

# Provinciale Hogeschool Limburg

## E-learning for first-year students with wireless Cisco Aironet network



“IN TODAY’S SOCIETY, ICT IS BECOMING ONE OF THE MOST IMPORTANT INTERDISCIPLINARY SKILLS. OUR LAPTOP PROJECT IS FURTHER ACCELERATING THE EVOLUTION FROM LECTURE-BASED TEACHING TO COMPETENCE-ORIENTED TRAINING. THANKS TO OUR WIRELESS NETWORK WE CAN MORE EASILY OFFER A MODERN PRACTICAL EDUCATION.”

Robert Lavigne, *General Director of the Provinciale Hogeschool Limburg*

Cisco Systems, together with system integrator Cobweb, has established a wireless network (wireless Local Area Network or WLAN) at the campuses of the Provinciale Hogeschool Limburg (PHL). With 3000 users it is one of the biggest wireless networks in Europe. Moreover, the PHL is the first Belgian institute of higher education to use e-learning on such a scale.

### 2500 STUDENTS ON WIRELESS NETWORK

The Provinciale Hogeschool Limburg was created in 1995 out the merger of six institutes of higher education. Three hundred teaching staff teach around 4000 students at campuses in Hasselt, Diepenbeek and Tongeren. The PHL offers non-university education in six subjects: biotechnology, health care, commercial and business studies, architecture, arts and teacher training. The courses vary from three to five years.

At the start of the academic year 2001/2002, 2500 first-year students and teachers were equipped with portable Toshiba computers and wireless Cisco network cards. The latter provide a permanent wireless connection with the college network in and around the buildings of the PHL. During the course of the year, the PHL decided to include an additional 500 users. The project is one approach being used by the PHL in its

### EXECUTIVE SUMMARY

#### Background

The Provinciale Hogeschool Limburg (PHL) offers non-university higher education in six subjects: biotechnology, health care, commercial and business studies, architecture, arts and teacher training. Three hundred teaching staff teach around 4000 students at the campuses in Hasselt, Diepenbeek and Tongeren.

#### Challenge

The PHL wants to prepare its students optimally for professional life and so is trying to base the training less on lecturing and more on problem-solving and building competence. By integrating ICT into the teaching, the school aims to prepare its students for the informatics society, teaching them to work independently as well as practically.

#### Solution

Catalyst 3524 switches and Aironet 352 access points were installed at the four PHL campuses in Hasselt, Diepenbeek and Tongeren. At the start of the academic year 2001/2002, 2500 first-year students and teachers were equipped with portable Toshiba computers and wireless Cisco network cards. This means they have permanent wireless access to the school network in and around the buildings of the PHL.

#### Results

There are ICT initiatives in the first years of all the courses. Students and teachers work intensively with their laptops. They have a 2 Mbit connection and several megabytes of storage space on the school's servers. The wireless network gives them access to the Internet and a number of e-learning tools. During the course of the year, the PHL decided to purchase equipment for an additional 500 users.



pursuit of teaching programmes that are based more on problem-solving and building competence. Moreover, after graduation the students are ready immediately to integrate smoothly into the informatics society.

### **ICT promotes independence**

Robert Lavigne, General Director of the PHL explains: “Our institute wants to prepare its students optimally for professional life. So we are continually innovating our teaching projects in step with changes in society. The laptop project is part of our drive towards training that is based less on lecturing and more on problem-solving and building competence. This means the students have more tasks to solve individually or in groups. Through the network, they now have the means necessary to prepare and teach lessons themselves. So they are also learning to look up and process information on their own.”

There are ICT initiatives in the first years of all the courses. The first-year students and their teachers work intensively with their laptops. They have a 2 Mbit connection and several megabytes of storage space on the school’s servers. The wireless network gives them access to the Internet and a number of e-learning tools. There are software packages and learning environments available, such as the discussion forum ‘Blackboard’.

### **Ready for real life**

All teachers who were technologically minded or educated were grouped together in the targeted years. Seasoned ICT users take less-experienced students and teachers under their wings. A building was rented to function as a training centre. If new teachers are recruited, then they are also assessed according to their ICT skills. As the current first-year students move on, e-learning will gradually permeate the higher years. Within a few years all PHL graduates will have a practical basic knowledge of IT and know how to handle computers.

Although the number of hours spent sitting at a desk may have been reduced, the teacher is certainly not disappearing from view. “We definitely don’t want to move away from personal teaching. Guidance by an expert remains an important way of transferring knowledge. Especially for teaching problem solving, where students have to prepare teaching materials and instruct one another. Here a teacher is vital for summarising work and for guidance. Neither do the students spend less time on education. But they can work where and when they want and determine their own pace. What’s more, the teachers are available on-line by e-mail and through the discussion forum,” says Robert Lavigne.

The laptop project also stimulates the students’ independence and sense of initiative. Robert Lavigne: “The PHL doesn’t just want to instil professional skills – interdisciplinary skills are also important to us. In today’s society, ICT is becoming one of the most important interdisciplinary skills. Our laptop project is further accelerating the evolution from lecture-based teaching to problem-solving training. Thanks to the wireless network we are can more easily offer a modern practical education.”

### **Wireless point-to-point connection**

At the Elfde Linie campus, two wireless bridges with Yagi aerials provide a point-to-point connection between the main building and the so-called student tower where the student rooms are, and between the main building and the computer centre in the Witte Nonnenstraat where the ICT training takes place. Cisco’s Yagi aerials are directional aerials that focus the transmission in a specific direction to bridge a larger gap. The buildings of the Elfde Linie campus, where there are over 2000 students, are connected through gigabit glass-fibre connections. Leased lines of 512K run to the LUC Diepenbeek campus, where there are around 400 architecture students, and the Virga-Jesse hospital in Hasselt, where there are about 900 health-care students. The biotechnology campus in Tongeren is linked to the network through an ADSL connection and has around 100 students.

So far, 14 Catalyst 3524 switches and 216 Aironet 352 access points have been installed at the four PHL campuses in Hasselt, Diepenbeek and Tongeren.

### **In-line power**

The Catalyst 3524 switches provide for optimal data traffic between the servers and the access points and supply in-line power. This means the access points obtain power via the cable through which the data traffic runs, so that no additional sockets are needed.

The Aironet access points form the link between the cabled network and the laptops. They meet the IEEE 802.11b standard and guarantee transmission speeds of up to 11 Mbps. There were enough provided to guarantee everyone with the necessary bandwidth. In a school you have to allow for a high number of users in a limited area. The radio transmitters in the access points normally have available the maximum allowed power of 50 milliwatts and so attain the highest possible range in the WLAN. During the installation at the PHL, the power was reduced to 10 milliwatts to keep the cells – the number of users for each aerial – to a minimum and to counteract interference.



Moreover, all laptops are provided with Aironet 350 Client Adaptors, the wireless network cards from Cisco. All Aironet products work with a frequency of 2.4 GHz, a frequency that is free for use in Belgium.

### **Optimally secured**

A Cisco Secure Access Control Server controls access to the network. It ensures recognition of the users and differentiates between teachers and students. The latter do not have access to certain sensitive applications. The Secure Access Control Server uses WEP (Wired Equivalent Privacy) coding, a 128-bit encryption for wireless transmission of data. The security is guaranteed by individual encryption for each user. Moreover, the key is changed each time someone logs on. The RADIUS security protocol controls the usernames and passwords and manages the dynamic encryption. This relieves the informatics staff of the manual configuration that is normally required for WEP coding, which would have been virtually impossible with thousands of users.



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