Chapter 9

The Wireless Stampede

How fast is the communications revolution moving? Consider this: Within the next three to five years, stationary desktop systems will no longer be the tool of choice for accessing the Internet. Mobile devices—smart phones and other types of hand-held devices—will enable the Net to float free of its traditional moorings and provide users, wherever they may be, with access to e-mail, sports scores, stock quotes, flight status, shopping tips, traffic alerts, driving directions, and much more.

What's making this phenomenon possible is none other than advanced wireless technologies—technologies that are fueling an incredible explosion of voice as well as data services in every corner of the world. Industry figures show that nearly 260 million subscribers worldwide had moved to some form of wireless communication by 2000 to satisfy their need for greater mobility, a number that has tripled over the past three years. It's no wonder that NTT DoCoMo sold more than one million of its Internet-based i-mode phones in the first week they were on the market, and that Motorola estimates that by 2005, the number of wireless devices with Internet access will actually exceed the number of wired ones!

■ GOVERNMENT-GUIDED INDUSTRY

Despite its meteoric rise, wireless is hardly the new technology kid on the block. It was developed by Bell Laboratories in the 1960s and, in 1981, the U.S. government undertook a sweeping plan to launch wireless mobile telephone service across the United States. The Federal Communications Commission established a cellular duopoly in each of 305 metropolitan statistical areas (MSAs). This meant that each MSA supported two cellular licenses: one sold via lottery (at a price predetermined by the government), the other granted to the common carrier (the incumbent) already providing local wireline service to that market.

The pioneering days of cellular abound with stories of wheeling and dealing in the license arena, and fortunes that were made virtually overnight. Some individuals granted licenses via the lottery literally walked into FCC offices to claim their prizes, then turned around and sold them to wireless operators who had stationed themselves in the basement of the building. In another instance, a couple in Yakima, Washington, who paid $15,000 for their license on the advice of their financial advisor raked in $6 million a few years later when they sold those valuable rights to a larger player.

Fact is, the government has never quite gotten its act together when it comes to apportioning wireless rights in a fair and effective way among the industry's players. When it auctioned off personal communication services (PCS) licenses in the mid-1990s, the market bid the prices up to astronomical levels, with the result being that some of the winning bidders were never able to raise the requisite money to claim their prizes. Consequently, a number of licenses were tied up in endless litigation, which served to seriously delay their implementation for a public anxiously awaiting cellular service. That same scenario has played out in other countries that have auctioned off wireless rights, such as India, where licenses were sold for prices higher than in some parts of the United States.

Against this backdrop, cellular telephone service got off the ground in 1983, with both AT&T and Motorola claiming to be first to market (the issue is still a matter of debate). But it was businessman Craig McCaw who built the first national wireless network, McCaw Cellular—really a patchwork of networks and licenses around the country formed in partnership with LIN Cellular. He sold this enterprise to AT&T in 1994 for the princely sum (at the time) of $20 billion. (More recently, Mr. McCaw's interests have turned to other communications enterprises that include terrestrial-based Nextel and NextLink, and Teledesic, with its ambitious satellite-based Internet-in-the-Sky network, which he is pursuing along with Microsoft's Bill Gates.) In addition to McCaw, other major players in the early days of cellular included the Regional Bell Operating Companies (Southwestern Bell, BellSouth, Ameritech, Pacific Bell, Bell Atlantic, NYNEX, and U S WEST) and GTE. Many of these operators, especially Southwestern Bell, GTE, and BellSouth, became adept at making acquisitions around the country to build their footprints. Bell Atlantic, for example, acquired NYNEX Cellular, while Pacific Bell eventually spun its wireless arm off into AirTouch Cellular (now part of the Bell Atlantic/GTE/Vodafone AirTouch entity Verizon Wireless). It wasn't long before the international markets were also taking off, with Europe, Latin America, and Asia becoming fertile fields for wireless.

In the United States, the duopoly system of two companies licensed to provide cellular phone service in each designated region stood until the Telecommunications Act of 1996, which attempted to promote greater competition among carriers in both wireline and wireless fields. In a move that in hindsight appears motivated as much by greed and ego as it was by competitive instincts, the FCC decided to auction off up to nine licenses in a given market for personal communication services in the 1.8 GHz spectrum. This spectrum had been largely occupied by

AT&T Wireless Services

AT&T has consistently been among the wireless industry's movers and shakers. AT&T Bell Laboratories invented wireless cellular technology in the 1960s, and AT&T Wireless Services today boasts one of the world's most extensive wireless footprints. What's more, AT&T's Digital One Rate plan helped bring wireless into the communications mainstream for consumers in the second half of the 1990s.

Cellular began in earnest nearly 20 years ago, with AT&T and Motorola both launching their novel new form of mobile telephone service at roughly the same time. But they soon took a back seat to Craig McCaw, who teamed up with LIN Cellular to build the largest cellular company in the world. McCaw Cellular was really a patchwork of licenses from around the country. Apart from size, one of the company's major accomplishments was launching the time division multiple access (TDMA) transmission standard. Because this wireless standard used only a third of the radio spectrum of analog, it neatly cleared a major hurdle to wireless development that the spectrum-hungry analog had posed.

In 1994, McCaw sold his company to AT&T for approximately $20 billion, and turned his attention to other pursuits in the communications field. Intent on growing its wireless franchise, AT&T Wireless Services, as it was now known, acquired 21 PCS licenses in 1995 to fill in its national network. When the network is fully constructed, these licenses will enable the company to increase its coverage to over 80% of the U.S. population.

