



Telecom Industry Trends

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The telecommunications industry is one of the fastest growing and fastest changing sectors of the US economy. The industry includes local and long-distance phone service, wireless communication, Internet access, and cable and digital television service. In 2004, total spending for telecom services and equipment in the US was more than \$784 billion, and is projected to pass \$1 trillion by 2008.¹

The industry has gone through a remarkable transformation over the past decade, driven by changes in government regulations, technologies, and market conditions. Prior to 1996, the industry was dominated by a handful of phone companies and a handful of equipment makers. In an effort to end the Baby Bell's monopoly in local phone markets and open those markets to competition, the Telecommunications Act of 1996 required the Baby Bells to rent their networks at a discount to competitors, and encouraged cable operators, long distance carriers, and new entrants to compete directly in local phone markets. Congress envisioned that once the newcomers won enough local phone customers, they would build their own networks and break the monopoly hold of the baby Bells. Between 1996 and 1999, 144 telecom companies, mostly start-ups, went public, raising more than \$25 billion.²

Encouraged by Congress and lured by the rapid expansion of the internet, the start-ups and traditional phone companies made unprecedented investments in transmission capacity in the late 1990s, convinced that internet traffic was doubling every 100 days. This notion was initially espoused by WorldCom, but gained widespread currency after appearing in a report by the Department of Commerce. As it turns out, internet traffic was doubling at less than a third of that rate.³

One result of that miscalculation was a significant over-speculation in transmission capacity, particularly in fiber optic cable. Between 1998 and 2001, the amount of fiber optic cable laid increased by a factor of 5, while the transmission capacity of a single strand of fiber increased by a factor of 100. So, total fiber optic transmission capacity increased by a factor of 500. Meanwhile, demand only increased by a factor of 4. The resulting excess transmission capacity, along with the additional competition in the industry, led to falling prices, declining revenues,

¹ Telecommunications Industry Association, "Spending in U.S. Telecom Industry Rises 7.9% to \$784.5 Billion in 2004," February 1, 2005.

² Stephanie N. Mehta, "Why Telecom Crashed," *Fortune*, November 27, 2000.

³ *The Economist*, "Beyond the Bubble," October 9, 2003.

and huge debts across the industry, which in turn led to massive layoffs, accounting scandals, and bankruptcies, most notably at Global Crossing and WorldCom.

After the telecom bubble burst in 2001, price wars and industry restructuring drove most of the newcomers out of business and reestablished the dominance of the Baby Bells and AT&T, and equipment makers Lucent, Cisco, and Nortel. However, other underlying trends have continued to shake up the industry.

This report describes those key trends and the global dynamics that are reshaping the telecom industry, as well as the implications for employment in the US.

Key Trends

From Wires to Wireless. One of the biggest shifts in the industry over the past decade has been the growth in wireless phone service at the expense of wired service. Wireless service has been growing by 15 percent a year, while the number of telephone lines has fallen by 11 percent, since 2000. The number of wireless phone customers now exceeds the number of residential wired customers, and the gap is widening. In 2004, there were 72 percent more wireless than wired customers.⁴ Around 6 percent of households in the US now rely solely on their wireless phones.⁵ This number will likely continue to increase as wireless service improves in quality.

With falling revenues from traditional local and long-distance phone service, and a penetration rate of 94 percent, competition has heated up among phone companies for wireless customers. Although new companies entered this market, the Baby Bells and AT&T responded by launching their own wireless divisions. As the wireless market has become more saturated – currently two-thirds of the US population has a cell phone – the industry has consolidated, increasing the dominance of the Baby Bells and AT&T.

In the last two years, the number of major players in the wireless market has consolidated even further, going from six to four. In October 2004, Cingular, a joint venture between SBC and Bell South, purchased AT&T Wireless to become the nation's largest wireless operator. In December 2004, Sprint and Nextel, the nation's third and fifth largest operators, merged to become Sprint Nextel, making them number 3 behind Cingular and Verizon Wireless, of which 45 percent is owned by Vodafone, the world's largest mobile phone service provider, based in the UK. T-Mobile, a subsidiary of Deutsche Telekom, is fourth with around 20 million subscribers, well below its rivals, all of which have 40 million or more subscribers. In 2004, these four carriers accounted for around 95 percent of all new wireless subscribers in the US.⁶

The industry consolidated even further in 2005, as SBC acquired AT&T, and MCI accepted a takeover bid from Verizon. Long-distance prices and revenues have been declining for years, making it difficult for AT&T and MCI to survive on their own. The use of wireless, e-mail, and

⁴ Thomas M. Lenard and Michael J. Pickford, *The Digital Economy Fact Book*, The Progress & Freedom Foundation, Washington, DC, 2005.

