

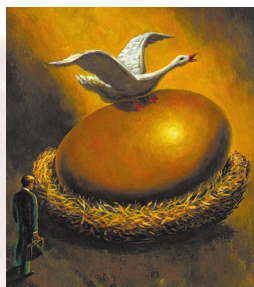
UbiNet: The Ubiquitous Internet Will Be Wireless

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According to the Gartner Group, by 2005 the world will have a billion mobile phone users ("Market Risks: Security: The Downside of .com," Research Briefs, <http://www.infoworld.com>, 20 July 1999). By 2008, more people will access the Internet from a wireless device than a wired one. Cell phones will outnumber PCs sometime around 2005, and devices in 45 million cars, 300 million homes, and countless other nonoffice locations will render the Wintel PC as obsolete as the horse and buggy.

Today's Internet is tethered to telephone wires and coaxial cable. Remove the encumbering wires, and Internet access rates soar. Eastern Europe, South America, and Asia learned this lesson a decade ago, finding it much faster and cheaper to interconnect by cell phone than PC. The only way the Internet will ever become ubiquitous is if it goes wireless. Therefore, it's the new wireless telephone companies, not the computer industry, that will bring a wireless, ubiquitous Internet—the UbiNet—to you.

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Major players are building an infrastructure for the ubiquitous, wireless access they hope will replace the Internet.

SEAMLESS CONNECTIVITY

The trouble with cellular telephone service is twofold: It doesn't interoperate, and it has ridiculously low bandwidth. Barriers to interoperability exist at both global and regional levels. European cell phones won't work in the US, and US phones won't work anywhere outside a defined local area, like central California or New York City. Europeans are better off because the Global System for Messaging (GSM) protocol they adopted lets cell phone users talk to each other regardless of service provider. Americans, on the other hand, let free enterprise implement a

variety of protocols, and now no one can talk to anyone else unless both parties share the same protocol.

Worse, GSM and other protocols do not provide enough bandwidth to use the Internet effectively. Typically, cell phone bandwidths measure less than 19.2 kilobits per second, and often only 9.6 Kbps. In select areas, such as San Jose and Washington, D.C., consumers get 56 Kbps today through Metricom's Ricochet packet radio, with the promise of 128 Kbps next year. This parallels what many ISPs offer now, but it's unlikely that Ricochet or systems like it will ever become ubiquitous, because, to expand its service, Metricom must hang transceivers on telephone poles and buildings every mile or two.

Fortunately, the industry is doing something about interoperability standards and low bandwidth. Cell phone equipment manufacturers like Nokia, Ericsson, and Motorola recently agreed to adopt a variation of Qualcomm's code division multiple access (CDMA) protocol for wireless communication. The 3G (third-generation) cell phone standard promises to bring ubiquity to the global mobile telephone industry. Figure 1 forecasts that, by 2004, 3G will be on its way to mobile telecommunications dominance. Figure 2 shows why: The average cost for making a cell phone call will plunge to less than two cents per minute. By then, everyone will want to own a personal communicator and connect to the Internet. Add mobility to the low cost of access, and you have the makings of a ubiquitous Internet.

The 3G standard aims to boost bandwidth while interoperating seamlessly throughout the world. By 2005, stationary users will get 2-megabit-per-second connectivity, pedestrians will download banner ads at 384 Kbps, and automobile passengers will have 144-Kbps access. This bandwidth lets content providers deliver high-quality movies to homes, enables low-quality video teleconferencing for users on foot, and allows business travelers to receive e-mail with attachments while traveling at freeway speeds.

Industry is not blind to 3G network implications. Vodafone and AirTouch already conspire to own a major share of

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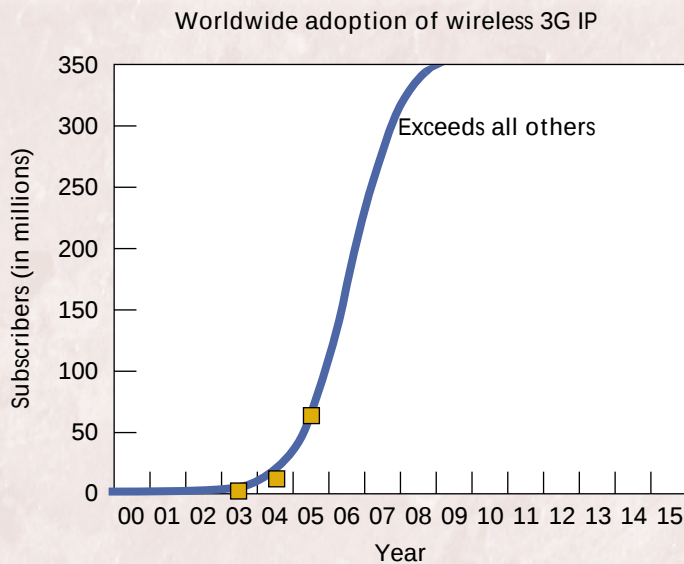