AT&T Wireless scored a major marketing coup in 1998 with the rollout of Digital One Rate. This family of calling plans was the first to offer users one rate with no roaming or domestic long-distance charges across all 50 states, irrespective of whether the customer is on AT&T's network. Consumer acceptance was swift and extremely positive. Digital One Rate soon became a standard for the industry, and served to accelerate the growth of wireless among a cost-conscious public.

Today, AT&T is one of the largest cellular carriers in the United States, covering 40% of the population and providing service to more than 10 million users. Its local wireless systems are connected through a single network—the North American Cellular Network, pioneered by AT&T—that allows customers to use their phones seamlessly across different cellular territories in over 7,000 cities across the United States, Canada, and Mexico. Additional connections with international standards extends service to over 46 countries in Europe, Asia, Oceania, Africa, and the Middle East.

AT&T has also broken new ground through its Wireless Office Service, which allows customers to use their cellular phones just like a wired PBX extension to make or take interoffice calls, whether they're in the office or thousands of miles away. A connection between the PBX and a mobile switching center (MSC) gives cellular subscribers access to the company's PBX features, its internal dialing plan, interoffice transmission facilities, and private network.

AT&T had less luck, however, in integrating its wireless business with the mother ship. After several unsuccessful reorganizations, the company decided to spin off its wireless division with a tracking stock in April 2000. That move was designed to significantly enhance shareholder value, inasmuch as the market can now better analyze and value the wireless unit independent of the long-distance-heavy parent company. Even more important, the spun-off business now has the freedom to call the shots and shape its own destiny based on the unique dynamics of the wireless market.

What's next for AT&T Wireless? It is certain the business will continue to expand its infrastructure and coverage throughout North America via strategic alliances and acquisitions. One benefit to this buildup will be reduced cost of delivery of wireless services through the Digital One Rate plans. Also look for AT&T Wireless to aggressively move into data services as it seeks to capitalize on the public's growing fascination with Internet access and information retrieval via wireless hand-held devices.

microwave technologies, and once these licenses were granted, the microwave users had to vacate them within a fixed period. This public auction poured billions of dollars into government coffers, but at the same time led to a fragmented universe of three major digital wireless standards that until recently continued to thwart efforts to create a strong, seamless wireless enterprise.

Verizon Wireless

In a rapidly growing field of competitors, Verizon appears to be in the best position to dominate the wireless business nationally. A litany of acquisitions and partnerships in recent years have rewarded Verizon with the most extensive wireless network in the country.

The period of intense growth began in the summer of 1995 when Bell Atlantic Mobile acquired NYNEX Mobile and the expanded organization adopted the CDMA digital technology platform. Bell Atlantic Mobile now controlled, to a great extent, the Northeast corridor and the Mid-Atlantic region. The Boston-to-Washington, D.C., corridor is particularly vital because this 5% slice of the nation's land mass generates 20% of its telecom dollars.

Additional wireless coverage throughout the United States is resulting from Bell Atlantic's merger with GTE. Just as important, though, Bell Atlantic partnered with AirTouch Communications—the wireless spin-off from Pacific Bell with coverage in the northwestern and midwestern parts of the country—to bid on and win a host of PCS licenses in 1995. Soon afterward, the two wireless companies formed a new entity, PrimeCo, to fill in the gaps in their respective cellular networks. In the process, they adopted CDMA technology and worked closely together on product development.

All signs pointed to a high-profile merger between AirTouch and Bell Atlantic. But the alliance was never able to fully capitalize on its considerable wireless assets and provide truly national coverage, and that eventually led to its demise. Independent of its relationship with Bell Atlantic, AirTouch had undertaken an aggressive expansion campaign globally, and was now the largest wireless operator in the world. That, in turn, set the stage for a groundbreaking deal with another expansion-minded company, the Vodafone Group of the United Kingdom. In the summer of 1999, Vodafone snatched AirTouch Communications from under the nose of Bell Atlantic in a rancorous and highly publicized two-week bidding war that culminated in a $60 billion offer. Vodafone AirTouch instantly became the number one global carrier with nearly 30 million wireless subscribers across four continents.

But Bell Atlantic was not out of the game. Nine months later, it surprised everyone by signing an agreement with its erstwhile enemy—Vodafone AirTouch—to meld their respective U.S. cellular operations into the nation's largest wireless network. The new joint venture strategically positions Verizon Wireless in the Northeast and Mid-Atlantic, and Vodafone AirTouch in the West and parts of the Midwest, with PCS PrimeCo and GTE filling in the territorial service gaps.

Because of its size and coverage, the new entity—which carries the name Verizon Wireless—will likely be able to offer highly competitive price packages on national and regional levels. It will be, in short, a wireless power to contend with.

■ ANALOG VERSUS DIGITAL

The definition of wireless has also changed considerably over the years. The term *cellular* has traditionally referred to analog technology. Basically, analog systems involve the amplification of a radio signal; in other words, they transmit and receive information through a continuous flow of electrical signals. The major drawbacks of analog systems are their susceptibility to noise interference, their limitation to one call per channel, and such networks' inability

to provide several features taken for granted with today's wireless service, such as call waiting, caller ID, and call forwarding. The main advantage of analog—that it has been around since the beginning of wireless and is universally available—is fast being eroded by newer and more powerful digital wireless technology.

Digital wireless telephony works by converting the analog voice signal into bits of data that are broken up into small packets for transmission, then reassembled at their destination. Digital offers decided advantages over analog when it comes to wireless transmission. One of the biggest is clarity: Digital wireless better approximates the quality of wireline phone service since it is more resistant to fading, static, and general noise interference. In addition, digital offers superior capacity compared to analog since it utilizes the spectrum more efficiently.