⁵ Cellular Telecommunications and Internet Association website, www.ctia.org, "Wireless Quick Facts."

⁶ Kenneth M. Leon, "Wireless" Quick-Shrink Act," *Business Week*, January 20, 2005.

instant messaging has cut the demand for long-distance services by half since 2000.⁷ Through these acquisitions, SBC and Verizon gain access to the lucrative business market and expand their reach overseas through contracts with multinational corporations.

From Phones to Broadband. As the US market for phone service, both wired and wireless, has become more saturated, the focus of competition has shifted to internet access, particularly broadband. The percentage of the US population with internet access has grown steadily over the past decade, and now stands at around 74 percent. The number of households with high-speed internet access more than tripled between 2001 and the end of 2004, and the percentage of US households with broadband is currently at around 60 percent.⁸ The most common use of the internet is sending and receiving e-mail, with more than half of those online using e-mail daily. In addition, it's now possible to make phone calls over the internet with a broadband connection, using Voice over Internet Protocol (VoIP). Both e-mail and VoIP have the potential to significantly reduce demand for traditional phone service.

The cable industry got a head start in offering high-speed internet access. While the phone companies were building their wireless networks, the cable companies were building their own digital networks with the capacity to offer hundreds of channels of video, movies on demand, high-definition TV, and high-speed internet access. And they have been aggressively promoting phone service over their networks. VoIP is starting to take off, particularly with businesses, but also increasingly with residential customers. An estimated 52 percent of all businesses are currently using VoIP.⁹ One in four international calls is now on VoIP.¹⁰ Meanwhile, the number of residential VoIP subscribers, currently around 3 million, is expected to grow to 27 million during the next three years.¹¹ If that expectation is realized, one-quarter of all the households currently wired for residential phone service could be using VoIP by 2008.

The phone companies have responded with digital subscriber line (DSL) technology, to take advantage of the wires they already have in place. During the second half of last year, DSL subscriptions grew by 20 percent, while cable subscriptions grew by only 14 percent. Also, the phone companies continue to drive down the price of their broadband service, and now are priced an average \$2 below cable service. But, the cable companies still hold the high ground in the broadband market, with 59 percent of all subscribers.

The phone companies have also been fighting back with fiber optic cable, allowing them to offer video, as well as provide even faster internet access. An FCC decision in late 2004 ruled that the phone companies do not have to lease their fiber optic networks to competitors at a discount, as they are required to do with their copper wires. That has touched off a race between Verizon and SBC to expand their fiber optic networks. However, fiber optic cable is very expensive and time-consuming to install. And the phone companies have a lot of catching up to do. At the end

⁷ Matt Richtel, "The Diminishing Bell: The Industry; Bells Win a Battle, Not Necessarily the War," New York Times, July 23, 2004.

⁸ *The Digital Economy Fact Book*; and "FCC Fudging Broadband Figures? - US Broadband Penetration Jumps to 58.6% in June - July 2005 Bandwidth Report," www.websiteoptimization.com/bw/0507/.

⁹ Olga Kharif, "VoIP Providers: Heeding the Call?" *Business Week*, November 28, 2005.

¹⁰ iLocus, *Global VoIP Market 2004: 5th Annual Industry Update*, July 2004.

¹¹ *The Digital Economy Fact Book*.

of 2004, only 2 million households were wired with fiber-optic cable, while 99 million households were already wired with coaxial cable.

Phone companies may face an uphill battle on the regulatory front as well. Currently, the cable companies pay around \$2.4 billion a year in franchise fees to local communities to secure the rights to run cable lines under public streets and sidewalks. They also have to provide universal access. The cable companies are insisting that if phone companies want to enter the market for video services, they need to play by the same rules. Many local communities, in need of additional revenue, agree. So far, the FCC has not weighed in on this issue, leaving the phone companies to negotiate with each community separately.¹²

From Wired to Wireless Broadband. While the cable companies appear to have the advantage at the moment in offering the “triple play” package of video, high-speed internet access, and VoIP phone service, the phone companies may have a trump card yet to play – their wireless networks – giving them the possibility of a “quadruple play” bundle of services. Conventional wireless internet access is relatively slow, and cell phones can only display limited amounts of information. But wireless companies are beginning to deploy the next generation of wireless technology – called “3G” for third generation. Verizon’s 3G network is currently available to about one-third of the US population, and is expected to cover one-half of the population by the end of 2005. Sprint Nextel and Cingular are also expanding their 3G coverage.¹³ The 3G technology provides much faster data transmission and internet access, making it possible for cell phones to replicate many of the functions of computers wired to broadband networks.

