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Paying the Price for Going Wireless

Wireless networks aren't expensive to install, but costs quickly can rise as a result of unexpected expenses and a desire for upgraded functionality.

By Bill Briggs, Senior Editor

Implementing wireless networks in hospitals and other health care facilities is a bit like getting cable television at home. Basic service has a manageable price tag, but with the addition of more functions, including pay-per-view events, high-speed Internet access and Voice over Internet Protocol telephone service, costs begin to climb.

"There is a great deal of interest among CIOs and chief technology officers in implementing wireless technology," says Craig Dahl, health care practice director, at Englewood, Colo.-based Interlink Group Inc., an I.T. consulting firm. "They are getting very creative about using the technology now and about what they will do with it. It's going to be hot for the next three to five years for hospitals; it's just a matter of taking time with the design."

Wireless networks are sprouting up in physician practices, long-term care facilities and other locations, but hospitals have taken the lead with deployments.

The initial expense for basic wireless network hardware, including access points to transmit and receive radio wave signals, cabling and switches, and network management software, can total as little as \$100,000 for a 300-bed hospital.

But creating access for multiple clinical applications, including order entry and electronic medical records, and administrative applications, such as medical device and inventory tracking, adds to the cost. And newer functions, including VoIP phone service and public network access, will take an increasing bite out of operating budgets.

When St Mary's/Duluth (Minn.) Health System leaders decided in 2003 to pursue a wireless network, their goal was to get the technology in place while minimizing costs to, and impact on, the organization, says Rick Schroeder, network analyst.

For St Mary's/Duluth, which comprises four hospitals and 20 clinics, costs were measured in various ways. "We looked at cost in dollars, management time, security vulnerabilities, and cost to users and patients," he explains.

One key goal—and cost factor—was to install cable only once to connect the medical facilities, and then building

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the network from there. "That way the infrastructure goes in once and you disturb the ceiling tiles only once," Schroeder adds. "That appealed to our management." Some hospitals, however, have found that adding wireless functions requires laying additional cable.

Another cost factor addressed security issues. Rather than position access points in public areas, network designers wanted to reduce vulnerability by locating them in data closets that already had restricted accessibility as well as electrical connections to power the units.

St. Mary's/Duluth's cost factors closely resemble those described by Dahl, the consultant. He parcels wireless networking costs into four categories: hardware; network design and coverage; security; and network management.

Most provider organizations Interlink works with are doing a good job managing the first two cost categories, he notes. And while most of those have adequate security or better, some haven't devoted enough resources to the task, he says.

Many organizations also haven't gotten their arms around wireless network management, Dahl adds.

Security focus

Security and network management are areas where provider organizations contemplating or recently moving into the wireless world should keep a sharp focus, he says.

"CIO and COOs are not living in fear of wireless network security, but they tend to be more concerned with external intrusion into hardwired networks," Dahl says.

In terms of network hardware, St. Mary's/Duluth Health System deployed wireless technology from Cisco Systems Inc., San Jose, Calif. However, access point deployment presented several options, says Schroeder, the network analyst.

Buying 200 of Cisco's access points would have cost about \$160,000, he says. But the Minnetonka, Minn.-based branch of network installation vendor Black Box Network Services, Lawrence, Pa., suggested another alternative—a system from MobileAccess Inc., Vienna, Va., that enabled the delivery system to deploy about one-third as many access points.

Though the cost difference was negligible, the MobileAccess technology is designed to accommodate future applications without additional cabling, Schroeder adds. It also met the provider's wishes for access point deployment in the locked data closets. St. Mary's/Duluth already is testing wireless inventory tracking in 23 operating rooms in St. Mary's Medical Center, the delivery system's flagship hospital.

"We're seeing \$400 in savings per day, per room using the system to prevent inventory loss, make better use of just-in-time supply management and prevent lost billings," Schroeder says. "We could save \$1 million per year by deploying the wireless inventory management system."

The inventory system pilot uses wireless bar code scanners from Symbol Technologies Inc., Holtsville, N.Y., and scanning software from Caduceus Systems LLC, Austin, Texas.

Wireless inventory tracking isn't new to health care, but the opportunities to tie clinical and administrative data into the same networks is enabling new ways to examine supply use and patient care. And the multiple uses of wireless networks are helping provider organizations justify spending, experts say.

New technology, such as radio frequency identification, or RFID, can present a cost dilemma for many hospitals. Results of a recent survey by BearingPoint Inc. and The National Alliance for Health Information Technology, Chicago, indicate that the technology's costs and provider funding present some barriers to acquiring the technology, says Nicholas Evans, a health care I.T. consultant specializing in emerging technology at BearingPoint Inc., McLean, Va.

But those obstacles won't necessarily prevent pursuit of wireless technology.

Of 313 survey respondents, 53% rate wireless technology as "very important" for adopting RFID. "Most said they planned to use RFID in the next 24 months," he adds, "which suggests they might not currently have that infrastructure."

