

WIRELESS WORLD

NUS MOVES CLOSER TO ITS GOAL OF BECOMING A GLOBAL KNOWLEDGE ENTERPRISE WITH ONE OF ASIA PACIFIC'S FIRST IEEE 802.11g WIRELESS IMPLEMENTATIONS.

Acknowledged as one of the finest universities in the Asia Pacific region, the National University of Singapore (NUS) is a comprehensive university offering a broad-based curriculum underscored by multi-disciplinary courses and cross-faculty enrichment. NUS has 11 faculties, with an enrolment of more than 23,000 undergraduate and 9,000 graduate students.

The Computer Centre, the Centre for Instructional Technology (CIT), Faculty IT Units and the Centre for Development of Teaching and Learning work together to facilitate the effective use of technology in teaching and learning across the University. One of the most successful projects to date is the implementation of a campus-wide wireless network.

THE CHALLENGE

NUS ADDRESSES THE CHALLENGES AND RISING COST OF MAINTAINING WIRED NETWORK AND IMPROVES CAMPUS-WIDE CONNECTIVITY FOR STUDENTS AND FACULTY MEMBERS WITH CISCO WIRELESS SOLUTION.

The NUS Notebook Ownership Scheme, which was introduced in 1998, makes it easy for students to acquire notebooks at affordable prices. In the last six years, the number of notebook users has swelled to 32,000 students and 6,000 faculty members.

To support the emerging base of mobile users, the NUS Wireless Information Network (WINZONE) project was launched in July the same year. It started as an 8 Mbps service and was subsequently upgraded to 11Mbps when the IEEE 802.11b standard was announced. In January 2003, WINZONE-2 was launched utilising 802.11a technology, initially made available only at Computer Centre and the University's six libraries.

"With a growing population of notebook users, the NUS management took the decision to invest in a campus-wide wireless network infrastructure. Our first wireless trial which began in 1998 was seen as supplementary to NUS' wired infrastructure," said Mr Roland Yeo, Network Manager, Computer Centre, NUS.

He explained some of the drivers behind this decision. "Installing thousands of wired network points was a complex exercise. We had several challenges with the wired network. For one, managing and maintaining the wired infrastructure was very

expensive, mainly because of operational overheads. We observed a relatively high failure rate due to the frequent UTP cable plug-in/pull out of such points. This meant very regular campus wide inspection of fixed network points was needed."

The University's proximity to the sea and the petrochemical refineries that operate just offshore also caused the sockets used in wired access points to deteriorate at a faster rate than normal, strengthening the case for wireless.

Mr Yeo continued, "Previously, we had to make best guesses as to how many network points were required in locations such as lecture theatres, libraries and common areas. Network connectivity would then be provided through the installation of wired connections, an expensive affair in itself, which may be under-utilised or over-subscribed.

"A wireless network gives us the flexibility to cater to fluctuating demand. The increasing area density of access points means we can cater to large number of users within a single location. Overall, this translates into cost savings and more efficient deployment and use of critical resources."



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THE SOLUTION

NUS BECOMES ONE OF ASIA PACIFIC'S FIRST ORGANISATIONS TO MOVE TO IEEE 802.11g TECHNOLOGY WITH ITS LARGE-SCALE ADOPTION OF CISCO AIRONET 1200 SERIES.

NUS has an end-to-end Cisco network which makes it easier for the University to integrate its wireless network. Deploying on Cisco also has other benefits, such as lower training and maintenance costs and the lack of interoperability issues.

In 2004, NUS became one of the first in the Asia Pacific to adopt IEEE 802.11g technology on a large-scale with the adoption of almost 1,000 units of the Cisco Aironet 1200 Series and the introduction of the Cisco Wireless LAN Switching Engine 2.5 (WLSE).

Mr Gong Wei, Project Lead for the NUS Wireless Network, explained how NUS came to build its wireless network on Cisco technology.

"Performance was one key differentiator as the Cisco wireless solution performed better. It could support more users, and it was easier to manage and more secure.