Industry gurus envisioned PCS as providing a wealth of features and capabilities never before considered in traditional cellular space, such as superior fraud protection, caller ID, and voice mail. However, as the industry started identifying the technology that needed to be crafted for the PCS world, it realized that much of it was already under development for digital cellular networks. The only significant difference between PCS and digital cellular was the frequency in which PCS would operate: Its higher frequency of 1.8 GHz versus the 800 MHz range for cellular meant smaller cellular coverage per cell site and, thus, more required cell sites.

A third wireless technology (in addition to analog and digital) is enhanced specialized mobile radio (ESMR), a dispatch-based system used by transportation and courier services. This technology was developed by Motorola through its much older private radio business, and was intended to be a digital standard for the dispatch market. Nextel Communications became the largest player to adopt this technology, along with other operators, including Southern Company and several other utilities and government agencies. Nextel's growth came through several acquisitions of smaller analog dispatch licenses, and a large number of licenses owned by Motorola, which created a national footprint. However, ESMR technology wasn't able to live up to its promise and Nextel found itself wrestling with serious deployment problems. After failed attempts to merge with a large telecommunications brand name, Craig McCaw acquired a sizable stake in the company and took over its management. ESMR was renamed iDEN, and since then Nextel has not only managed to strengthen its position among its loyal, traditional blue-collar customer base, but has aggressively pursued the cellular/PCS market with highly competitive products.

According to Standard & Poor's, cellular operators represented more than 90% of the industry's $37 billion in wireless revenues through the first half of 1999 (see Figure 9.1). PCS and ESMR shared the remainder. Clearly, the tables will be turning and PCS will be gaining massive ground in the period ahead as the marketplace moves toward an all-digital wireless network. Hastening that process is the buildup of extensive digital infrastructure by communications carriers, which is removing the availability constraints of the past.

■ EUROPE VERSUS THE UNITED STATES

Despite the meteoric rise of wireless in the United States, it still lags behind Europe when it comes to penetration and overall network development. An examination of the underlying reasons provides a revealing window on the evolution of the ,medium both in the United States and abroad.

Ironically, the first reason can be traced to a strength rather than any weakness in the U.S. communications infrastructure. The U.S. landline network is indisputably the best in the world. And because traditional telephony is available just about everywhere, the need for wireless

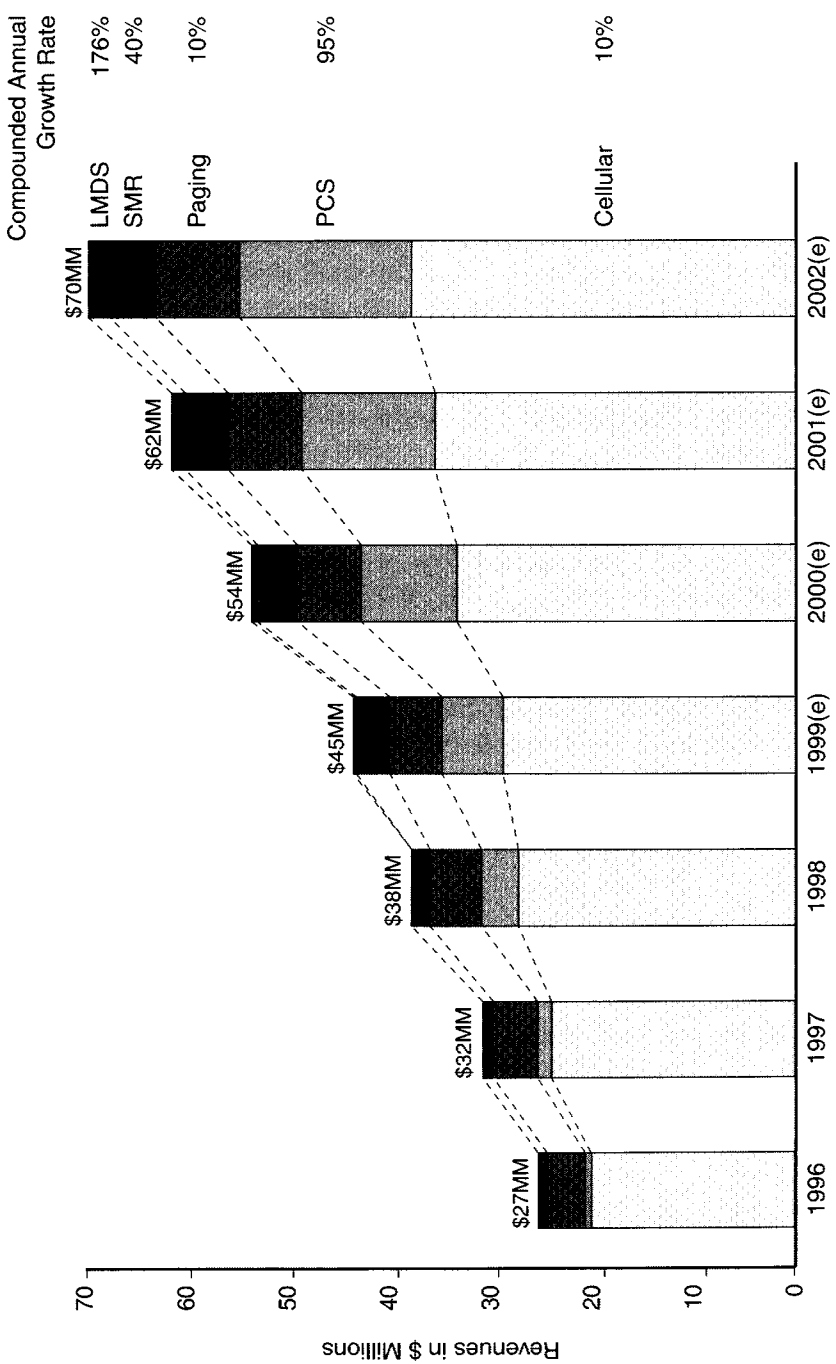


Figure 9.1 U.S. Wireless Revenue Subscriber Base Technology Breakdown

Sources: Donaldson, Lufkin & Jenrette, The Strategis Group, CTIA, MMTA (MultiMedia Telecommunications Association), Paul Kagan Associates