Figure 1. Worldwide adoption of the Wireless 3G standard for Internet access.
(Source: Blaise Zerega, "The 3G Force," Red Herring, Aug. 1999, pp. 84-88)

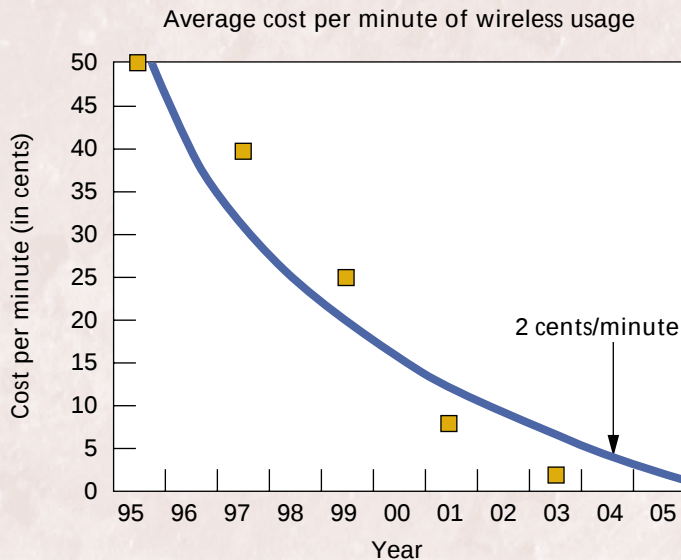


Figure 2. Cost of mobile telecommunications access predicted to plunge by 2005.
(Source: Blaise Zerega, "The 3G Force," Red Herring, Aug. 1999, pp. 84-88)

UbiNet. Growing at a rate of 1 percent per month, these two companies operate in 23 countries and have access to 60 million wireless users. Because global companies are not subject to any single country's regulatory limits, Vodafone and AirTouch could become the next major Internet companies. Meanwhile, Cisco

Systems and Motorola have invested \$1 billion in the New World Framework, which will serve as the hardware plumbing for 3G networks. Microsoft, British Telecom, and several other firms have joined the effort. Together, these early entrants look set to own UbiNet sometime early in the next decade.

CELLULAR ALTERNATIVES

By 2008, everyone could be connecting to the Internet through a cellular phone. Or will they? If you just bought an Apple iBook with an AirPort wireless access point, you probably aren't thinking of becoming a cell phone subscriber just so you can get on the Internet. You already own your own wireless network. The Apple iBook seamlessly glues together all your home computing appliances by using Lucent Technologies products that implement IEEE 802.11 wireless LAN standards. Every laptop manufacturer between Houston, Texas and Taipei, Taiwan will copy this innovative product. Home networks based on 802.11 will likely be big Christmas items in 2000.

The IEEE 802.11 wireless LAN used by Apple communicates at 11 Mbps, which means it can support three to five users at the same time. It implements direct-sequencing spread-spectrum technology, which uses air waves more efficiently than Ethernet uses frequencies. Its reach is about right for homes and offices: 100 meters. The only problem with 802.11 is that it lacks scalability: Bandwidth goes down as you crowd more people into the same room.

Nonetheless, wireless LAN installations look like they're on the rise—perhaps growing even faster than 3G cellular, if the projections in Figure 3 prove accurate. But 802.11 must also contend with another rival. The Bluetooth consortium—IBM, Intel, Toshiba, Nokia, Motorola, Boeing, Saab, and Silicon Wave—wants its short-range radio frequency protocol to become the home network's backbone. Philips Electronics predicts 600 million Bluetooth technology users by 2002.

Bluetooth has big backers and lots of momentum, but lacks 802.11's bandwidth and range. Named after an ugly Scandinavian king, Bluetooth delivers 1-Mbps bandwidth over distances of less than 10 meters—one tenth the bandwidth and range of 802.11. These specifications are ugly, so I doubt that consumers will buy Bluetooth for anything but cordless phones. Who wants to watch a printer or TV deliver a mere 1 Mbps of data?

