Internet infrastructures, CERNET2 and CNGI.

Control and management of user connections are common concerns for campus networks. If these problems are not resolved, resources cannot be put into use effectively. In addition, unauthorized or uncontrolled user sessions give rise to a range of security issues including virus dissemination and data security. Juniper offered a solution that combines access control and secure remote access (via its SA Series SSL VPN Appliances) to deliver easy and practical Web-based intranet and remote connectivity. The Juniper Networks SA6500 SSL

VPN Appliance is a high-end networking product that can handle many simultaneous sessions and can be extended to support even the largest scale topology. In the current project, the SA6500 allows up to 1,000 concurrent users and can easily expand to handle up to 10,000 concurrent users with no need for additional equipment—fully satisfying the continuously developing requirements of CUMT's campus network.

Juniper Networks SRC Series Session and Resource Control Modules provide total user management and in-depth access control functions, enabling CUMT a flexible topology and varied access control strategies—including user authentication and access to different resources according to user privileges.

Finally, high-end Juniper firewalls provide further measures to secure the entire network. Juniper Networks NetScreen-5200 is a specialized high-performance solution that integrates firewall, VPN, denial of service (DoS), and distributed denial of service (DDoS) protection to provide outstanding comprehensive security with high expandability and flexibility.

Results

Successful implementation of the project has resulted in numerous benefits for the university, teachers, and students as users of the campus network:

1. Network and application responsiveness are greatly enhanced, which has a direct, positive impact on faculty and student productivity.
2. The entire network has been transformed from the original, complex framework to a more streamlined, flatter topology with separation of routing and forwarding planes. This has resulted in performance, cost, and management benefits.
3. User authentication across the whole network is enabled, resolving problems of bandwidth bottlenecks by eliminating unauthorized usage.
4. Potential threats from external attacks, and uncontrolled access, were resolved to make network operations safer and more reliable.
5. Web-based authentication avoids the need for client software downloading, making remote connections easier—providing highly efficient, convenient campus network services for clients.
6. The complexity of campus network operation and maintenance was greatly reduced and related costs were brought down.
7. The existing investment of CUMT in its campus network is effectively protected and there is plenty of capacity for further expansion.
8. The IPv4/IPv6 dual-stack campus network is implemented, enabling completely smooth interoperability with China's major next-generation Internet infrastructures—CERNET2 and CNGI.

Next Steps and Lessons Learned

By upgrading its campus network with high-performance Juniper Networks solutions, CUMT is ensuring a reliable and powerful platform to support its continued academic development. Thanks to Juniper's networking and security innovations, CUMT is now in a position to make greater contributions toward cultivating China's top talents and integrating itself with other world-class institutions of research and education.

For More Information

To find out more about Juniper Networks products and solutions mentioned in this case study, please visit www.juniper.net/us/en/products-services.

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

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