



Bluetooth bites back

By Courtney Macavinta

After much anticipation, this short-range radio technology is finally ready to pull the plug for electronic devices and give new meaning to the word *wireless*

Mike McCamon has a dream. He envisions a world in which he starts his morning routine by rocking out to his favorite song on his portable MP3 player. When he is ready to go to work, he does not lose his groove; he simply puts his MP3 player in his briefcase, heads for the garage, and cranks the volume on his car sound system just as the chorus hits. No need to connect his MP3 player into the car sound system—the music automatically transfers smoothly from headphones to car speakers. He sings along to the song until his cell phone rings with an important call. Then, his hands-free mobile phone automatically pauses the tunes so he can keep his eyes on the road. When McCamon arrives at the office, his MP3 player still tucked away in his briefcase, the audio transfers to his wireless notebook and is piped over the sound system in his office just as he sits down to start the day. For a music lover like McCamon, life is best when the band plays on as he moves seamlessly from one place to the next.

McCamon's fantasy is not just for gadget—or music—aficionados, and it turns out that he is not really dreaming. This scenario is on the verge of becoming true, thanks to Bluetooth® technology.

As marketing director of the Bluetooth Special Interest Group (SIG), McCamon was one of the first believers in Bluetooth. Even so, his enthusiasm is not simply a case of drinking or pushing the Bluetooth Kool-Aid. Gartner, Inc., projects that 107 million Bluetooth devices will ship in 2004, which is a 97 percent increase from the previous year. And the number is predicted by Gartner to keep climbing in 2005 with 212 million devices predicted to ship.¹

Bluetooth versus Wi-Fi: No contest

It might seem like Bluetooth and Wi-Fi are the same thing: mysterious, invisible wireless technologies that somehow connect people to the Internet. In reality, Bluetooth and Wi-Fi were created for different purposes and have unique characteristics. The following rundown explains what Bluetooth and Wi-Fi actually do.

Bluetooth

What: Bluetooth wireless technology is designed to replace cables between cell phones, notebooks, PDAs, headsets, printers, and other devices.

Range: Approximately 30 feet.²

What it does: Bluetooth enables the ad hoc exchange of business cards, calendar appointments, and any kind of file with groups of Bluetooth users; cordless data transfers and file synchronization between devices; wireless connections for remote controls, keyboards, mice, keys, and e-cash wallets; audio (mono and stereo); dial-up Internet access through Bluetooth cellular phones with data service.

Interference: Bluetooth version 1.2 includes Adaptive Frequency Hopping (AFH), which reduces the interference between wireless technologies sharing the 2.4 GHz spectrum. AFH allows more efficient transmission within the spectrum—it essentially recognizes other Wi-Fi devices and hops around them—which improves the performance of Bluetooth devices.

Wi-Fi

What: Wi-Fi is wireless Ethernet. It replaces or extends wired networks for computing devices and operates in the 2.4 GHz spectrum with a bandwidth of 11 Mbps up to 54 Mbps.³

Range: Typically 100–500 feet between a base station and a Wi-Fi equipped computer; however, speed decreases the further a device moves from the base station.²

What it does: Wi-Fi networks allow mobile computer users to get online from Internet cafes, hotels, convention centers, airports, universities, or within entire shopping districts; enables data transfers anywhere within the range of a base station—indoors or outdoors.

Interference: Microwave ovens, cordless phones, medical and scientific equipment, and Bluetooth devices all work within the 2.4 GHz frequency band and can cause some interference or can slow down connections.

Moreover, enterprises will accelerate wireless spending through 2007 and 50 percent will switch to wireless e-mail, sparking the use of other wireless devices within companies, according to META Group.⁴ Such an increase in the use of wireless devices could spark even faster adoption of Bluetooth. Also, Microsoft will include support for Bluetooth technology in Windows® XP Service Pack 2—support that is a result of customer demand.