Wireless broadband has been available for several years, mainly within homes and offices, using a router to allow computers to share an internet connection. However, Americans are increasingly demanding mobile access to the internet outside their homes and offices. Around 41 percent of all Internet users – or 56 million Americans -- use computers or hand-held devices that are capable of accessing the Internet wirelessly. Half of all new computers now come with wireless fidelity, “Wi-Fi,” technology already installed. Users are becoming accustomed to the freedom and mobility that Wi-Fi offers. The resulting demand and the falling cost of equipment are spurring establishments and local governments to install network “hotspots” in public spaces. These hotspots are increasing at a rapid rate, and there’s speculation that Wi-Fi will become as common as a modem in the near future.¹⁴

However, one of the drawbacks of Wi-Fi is its limited range, typically from 100-300 feet, with reception getting weaker further from the signal source. WiMax technology (Worldwide Interoperability for Microwave Access) is designed to cover a much larger area, as much as 5 miles, making it possible for an entire community to have access to broadband services.

WiMax is still in development, with tests going on in Atlanta, Philadelphia, Portland, and other cities. However, it could become an alternative to DSL and cable. The costs of installing and

¹² Brian Grow, Roger Crockett, and Cathy Yang, “Telecom: the Fiber-Optic Quagmire,” *Business Week*, December, 6, 2004.

¹³ *The Digital Economy Fact Book*.

¹⁴ Wi-Fi Alliance, “Enabling the Future of Wi-Fi Public Access,” February 2, 2004.

maintaining a WiMax network are significantly less than either cable or wires. Since the signal travels through the air, there's much less equipment involved. That makes it possible to extend the reach of broadband technologies to traditionally underserved communities, such as rural areas and less affluent urban markets. There's also little danger of construction crews digging through the cable, and repairs are simpler following a natural disaster.

The phone companies are trying to stake their claim to this new technology. BellSouth has commercially deployed WiMax in Georgia and Florida. AT&T has conducted trials in New Jersey and Atlanta. And Verizon and Sprint Nextel are also running tests of their own.¹⁵

But Wi-Fi and WiMax are also attracting new players that don't have a vested interest in either cable or DSL, such as internet-based companies like Microsoft, Yahoo, AOL, and Google. Microsoft and MCI recently announced a partnership to offer VoIP service through Microsoft's instant messaging service.¹⁶ Yahoo, Google, and AOL already offer free calling within the same instant messaging system. They are also developing systems similar to what Microsoft is implementing. The price of the calls will be less than traditional long-distance phone service, but still higher than the rates offered by Skype (recently acquired by eBay), which gives away software that allows people to talk for free over the internet.

These companies are well-established, are very innovative, and have deep pockets. Many telecom industry observers believe that they may significantly alter the competitive landscape in the years ahead.

Global Competition

The same trends outlined above for the US are also playing out globally. Although the number of fixed phone lines continues to creep up around the world, mostly in developing countries, the number of wireless subscribers is growing six times as fast.¹⁷ Wireless customers now outnumber wired customers worldwide, and wireless carriers now bring in half of global phone revenue. The biggest increases in wireless use have been in the Asia-Pacific region, followed by Europe, then North America.¹⁸ In Finland, an estimated 35 percent of subscribers now rely solely on their mobile phone.

Global internet access is expanding rapidly. Between 2000 and 2005, internet usage grew by 146 percent worldwide. Currently, the country with the largest on-line population is the US, followed by China, Japan, Germany, India, and the UK. But the biggest growth has been in China, Brazil, India, Russia, and Indonesia.¹⁹

Broadband access is also expanding rapidly. Total broadband lines, both cable and DSL, increased by 50 percent worldwide during 2004. DSL lines grew by 24 percent, while cable grew by 16 percent. Over all, there are nearly twice as many DSL subscribers as cable

¹⁵ Ed Sutherland, "Will Mobile Broadband Kill WiFi?" www.commsdesign.com, December 20, 2005.