"We started with 320 Cisco Aironet 350 Access Points a few years back, and in April 2004, these were all upgraded to Cisco Aironet 1200 Access Points. An additional 660 Cisco Aironet 1200 Access Points will be installed by July, in time for the new 2004 academic year."

With simultaneous support for both 2.4 GHz and 5 GHz radios, the Cisco Aironet 1200 Series enables NUS to protect its existing IEEE 802.11a and 802.11b investments while providing a migration path to the 54 Mbps bandwidth with the IEEE 802.11g protocol. Its modular design supports single- and dual-band configuration, plus the field upgradeability to change these configurations as requirements change and technologies evolve.

The cast-aluminium casing and integrated mounting system for wall and ceiling mounting of the Cisco Aironet 1200 Series provide the

ruggedness and flexibility NUS required to create a complete wireless environment for the convenience of its students and faculty members.

Investment protection is further ensured by the high capacity management support that is possible with Cisco management tools, delivering the scalable means to upgrade firmware and deliver new features as they become available.

For example, the Cisco WLSE 2.5 has made it easier for NUS to manage the almost 1,000 Cisco Aironet 1200 Access Points across the campus. "Without a centralised management solution like Cisco WLSE 2.5, it would not be practical for us to operate a large wireless network that covers all NUS campus. It would have taken two to three full-time engineer days' effort each time we needed to perform common tasks like upgrading AP firmware, updating configuration and changing passwords," said Mr Gong.

CISCO WIRELESS SOLUTION DELIVERS THE INVESTMENT PROTECTION AND PRICE-PERFORMANCE REQUIRED BY NUS.

Before the implementation, the NUS staff conducted the site surveys and identified new sites for the access points. The configuration of the access points was handled by NCS Pte Ltd, NUS' systems integration partner, after which the University's cabling contractor helped install them. He added, "Implementation was complicated not because of the technology, but because of the physical aspects. It required careful coordination among contractors, faculty owners and users."



THE RESULTS

THE IMPLEMENTATION OF CISCO WIRELESS SOLUTION RESULTS IN HAPPIER STUDENTS AND STAFF, COST SAVINGS AND SIMPLIFIED NETWORK MANAGEMENT.

NUS has now improved wireless coverage from just 30 percent of its 150-hectare campus to 100 percent. The University used to list where the access points were located. Now it's totally transparent to the users, as they will have access anywhere they go on the campus.

"It's always challenging to provide anywhere, anytime network access.

Wireless LAN addresses that requirement nicely. The wireless network is now the main network, with the wired network providing additional access. The result is much more convenient access to various IT resources to facilitate the teaching and learning activities," said Mr Yeo.

NUS PROVIDES ANYWHERE, ANYTIME ACCESS FROM ACROSS ITS 150-HECTARE CAMPUS TO STUDENTS AND FACULTY MEMBERS WITH NEW CISCO WIRELESS SOLUTION.

"In addition, the wireless network delivers investment protection for the University. Since everything is wireless, we don't have to worry about re-wiring every time renovations take place in the laboratories or offices. This has helped us reduce our network management costs significantly."

"The recent upgrade provides campus-wide wireless coverage, making it possible for teaching staff to perform various tasks from anywhere on the campus. These include the upload of teaching materials to the NUS Integrated Virtual Learning Environment (IVLE) and email communication with students/colleagues, mark assignments – all from their notebook, anytime anywhere," added Mr Yeo.

