# Largest Academic Wireless Network in Germany Adopts 802.11n

The Free University of Berlin's Digital Campus project provides all connected universities with highly secure network access using Cisco's wireless LAN solution

## EXECUTIVE SUMMARY

**The Free University of Berlin**

- Higher Education
- 38,000 students
- One of the largest and highest-performing universities in German

**BUSINESS CHALLENGE**

- Build a digital campus infrastructure to provide secure and reliable centralized IT and communications services for research, teaching, and university administration
- Deploy a wireless network with access throughout the campus, despite building materials unfavorable for wireless LAN coverage
- Provide secure, reliable wireless access for visitors from other educational institutions participating in pan-European "eduroam" service

**NETWORK SOLUTION**

- The Cisco® Unified Wireless Network enables centralized management and control, simplifying operations
- Campus wireless LAN access provided by 1200 Cisco Aironet® Access Points
- The Cisco Aironet 1250 Series rugged indoor access point delivers antenna versatility, improved wireless coverage, and combined data rates of up to 300 Mbps per radio
- Cisco Catalyst® 6500 Series Switches provide Power over Ethernet and maintain connectivity to the University's wired backbone

**BUSINESS RESULTS**

- Extended secure, reliable wireless network access to the University's three campuses in Dahlem, Duelppel, and Lankwitz, contributing to the university's competitive edge and status as a global knowledge center
- Improved the education and research environment, enabling students, faculty, and research teams access to network resources anywhere on campus


### Challenge

The Free University of Berlin, an internationally renowned university, planned to implement a campuswide wireless network. The solution needed to be reliable, secure and able to overcome the challenging RF environment in one of their landmark buildings, the Rostlaube (the "rusty shack"). The Rostlaube, which was built in the 1960s, owes its name to its rusty brown, deeply corroded iron façade, a deliberately stylized effect.

The interior walls of the Rostlaube were built almost entirely of iron. "The architects at the time didn't take into account mobile phone reception and wireless LANs," said Rainer Ronke, head of the Network and Communications division of the ZEDAT campus data center of the Free University of Berlin. Due to a protracted asbestos removal project, the building was not connected to the university's campuswide wireless LAN until recently. "There was some pressure from faculty members—many of them wanted to use the benefits of wireless data communications for educational purposes. For example, they wanted to be able to take their notebooks from their offices to the lecture hall while they're switched on, without needing to connect to the network again," Rainer Ronke explained. "Surprisingly, lecturers in the humanities tend to have much more affinity for innovative technology—which promises greater efficiency in research and teaching—than science lecturers."

The Rostlaube is home to the interdisciplinary research team Languages of Emotion, a Cluster of Excellence that last year won a competition for Initiatives of Excellence organized by the German Confederation and the federal states. The team, which is comprised of neurologists, psychologists, sociologists, literary scholars, art historians, and religious scholars, is committed to discovering the deeper connection between language and emotion. It is a

decidedly important subject, as the evolution of people's capacity for symbolization is considered to have been one of the key factors in the rapid development of human intelligence. More than twenty disciplines are involved in the mega project, which has attracted worldwide attention. "That is why it was all the more important to us that the Rostlaube was equipped with wireless LAN services as soon as possible: excellent research requires excellent conditions," Ronke said.

## Solution

The Free University of Berlin chose Cisco for the deployment of the wireless LAN. "Campuswide Wi-Fi wireless network access at the Free University of Berlin is one of our highest-priority infrastructure goals," added Torsten Prill, Managing Director of the campus data center. Within a few years, Prill succeeded in establishing the largest academic wireless network in Germany, which covers the university's three campuses in Dahlem, Dueppel, and Lankwitz. In December 2005, after a nationwide search, the university contracted IT service provider Lewron GmbH for the wireless LAN subproject, and since then Lewron has remained involved as a partner by providing expert, onsite support. Approximately 1200 Cisco Aironet Access Points have been deployed so far.