¹⁶ Yuki Noguchi, "Microsoft, MCI Partner on Calls," *Washington Post*, December 13, 2005.

¹⁷ Andy Reinhardt, "The Wireless Challenge," *Business Week*, October 20, 2003.

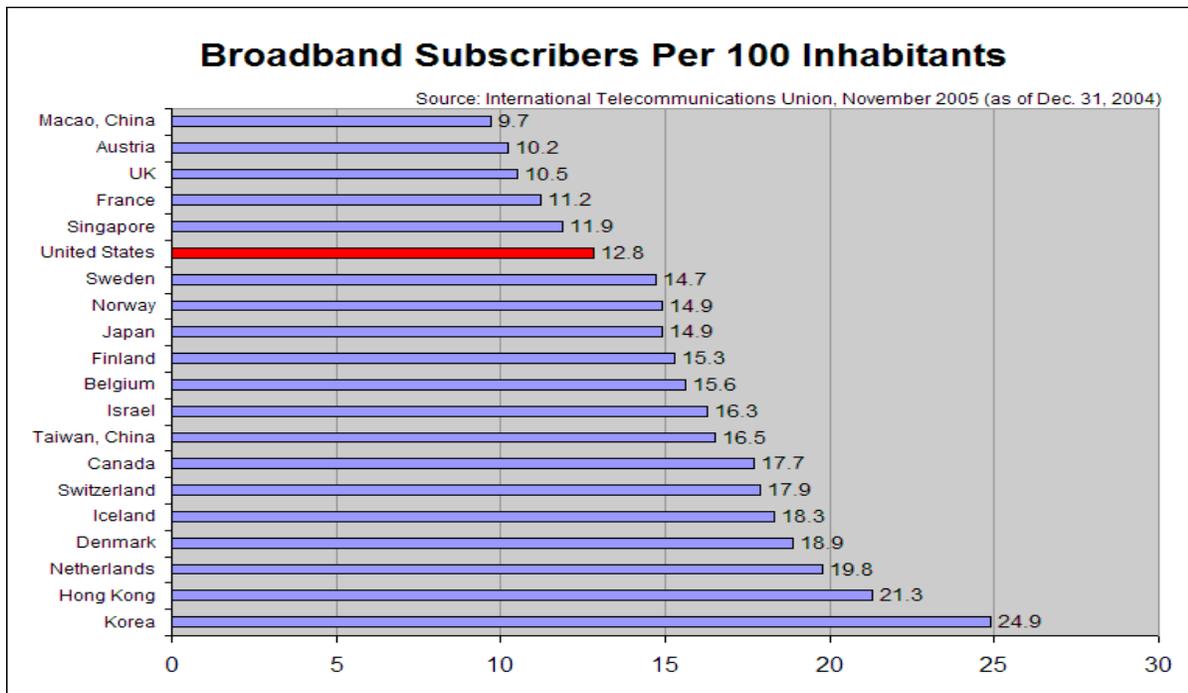
¹⁸ *The Digital Economy Fact Book*.

¹⁹ *The Digital Economy Fact Book*.

subscribers worldwide, and that gap is widening. North America is the only place in the world where cable use is more prevalent than DSL for broadband access.

US Behind in Broadband. Until recently, the US led the world in the technological development and deployment of internet services. However, over the past several years, there is evidence that the US has steadily fallen behind other nations in terms of its share of the population with broadband access and the speed of those connections. According to data compiled by the International Telecommunications Union, the US ranked third in broadband penetration in 2000. The US now ranks 15th, up from 16th a year ago.²⁰ Worldwide, broadband deployment is growing at 78 percent a year. In the US, broadband deployment is growing at 35 percent a year.²¹

South Korea leads the world in the deployment of broadband. More than 76 percent of South Korean households currently have broadband access at speeds up to 20 megabits per second. In addition, some 75 percent of South Koreans have mobile phones, most of which are also enabled for high-speed broadband access. As the most wired country in the world, South Korea is where leading high-tech and telecom companies go to test their new products. For instance, Microsoft tested its MSN Messenger service, which enables instant messaging on mobile phones, first in South Korea before bringing it to the US six months later.²²



²⁰ WebSiteOptimization.com, “US Passes Singapore to 15th in Global Broadband Penetration,” accessed November 28, 2005.

²¹ Charles H. Ferguson, “Broadband Policy and the Future of American Information Technology,” Testimony Before the Senate Commerce Committee, April 28, 2004.