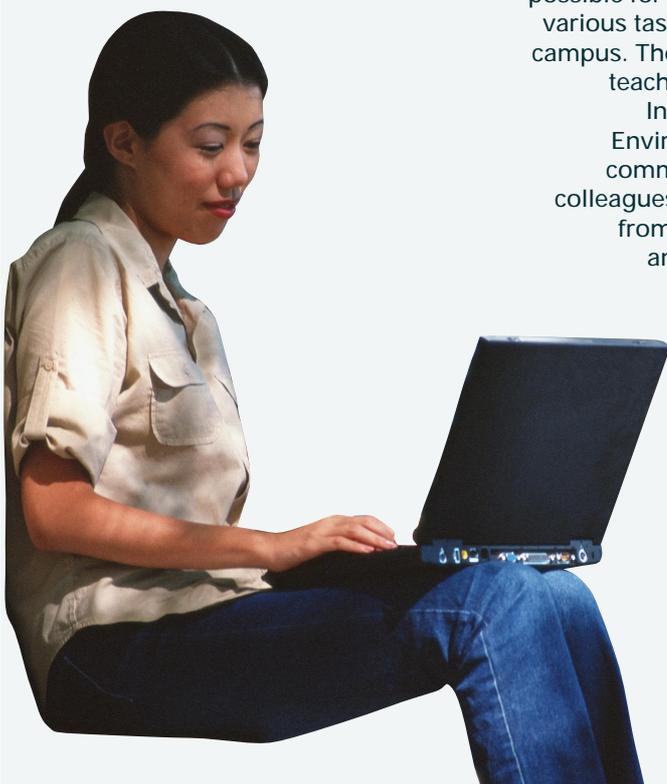
"Similarly, our students have welcomed the added physical freedom. They can access teaching materials and other e-Services from anywhere on campus and can stay connected for a longer time, increasing collaboration and communication among the students and lecturers."

Today, the NUS Faculty of Medicine uses PDAs with wireless connectivity for various applications. Most of their e-Course Notes have been customised for display on small-screen devices like PDAs. Students also frequently use PDAs with wireless network connectivity to participate in online quizzes conducted by their lecturers.

Mr Gong explained the technical improvements that they have seen with the new Cisco Aironet 1200 Series. "Bandwidth has improved from 11 Mbps to 54 Mbps with the new IEEE 802.11g protocol. This allows us to support more users across the entire campus. Another advantage is we can put in more access points in same cell area. We used to only be able to locate three access points within a lecture theatre before encountering radio frequency interference. Now we can put in more which means we can support a larger user base within the same floor area. Density is improved."

This campus-wide wireless network lays the foundation for new applications in the future. For example, online examinations are now possible with improved support for hundreds of users within a specific space. Moving forward, NUS is looking into introducing wireless asset tracking by its administrative or technical staff as they go around the campus. With wireless cameras becoming available and NUS' heavy usage of webcasting, the University may soon see live transmissions of events from anywhere within the campus using the wireless network.

"After we finish the implementation in July, we will begin looking for a single card that can support IEEE 802.11a/802.11b and 802.11g. This way, our users can have one card that will allow them access to the high speed NUS wireless LAN when on campus as well as access other lower speed wireless hotspots outside the NUS campus." said Mr Gong.



THE PARTNERSHIP

NUS AND CISCO ENJOY LONG-TERM, MUTUALLY BENEFICIAL PARTNERSHIP BUILT ON A FOUNDATION OF TRUST AND PROFESSIONALISM.

NUS has been working with Cisco for many years, starting with Cisco's routing products in the 1990s. Since 2000, Cisco has been the main provider for NUS' campus network infrastructure with Catalyst 6500 Series Switches and Catalyst 3500 Series Switches forming the core of the network.

In 2001, Cisco became the main wireless and firewall vendor for NUS. In 2003, NUS replaced its in-house developed fault management system with Cisco's Network Connectivity Monitor (NCM). Today, NUS boasts one of the largest wireless networks in the Asia Pacific with almost 1,000 Cisco Aironet Access Points deployed across their campus.

"We have a strong and mutually beneficial relationship with Cisco," said Mr Tommy Hor, Director of NUS Computer Centre. "Their products work well, for example, their wireless solution is certainly a great choice. The people we have worked with from Cisco are also very professional.

NUS SEES CISCO AS MORE OF A PARTNER THAN A VENDOR.

"Most importantly, we both see this as more of a partnership, than a customer-vendor relationship. It is one that we believe will last for many more years to come."



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