When Bluetooth came on the scene in the 1990s, it was the “it” wireless technology. Developers and consumers had high hopes that Bluetooth would cut the cord for all kinds of electronic devices—from printers to telephone headsets. The short-range wireless specification can connect electronic devices within approximately a 30-foot range over radio waves without cables.² Bluetooth devices are connected through “pairing,” and can be continuously connected or linked together only when they are in use. But as time went on, Bluetooth’s star status dwindled because devices did not come to market or gain widespread popularity overnight. Bluetooth seemed to be fading into obscurity, overshadowed by the Wi-Fi® wireless protocol that links users to the Internet while on the go.

Now, however, Bluetooth is quietly making a comeback. In addition to desktops, computer mice, and keyboards, devices—including audio/visual products, home appliances, and medical devices—can be connected wirelessly with Bluetooth. While traveling, Bluetooth users can quickly transfer important data from a phone or personal digital assistant (PDA) to a notebook or desktop computer without

fretting over forgetting an essential cable at home. Bringing back the joy of Polaroid, digital pictures can be instantly transferred from Bluetooth cameras to printers. Bluetooth-enabled blood pressure monitors can continually check and record a patient’s blood pressure without a doctor’s presence to cause the dreaded “white coat hypertension.” Even better, Bluetooth-enabled cellular phones are completing the “last mile” for wireless Internet connectivity. While on the go, people can connect their notebooks or PDAs to their Bluetooth-enabled cellular phones without cables and get online where service is available. In other words, consumers will not need to find a hotspot to get online—with Bluetooth and a cellular phone, they can *be* a hotspot.

“This year and 2005 will be crossover years for Bluetooth,” says John Jackson, a senior wireless and mobile technologies analyst for The Yankee Group. “Before, Bluetooth was a technology in search of a solution. Now, because of the SIG’s work to harmonize interoperability issues and to get industry buy-in, Bluetooth is starting to flourish. Bluetooth is cementing its incumbency as the de facto standard for short-range connectivity.”

Although Bluetooth seems to be all about mobility, PC makers are firmly planted at the center of the expanding Bluetooth universe for two reasons: pairing and synchronization. “People want Bluetooth portable devices that can transfer data, contacts, and calendars to their computers. Our PCs are where we create most of our content,” McCamon says. “PCs are of value in the wireless equation because they are the workhorses—the hubs—for managing people’s digital data.”



The driving forces behind the comeback

Since September 1998, the Bluetooth SIG has been leading the development of short-range wireless products. Members of the trade association include electronics giants such as Dell, Ericsson, Intel, Microsoft, Motorola, Nokia, and Toshiba. By industry analysts' and developers' accounts, the SIG has done its fair share to bolster the proliferation of Bluetooth. The SIG leads industry development of Bluetooth specification profiles—dozens of which have been adopted by vendors.

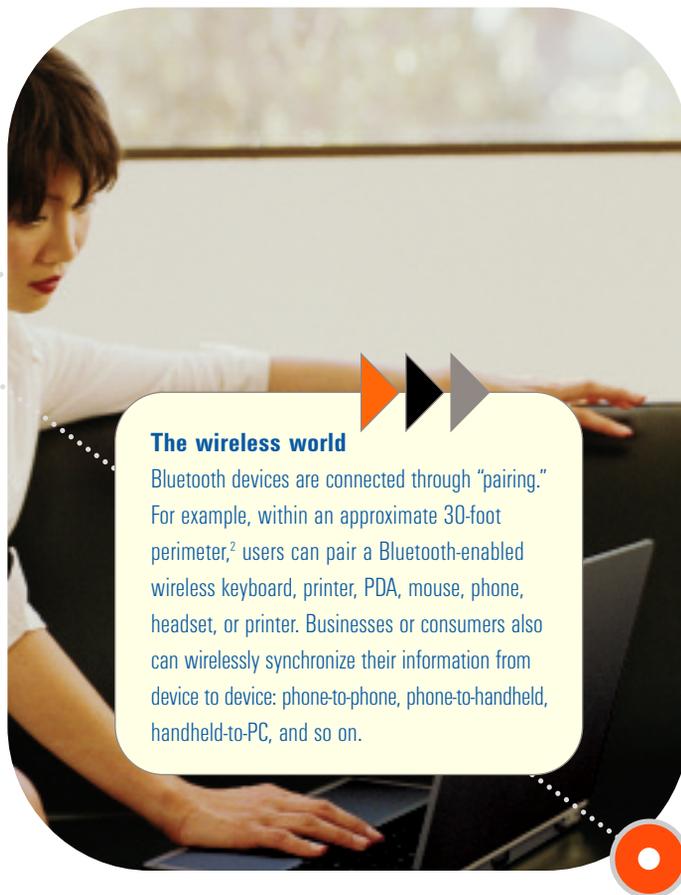
But the SIG is not the only force behind the recent surge in Bluetooth development. Carmakers also are driving the progress of Bluetooth. DaimlerChrysler, Toyota, and others are equipping various models, such as the new Toyota® Prius® hybrid car, with Bluetooth. Bluetooth-enabled vehicles allow drivers to make hands-free calls through a car's onboard navigation system, use wireless GPS services, or—as McCamon hopes—operate portable music players without cumbersome cables.