However, deploying wireless in the iron Rostlaube was a major source of concern for Rainer Ronke: "The metal inside the walls was causing extreme reflections, and there was no immediate solution available." Fortunately, that changed when he attended a presentation on the new Cisco Aironet 1250 Series Access Point at the Cisco Networking Conference in Barcelona in early 2008. The products comply with the 802.11n draft standard for wireless networking, which provides data rates up to 300 Mpbs per radio and is backwards compatible with 802.11a/b/g clients. Through the use of multiple-in multiple-out (MIMO) technology, the 1250 Series is designed to excel in challenging RF environments such as the Rostlaube. Ronke installed 30 Cisco Aironet 1250 Series Access Points in the building and saw an immediate improvement in WLAN coverage. A post-deployment site survey confirmed that coverage had indeed improved considerably. To Ronke's pleasant surprise, the site survey also revealed another benefit of the new Cisco Aironet 1250 Series Access Points: "Although the 802.11n radio cells are not necessarily bigger than 802.11a/g, we found that the signal strength up to the cell boundary is almost completely stable. That provided a much more consistent level of coverage and client throughput across the building," Ronke continued. In addition, automatic channel selection ensures that adjacent cells transmit and receive on different channels, eliminating co-channel interference.

A total of 30 Cisco Aironet 1250 Series Access Points are currently deployed, the majority of which have been installed above the ceiling with external antennas installed beneath a lamp shade or other device. "That ensures the access points are invisible and don't attract any attention. It helps prevent theft and vandalism, and therefore protects our investment," Rainer Ronke said.

The new Cisco access points are managed using the same administration tools as the rest of the wireless local area network. All Cisco access points on the wireless campus are managed by the Cisco Wireless LAN Controller, which, connects to the Cisco Catalyst 6500 Series Switches, maintaining the connection to the university's wired backbone in the campus data center. Configurations and software upgrades are automatically distributed from the wireless LAN controllers. This zero-touch deployment, as the system is called, shows exactly what Torsten Prill meant when he was talking about highly efficient, centralized services.

> "Campuswide wireless network access at the Free University of Berlin is one of our highest-priority infrastructure goals."
> **Torsten Prill, Managing Director of the campus data center of the Free University of Berlin**

## Results

The Cisco Unified Wireless Network has particularly benefited the work of interdisciplinary research teams, through which the university will be able to enhance Berlin's status as a global knowledge center. Supporting data rates up to 300 Mbps per radio, the Cisco Aironet 1250 Series Access Points provide bandwidth comparable to wired Ethernet. The reliability and security of the university's wireless services have also improved.

"The Wireless LAN project is part of the overarching Digital Campus technology project," Torsten Prill continued. The purpose of that project is to provide secure and reliable centralized IT and communications services for research, teaching, and university administration as efficiently as possible, as part of a cooperative service structure. We are working closely with all of the relevant internal and external stakeholders, faculties, and administrative departments."

According to Prill, the Digital Campus is regarded as the basis for the development of an international university. Internationalization plays a key role in the global competition between knowledge centers, and the Free University of Berlin currently has offices in Beijing and New York. The university's internationalization strategy is also reflected in the wireless LAN: based on the IEEE 802.11X security standard, the pan-European "eduroam" service provides all connected educational institutions with highly secure wireless access to local network resources and the Internet.

## Next Steps

The Universtiy currently has a mobile voice-over-wireless-LAN (VoWLAN) pilot installed, which has already demonstrated tangible results. ZEDAT director Reiner Ronke's laptop is equipped with Unified Personal Communicator, a software-based VoIP solution, and there is a Cisco Unified Wireless IP Phone 7921 sitting on his desk. The phone is one of around 20 test devices used across campus, which point to the next step towards a wireless campus at the Free University of Berlin. "Voice over wireless LAN is based on high availability and stable bandwidths," Torsten Prill said. "Mobile IP telephony as a component of Unified Communications—that is, the standardization of all wired and wireless communications channels and media, including video communications—will considerably improve the research and educational environments in the future. Unified Communications is one of our next major projects." For Ronke, the results of a mobile voice pilot project at the university's veterinary clinic in Düppel bode well for the implementation of the new solution, which is scheduled for the near future.

The University also has a unique, location-based services application in the works for its botanical garden. Utilizing the Cisco Wireless Location Appliance, Wi-Fi client devices can accurately be located in the open spaces and large greenhouses to within just a few meters. This real-time location data can serve as the basis for transmitting information about the plants to visitors on their PDAs or iPhones as they are observing them.

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