



# Baseline

March 4, 2009

## Deploying In-Building Wireless Coverage

By David Strom

For wireless applications to function properly, they require the right in-building coverage, which involves more than just proper antenna placement and access point design.

More enterprises are deploying universal wireless coverage across their campuses. Software has matured, wireless networks are easier to manage and more secure, and bandwidth is approaching that of wired connections.

Today's work force is more mobile, and the desktop of choice is usually a laptop. As wireless becomes more ubiquitous, it enables an entire collection of new applications that can be used to communicate with employees when they are away from their offices, monitor sensors around a building and even transmit video streams.

Take, for example, 3G cellular broadband offerings. With the popularity of Apple's iPhone and similar devices, more IT workers want always-on Internet from their smartphones. A survey conducted by Trellia Networks last fall found widespread interest in 3G broadband adoption, with half of the respondents evaluating this technology and another third in the middle of deploying it.

In the hospitality industry, many hotel owners recognize they have to attract premium guests and offer corresponding premium services. They are doing so with various wireless technologies that will open guest doors, track the items in the minibar and deliver Internet telephony to each room.

Hospitals are also coming on board with wireless.

“Five years ago, hospitals were afraid wireless devices were going to interfere with their medical telemetry, so they put bans into effect,” says Scott Sbihli, global product manager of networking systems for GE Healthcare. “But few problems have materialized, and, for the most part, interference isn't an issue.”

As wireless technologies have matured, many have realized that interference is more of an urban legend than reality. With the proper arrangement of antennae and configuration, everyone's radios can coexist and not threaten critical functions.

For these new applications to function properly, wireless has to be available everywhere. That requires designing the right in-building coverage, which involves more than proper antenna placement and access point design to avoid radio dead spots.

There are many issues to resolve (see "Issues to Consider" at right), particularly if an IT shop wants to support multiple wireless technologies beyond Wi-Fi and cellular voice connections. There are multiple standards to support, and mixing wired and wireless infrastructure can be more of a black art than cut-and-dried engineering. Deploying centrally managed wireless solutions will take some careful planning and vendor evaluations.

The major vendors for managing mixed cellular/Wi-Fi networks are ADC Telecommunications' subsidiary LGC Wireless, Powerwave Technologies, InnerWireless and MobileAccess.

### **Coverage and Quality**

Just because an enterprise has deployed wireless access doesn't mean it's optimized. At the Baptist Healthcare East hospital in Louisville, Ky., doctors were receiving their pages a few minutes late due to poor in-building cellular coverage. "A lot of the doctors had [Nextel](#) push-to-talk [phones](#), but they only worked in the surgical areas of the hospital," says Jim Laval, manager of corporate IT. "They wanted something that worked everywhere."

The hospital deployed ADC's InterReach Fusion and now has universal coverage and high-quality wireless signals. It is deploying new applications that depend on this wireless infrastructure. "Having a solid wireless infrastructure gives us a lot of potential for new applications that enhance staff productivity and improve the quality of our care," Laval says.

As the number of different radio frequencies in an enterprise increases, deployments should make use of filters to mitigate interference. Proper construction of antenna arrays that can operate at low power levels and focus coverage on particular areas is also important. The goal is to keep coverage high without sacrificing signal quality and service.

That's the solution adopted by MobileAccess, with its Universal Wireless Network products that combine multiple radio signals over a single antenna array. The company groups antennae by using lower power emitters and filters to separate the signals and mitigate interference.

Both InnerWireless and MobileAccess use a single antenna to support multiple wireless signals but make use of coaxial cabling to connect this antenna to the wiring closet on

each floor. The Wi-Fi access points are kept in the wiring closets and are connected via coaxial cables to antennae that are mounted closer to the users.

This keeps IT infrastructure out of the ceilings and in more centralized areas, which can be protected and more easily maintained. It also removes these devices from public areas, where they may be tampered with.

### **Deploying In-Building Wireless Coverage - An Alternative Approach**

A different method is used by ADC and Powerwave. They have a separate antenna array for each [wireless service](#), connecting each via standard Category 5 twisted-pair wiring to bring the radio signals back to the floor's wiring closet. This has the advantage of using common wiring that is probably already installed and is well-understood by most corporate infrastructure engineers.

ADC places more active elements closer to the users, which can be more costly, depending on the configuration. The trade-off is using cheaper passive antennae but having more expensive cabling compared with a single set of active antennae that are less expensive than cable but require separate antennae. Part of the biggest cost component of any antenna installation is the final few yards of cabling that will go closest to the users.

“There is a big labor cost to go in the ceiling, and the less you can do there and the more you can do in the wiring closet when you want to add your second and third frequency band, the less costly your job will be,” says GE Healthcare’s Sbihli. “You might also design a system for future expansion so that you don’t have to pull more cable two or three years from now.”

That was the motivation behind the design of the Comcast Center, an office tower in Philadelphia that is the home office of Comcast Corp.

“We wanted an in-building antenna system to future-proof the building,” says Fred Dougherty, vice president of portfolio technology for Liberty Property Trust and the developer of the skyscraper. “Given the height of our building and the fact that we were using low-energy emissions glass cladding that would block a lot of cellular radio transmissions, we had to do something to support four major [cellular carriers](#) and Wi-Fi throughout the complex.”

Liberty chose MobileAccess to deploy its wireless solution after evaluating several vendors.

“Each tenant can connect its private network to the MobileAccess equipment and benefit from a fully engineered wireless network distribution system in its space,” Dougherty says. “The reliability of the system is exceptional, and all of our property management and building staff have superior communications. Wireless coverage is complete, without interference or any signal loss throughout the building.”

Supporting in-building wireless requires a lot of planning and specifications development. For example, the Comcast project started seven years ago when the first requests for proposals for its IT infrastructure were created.

The good news is that the technology is improving, and it's getting easier to support multiple wireless frequencies.

### **Issues to Consider**

Here are five questions you should ask when implementing a [wireless network](#):

1. How far into your wired [network](#) do the wireless packets have to travel? You may have to rewire some of your network between floors or from wiring closets to your access point locations if you don't have any wiring to accommodate the APs in the best locations for providing service.
2. Is end-to-end network management important? Cisco doesn't have this across both wired and wireless product lines, for example.
3. Do you want to skip earlier 802.11a/b/g radio standards and move right to 802.11n? Then make sure your products are current with 11n support.
4. Do you need a lot of capacity for wireless users in a small area? Look at products such as Xirrus, which can support these higher-density uses.
5. Do you need both Wi-Fi and cellular support, and, if so, do you want to use the same antenna arrays and infrastructure?