Cingular Wireless

With the recent merger of its wireless business with that of BellSouth Corporation's U.S. operations, SBC Communications is once again a formidable wireless presence. The new company christened Cingular Wireless will be the second-largest wireless carrier in the United States, serving over 16 million subscribers and reaching 175 potential customers from coast to coast.

In the early part of the 1990s, there were few more aggressive wireless players than SBC. With the lowest pricing plans in the country, it had gained the highest population penetration of any cellular company, and it continued to grow its network through the rapid acquisition of cellular properties. In the second half of the decade, however, the momentum dissipated. In that interval, SBC's adoption of TDMA technology was its only move of note.

SBC roused itself with its 1999 acquisition of Ameritech, which included the latter's large cellular division covering five Midwestern states. The same year, SBC acquired Comcast Wireless, giving it a foothold in the Philadelphia area. The year before, the company had picked up Connecticut's wireless service through the acquisition of Southern New England Telephone Company (SNET).

The real coup, however, is the merger with BellSouth. This latest move will give SBC/BellSouth wireless operations immediate reach into 19 of the nation's top 20 markets, covering 70% of the U.S. population. The joint venture (owned 60% by SBC, 40% by BellSouth) is designed to give the companies the scale and heft they need to be true national contenders, offering customers everything from wireless Internet access and interactive messaging to attractive rate plans and bundles of services. Longer term, the goal is to become a North American powerhouse, extending service across Canada and Mexico – markets where SBC has already begun to make forays.

On the downside of SBC's growing wireless franchise, its network is a jumble of technical standards. It may take U.S. introduction of the 3G platform to coordinate the pieces.

service has not been nearly as strong as in Europe, where the landline networks are of lower quality. As a result, wireless carriers have been able to mount a persuasive—and highly successful—campaign in Europe to draw landline customers into their fold.

Another issue has to do with basic economics. The price differential between European landline and wireless service has generally been less pronounced than in the United States. As a result, the move to wireless by Europeans is a much easier reach than in this country.

Third is the area of management. Fact is, the wireless industry grew up rather quickly in the United States, with many of its managers launching their careers right out of school. Their exposure to any other type of business has typically been limited, and that has produced some noticeable fallout. For example, as wireless service in the United States migrated rapidly from a luxury product to a business product to almost a residential necessity, the type of marketing required has also changed significantly. Unfortunately, the responsibility for that transition has often been left to managers who lack the requisite skills and seasoning to effectively pull it off. Industry investment in business research and analysis remains limited, and seat-of-the-pants decision making commonplace. Witness how numerous wireless companies have missed out on huge opportunities to pursue local and long-distance landline service as a way of migrating traffic to their networks, and on getting an early jump on the wireless data boom.

Technology also factors into the U.S.-European wireless dichotomy. While over 95% of the populated area in the United States is covered by wireless service, this network is largely analog. And analog is an inefficient, bandwidth-hungry technology. Compare that to Europe's largely digital networks, which are fully equipped to meet the continent's expanding bandwidth needs while delivering a new generation of wireless features and capabilities. It doesn't take a wireless sage to recognize that the United States must invest mightily now to overlay its analog with digital networks. And that, of course, will be no easy task in a country of its size and complexity.

Last is the issue of regulation. In the United States, regulators have insisted—unwisely, in my opinion—that cellular companies operate and provide the older analog service during and after the completion of their digital networks. In order to introduce digital coverage in cellular frequencies and still maintain quality of service, additional analog cell sites must be installed and frequency freed up for digital service. And that's an expensive proposition.

Even though cellular providers have gone the extra mile to make digital service attractive compared to analog—often offering customers price incentives to switch—adoption has been slow. If regulators had accepted digital technologies more readily, however, I believe wireless service providers would have hastened the installation of digital technology, in effect bumping analog customers to the digital world. In Hong Kong, for example, when analog service began eating up spectrum at an uncontrollable pace, the government mandated that the entire country move to digital CDMA service. And that's exactly what happened.

Regulators could also have moved faster to bring competition to the market. It took 15 years after cellular licenses were first issued in 1981 for the government to auction off new spectrum to promote greater competition. In hindsight, an earlier reaction to the market's need for that capacity would have introduced competition at an earlier stage, and the adoption of wireless would have undoubtedly been accelerated.

■ THE WIRELESS LOCAL LOOP

Beyond Europe, a sign of the changing times is that China, which had almost no wireless users as recently as 1992, now has the second-largest wireless presence of any country in

WorldCom

For years it was MCI WorldCom's Achilles' heel: wireless phone service.

MCI's earliest attempt at gaining entry to the wireless arena was through a proposed branded deal with Nextel Communications in the mid-1990s. But when Nextel raised the stakes to a level MCI considered out of hand, it simply walked away. Thereafter, the long-distance carrier seemed to have its hands tied, the only real news being the criticism it continued to draw for failing to mount an effective wireless strategy. Finally, WorldCom took a tentative step: In October of 1999, it acquired SkyTel Communications, the world's largest paging company. SkyTel, according to MCI WorldCom chief Bernard Ebbers, would be "an important building block" in the company's emerging wireless plan.