“When I buy my BMW and it has Bluetooth capabilities, but it doesn't play nice with my mobile phone or portable CD player, that is a problem,” Jackson says. “The integration of Bluetooth into cars has the potential to create ‘demand pull’ to spark the integration of Bluetooth into more mobile devices.” The technology can even help some people remain law-abiding citizens. “Bluetooth-enabled vehicles also address the crop of new regulations that restrict people from holding cell phones while driving.”

A ubiquitous accessory in daily life—the cell phone—is obviously fueling the spread of Bluetooth. With a mobile phone plan that offers data service, consumers can get online while in motion by using Bluetooth mobile phones as modems. European telecommunications companies are leading this market, but more U.S. consumers are purchasing Bluetooth mobile phones. Already, about 5 million Bluetooth mobile handsets are in use in the United States, and that number is expected to reach 40 million by 2008, according to the Yankee Group.⁵

“I have used my Bluetooth cell phone as a hotspot to get online everywhere from Amsterdam to Austin. I don't even carry a phone cord for my notebook anymore when I travel. It's a cultural shift,” McCamon says. “As more devices become mobile and we continue to blend our personal and work lives, more technologies need to talk to each other seamlessly. Bluetooth is a mature specification for connecting those devices and enabling mobile online access.”

The Bluetooth audio category is also set to boom. These days, consumers can get MP3-quality sound over wireless speakers,



The wireless world

Bluetooth devices are connected through “pairing.” For example, within an approximate 30-foot perimeter,² users can pair a Bluetooth-enabled wireless keyboard, printer, PDA, mouse, phone, headset, or printer. Businesses or consumers also can wirelessly synchronize their information from device to device: phone-to-phone, phone-to-handheld, handheld-to-PC, and so on.

often with little to no interference, and they are expected to be able to connect their portable CD or MP3 players to a car's sound system in the very near future. At the SIG headquarters, for example, there are more than 20 Bluetooth devices and a dozen Wi-Fi devices “on air.” And when McCamon plays his wireless sound system, he hears no noisome crackling. “Bluetooth was designed to work in high-interference areas and to be immune to interruptions.”

Don't forget the ultimate trendsetters who are unknowingly pressuring the market for more Bluetooth devices: teens. From playing with cordless game console controls to wirelessly swapping mobile phone numbers while at the mall or school, teens' daily lives seem to command built-in Bluetooth capabilities. Forget text messaging; for teens, a trip on the bus can now become a mobile instant messaging (IM) session with a gaggle of friends using cell phones as hotspots.

“It is reasonable to expect a profusion of highly targeted Bluetooth devices for teens, such as dedicated music, game, and messaging devices,” Jackson says. “If teens can be shown the ability of Bluetooth for peer-to-peer applications—messaging and multi-player games, for example—these applications will warrant a good bit of attention from vendors because teens are the early adopters.”

