

# Unlicensed and Unwired: The FCC's Signal Achievement

*Wireless networks are changing how we view communications networks*

By Wayne Hall



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orget for the moment what you don't know about wireless technology and focus on two facts: according to a recent survey by the Pew Internet and American Life Project, more than a quarter of all Americans can now use wireless-enabled devices like notebook computers and cellular phones to connect to the Internet. And thanks to wireless connections, about one-

third of the U.S. work force now works from home at least part time, according to figures released in July by In-Stat/MDR. Many of these people will use free or cheap connections, thanks to a fresh idea nurtured by the Federal Communications Commission.

## Trash to Treasure

Until recently, technology and the nature of radio spectrum conspired to prohibit license holders in the same geographic area from using the same frequency to transmit, for example, a television signal. Broadcasters would interfere with each other, or more accurately, with viewers' ability to pick up the broadcast, because television sets could not distinguish between competing signals using the same frequency.

As with nearly every other practice in the public and private sectors, the digital reformation is challenging old ideas.

One of the FCC's biggest achievements in recent years is the culmination of a decision made in 1985 to permit unlicensed devices to operate in so-called "junk" frequency bands—meaning not very valuable commercially—as long as they did not interfere with licensed services. For years cordless phones and baby monitors, essentially "dumb" devices, filled that product niche.

Realizing how technical standards had created a boom in office computer networking, technologists in the late 1980s sought to establish similar standards for wireless networks. By 1997 a group established by the Institute of Electrical and Electronics Engineers had created a technology standard with the odd name of 802.11, after the subcommittee that created it. The new standard first registered with the public about three years ago near the bottom of the technology driven stock market crash, making it one of the few success stories in an otherwise dismal period for the industry.

Marketed by the computer industry as Wi-Fi, the standard created a broadband wireless connection of 100 feet or less—not far, but suddenly people found themselves with fast, inexpensive wireless access to the Internet. Bingo.

In urban areas of the country today, large areas are blanketed with broadband wireless "hot spots." Starbucks and other national retail chains such as McDonalds have found that Wi-Fi connections are people magnets. Because they cost so little to set up, they add virtually nothing to operating costs. Business travelers now rely on Wi-Fi connections at airports and city centers to stay connected to the office. Supported by cheap and readily available networking gear, Wi-Fi home networks are also commonplace.

## Racing Against Time?

Cellular carriers, in contrast, have been working for some time on their versions of high-speed wireless services. Each national carrier has plans to expand or build new wireless infrastructure to accommodate various wireless broadband technologies used in their respective networks. These services are collectively referred to as "3G," or third generation cellular. Cellular phones using 3G

services often sport tiny keyboards and color screens because of the emphasis on transmitting data like pictures, spreadsheets and business documents.

Unlike Wi-Fi, which is a well defined and widely accepted data communications standard, incompatible cellular technologies are closely identified with their respective carriers. Switching carriers often means switching phones. Having paid billions of dollars at auction for spectrum, cellular carriers must also recoup those expenditures, leading to high roaming rates, indecipherable calling plans and unpopular long-term commitments.



Meanwhile, Intel has built Wi-Fi technology into its processors, which are used in the vast majority of notebook computers around the world. It also recently threw its support behind a newer, longer range version of Wi-Fi called WiMax.

Whereas Wi-Fi signal can be measured in feet, WiMax, which operates in both unlicensed and licensed bands, will extend the broadband signal for miles. Municipalities and some county governments are now beginning the first cautious implementations of the extended technology because it offers a promising third option for customers who lack broadband choices from either the telephone or cable companies.

#### **A New Policy, \$100 at a Time**

The success of Wi-Fi has certainly spiced the debate over the best methods for managing spectrum, which is, after all, public property. To no one's surprise, the U.S. General Accounting Office recently reported that the nation's airwaves are poorly managed because software-driven wireless services can increasingly be made to use nearly any available spectrum. Current policy generally assigns spectrum to services (such as radio navigation in aviation) and users (federal, nonfederal and shared) rather than permitting services to find available spectrum.

That criticism has not been lost on the FCC, which is at the beginning of an historic overhaul that recognizes that future wireless technologies will make service- or user-specific spectrum assignments essentially meaningless.

For example, the commission recently changed its rules governing unlicensed devices to make it easier to deploy "smart antenna" technologies. Smart antennas adjust to their environment, dynamically reusing—or avoiding—licensed spectrum as needed.

Paired with consumer hand-held technologies, such wireless tangos will foster even more innovative use of this public property.

In May the FCC also appointed a wireless broadband task force that will review spectrum management policies and regulations and deliver recommendations to FCC commissioners this fall. One of the FCC's explicit goals will be to encourage the development of wireless Internet service providers (WISPs), particularly in rural areas. Given recent advances in delivering voice communications using Internet technologies, WISPs could establish themselves as new, Internet-powered phone companies. The cost to enter this market as a provider is very low.

The commission may have to engage the broadcasting industry in hard bargaining before that occurs. Because radio waves in the lower television bands can travel longer distances using the same power and are relatively unaffected by obstacles like trees and homes, broadband wireless advocates have a great deal of affection for the lower reaches of radio spectrum where broadcasters operate. Wireless broadband is simply more effective in the lower frequencies.

They have an ally in FCC Chairman Michael Powell, who is an ardent proponent of exploring those alternatives. In another of several indications that reform is coming, the agency has put the industry on notice that it is looking at the assigned "white space" for broadband applications. That vacant spectrum has been used as a buffer to separate adjacent broadcast channels, a relic of a rapidly closing era.

But perhaps the greatest legacy of the development of Wi-Fi and unlicensed devices will be how such networks are capitalized. Clay Shirky, who studies Internet technologies and society, points out in his article, "The Possibility of Spectrum as a Public Good," that "there are two ways to build \$10 billion in network infrastructure. The first is to get ten large firms to pony up a billion each [buying spectrum licenses at auctions], and the second is to get 10 million users to spend a hundred dollars each [on network hot spots]. Wi-Fi fits that second model ..."

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Unlicensed—free—spectrum created an opening for the development of consumer broadband wireless applications like Wi-Fi, which has been an enormous success. Further exploitation of that free spectrum by the information technology industry to deliver voice, data and video over the airwaves will change how we view communications networks. People, not government-subsidized industries, are creating a wireless future one \$100-purchase at a time. That's economic development.

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