What followed several months later, however, almost totally eclipsed the SkyTel deal—as well as every other deal in the communications space to that point: the proposed $129 billion acquisition of Sprint by WorldCom. The real prize for WorldCom in this titanic takeover happened to be Sprint PCS, the fast-growing and market-savvy digital wireless communications arm of Sprint.

Sprint PCS was indeed a company on the move. It had spun off its cellular division into 360° Communications (recently purchased by Alltel), which cleared the way for Sprint to acquire a cache of PCS licenses and build from the ground up an all-digital CDMA network, known as Sprint PCS. The company had also launched the first truly national reduced-rate wireless calling plan, though roaming charges still proved to be exorbitant (unlike AT&T's Digital One Rate plans, which eliminated roaming charges altogether). Sprint was also the first company to introduce wireless data to the mass market in 1999.

As a WorldCom property, Sprint PCS would finally give the carrier a wireless presence, moving it closer to its goal of becoming the preeminent supplier of long-distance, data, and wireless services to business customers.

WorldCom–Sprint synergies would have figured in another important way. Determined to develop their own fixed wireless systems for broadband delivery, each company had spent in excess of $1 billion acquiring companies that own MMDS licenses. WorldCom even created a new division, WorldCom Wireless Solutions, which began to offer MMDS to select markets as part of a national trial. A growing number of key players in the communications field are pushing MMDS as the most practical and cost-effective way—moreso than cable and DSL—of bridging the last mile between the carrier's network and the customer. MMDS, they contend, not only promises rapid deployment of fixed wireless technology at relatively low build-out cost, but extends high-speed access to rural and suburban markets that are either not served or underserved by cable or DSL.

Clearly, the WorldCom–Sprint merger would have created an entity better equipped and positioned than ever to roll out MMDS. In fact, the company projected that by late 2001, it would have been able to offer broadband fixed wireless service to customers in more than 100 cities nationwide—and have the potential to reach about 60% of all households in the United States.

For now, WorldCom appears to be laying low and is evaluating its options in this arena.

the world, boasting more than 70 million users. As China illustrates, wireless technology provides a valuable medium for bringing phone service into remote, rural, and undeveloped regions of the world, where it simply isn't feasible to undertake the expensive and time-consuming job of installing wireline networks needed to deliver landline service.

What promises to be critical to the future build-out of communications systems in Third World countries are new fixed wireless technologies known collectively as wireless local loop (WLL). Already leaving their imprint in China, India, and Eastern Europe, WLL technologies are basically cellular network–based, with the ability to realize huge

economies by obviating the need to install wireline telephone service. Indeed, by putting in place a small number of cell sites, operators can achieve coverage of densely populated areas very quickly.

Wireless local loop is a logistically smart way of deploying the same wireless network that's used in developed countries for cellular/PCS services. Operationally, from a user's perspective, WLL is a lot like a cordless phone. The phone itself connects to a small, immobile cellular base station that contains the transceiver (for transmitting and receiving wireless signals). The base station, in turn, links to the broad cellular network. This architecture produces some major advantages. For one thing, because the base station is immobile, it can use the radio frequency spectrum far more efficiently than mobile cellular devices. This means a greater number of channels or signals within the bandwidth that's been allocated for the cellular system.

Another important advantage of wireless local loop is that it's not dependent on line-of-sight. This sets it distinctly apart from the other major types of fixed wireless discussed in Chapter 8—multichannel multipoint distribution services (MMDS) and local multichannel distribution service (LMDS). Both of these are microwave-frequency technologies that require an unobstructed line of sight between a transmitting antenna located on a tower or other tall structure and a second small antenna, usually mounted on the roof of the party receiving the signal. Because wireless local loop is cellular technology, it can pick up signals beamed anywhere near the receiving antenna. This lends itself particularly well to customers in developing countries because it makes it much easier to deploy wide area networks.

There is perhaps no greater testimonial to WLL, however, than the issue of cost. In the wireline world today, it typically costs nearly $2,500 to connect a single home to the local network. Because of the efficiences of WLL, and

because it requires no massive laying of cable, the cost of connection per home is less than $1,000. With economics like that, it's no wonder a growing number of countries that have never known the benefits of universal telephone service are going straight to wireless cellular as the most effective way to provide basic voice services to their citizens.

■ A PATCHWORK OF STANDARDS

Not only have the capabilities of wireless changed, so have the global players. The roster of major providers now includes AT&T Wireless Services, Verizon Wireless, China Telecom, NTT, SBC, and Sprint.

In building their systems, each of these industry leaders has been able to choose among three different technical platforms—a condition that's led to a confusing and incompatible quilt of wireless transmission standards worldwide. Time division multiple access (TDMA), code division multiple access (CDMA), and global system for mobile communications (GSM) have each garnered a slice of the wireless pie (see Figure 9.2). These platforms essentially govern how a wireless network is configured and how its signals are processed. Because of the different network air interfaces of each, roaming between TDMA, CDMA, and GMS platforms can be an exasperating experience for users.

