



## New Brunswick Schools Adopt Wireless to “Prepare Students for High-Tech World”

### Background

The central New Jersey city of New Brunswick boasts Rutgers University, Johnson & Johnson corporate headquarters, and a public school district committed to a curriculum that “prepares students to live and compete in our rapidly changing, high-tech world.”

### Challenge

The Board of Education planned to upgrade local area networks (LANs) throughout the 13-building district and replace the district’s conventional phone system with an IP-based private branch exchange (PBX) system. This involved upgrading its wide-area network (WAN) by migrating from leased T1 and Frame Relay lines to wholly owned wireless microwave 100-Mb inter-building links. Wireless would accommodate voice, data, and video more efficiently than a wired solution in part because of the age of the district’s schools: not only were several buildings unable to accommodate the infrastructure of wiring closets, but it was considered likely that some particularly old buildings would be permanently shut down in the near future.

“Despite the limitations presented by the age of these structures, we wanted the capability of putting a phone in every classroom, and wireless was the obvious answer,” said Brian Auker, Director of Technology for the school district. The incumbent system utilized Avaya equipment, but Auker decided to compare it with the Cisco Aironet® Access Point.

“We had started putting in Cisco equipment at various places, such as switches at one high school, and it always operated flawlessly,” he stated.

“When I explained to each vendor what I needed, Avaya told me its wireless system required using one set of access points for computers and another set of access points for the phones. That meant more chance of breakdowns, not to mention twice the installation and equipment costs. This made our decision a lot easier.”

For every cluster of four classrooms, the cost is \$3,200. By comparison, those same four classrooms can be served by one wireless access point, which costs \$1,200 for equipment and installation. That’s an enormous savings.”

—Brian Auker  
Director of Technology  
New Brunswick School District



## Solution

Through TransNet Corp., an authorized Cisco Premier Voice Provider, the existing network was replaced with a Cisco Ethernet switched network. TransNet installed Cisco's IP Telephony system—employing Cisco 7940 and 7960 Series IP telephones—and the Cisco survivable remote site telephony (SRST) backup system. The company implemented the Cisco Unity™ Voice Mail and Automated Attendant System and replaced the existing Dynamic Host Configuration Protocol (DHCP) services with Cisco's DHCP services.

Cisco Aironet 350 Series access points were deployed at each school—approximately 20 per school—and Cisco Aironet 350 Series Access Point PC adapter cards were installed in classroom laptops, PCs, and Compaq IPAQs. The notebooks and IPAQs are primarily for district staff and teachers, and the PCs are available to students for research.

Based on direct-sequence-spread-spectrum technology and operating in the 2.4-gigahertz (GHz) band, Cisco Aironet 350 Series access points and client adapters provide an Ethernet-like data rate of up to 11 megabits per second (Mbps). They are IEEE 802.11b compliant and Wi-Fi certified for interoperability by the Wireless Ethernet Compatibility Alliance.

The Cisco Aironet 350 Series also supports both wired equivalent privacy (WEP) keys for encrypting data before it is transmitted and a centralized security architecture based on the IEEE 802.1x standard for wireless LANs (WLAN)s. This new standard includes centralized, mutual authentication and ensures that every client uses a unique, dynamic WEP key. Cisco supports an 802.1x authentication type called Extensible Authentication Protocol (EAP)—Cisco Wireless, or Lightweight EAP (LEAP)—on all its client adapters.

System security, while important, was not a driving factor in choosing the Cisco Aironet Series, Auker said, because the district employs filters on its LANs. Nevertheless, the district's technology staff utilizes some security features of the Cisco Aironet 350 Series.

“We also upgraded our switches to Cisco, particularly the Cisco Catalyst® 3524 (Cisco Catalyst 3524-PWR), which lets us power the phones and access points remotely.” Cisco Aironet 350 Series access points feature inline power capability, permitting remote power along an Ethernet cable. Thus, power can be provided by a Cisco Catalyst 3524-PWR Switch, a powered patch panel, or a small, inline device called a power injector. “The switches are another element of a truly comprehensive solution that serves all our voice, video, and data requirements,” Auker said

The project also entailed infrastructure wiring upgrades, including fiber-optic and Category 5e cabling, the installation of microwave bridges and external towers, and deployment of SpectraLink IEEE 802.11b NetLink Wireless telephones.

“With a Gigabit Ethernet backbone in each building, the network provides data and Internet access while also running the district's phone system and providing wireless access to the network for both wireless phones and laptops. The system is tied together by 100-Mbps microwave connections emanating from rooftop towers,” said Joseph Marateo, Director of Information Systems, TransNet.

## Results

"It's already clear that wireless is going to be a major milestone in advancing the New Brunswick Board of Education's commitment toward providing a rich educational experience," Auker said. "Those using the system are particularly happy with the mobility. With a wired system, teachers had to arrange their rooms to accommodate cable drops. Now teachers can rearrange rooms every semester or every week, whatever works best for their particular lesson plans."

In addition to convenience, wireless has been an economical decision for the district. "We haven't run all the numbers yet, so the best approximation I can make begins with the understanding that wired drops cost approximately \$200 each. Say a classroom has four computers; that costs \$800 to get that room on the network. For every cluster of four classrooms, the cost is \$3,200. By comparison, those same four classrooms can be served by one wireless access point, which costs \$1,200 for equipment and installation," Auker said. "That's an enormous savings."

Through use of the microwave WAN and integrated telephony, the district also has eliminated all intra-district phone charges, and there are no monthly telecommunication charges for connectivity between facilities. Bandwidth capacity is wholly district owned and is suitable for both data and voice as well as for upcoming video applications. There is room to grow the number of users as well as the types of services provided. The existing technical staff can manage all the systems.

## Next Steps

More than 350 Cisco IP phones and 150 SpectraLink NetLink Wireless telephones were included in the initial rollout. Most of these phones were for administrative staff. Another 600 or 700 wireless phones are planned for all teachers in the coming school year.



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