²² Birgitta Forsberg, “The Future is South Korea – Tech Firms Try Out Latest In World’s Most Wired Country,” *The San Francisco Chronicle*, March 13, 2005.

Japan is also far ahead of the US in broadband service. Today, nearly everyone in Japan has access to “high-speed” broadband, at speeds on average 16 times faster than in the US, and at prices one-third less than what the average subscriber pays in the US.²³ Ultra-high-speed broadband through fiber optic cable (up to 100 megabits per second) is scheduled to be available throughout Japan by the end of 2005 at prices comparable to what customers in the US pay for basic service (at 1.5 megabits per second). Currently, most Americans only have access to basic service, which is among the slowest, most expensive, and least reliable in the developed world.

The US is falling even further behind in wireless access to the internet. Japan has been actively promoting the use of its wireless network for internet services. In December 2004, 86 percent of cell phone subscriptions in Japan included internet services. Building on this success, the Japanese have made significant strides in deploying 3G technology, which is growing at nearly 190 percent a year. And they are now testing fourth generation broadband wireless phones that are capable of supporting high-definition television reception, movie downloads, and sophisticated games. As a result, Japan is in a strong position to develop new commercial applications, products, services, and content.

One reason the Japanese have been so successful is their development of a national IT strategy with strong government support for its implementation. In contrast, the US stands alone among developed nations in its lack of a comprehensive broadband plan. In 2004, President Bush set a goal of “universal, affordable access for broadband technology by the year 2007,” and the Federal Communications Commission (FCC) now claims that 99 percent of the US population has access to high-speed internet service. However, critics point out that the FCC definition of “high-speed service” is anything above 200 kilobits per second, which is only about four times the speed of dial-up service, one-eighth of the average DSL connection, and just a fraction of what’s available in other countries. The definition of “access” is similarly watered down to include any zip code that has at least one person with a broadband connection.²⁴

Another reason the Japanese have been so successful is their development of a competitive marketplace for new broadband services. As the number of broadband connections in Japan has surged in the past few years, the established providers have only accounted for 40 percent of the new connections.²⁵ That contrasts with 98 percent in the US, where most consumers can only get broadband service from their local cable or phone company.²⁶

There is concern that this duopoly structure may be slowing the pace of innovation in the US. Since high-speed broadband is leading to more widespread use of cheaper internet telephone service, it is undercutting the wired and wireless phone business that is the bread and butter of the local phone companies. Similarly, high-speed broadband service makes it possible for internet-based companies to offer movie and video offerings, undercutting the traditional business of the cable companies. So, even though the Japanese have shown that it’s possible to

²³ Thomas Bleha, “Down to the Wire,” *Foreign Affairs*, May/June 2005.

²⁴ S. Derek Turner, “Free American Broadband!” www.salon.com, October 18, 2005.

²⁵ Philip J. Weiser, “Which Broadband Nation?” *Foreign Affairs*, September/October 2005.

²⁶ Elliott Maxwell, “A New Future for Telecommunications Policy: Learning From Past Mistakes,” Economic Policy Institute Working Paper No. 274, November 2005.

offer cheap, high-speed service on a large scale, the cable and phone companies that dominate the market in the US may have financial incentives to drag their feet.

The duopoly structure was reinforced in 2005, first by the Supreme Court in its ruling in *Brand X v. the FCC* that cable companies are not required to provide open access to their networks to competing internet service providers, then by an FCC decision that phone companies are no longer required to provide the same open access to their DSL networks that they have provided in the past. Those in favor of restricting open access, including the Bush administration, argue that open access puts a damper on innovation by restricting the investments that cable and phone companies can make in improving broadband speed and access. Critics argue that restricting open access will limit competition, lead to higher prices, and reduce incentives to improve the quality of service.

Some industry observers argue that if the US is ever to achieve world-class performance in broadband, it will need to create a viable competitor to cable and DSL. One candidate is to have electric companies provide broadband over their power lines. EarthLink, concerned about restrictions on open access to cable and phone lines, has been conducting trials of this approach with three power companies. Google is investing in a Maryland company, and IBM is partnering with a Houston-based power company. However, critics point out that previous experiments ran into technical problems that haven't been completely resolved, and that it would be difficult for power companies to bundle services in the same way that cable and phone companies are able to do.²⁷

The other obvious candidates are WiFi and WiMax, which are capable of transmitting data at 75 megabits per second, nearly as fast as fiber optic cable, but at much lower cost to install and operate. The market is still open for new companies, and even municipalities, to get into this game.