The push for plug and play

Many Bluetooth devices also are gaining market share for another simple reason: They are now less complicated. To garner success early on, Bluetooth needed not only some killer usage scenarios,

Bluetooth from Dell

With Bluetooth-enabled devices, Dell customers can wirelessly exchange business cards, calendar appointments, and documents with other Bluetooth users. They can access the Internet or a corporate network and synchronize data on a computer that is equipped with Bluetooth. Dell offers the following Bluetooth products:

PDA's. Two new Dell™ Axim™ X30 PDA models now come with support for Bluetooth and Wi-Fi. Dell also will introduce a Bluetooth keyboard and a GPS receiver kit for the Axim PDAs later this summer. Gaining more mobility, Dell PDA users can set up a wireless personal area network with Bluetooth or connect to Internet hotspots via Wi-Fi. For example, business users can wirelessly connect their PDA to their company's WLAN while on the job or get online while on the road, using a Bluetooth mobile phone or Wi-Fi connection. The Axim X30 PDAs also come with a new Intel® PXA270 processor, which is designed to improve security and multimedia features for online users.

Notebooks. The Dell TrueMobile™ 300 Bluetooth module—an integrated option for all Dell Latitude™ D series notebooks and select Dell Inspiron™ notebooks—allows customers to pair with compatible Bluetooth-enabled devices such as cell phones, printers, keyboards, mice, and PDAs for data synchronization and cable-free connectivity.

but also more standardized specification profiles to make it easier for vendors to implement and seamless for consumers to use. “The success of Bluetooth is critically dependent on its implementation,” Jackson says. “Vendors need to make a lot of progress to enable a plug-and-play experience. The work that the SIG is doing will go a long way toward ensuring that obstacle is overcome.”

SIG members could not agree more. “We are focused on making Bluetooth products more usable,” McCamon says. “The goal is for devices to be wireless within five minutes of being out of the box.”

Ultimately, the key to broadening the reach of Bluetooth is for users to get hooked on one device, and then want another. Call it the “network effect,” McCamon says. For instance, Bluetooth-enabled cell phones are propelling the market for wireless headsets. Wireless MP3 and CD players are creating the desire for wireless speakers—and on and on.

Bluetooth's enterprising future

When 20th-century futurists predicted how people would live one day, they painted a picture of a wireless and digital world. So perhaps it is no surprise that, in Japan, you can find a wireless refrigerator or that a Bluetooth-enabled security system can open a front door when someone approaches the house.

The home front is not the only area where wireless connectivity will one day become ubiquitous. Enterprises will increasingly have to deal with employees and vendors linking Bluetooth and Wi-Fi devices to their IT networks. Although the pervasiveness of wireless devices present new security risks for companies—such as unauthorized users taking a free ride on corporate networks—wireless networks also deliver cost savings and productivity benefits to enterprises.

“Bluetooth will come into your shop or office with your

employees because we are blending personal and work-life technologies more and more,” McCamon says. “However, enterprise support of Bluetooth also makes sense because it benefits corporations' efficiency and productivity by increasing the mobility of workers both in and out of the office.”

When it comes to cost savings, for example, a wireless IT architecture can help reduce the costs associated with office relocations and setting up desktops for new employees. Using Bluetooth and wireless LANs (WLANs), companies do not have to purchase as many cables, hardwire Internet connections, or reconnect PCs to various devices when someone switches offices. As for productivity, customer service employees who use Bluetooth headsets can reduce “dead time” by taking calls when they are away from their desks—these same folks can also cut the time they spend retrieving voice mail messages and returning phone calls. With a wireless network in place, employees who come into the office occasionally also would not need dedicated workspace; mobile workers could simply hop on the network with their notebook computers and user IDs or have calls routed to their Bluetooth phones at temporary desks.

To be successful, McCamon says Bluetooth does not have to be the star of the wireless world—it needs to work its magic behind the scenes. “When people use Bluetooth devices, they should have a ‘pixie-dust’ feeling,” he says. “Bluetooth should work well and seem magical at the same time.” **D**

¹ Gartner, Inc. 2004.

² Range may vary due to number of users, interference, transmission barriers (such as walls and building material), and other factors.

³ For comparative purposes only. Actual speed varies with environment, equipment, and other factors, and will be less.

⁴ META Group. *Enterprise Wireless Spending to Accelerate Through 2007*. May 2004.

⁵ Yankee Group. *Bluetooth-Enabled Handset Penetration Forecast: United States*. May 2004.