Corporate Campus Embraces the Pervasive Wireless Workplace

Intel's Jones Farm campus deploys a unified wireless LAN as the primary network access method for company employees.

EXECUTIVE SUMMARY

INTEL CORPORATION'S JONES FARM CAMPUS

- Networking
- Hillsboro, Oregon
- 5,000+ employees

BUSINESS CHALLENGE

- Need to increase employee acceptance of wireless LAN through better performance
- Need to unify data, video, and voice traffic on one network
- Need to reduce network costs

SOLUTION

- A secure, pervasive wireless LAN with centralized deployment, operations, and management—used as the preferred means of network access.

BUSINESS RESULTS

- Cut annual costs by $25 per employee for moves, adds, and changes
- Cut operating costs by 20 to 30 percent
- Demonstrated employee preference for wireless as the primary network access method

Business Challenge

Both a creator and adopter of mobile technology, Intel Corporation has been offering wireless LAN connectivity to its own employees since 2002. Initially some 1500 users took advantage of a company WLAN, but within three years the number jumped to 55,000 users in 200 Intel locations all over the world.

"When we first introduced wireless networking, employees relied primarily on the wired LAN, using the WLAN only for secondary access such as connectivity in conference rooms," says Sylvia Stump, IT wireless program manager at Intel.

But as wireless use became increasingly prevalent, Intel began exploring ways to reduce network costs. The company's IT team was juggling three networks—the LAN, the WLAN, and the telephony network—each with its own set of expenses. If the WLAN were the primary access method for data, video, and even voice, the team reasoned, costs would be reduced dramatically.

The company also surveyed its employees, who reported that they would welcome the idea of a wireless LAN as the primary method of access provided it were fast and reliable enough.

In 2004, Intel's IT team decided that its Jones Farm campus would be an ideal model for a pervasive wireless LAN. For one thing, Jones Farm is the home of Intel's Centrino mobile client technology, so employees had a natural penchant for wireless technology. Furthermore, Jones Farm consists of five connecting buildings, so the team could make the network pervasive without having to worry about outdoor connectivity.

Network Solution

Knowing that a completely pervasive wireless LAN would require a new network architecture to manage the larger deployment of access points, Intel looked for economies in network management. “With our original wireless architecture, we managed each access point individually,” says Stump. “As the WLAN continued to grow in size and complexity, we realized we would need centralized management and more automation to prevent a dramatic rise in operational costs and staffing requirements.”

The company decided to upgrade and expand its existing Cisco® wireless network equipment to create a unified, centralized WLAN. The new network would work in conjunction with Intel’s installed base of Cisco Catalyst® 6500, 3500, and 4500 series switches. Cisco’s ability to provide centralized, automatic management and access point configuration was important to Intel. In addition to consuming time, “manual configuration introduces the risk of error because technicians might interpret our design standards differently,” Stump says.

To create the new WLAN, Intel purchased eight Cisco 4400 Series Wireless LAN Controllers and a Cisco Wireless Control System (WCS) to control, manage, and automatically configure some 456 Cisco Aironet® 1200 Series Access Points using the Lightweight Access Point Protocol (LWAPP). Existing access points were software-upgraded to support LWAPP. Each access point was assigned a primary and a secondary controller, providing complete redundancy, so all access points could remain active even in the case of a controller failure.

Each of the three largest buildings on campus has two controllers, while the smaller two buildings each have one. The two controllers in the two small buildings are grouped together as a single logical controller under the Cisco WCS. Clients that roam between controllers remain on the same IP network. To ensure fast handoff and constant connectivity among controllers and access points, the Intel IT team implemented Cisco Compatible Extensions with Cisco Centralized Key Management, which lets clients reassociate almost instantaneously.

The new network provides pervasive 802.11a Wi-Fi connectivity everywhere on the premises, even in stairwells. The 802.11a standard provides a nominal 54 Mbps of bandwidth, which decreases as the distance from an access point increases. Another protocol, 802.11g, provides similar connection speeds, but because it runs in 3 channels whereas 802.11a runs in 12 channels, choosing 802.11a helps reduce the risk of radio frequency interference. Intel designed its network to provide a minimum of 36 Mbps per access point, shared among up to 22 simultaneous connections. However, Intel still operates an 802.11b/g network to support handheld devices that do not yet support 802.11a. Cisco’s access points can support both 802.11a and 802.11g.

The network implementation had three phases. The first phase, completed in 2005, included providing data services to a single building, supporting notebook computer clients. The second phase, completed in the middle of 2006, extended the network to the rest of the campus and added video multicast capabilities. Phase three, still in progress in 2007, adds support for voice over IP for both laptops and handheld devices. To that end Intel is beta-testing the Cisco Wireless 7921G IP Phone.

Business Results

Intel predicts a big return on investment for the Jones Farm wireless network as the rollout is completed, especially with the cost of adding new employees to the network and moving existing employees from one office to another; the company estimates a savings of $25 per employee per year for moves, adds, and changes. Operating costs are expected to drop by 20 to 30 percent. In terms of equipment, cabling, and maintenance, Intel predicts a general cost savings of between 9 and 21 percent.

PRODUCT LIST

- Cisco Aironet 1200 Series Access Points
- Cisco Catalyst 6500 Series Switch
- Cisco 4400 Series Wireless LAN Controllers
- Cisco Wireless Control System
- Cisco 7921G Wireless IP Phones

Through the initial stage of deployment, the Intel IT team studied network usage for applications such as e-mail, calendaring, print services, and Web access. The team found that employees generally preferred the wireless network over both the wired LAN and the previous WLAN. Users reported that faster connection times with the 802.11a network made a big productivity difference in conference room meetings, where wireless connectivity was the only choice. In fact, the connection speeds were good enough that users generally chose the WLAN even when a wired Ethernet connection was available. Even so, WLAN capacity exceeded usage by a comfortable margin, so the pervasive network is ready to handle voice applications in the near future.

“Originally, employees preferred the LAN because the quality and stability of the WLAN were inconsistent,” Stump says. “Now they prefer the WLAN because the user experience has been made consistent, simple, and—with mobility—ubiquitous.”

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