Building Bridges

Point-to-point bridging helps businesses wirelessly connect multiple locations and share central resources.
Do you need to network multiple offices, but don’t want the expense or hassle of laying fiber or subscribing to leased lines in each building? Consider wireless bridges — a more practical and cost-effective alternative.

Wireless bridges allow for point-to-point or point-to-multipoint connections, meaning a company can use the wireless technology to link the local area network (LAN) of headquarters to one or many remote office buildings, allowing everyone to access central resources, such as file servers and databases. The technology even allows a central office building to share its high-speed Internet access, such as a T1 line, to any of its remote offices that are within line-of-sight, which saves companies money on data communications costs.

“The main office can extend the reach of its circuit or DSL connection to campus buildings that don’t have circuit or DSL lines provisioned,” says Ben Gibson, director of wireless and mobility marketing at Cisco Systems.

Cisco Systems Inc., Proxim Wireless Corp. and SMC Networks Inc. are among the wireless networking vendors offering point-to-point and point-to-multipoint bridging products, featuring a variety of data transfer rates, ranges and form factors for indoor and outdoor use. Bridges can link buildings that are under a mile to more than 20 miles away, depending on vendor, weather, terrain and antenna size. Bridges that support the 802.11a, b and g standards have data transfer rates of between 11Mb/sec (megabits per second) and 54Mb/sec. Proxim’s higher-end proprietary wireless bridging technology can reach 1Gb/sec (gigabit per second) speeds.

In fact, when compared to a T1 connection at 1.5Mb/sec, an enterprise using bridging technology can boost throughput between buildings by several times while still cutting costs, says Amit Malhotra, Proxim’s vice president of marketing.

Wireless bridges are popular among businesses, the healthcare and construction industries, local governments who want to build public safety networks and education, in which colleges and school districts need to network multiple school buildings, Cisco’s Gibson says. Wireless bridges are also perfect for rural areas where there isn’t a lot of fiber laid on the ground, he adds.

While some businesses use wireless bridging to share high-speed Internet access between buildings, others install wireless bridges as a redundant network in case of disasters, Gibson explains. For example, in situations where a company is leasing T1 lines for each building and a T1 line goes down at one site, employees at that site can still access the corporate network and the Internet through the wireless bridge connection, he says.

How Bridges Work
With wireless bridges, businesses can quickly and easily set up the network connections without the exorbitant costs of laying their own fiber and the monthly cost of having to subscribe to leased lines for each of their buildings, says Brian Nickell, product manager at SMC.
Installing fiber could take months and getting leased lines set up could take weeks. In contrast, wireless bridges are a one-time cost and typically take just one day to install, Nickell says. Enterprises simply install a bridge in each building, wire it into their Ethernet network, connect high-gain antennas and point them toward each other.

For example, SMC’s EliteConnect bridges support a standard called Wireless Distribution System (WDS), which allows wireless equipment to connect to each other. To make point-to-point and point-to-multipoint bridges, IT managers must swap each bridge’s MAC (Media Access Control) address and configure them on the same channel and they will connect, Nickell says. Each wireless bridge has an easy-to-use Web interface to make any configuration changes or to set up wireless or security settings.

“You can set up the basic configuration of a point-to-point bridge connection in five minutes,” Nickell says.

IT managers typically connect a switch to the bridge in remote offices, allowing employees to connect to the corporate network and Internet, he says. With bridges that feature two built-in radios, one can act as the bridge and the other as an access point, allowing users to connect wirelessly to the corporate network and the Internet.

Businesses have a choice between indoor and outdoor wireless bridges. The outdoor bridges are rugged, can handle all types of weather and are mounted on rooftops. With indoor bridges, antenna cables are strung between the bridges inside and the antennas on rooftops, Nickell says.

Omni-directional antennas, which beam wireless signals at 360 degrees, have shorter ranges, such as a mile or two. Larger, directional antennas, which beam the signals at about a 20- to 30-degree angle, allow for longer distances, he adds.

The point-to-point or point-to-multipoint bridging solution that enterprises choose depends on several factors, including bandwidth needs, reliability requirements, distance between buildings and budget, Proxim’s Malhotra says.

For example, Proxim’s Tsunami QuickBridge products offer data transfer rates of between 11Mb/sec to 54Mb/sec, which is enough for remote offices with anywhere from 10 to 50 users, Malhotra says. “But if you need to transfer large data files, such as medical centers sending MRI images to physicians’ offices across the street, then you may need Gigabit Ethernet.”

### Cisco Solutions

One of the products offered by Cisco Systems — the Cisco Aironet 1400 Series Wireless Bridge — operates on the 802.11a band, supports data transfer rates of up to 54Mb/sec, and handles both point-to-point and point-to-multipoint configurations. It features a ruggedized form factor, allowing businesses to install it outdoors, but it can also be used indoors, says Gibson. The bridge supports Power over Ethernet (PoE), 802.1x authentication and TKIP (Temporal Key Integrity Protocol) encryption. Administrators can centrally manage authentication and encryption through a RADIUS (Remote Authentication Dial-In User Service) server and manage the bridges through the CiscoWorks Wireless LAN Solution Engine (WLSE), a tool for centrally managing Cisco’s wireless equipment.

