

Yonsei University Moves Toward Smart Campus with a Juniper Wired/Wireless Network

Summary

Company:

Yonsei University

Industry:

Education

Business Challenge:

- Failure to respond to rapidly changing campus network environment due to aging network system implemented in 2004
- Deteriorating service quality, including system failures and traffic bottlenecks

Technology Solution:

- EX9208 Ethernet Switch
- EX4600 Ethernet Switch

Business Results:

- A fast and secure network is established by implementing 40 Gbps and 10 Gbps Ethernet backbone networks with 120 switches.
- Expansion of network bandwidth and configuration change enables implementation of a scalable system that can process high traffic.
- High-quality network services are available, which enables the university to actively respond to industry trends.

Yonsei University is Korea's first modern institution for higher education. It was established in 1957 through the union of Yonhi College and Severance Union Medical College, and is now regarded as Korea's top private university. On top of its long tradition, it has set up a blueprint for the future and is making preparations to develop into a world-class university. The main Sinchon campus has many individual buildings for various purposes, including 69 lecture buildings, academic research centers, administrative offices, exhibition centers, performance centers, and libraries. It has 30,000 undergraduate/postgraduate students, 4,200 full-time/part-time professors and instructors, and 900 administrative employees.

Business Challenge

The Sinchon campus was using an outdated Ethernet network implemented in 2004. The university wanted to upgrade the network to accommodate the mobile-oriented learning environment and to support global communication and large-scale research, and this required implementation of 40 Gbps and 10 Gbps Ethernet backbone networks. The university's ultimate goal was to provide the best service to all of its users, including students, professors, and administrative employees, by introducing an innovative wired network infrastructure. It selected Juniper Networks as the primary network vendor to build this next-generation network integration project aimed at implementing a more sophisticated wired network, which entails installing over 700 high-performance switches in the next four years.

As Jaesik Han, network manager, information system maintenance team, Library and Information Services explains, "Since 2014, we have developed a 4-year information strategy plan to introduce a next-generation integrated network, which includes replacement of aged network equipment. Based on this plan, we selected Juniper Networks as the backbone and access switching supplier in the second half of last year, and successfully completed the first phase of the project early this year."

"With the completion of the first phase, we now expect high-quality processing of large, high-definition media traffic and flexible network scalability for bandwidth and user port. We can also respond to increasing traffic flexibly and efficiently by introducing large/high performance equipment that can support up to 100 Gbps."

Jaesik Han, Network Manager, Information System Maintenance Team, Library and Information Services, Yonsei University

Technology Solution



With a goal of establishing a world-class campus network, Yonsei University reviewed proposals from the global top five network vendors to deliver the backbone and access switching. Yonsei University Library and Information Services, which took charge of the overall project, stated that as the performance and competency of the global vendors had already been proven by references from home and abroad, it focused its selection criteria on stable operation, management, and maintenance of networks, examining each vendor's credibility and support capabilities from every angle. Its final decision was to partner with Juniper Networks.

The first-year phase of the project was kicked off in July 2015. Implementation of a next-generation campus network started with a plan to create the best smart campus environment in which the university can provide more diverse services in a more convenient way, based on high-speed wired/wireless network infrastructure. The university set up a detailed action plan for laying the foundation for high-quality, stable network services so that it can efficiently respond to rapidly increasing demand for network service and traffic surges. These network services will also enable the university to actively respond to industry trends and significantly improve users' experience and satisfaction.

"We used Juniper's high-performance switches to connect the server farm to the Library and Information Services over a 40 Gbps link, the server farm to the College of Engineering using a 10 Gbps link, and user PCs at a 1 Gbps level. We also simplified the network layer from 3-layer structure to 2-layer structure to improve network stability and management efficiency."

Jaesik Han, Network Manager, Information System Maintenance Team, Library and Information Services, Yonsei University

During the first phase, Juniper introduced 120 units of high-performance backbone and workgroup switches, including the Juniper Networks® EX9208 Ethernet Switch, which aggregates 40 Gbps interfaces, and the EX4600 Ethernet Switch, which aggregates 10 Gbps interfaces and connects to 40 Gbps uplinks. This resolved the issue of deteriorating service quality caused by system failures and traffic bottlenecks. Juniper also expanded the network bandwidth of each building to 10 Gbps and 40 Gbps, which enhanced network speed and improved network stability so that the network could handle traffic surges. For the server farm, Juniper introduced two backbones, two optical switches, and 15 workgroup switches, and it expanded the network bandwidth from 1 Gbps to 10 Gbps and from 10 Gbps to 40 Gbps to improve network stability.