However, the established phone companies are taking steps to block access by competitors. After Philadelphia announced its intention to partner with EarthLink to build a wireless network to span the entire city last year, at no cost to the taxpayers, Verizon successfully lobbied the state government to pass a bill preventing cities and townships from offering broadband services unless the phone company agrees. Similar laws are already on the books in a dozen states. And similar legislation has been introduced at the federal level.²⁸

As part of its reconstruction efforts, New Orleans is setting up a municipally owned WiFi system to provide free internet access to all users across the city. Although Louisiana has a state law prohibiting any municipality from offering internet connections any faster than 144 kilobits per second (one-twentieth of a typical DSL connection), New Orleans has been granted an exemption because it's under a state of emergency. City officials say they plan to fight to keep their system in place when the state of emergency is lifted.²⁹

²⁷ Marguerite Reardon, "Broadband's Power Line Push," www.news.com, July 11, 2005.

²⁸ Adam L. Penenberg, "The Fight Over Wireless," *Slate*, October 24, 2005.

²⁹ Jonathan Krim, "New Orleans's New Connection," *The Washington Post*, November 29, 2005.

There's also a technical roadblock to the expansion of wireless broadband networks. The best radio spectrum for wireless broadband is currently being used by TV broadcasters for analog transmissions. Although broadcasters have been granted another spectrum of airwaves for digital TV, and most viewers have already switched to cable or satellite TV, broadcasters have been reluctant to give up this valuable public commodity.

Stiff Competition in Telecom Equipment. Another arena of global competition is in telecom equipment. The stiffest competition is among the makers of mobile phones and internet gear.

There were 664 million mobile phones sold worldwide in 2004, a 29 percent increase over the previous year. And sales are expected to top 810 million in 2005.³⁰ The market leaders are Nokia (Finland), with a 32 percent global share, Motorola (US) with 18 percent, and Samsung (South Korea) with 13 percent. These large companies are making gains at the expense of their smaller rivals.

At the high end of the market, most of the mobile phones sold are replacement phones, and the biggest growth is in "smart phones," which combine voice service with e-mail and other web applications, and allow users to take pictures and record video. Smart phone sales increased by 135 percent in the first quarter of 2005, relative to the first quarter in 2004. Nokia is the undisputed global leader with 65 percent of this market, followed by RIM, the maker of Blackberry devices, with 9 percent of the market, then Fujitsu, palmOne, and Sony Ericsson.³¹

At the other end of the market, most of mobile phone sales are to first-time subscribers in developing countries. That market is expected to grow by 100 percent annually for the next five years. The only serious contenders in this market are Nokia and Motorola, who are able to use their economies of scale to produce a high volume of ultra-cheap phones, and sell them for less than \$50. Since the margins on these cheap phones are higher than on the high-end models, Nokia and Motorola are in a strong position to compete with other mobile phone makers who focus just on the high end.

So far, low-cost Chinese mobile phone makers have not been able to match Nokia and Motorola, because their volumes aren't high enough yet to enjoy the same economies of scale. Nor are their engineers as adept. In addition, consumers in developing countries are surprisingly fashion conscious and prefer brand names, even if they have to pay a bit more for them.³² As a result, Nokia and Motorola are holding their own even in China, the fastest growing mobile phone market in the world.³³ However, both are facing increasing pressure from Chinese rivals TCL and Bird, which are reducing their dependence on foreign help and growing their own in-house R&D capacity. TCL and Bird also have the advantage of established distribution networks in smaller cities and in the countryside, which are becoming more important as the market becomes more saturated in the big metropolitan areas.³⁴

³⁰ BBC News, "Big Growth in Mobile Phone Sales," November 22, 2005.

³¹ *The Digital Economy Fact Book.*

³² Andy Reinhardt, "Cell Phones for the People," *Business Week*, November 14, 2005.

³³ Agence France Presse, "Nokia's Cell Phone Sales Skyrocket in China," www.yahoo.com, November 25, 2005.

³⁴ Bruce Einhorn, "Motorola's China Challenge," *Business Week*, September 23, 2003.

The competition is even stiffer when it comes to the equipment used for routing phone calls and internet data. In response, the major players have sought to achieve dominance in particular niches. Nokia, Motorola, and Ericsson (Sweden) have focused on networks for wireless markets. Alcatel (France) dominates in DSL equipment. Fujitsu (Japan) has been developing WiMax technology. And Cisco has focused on internet-based communications equipment. Meanwhile, Lucent and Nortel have had significant market declines, due to their failure to initially embrace these new technologies.

