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Everything's Connected, Yes. But How?

By ERIC A. TAUB

Consumer technology seers say they think they have a good idea about the home of the future. It will be a place where photos, television shows, movies and music will be stored centrally and available in any room on demand.

It is called the connected home, where television sets, digital video recorders, DVD and music players and computers are all tied together. But an important question must be answered before the connected home becomes a reality: how will everything actually be connected?

A number of electronics companies and industry groups are working to answer that question, developing standards for connecting home entertainment devices.

Consumers who have created a small home computer network know of a few solutions that at first glance seem like candidates, like Ethernet cables and wireless.

But while tying together two or three computers to share an Internet connection and swap the occasional music or photo file is one thing, a home entertainment network can be another thing entirely. It can involve many more gadgets: television sets in the family room, kitchen and bedrooms; cable boxes; satellite TV receivers; DVD and audio players in the den; amplifiers and speakers scattered throughout the house; and one or more computers. And multimedia files like high-definition video or movies can be enormous, requiring lots of bandwidth.

Running Ethernet wire throughout a house to connect so many devices can be very expensive, particularly in an older home. And current versions of home wireless technology are not good contenders for home entertainment. Signals can be erratic, depending on the time of day, distance from the router and factors like interference from other home appliances. Move a wireless television like Sony's LocationFree model around the house, and watch the picture come and go.

So the ideal solution for the connected home would seem to be to find some wiring already in the house that digital data could share. Fortunately, most homes already have electrical wiring and coaxial cable.

Baby boomers may recall that a home's electrical wiring has been called into alternative service previously. In the 1970's, various companies sold devices with such names as the Little Wonder TV Antenna. Plug it into the wall, and it promised to turn a home's wiring into "a giant TV antenna," forever ridding the set of ghosts and snow.

Unlike those novelty items, today's radically different technology actually works. Companies like NetGear already sell products that extend wireless signals by transmitting them through electrical wiring to other rooms. To pick up the signal, users plug a network interface box into an electrical outlet.

The technology uses a standard called HomePlug 1.0, developed by an industry group called the HomePlug Powerline Alliance. The group hopes an advanced version of that standard, HomePlug AV, will become an industry standard for home-entertainment networks.

Backed by companies like Comcast, EchoStar and RadioShack, the group is designing its HomePlug AV standard to reliably carry 150 megabits of data a second over home electrical wiring. A high-definition video stream uses about 24 megabits a second, so the standard should provide enough capacity to simultaneously send multiple streams of HD video from room to room.

Not everyone thinks the HomePlug approach is such a great idea. Another group of semiconductor and electronics companies, including D-Link, Motorola, Panasonic and Thomson, wants to use existing coaxial cable, now used for cable TV, as the network link. Many homes already have coax going to at least several rooms.

Last week, the Multimedia Over Coax Alliance announced that it had successfully tested the technology in more than 200 homes, and that it was able to deliver data at a rate of 100 megabits a second in 95 percent of the wall outlets it tested.

The 5 percent that did not achieve that rate have problems like deteriorated cable and "are easily fixable," said Ladd Wardani, president of the group. "In the worst case, we'd just have to run another coax cable," he said. But if that happened with power lines, "you'd need an electrician to fix it."

Mr. Wardani also argued that coax cables were not subject to line interference from other devices, as the technology operates in a different frequency range.

HomePlug proponents naturally disagree with such conclusions. Various error-correcting technologies eliminate problems like noise, according to Oleg Logvinov, president of the group.

Mr. Logvinov said that the coaxial cable approach had problems. Because many consumers use cable TV splitters, coax will not be easily suitable for two-way communications, he said.

"The fundamental issue is, what is the convenience factor?" Mr. Logvinov said. "Where I would place my L.C.D. TV is not necessarily where I would have a coax outlet."

Consumer electronics companies continue to hedge their bets, supporting either multiple connectivity approaches or none at all.

Panasonic, a former member of the HomePlug Alliance, has left the group; together with Sony and Mitsubishi it has created the CE-Powerline Communications Alliance, which advocates another version of power line technology. HomePlug's specification does not adequately address interference issues, according to Paul Liao, Panasonic North America's chief technology officer.

Yet at the same time, Panasonic is also working with the coaxial cable group. Its partners Sony and Mitsubishi continue as members of HomePlug.

And Sharp, while also a member of the HomePlug Alliance, "is in no way committed to one technology or organization," said Deepak Ayyagari, principal scientist with Sharp Laboratories.

No matter how ubiquitous coax or electrical outlets may be in a house, there will always be some place in a room that does not have easy access to either. All too often, that is just where someone will want to

put a new [flat-panel](#) TV.

To tackle such problems, a new short-range, high-data-rate wireless technology is being developed; proponents of both coax and home wiring see it as a natural complement to their own hard-wired schemes.

Known as ultrawideband or UWB, this new wireless technology promises to deliver data at 480 megabits a second at distances up to 30 feet. While the range is too short for wireless networks, it could be ideal to provide the last few feet of connectivity needed for TV's and other consumer electronics devices that need to be placed a few feet away from an electrical or coax outlet.

"HomePlug and UWB can be a remarkable marriage," Mr. Logvinov said. He envisions a day when ultrawideband is used to beam a television program guide to a hand-held organizer, while the shows themselves are sent via power lines.

Products using these three technologies will begin to appear this year or in 2006. At first, interface devices will be sold, small units that plug into an electrical or cable outlet, and then transmit their signal to a television or other device through an Ethernet cable or other means.

Only later will chips and other hardware using these standards be incorporated in products like television sets and DVD players.

The cost may be low enough that all three standards could be incorporated in a single product, letting the market decide which ones to adopt.

"There will be a place for all of this stuff," said Mr. Liao of Panasonic. "You won't need it all, but it will become cheap enough to get it all."