The redundant configuration of Layer 4 switches allows efficient load balancing of the server traffic and stable handling of traffic. For the College of Engineering, Juniper introduced one backbone and 15 workgroup switches to expand the network bandwidth from 1 Gbps to 10 Gbps, while changing the network configuration from tree type to star type to improve scalability. For Library and Information Services, Juniper introduced one backbone and 75 workgroup switches to expand the network bandwidth from existing 1 Gbps to 10 Gbps and from existing 10 Gbps to 40 Gbps. It also improved scalability through the star-type network configuration.

In addition Juniper's unique Virtual Chassis technology, which enables up to 10 interconnected switches to operate as a single, logical device with a single IP address, dramatically simplifies the network switching layers. Yonsei University takes advantage of this powerful capability to reduce management complexity and operational expenses.

As Han explains, "We applied 40 Gbps bandwidth to 10 major buildings that have high network traffic and applied 10 Gbps bandwidth to the remaining buildings. Our plan is to enhance the wired networks of 69 buildings over the next four years, and as part of the first-year phase, we completed advancement of wired networks of the server farm, College of Engineering, and the Library and Information Services. We used Juniper's high-performance switches to connect the server farm to the Library and Information Services over a 40 Gbps link, the server farm to the College of Engineering using a 10 Gbps link, and user PCs at a 1 Gbps level. We also simplified the network layer from a 3-layer structure to a 2-layer structure to improve network stability and management efficiency."

Business Results

This project enabled Yonsei University to make thorough preparations for the information strategy planning which will be implemented in the future. It greatly enhanced project efficiency by using equipment from a single vendor. The specific benefits of the Juniper Networks solution include high-quality processing of high-definition media traffic; flexible network scalability (bandwidth and user port); introduction of 1 Gbps ports to user terminals; and implementation of large/high-performance equipment that can support up to 100 Gbps. This allows the university to create an environment that can support mobile demand and traffic surges over time.

In addition, the project secured operational efficiency by implementing a static network/system and applying standard design criteria, enhanced maintenance efficiency through integrated wiring, and an environment for systematically controlling network service quality. "With the completion of the first phase, we now expect high-quality processing of large, high-definition media traffic and flexible network scalability for bandwidth and user port," Han says. "We can also respond to increasing traffic flexibly and efficiently by introducing large/high-performance equipment that can support up to 100 Gbps."

“We believe security threats have been minimized because any weaknesses of user terminals are now managed centrally,” Han adds. “We can also promote operational efficiency by applying standard design criteria, improve maintenance efficiency through integrated wiring, and create an environment for systematically controlling network service quality. Simply put, we successfully implemented a next-generation network that is optimal for a university campus.”

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Next Steps

For the second phase of the project, Yonsei University will set up four 40 Gbps building backbones and five 10 Gbps building backbones in College of Engineering, Science Center, High-Tech Center, Samsung Hall, etc. as well as 174 1 Gbps workgroup switches that are connected to PCs. This year, the university plans to install primary fiber optic cables using 24 or 48 core single mode in the buildings that are slated for wired network

advancement, and install fiber optic cables using 10 Gbps 12 core single mode between floors of those buildings. Other plans include setting up the Network Management System (NMS) to manage the wired network more efficiently, and a control system to monitor the overall situation of wired/wireless networks in real time. The control system, when implemented, will enable the university to keep track of the resource usage information, including current traffic and equipment usage, and to quickly identify any failures as they occur. In this way, the University will be able to promptly respond to any issues that may affect the services it provides, and thereby reduce service downtime.

“The network speed has significantly improved to the point where the users can clearly feel the increased download speed,” Han says. “There are also benefits for administrators because the work needed to handle failures of the aging equipment has been reduced. As the network performance is now supported by Juniper Networks’ equipment, we are also considering a transition to IPv6 to address the shortage of IP addresses. In addition, we will establish a network management system (NMS) and a control system to monitor the current situation and manage any issues that arise more efficiently. Hopefully, this will contribute to bringing greater success to this project.”

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at [Juniper Networks](#) or connect with Juniper on [Twitter](#) and [Facebook](#).

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