Rapid improvements in wireless networking technology can be frustrating for buyers that are left holding older versions. But for Underwood-Memorial Hospital, a 315-bed community-based not-for-profit in Woodbury, N.J., the timing of one of those frequent technology shifts couldn't have been better.

In July 2004, the hospital bought wireless technology from 3Com Corp., Marlborough, Mass., which it deployed in and around its emergency department, says Michael Baker, director of information systems.

Small beginnings

The small-scale implementation in the emergency department was intended to be a precursor to the hospital's initiative to upgrade its clinical documentation system to the Millennium application from Cerner Corp., Kansas City, Mo., and to extend wireless access across the facility.

Underwood-Memorial chose software from Ibox Healthdata Systems, now part of Picis Inc., Wakefield, Mass., for the emergency department.

"We got a proposal from 3Com to install the wireless equipment and decided to move ahead," Baker says. "When we placed the order, they were just moving to a new series of wireless access devices."

The older units were "intelligent" devices that essentially made each access point vulnerable to failure, he explains.

Ironically, the new version is a “dumber” device controlled from a single point inside the facility. In effect, the newer technology moved the intelligent aspect of the system to the controller along with the vulnerability.

The advantages included reducing the likelihood of equipment malfunction interrupting the wireless network and enabling clinicians to move from one area of the seven-story hospital to another without logging in and out of different information systems, Baker says. The estimated cost of building an enterprisewide wireless network with the older equipment was about \$110,000. Although Baker expected that to go up for a network built on the new technology, the price actually dipped below \$100,000, he says, which included 36 access points.

The “dumb” devices provide additional security features as well. “The new devices not only enable roaming between hospital units, but also can look for rogue access points,” Baker says. Rogue access points are access points that have been installed without authorization and typically are not programmed with the necessary security to prevent network intrusion.

The enhanced wireless technology also enables I.T. staff to monitor and manage the wireless network from mobile computers. In addition, it automatically detects malfunctioning access points and increases power to others to compensate, Baker adds.

Such monitoring and management capabilities are vital to wireless networks, but network management and maintenance are areas where hidden costs often lurk. “The biggest unknown cost is application maintenance, the human labor cost,” Dahl says. For example, if users move through “dead” spots, where wireless signals don’t reach, some applications will lose the network connection. That might require repeating the log-in process, not something busy clinicians will tolerate.

Seeking resolutions

I.T. staff then must resolve such issues, which can arise with each new application or network overlay on the main wireless network. “Resolving dead spots can require establishing a completely different workflow,” he adds.

Coping with dead spots is a systemic cost factor that begins with wireless network design, but never quite goes away. “We’ve found that it’s a challenge to have the type of signal saturation needed to handle all devices,” says Michael Russell, M.D., associate CIO at Durham, N.C.-based Duke University Health System, which comprises three hospitals and a 1,000-physician faculty practice.

Corralling the number of channels needed to handle wireless data, with all the bandwidth necessary—and without leaking signals beyond the organization’s boundaries—is no simple management task. “It’s easy to have it, hard to maximize it,” Russell notes.

Duke University Health System’s history with wireless technology goes back more than a decade, beginning with wireless notebook computers carried by clinical

pharmacists accompanying physician rounding teams. There have been additions since that time, but wireless activity at Duke really heated up in the past year or so with wireless cart-based laptop computers.

The carts are from Stinger Medical, Murfreesboro, Tenn., and laptops from Dell Inc., Round Rock, Texas. The wireless network is based on Cisco technology. The organization also has deployed wireless PDA-based services using technologies from Palm Inc., Sunnyvale, Calif., and Redmond, Wash.-based Microsoft Inc.

Physicians use hand-held devices to access applications from PatientKeeper Inc., Boston, for results reporting and Pylon, from iAnywhere Solutions Inc., a subsidiary of Sybase Inc., Dublin, Calif., for connecting to Lotus Notes, from Armonk, N.Y.-based IBM Corp., for e-mail.

Seamless coverage

The challenge has been to enable computers to tap into the network in areas other than where they were planned, such as carts being moved to non-patient care locales by physicians. "Just making sure coverage is seamless is a very big deal and requires investment of time, intellect and hardware," Russell says.

Russell couldn't put a number on how much Duke University Health System has invested in wireless technology, but notes "it's a moving target and we invest in it on a yearly basis."

Some provider organizations pointedly invest resources upfront in an effort to avoid shocks down the road. "We have tried to limit surprises, by conducting pilots and limited rollouts," says Pat Skarulis, CIO at Memorial Sloan-Kettering Cancer Center, a 425-bed care, teaching and research facility in New York.

Memorial Sloan-Kettering wants to see results through pilots, such as one conducted with VoIP nurse communications via a system from Vocera Communications Inc., Cupertino, Calif.

These "shakedown cruises" can reveal operating strengths and also enable a better price negotiating position compared with original estimates, Skarulis says. She declined to reveal the organization's wireless investment.

Return on investment, however, is not the key measure when organizations like Memorial Sloan-Kettering pursue wireless technology, says Patrick Carragee, director of information systems. "When we deployed carts for physician rounding on those floors we weren't looking at a return on investment for wireless," Carragee adds. "Wireless on those floors was needed for patient safety and quality of care."