TDMA, for its part, transmits multiple signals over a single channel by interweaving them according to time slots. This arrangement makes it possible for multiple users to access a single radio frequency without interference. Among the companies that have selected North American TDMA standards are AT&T, SBC, and BellSouth. The time division principle is also the foundation for GSM. GSM was developed and deployed throughout Europe beginning in the late 1980s, and is still the most widely used

	Technology		Features
First-Generation Wireless	AMPS	Avanced Mobile Phone Service	Analog voice service No data service
Second-Generation Wireless	CDMA	Code Division Multiple Access	Digital voice service
	TDMA	Time Division Multiple Access	9.6Kbps to 14.4Kbps data
	GSM	Global System for Mobile Communications	Enhanced calling features like caller ID
	PDC	Personal Digital Cellular	No always-on data connection
Third-Generation Wireless	W-CDMA	Wide-band Code Division Multiple Access	Superior voice quality Up to 2 Mbps always-on data
	CDMA2000	Based on the IS-95 CDMA standard	Broadband data services like video and multimedia
			Enhanced roaming

Figure 9.2 The Alphabet Soup of Carrier Standards
Source: Forrester Research

standard around the world. In the United States, GSM wireless supporters include Omnipoint and Western Wireless.

The CDMA standard was developed by Qualcomm and introduced commercially in Hong Kong in 1995. In contrast to TDMA, CDMA uses an encryption technique based on the unique signal of each handset to transmit multiple signals. It is also known as spread spectrum multiple access (SSMA) because each signal is spread across a broad frequency spectrum. Companies that have adopted CDMA include Sprint PCS and the recently announced Verizon Wireless.

Increasingly, CDMA is becoming the preferred technology of wireless systems around the world. Within Asia, the platform has been adopted by Japan, China, Korea, Thailand, and the Philippines, and in Latin America, by Brazil, Peru, and Chile. While GSM still predominates in Europe and several other areas around the world, newcomers to the wireless arena like Poland and Russia are leaning toward the selection of CDMA.

There are a number of sound reasons for CDMA's ascendance. For one thing, it represents advanced, effective technology at reasonable cost. Second, it is better equipped than any other current standard to handle the high-capacity requirements of the rapidly growing data segment of the wireless market. Industry analysts expect CDMA to increase its global market share from about 14% at year-end 1999 to more than 25% by 2002.

■ THE PROMISE OF 3G

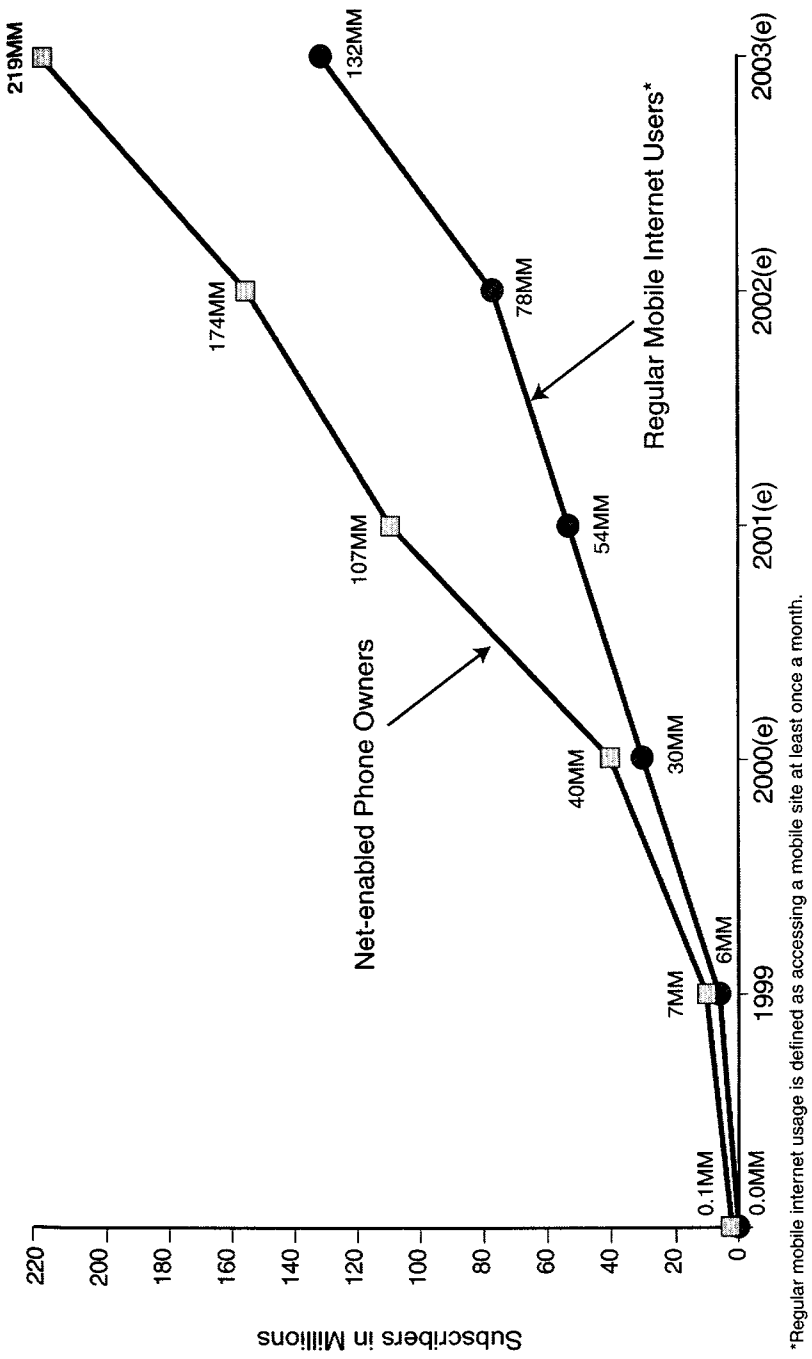
CDMA is not the last word in wireless technology platforms, however. That distinction belongs to 3G, the so-called third-generation systems that represent a significant technological advance over current platforms and promise to take the wireless revolution to new heights in the years ahead.

