



PATHWAYS AND THE PIONEERING SPIRIT



Pathways World School has successfully conceptualised and deployed a wireless network that many corporates would find hard to match.

Implementing a cutting-edge education system isn't easy. Pathways World School, an international baccalaureate school situated off Gurgaon-Sohna road near Delhi, has taken up the gauntlet. It has used wireless technology to create an educational system that radically differs from the traditional Indian model. Pathways has deployed a campus-wide wireless local area network (WLAN) across a 30-acre campus with around 40 access points. The WLAN was designed and deployed by IBM using Cisco wireless equipment and firewalls, along with IBM servers and ThinkPads. The WLAN is being used by faculty and students (sixth grade and higher; almost 60 percent of the total student population). The school plans to quadruple the number of students on its rolls from the present 300 to 1,200 over the next two years.

The WLAN initiative has helped Pathways create a learning-based education system. **Pathways director Prabhat Jain** says that though the school became operational in April 2003, research on education processes started back in late 1999, and case studies from various American schools were analysed by consultants. Pathways picked up the concept of a 'notebook cart' that has 10-30 wireless notebooks moving to the classrooms. This concept was expanded upon, leading to the decision to go in for a wireless network. Currently there are 150 notebook users and this is expected to increase to 1,200 in the future. The project kicked off in October 2002, and was completed in three months at a cost of around Rs 1 crore.

'Anytime, anywhere' education

In a learning-based system, teachers act as facilitators by giving projects to students who learn from books, CD-ROMs and the Internet. Since learning was going to be project-based, the school decided to adopt a model without fixed seating patterns within a classroom, resulting in the need to move around within the

Wlan at Pathways school

- **Requirement:** Campus-wide wireless network to provide 'anytime, anywhere' education
- **Servers:** 2
- **Access points:** 40
- **Deployment time:** 3 months
- **Cost:** Rs 1 crore
- **Users:** 180 (4x growth anticipated)
- **Options:** Can migrate to 802.11g using the existing set-up, and gain 5x bandwidth boost

classroom.

Pathways also wanted to introduce the concept of 'anytime, anywhere' learning. Students can sit anywhere in the campus (park, amphitheatre, dining room or their own rooms) and do their projects, submit assignments, send e-mail to teachers, access library resources over the intranet, research papers and access the Internet. This required wireless connectivity.

"The idea is to make education an enjoyable experience for students, rather than imposing it on them. For this we created very interesting spaces within the campus, and did not want to be restricted by the constraints of sitting in one particular place. Mobility is the key, and we realised that WLAN enables all these things," **explains Jain.**

Rolling out WiFi

For the WLAN solution, the school zeroed in on Cisco. What tipped the balance in Cisco's favour was its strong support and maintenance network in India. The Cisco WLAN solution at Pathways comprises Cisco Aironet 1200 Series access points, Gigabit LAN switches for the backbone network, and firewall security. The solution is future-proof as it gives the school the option of upgrading to 802.11g at a later date. The wireless access points supplied are compatible with 802.11g.

Right now Pathways is using the popular 802.11b standard, with access speeds of up to 11 Mbps. The option of upgrading to the faster 802.11g standard providing up to 54 Mbps connectivity on the same 2.4 GHz frequency gives the school room to grow.

IBM did the implementation, and provided servers and wireless-enabled ThinkPads. Pathways has deployed two IBM X-235 servers; one is an application server running on Windows 2000, the second is a Linux-based Internet proxy (controlling Internet access of students, and restricting specific sites.) "Since IBM and Cisco are partners, it made sense to implement their solutions," says Jain.

A joint study was conducted by IBM and Cisco, wherein the duo analysed the kind of applications that would be used, bandwidth requirement per user, applications that students would need to access, and locations to deploy the access points. The two key applications to be run on the WLAN were the school's intranet comprising the school management software, and ERP system developed by a company called Cross Section Interactive. The ERP helps the school to manage aspects like teacher-student records, boarding, dining, transportation, payroll and accounts.

The school Intranet provides a home page for each student and faculty member. This home page includes a bulletin board, timetable, syllabus, assignments, lessons, the teacher or student's personal database, and a link to library resources. Pathways intends to archive all workshops and lectures for students to access over the wireless network.

Deploying a WLAN posed several potential problems. For instance, there was the threat of students getting into the teachers' resource base or accessing unwanted websites. Security issues, including protection from viruses and worms, have been taken care of by adopting several measures. The school management software has a homepage enabling access to different areas. Access rights

vary, and students are restricted to those sections of the intranet that are relevant to them. A three-layer approach, including Authentication Authorisation Accounting (AAA) is in use. Like in most systems of this type, authentication is by means of entering a user name and password. Based on the rights of that particular user, he or she can access a specific list of applications and resources. Information accessed is logged into the accounting server. Says Anil Chawla, Principal Consultant at Cisco, "In order to prevent students from accessing the teachers' database, Cisco's WLAN solution provides for Virtual LANs segregating student and teacher resources."

The 802.1X security standard has been used. Cisco Wireless Security Suite provides an EAP framework for user-based authentication. Cisco has developed an 802.1X authentication type called EAP Cisco Wireless, or Cisco LEAP (Light Extensible Authentication Protocol). Cisco Aironet products support LEAP and all 802.1X authentication types, including EAP Transport Layer Security (EAP-TLS). In addition to this, it has also provided Wired Equivalent Privacy (WEP) and 128-bit encryption to secure the wireless network.

Firewalls are in place, both hardware- and software-based. Cisco's hardware-based firewall prevents unauthorised intrusion and stops Internet worms. It also blocks objectionable sites. The software firewall from Cyberoam takes care of bandwidth management by imposing bandwidth quotas on usage of the network.

Priority to voice & video

Real-time applications like video-on-demand require greater priority than batch applications like e-mail. Quality of Service (QoS) has been implemented. With Pathways looking at courses such as craft design technology, which provide features like real-time engineering and involves downloading heavy CAD files over the network, this was very much called for. "This feature ensures that voice and video packets are given preference as we could not afford to have jittery voice and video considering the applications that we were looking at," says Jain.

The school server maintains a broadband connection, giving each student continuous access via the school intranet to Internet resources. Primus Technologies is providing Internet bandwidth (128 Kbps, expandable in future) using a radio link. The school has a radio mast with an antenna that receives the signal from Primus' antenna which is connected to a router, from where it goes to the proxy server and into the WLAN.

With extensive effort having gone into planning and researching, Jain maintains that Pathways hasn't faced significant bottlenecks to date. **The wireless network has today enabled the school to deliver on its promise of 'anytime, anywhere' education.**