Memorial Sloan-Kettering has a multilayered wireless network, largely from Cisco, with five virtual local area networks operating on each access point, he says. They serve wireless computer carts, telephones, medical devices, public access—for patients and vendors—and network management.

Connecting buildings

One of the continuing challenges has been connecting different buildings in the sprawling campus.

The organization uses optical wireless technology—beams of light that carry digital data—from LightPointe Communications, San Diego, to connect buildings.

“One set of our offices is two blocks away,” Carragee says. “Line-of-sight communication is not easy in Manhattan, where changes in building configurations occur regularly.”

When Birmingham-based Baptist Health System of Alabama embarked on a broad wireless networking strategy, emergency department pilots in two hospitals also served as proving grounds. The seven-hospital delivery system already had a Cisco backbone and wanted to build on that technology where possible, says Steve Ramos, senior network engineer.

The only cost surprise came from site surveys from Atlanta-based Bell South Corp., another of Baptist’s wireless vendors.

“Some of the site survey numbers came out higher than what we anticipated,” Ramos says. “We purchased too much hardware, so we’re renegotiating how to reconcile the overage.”

The wireless network spans six hospitals and Baptist Health System’s corporate headquarters.

A big driver for wireless networking was the desire to enable hand-held computer users to access patient data via an application from MercuryMD Inc., Durham, N.C. PDAs from Dell and Hewlett Packard Co., Palo Alto, Calif., are in use in emergency departments and clinical areas, as well as laptops from IBM. Wireless EKG devices also were being added in late October.

Mobile carts and access point enclosures came from Flo Healthcare, Norcross, Ga. The enclosures provide aesthetics in that they house access points in a low-profile container and also boost wireless signals, Ramos adds.

The enclosures and antennas doubled the cost of the access points, but their easy access for maintenance and trouble-shooting made the difference palatable, Ramos says. “We knew that up front.”

Baptist Health has invested about \$2 million at seven locations for wireless technology that also includes VOIP from SpectraLink Corp., Boulder, Colo. •

Sidebar

RFID poised for a breakout?

Managers at Memorial Sloan-Kettering Cancer Center in New York believe piloting wireless technology is the best way to head off cost surprises later. One of the organization’s test programs could be a harbinger of things to come for the use of radio frequency identification

technology in the health care industry.

The 425-bed organization has completed an RFID pilot in the biomedical engineering area and is pondering an RFID asset management pilot on a clinical floor that would track devices such as IV pumps, says Pat Skarulis, CIO. "We want to see if the technology will save money and nursing time," she says. "We see RFID replacing some older forms of asset management."

Memorial Sloan-Kettering is joining a growing number of hospitals and other provider organizations exploring RFID technology. In a new survey conducted by BearingPoint Inc. and The National Alliance for Health Information Technology, Chicago, 15% of 313 respondents indicate they are piloting some type of RFID technology today.

The survey, titled "RFID in Healthcare," shows there's more to come: 31% of respondents expect to pilot RFID technology in the next year and 54% will do so in the next 24 months.

"Based on our client work and the survey, provider executives are very interested in exploring the technology," says Nicholas Evans, the survey director and a health care I.T. consultant specializing in emerging technology at BearingPoint Inc., McLean, Va. "They are finding ways to tap into RFID."

BearingPoint is working with clients on RFID strategy and pilot programs, he notes, and expects adoption to increase. "In the next 24 months, more facilities will start using RFID. They are already incorporating Voice over Internet Protocol and other wireless technology into the vision of where they want to take their organizations."

Benefits that provider organizations expect from RFID technology were divided into technological and business categories in the survey. Respondents cited improved data accuracy most often (54%). Improved patient safety led their business benefits expectations (67%), followed by improved productivity and improved patient flow management (at 48% each).

Cost is the top technological barrier to adopting RFID technology, with 46% of survey respondents citing tags, or the chips that store data, and reader devices as the chief expenses. Business barriers were led by the usual health care I.T. project villain: no funding or budget available for the technology, noted by 57%.

The BearingPoint/NAHIT survey also found that RFID has the much-sought potential to deliver value across both clinical and administrative segments of a provider organization. "From supply chain and asset tracking to patient safety issues like medication administration, RFID crosses clinical and operations sides," Evans notes. "It enables accessing multiple applications on a communications infrastructure."

Those organizations investing in RFID in fiscal 2006 (27.4%) will keep their spending under \$250,000. Just over half of the respondents say their organizations have no plans to purchase the technology next year. RFID technology spending projections for fiscal 2007 and 2008 show greater promise, however, with more than 13%

planning to invest between \$250,000 and \$499,000. And 35.1% expect to spend up to \$250,000. Those organizations with no plans to allocate dollars to RFID in the coming years declines to 26.2%.

The survey was conducted online in September and October and targeted BearingPoint customers, NAHIT members and external lists of health care executives. More than 85% of survey respondents were I.T. executives at private and public hospitals. For more information on the survey, visit www.nahit.org or www.bearingpoint.com. •

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