There is good reason for this optimism. Second-generation systems like GSM, TDMA, and CDMA are optimized for voice services, offering only limited data capabilities. 3G, on the other hand, will substantially upgrade the data capacity of wireless networks by offering true broadband rates of 2 Mbps, compared to the current rates of 9.6 Kbps to 14.4 Kbps. Of equal importance, the 3G platform will harmonize the welter of existing standards, making it possible for a business traveler between, say, New York and Italy to receive uninterrupted, high-quality wireless service.

While the data-intensive 3G standard is heir apparent to the wireless throne, it is a good five years away from adoption in the United States, where the FCC has yet to even allocate radio spectrum to handle 3G. It appears that Japan—where the available wireless spectrum is being rapidly used up and another technological standard is needed—will be the first country to implement 3G wireless, followed by Europe and eventually the United States, where the need for 3G is deemed less urgent than in other parts of the world.

■ THE WIRELESS DATA JUGGERNAUT

When all is said and done, the wireless voice revolution of the past few years could look like a Viennese waltz compared to what wireless data of the future promises to unleash. The truth is, telephones and computers are starting to converge in an entirely new and exciting way to produce the mobile digital devices, networks, and protocols needed to deliver the Internet in the palm of your hand. While data currently accounts for only 2 to 3% of wireless traffic in the United States, according to Cahners In-Stat Group, the number of wireless data subscribers is expected to soar from 1.7 million in 1999 to 24 million by 2003. (In Europe the stampede will be even greater—see Figure 9.3.) And not



*Regular mobile internet usage is defined as accessing a mobile site at least once a month.

Figure 9.3 Western Europe's Mobile Internet Population

*Regular mobile internet usage is defined as accessing a mobile site at least once a month.

Source: Forrester Research

long after that, the new generation of pocket-sized "smart" phones that you'll see just about everywhere will become the most popular channel for accessing the Net, moreso than the desk-bound PC, which will quickly find itself playing backup to these tiny but untethered portable devices.

Of course, we've heard grandiose promises from wireless data before. Throughout the 1990s, in fact, wireless data was the industry's Holy Grail. "Wait till next year" became the endless refrain for a field that, it soon became clear, needed the proper convergence of factors—including attractive pricing, widespread coverage, high-performance devices, and greatly improved transmission speeds—to succeed in the marketplace.

That convergence, I'm pleased to say, has begun in earnest and promises to send wireless data through the roof over the next few years. For one thing, wireless data packet technology is improving and promises to drive down costs while driving up notoriously slow transmission speeds (which currently peak at 14.4 Kbps in most devices). The 3G standard discussed earlier will represent a quantum leap in wireless speed, giving hand-held devices a powerful broadband capability supporting video and multimedia content. Geographic coverage is also improving markedly as wireless data continues to move beyond its limited base of major metropolitan areas. As for pricing, the overwhelming popularity of flat-rate pricing plans like AT&T's Digital One Rate is turning more and more consumers into full-time wireless users as they jettison their traditional analog wireless phones.

A renaissance is also under way in mobility gadgetry, which has progressed in the space of a few years from essentially dumb devices to increasingly sophisticated and, more important, market-accepted personal digital assistants like the Palm VII, which lets users check their e-mail, plan their daily schedules and, lest we forget, make phone calls. In other words, hand-helds are becoming personal computers, daily organizers, and mobile telephones all rolled into one compact device—a trend that failed to take off years ago as the market wasn't ready for it. And as this trend continues, as the behemoth PC is reduced to the size of a box of candy, it naturally follows that more and more technology-leery people will be coaxed onto the Net.

■ CREATING A NEW WIRELESS STANDARD

Technology is meaningless, however, unless it can deliver solid content. In the case of wireless, the challenge is enormous as it attempts to replicate the detailed graphics and icons of wireline. To date, the end product has been disappointing. The difficulty of transmitting data-intensive packets of information to a web-enabled mobile device has resulted in users having to settle for three or four lines of text (with as little as one word per line) on a tiny screen. Furthermore, the number of web sites formatted for wireless access has been extremely limited. Indeed, by no stretch of the imagination could the wireless Internet experience be compared to "surfing the Net," as some purveyors of the medium would have the public believe through their bloated sales pitches.

Once again, though, change is in the air. A new standard known as the wireless applications protocol (WAP) has drawn the support of dozens of industry players who are interested in marrying the needs of Internet users to the dynamics of wireless. More specifically, WAP allows for the creation of Internet sites that are scaled to the parameters of mobile phones with their tiny displays and thin connections. WAP is particularly hot in Europe, where a survey late last year by Forrester Research found that 90% of the e-commerce executives interviewed intend to deploy mobile Internet sites, and that they expect these sites to enhance customer retention, drive incremental revenue, and attract new customers. In fact, many of these executives said they expect to reach more consumers through the wireless medium than through PCs. What do they intend to offer

over their WAP-enabled sites? More than half said they will indulge online users with transactions like stock trading, travel bookings, and auction bidding. To attract additional users, they also plan to offer general content like news headlines, personalized content like stock portfolio reviews, and customer service features like order delivery status.

According to the Forrester study, there should be no shortage of takers. Europeans' love affair with wireless is expected to drive Internet usage at an unprecedented rate, with 14% of the population becoming regular mobile Internet service users within three years of the introduction of the first handsets in late 1999. Forrester believes that early adopters of the WAP devices—mostly mobile diehards such as business professionals and trendy young adults who buy new phones annually—will ignite growth in 2000. German phone shops already report long waiting lists for Nokia's WAP-enabled 7110. The European mass market is expected to kick in by 2002 as slow connections give way to the speedier general packet radio service (GPRS) phones, and as consumers warm to the easier-to-use and lower-priced second-generation units. Indeed, Nokia and Ericsson have ventured that after 2003 no equipment manufacturer will produce a mobile phone without some sort of Internet browser.