PERSONAL BUBBLES

Predictions for UbiNet in the home are extremely optimistic according to research firm Strategy Analytics (J. Sanchez, "Home Networks on the Rise in Europe, U.S.," *InfoWorld*, 26 July 1999, p. 38A). By 2005, 19 percent of US homes and 15 percent of European homes will have a wireless LAN. Compare these projections with the 11 percent of US and 4 percent of European homes expected to have a wired network over the same period. By 2005, Strategy Analytics expects such LANs will connect 77 million devices, yielding an adoption rate of 19 percent in the US. By then, both device and network connectivity will be ubiquitous.

Clearly, Apple Computer's introduction of AirPort and the iBook is a smart move that leverages the consumer market's warming toward UbiNet. But how does wireless LAN technology mesh with wireless WAN? Will different protocols fragment networks once again? Nokia visionaries think the future of UbiNet lies in what the company calls the "personal bubble." As a person moves through various information spheres or bubbles, his or her personal information follows. Thus, when you are connected to your 802.11 network at home, your information environment surrounds you there. When you commute to work, another bubble surrounds you—maybe one provided by an in-car Bluetooth network that connects via 3G to the Internet backbone. As you step into your office bubble, your information follows via a wired Ethernet LAN. The IEEE 802.11 standard, for example, automatically handles the hand-off required to pass control from one access point to another. The closest access point takes over as you move from bubble to bubble. The UbiNet may well evolve into a network of networks, all running IP over a combination of wired and wireless networks.

UbiNet offers more than low-cost wireless access. Its greatest threat to the established order is that posed by the mobile phone as credit card. Simply put, it is easier to buy things through a cell phone than through a browser. Take, for example, TeleVend

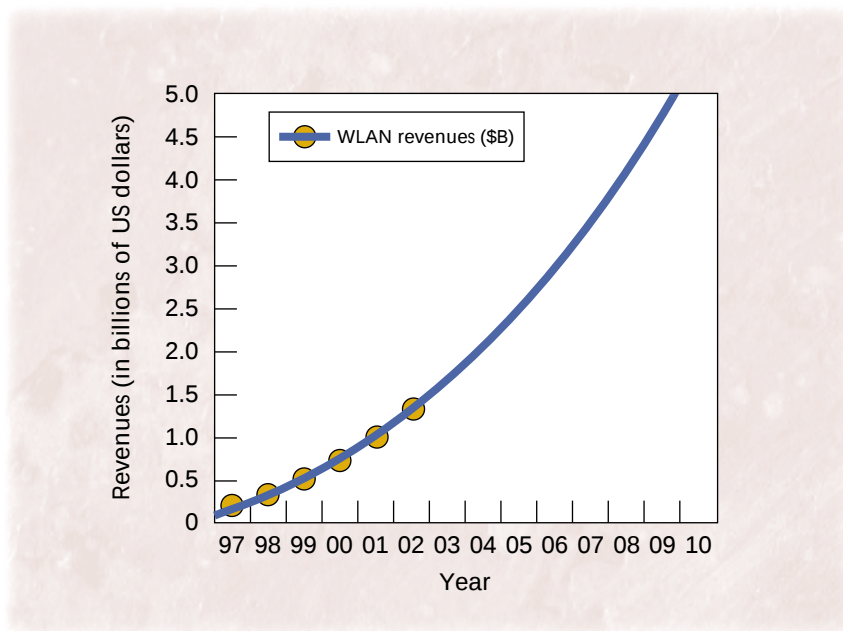


Figure 3. Wireless LAN revenues expected to top \$4 billion by 2008.

(Source: Warren Hersch, "Wireless Boom," *Computer Reseller News*, 26 July 1999, p. 93)

Ltd. (<http://www.televend.com>), an Israeli company that connects vending machines to the Internet. TeleVend technology lets soft-drink addicts in France dial a vending machine and charge the cost of the beverage to their telephone bill. Thus the telephone company becomes the infomediary, displacing Visa, MasterCard, and American Express.

In the future, you may be able to use your mobile phone to buy gasoline, a parking space, and other microcash items such as greeting cards, flowers, and

books. Who needs Amazon, eBay, and Yahoo if everything you want is at your mobile fingertips? More significantly, who needs Microsoft Windows? ♦

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