Customers also have a choice of antennas, including a high-gain 28 dBi dish antenna for longer distances, Gibson says. For point-to-point connections, enterprises using the Cisco Aironet 1400 Series Wireless Bridge can take advantage of 54Mb/sec speeds for up to 8.5 miles. If they lower the throughput to 9Mb/sec, the range can extend up to 23 miles using the 28 dBi dish antenna.

For point-to-multipoint bridging, businesses can have 54Mb/sec throughput rates for up to 2.75 miles. If they lower the bandwidth to 9Mb/sec, the bridge connection can extend to nine miles, according to Cisco.

“As the distance gets greater, the less bandwidth you will see out of that connection,” Gibson says.

### SMC’s Offerings

SMC offers a family of four EliteConnect bridges that supports the WPA (Wi-Fi Protected Access) security standard, which includes TKIP for encryption and 802.1x for authentication. It also supports PoE, which is important because enterprises don’t always install wireless equipment where there are power outlets, particularly if IT managers are installing an outdoor bridge on rooftops, SMC’s Nickell says.

The SMC2582W-B EliteConnect bridge supports the 802.11b standard, and offers data transfer rates of 11Mb/sec. SMC also offers two 802.11g bridges that feature 54Mb/sec speeds. The SMC2586W-G has one radio, while the SMC2585W-G supports two radios, one to act as a bridge and other as an access point. With an 802.11g bridge, the actual data transfer rate is about 20Mb/sec to 23Mb/sec. With noise, it could go down to about 15Mb/sec to 20Mb/sec, Nickell adds.

SMC’s higher-end outdoor bridge, the SMC2888W model, features two radios and supports 802.11a, b and g. With the SMC2888W, users can configure the 5GHz...
radio for the backhaul or bridge link and use the 2.4GHz radio for user access. The outdoor bridge can support up to 16 multipoint bridge links, while SMC’s other bridges can support six bridges, Nickell says.

SMC customers also have a choice of seven antennas that offer ranges between 1.8 to 9.3 miles and antenna cables ranging from 25 inches to 75 feet. SMC offers devices called “amplifiers” that extend the range of the antennas, he adds. For management, SMC provides EliteView, software that allows IT managers to centrally manage SMC wireless equipment via SNMP (Simple Network Management Protocol).

Proxim’s Portfolio

Proxim offers approximately 20 models of point-to-point and point-to-multipoint bridging products.

Proxim’s indoor ORINOCO AP-4000 dual-radio access point uses 802.11a, b and g standards and can be configured in bridge mode, with one radio supporting Wi-Fi access and the second radio supporting bridging.

Proxim also offers products for enterprises that require higher throughput, longer ranges, greater reliability and the ability to operate outdoors. Of these, the most cost-effective and easiest solution to install is its Tsunami QuickBridge family of outdoor point-to-point products, featuring data transfer rates of 11Mb/sec to 60Mb/sec and ranges from 2.5 to about 10 miles. The bridges come bundled with all the equipment required for installation, including antennas, outdoor cables, mounting hardware and “power injectors,” which are PoE adapters.

“From a performance and price standpoint, QuickBridge is ideal for anyone looking for an alternative to one or more T1 lines,” Proxim’s Malhotra says.

For example, in the 2.4GHz band, the QuickBridge.11 Model 2454 offers 54Mb/sec data transfer rates with actual throughput at 29Mb/sec. The QuickBridge.11 Model 5054-R, which operates in the 5.1- to 5.8GHz band, offers 54Mb/sec speeds with actual throughput of 40Mb/sec. Both products can extend to about 10 miles.

The QuickBridge products feature easy-to-use software that allows for fast configuration, Malhotra says. They also include QuickBridge Manager software, which allows IT administrators to manage the equipment. For security, the QuickBridge products support the Advanced Encryption Standard (AES).

Enterprises seeking to leverage the capabilities of the QuickBridge.11 in a point-to-multipoint configuration can use a related product, called the Tsunami MP.11, he says.

The Tsunami.GX series is a more sophisticated set of point-to-point products providing up to 102Mb/sec throughput full-duplex, up to 99.999 percent reliability, a range of 20 miles or more, and indoor or outdoor installation, Malhotra says. Full duplex means both sides of the link can transmit data simultaneously, allowing for a total throughput of 204Mb/sec.

For organizations that have large bandwidth needs, Proxim offers the GigaLink product family, outdoor point-to-point equipment that operates on the license-free 60GHz band. It can reach Fast Ethernet and Gigabit Ethernet speeds and has a range of under a mile.

“Larger enterprises routinely require Gigabit Ethernet connectivity for large file transfers or simply a fat pipe into their facilities,” Malhotra says. “Traditional wireless technologies such as Wi-Fi won’t achieve that kind of throughput, but GigaLink does.”

Like other wireless bridging products, Proxim’s equipment is easy to install and can be installed in one day, which is much faster than subscribing to leased lines or even installing fiber optic network, he says.

“We’ve seen cases where an enterprise has been told by the telco that it might take six months to establish wireline connectivity to their facility, and our product has met the need in a matter of days,” Malhotra says. “Considering product cost, elimination of recurring monthly charges and ease of deployment, our wireless bridges set a new standard for low total cost of ownership.”

CDW offers technology service support from top manufacturers and service providers across all product categories.