■ A NEW GENERATION OF SERVICES

While the pace may not be as frenetic as in Europe, the United States is also gearing up to serve a burgeoning family of wireless Internet users with an array of services. A number of companies are building wireless portals that offer a complete menu of wireless applications and content. Microsoft, for example, has announced MSN Mobile 2.0, a free service that allows customers to check personal itineraries booked through the Expedia travel site, read Hotmail messages, and check MoneyCentral portfolios. A Santa Clara, California, startup, @Mobile.com, is working with Yahoo! and others to beam weather forecasts, stock quotes, even available tee times at the local golf course, to mobile phone users. In addition, an Ontario, Canada–based company, QuoteCall.com, offers news, sports scores, even horoscopes over the radio waves, while another Ontario firm, AmikaNow!, has developed a unique service that reviews the subscriber's e-mail and transmits to a mobile phone the key words and phrases that appear important. Palm VII users can tap into a growing menu of services, like purchasing concert tickets, tracking auctions, and getting driving directions and traffic updates. An enterprising San Mateo, California, company, iScribe, lets physicians use their Palm organizers to automate such tasks as ordering prescriptions and lab tests, and capturing billing information.

That wireless data has finally arrived is underscored by the rash of alliances being formed among the industry's leading lights. They include a $1 billion partnership between Cisco Systems and Motorola to develop mobile Internet products, and the pairing up of previous wireless technology rivals Qualcomm and Ericsson to create a joint wireless standard, which will include a wireless data protocol. Microsoft, for its part, has teamed up with British Telecom to create new Internet and corporate data communications services for BT's 13 million mobile customers spread across ten countries. At the same time, Microsoft is actively promoting its Windows CE platform for mobile communications devices.

■ THE SELLING OF WIRELESS

The wireless groundswell is starting to focus attention on another transcendant issue the industry must come to grips with: how to strategically market and sell the wireless data product to business customers.

That the sale of wireless data has been handled ineffectively in the past is not really surprising. The industry and its players have been so preoccupied with wireless voice, with its explosive growth and enormous churn, that they simply haven't made the effort to understand or appropriately invest in the data side of the business. Indeed, a number of wireless carriers formed data sales forces only to disband them or let them languish in a corner of the company when they failed to perform adequately.

More often than not, companies began leveraging their wireless voice infrastructure to sell and promote data in the belief it was a logical and cost-effective step. Unfortunately, little attention was paid to understanding the dynamics of the business—precisely why people buy and how they utilize wireless data services. Moreover, the wireless voice reps asked to carry the ball had grown accustomed to selling into a commodity market where price was the paramount issue; they typically had little or no experience in selling the more sophisticated and complex wireless data product.

The result was predictable: Instead of trying to sell specialized applications, the voice reps put their efforts behind a generic package of Internet services that didn't mesh with the specific needs of customers. Detracting further from the effort was the fact that compensation levels set for reps from the sale of wireless data were usually inadequate. Even when they were set higher, the volume sold was too small to justify pushing the wireless data product.

No wonder wireless data failed to take off during the 1990s.

➤ The Optimal Sales Team

The stage is now set for a new sales paradigm with different players and different strategies. Clearly, the sale of wireless data demands individuals with knowledge, experience, and skills far different from those who sell wireless voice. It requires reps who know how to position and sell a complete wireless data *solution* that's in sync with the customer's application needs. And it requires reps who can deal with a sophisticated, high-level buyer—often the CIO of a company or his or her designee.

As it turns out, the larger telcos already have this select breed of sales practitioner under their roof. They are the same reps who currently sell wireline solutions within their networking division. These sales specialists thoroughly understand data, know what it takes to sell a total solution, and have access to the right people within the customer's organization. The fit is perfect inasmuch as it's my belief that wireless data, at least in its early stages, is really an extension of the capability and functionality of wireline service. Moreover, the buyers of wireless tend to be the same individuals within the corporation that the telco is used to dealing with on large networking and enterprise-wide solutions.

That being the case, why would a telecommunications company want to duplicate resources in order to sell similar solutions to essentially the same group of people? Why not piggyback the sale of wireless data with the sale of wireline networking solutions? This certainly makes more sense than adding wireless data to the wireless voice sales force and having to engage in massive retraining to bring its members up to speed. What's more, an integrated wireline-wireless data solution could have tremendous appeal to the customer; the marginal cost of adding wireless to the solution could bring with it a disproportionately higher return on investment.

➤ Selling the Solution

The need for an applications or business solutions approach to the sale of wireless data cannot be overemphasized. In today's complex corporate world, buyers not only desire but demand that communications suppliers understand the intricacies of their business. More to the point, they want solutions tailored to their businesses. For that reason, a dispatch solution for a livery company must look

and function differently from a dispatch solution for a heating oil distribution company. By the same token, a financial trading application for individual day traders needs to be structured differently from a financial application for retail banking employees. It's plain to see that the market is not only demanding exciting new applications, but the vertical sale of these tailored solutions.

Hence the overwhelming need for a strong and specialized team of sales reps with the knowledge and skills to close these complex deals. When it comes to wireless data, they must know how to sell more than just a product and more than just a generic application. To be successful, they must be focused on a total solutions approach that demonstrates to businesses how this revolutionary new medium can help them perform better and smarter than ever before.