Cisco has dominated the market in Asia ever since it installed the first generation of internet equipment there in the 1990s. It currently enjoys a 62 percent share of the market for routers and switches for internet gear, and an 87 percent share of the market for the routers that phone companies use.³⁵ But Cisco is starting to face some tough competition from Huawei and ZTE, two Chinese companies that are beginning to make inroads not only in China, but in Europe as well. Huawei currently controls 21 percent of the market in China for routers and switches, and recently signed deals in Europe with Marconi and Siemens, as well as with Dutch mobile phone operator Telfort to build a 3G wireless network.³⁶

For years, Huawei was content to rely on Western engineering and low labor costs, and to focus mainly on developing countries for exports. However, the company now claims that nearly half of its workforce is engaged in R&D, and that 85 percent of them have at least a university degree.³⁷ Huawei also has two R&D centers in the US, and another in India, where Cisco holds 75 percent of the market for routers and switches. If Huawei can take advantage of its low labor costs and the highly competitive and technologically advanced Asian market, and continue to innovate, it will likely meet its goal of earning 65 percent of its revenue from markets outside of China by 2006.

Implications for Employment

Employment trends in the telecom industry reflect the volatility and shifting landscape of the industry. Following the recession in the early 1990s, the telecom industry grew 10 percent faster than the overall economy between 1992 and 2001 to 1.3 million jobs. After the telecom bubble burst in 2001, the industry lost 380,500 jobs between March 2001 and May 2004. In fact, job losses in the telecom industry made up 29 percent of all jobs lost in the US during that period.³⁸

Telecom employment bottomed out in 2004 and was slowly climbing back until the mergers were announced between SBC and AT&T, and Verizon and MCI. SBC announced plans to cut 13,000 jobs as a result of the merger, on top of another 12,000 that it planned to eliminate prior to the merger. Verizon announced plans to cut 7,000 jobs, while MCI announced plans to lay off

³⁵ Brian Bremner and Peter Burrows, "Will Cisco Rewire Asia?" *Business Week*, February 7, 2005.

³⁶ The Economist, "See Huawei Run," March 3, 2005.

³⁷ Mary Henneck, "China IT Giant Eyes New Horizons," BBC News, January 1, 2005.

³⁸ Thomas W. Hazlett, Coleman Bazelon, John Rutledge, and Deborah Allen Hewitt, "Sending the Right Signals: Promoting Competition through Telecommunications Reform," U.S. Chamber of Commerce, October 2004.

7,500 employees, on top of the 4,500 layoffs it announced several months before the merger. And the Sprint-Nextel merger is expected to result in the loss of thousands of additional jobs.³⁹

These recent job losses have been mainly in the traditional phone businesses, which still employ 54 percent of all telecom workers,⁴⁰ and have been mainly among white collar workers. Meanwhile, employment is growing in the wireless and broadband sectors of the industry, as more people have started using mobile phones than traditional handsets, 40 percent of communication is now done by e-mail and instant messaging, and half of all business calls are made over the internet.

The changing landscape of the industry makes it hard to keep track of who's doing what, as the traditional distinctions between phone and cable companies become increasingly blurred. Two of the biggest providers of phone service in the US today are the cable companies Cox and Comcast. Meanwhile, phone companies are now providing movies and video-on-demand to people's homes, in addition to voice service and internet access, and are positioning themselves to provide the same services over wireless devices as well.

As voice and other communication migrate to the internet, it's going to get much harder for traditional providers and for regulators to control the market. New services will come in the form of new software, which can be developed by anyone anywhere and sold over the internet. As a result, there will be increasing separation between who owns the telecom infrastructure and who provides the services. And innovation is much more likely to take place in a global market.

The new global frontier for telecom is in broadband, where the US appears to be falling behind other countries. That gap may end up having the biggest impact on employment in the US in the long run, since broadband is also fast becoming the technology platform for productivity improvements across all other sectors of the economy. If other countries continue to advance technologically at a faster pace than the US, then R&D will migrate to those countries, and innovations will be deployed there first. Multinational companies that have the capacity to operate on a global scale will be able to shift their R&D operations to where the action is. But smaller companies will have a harder time following suit.

Alternatively, if the US can make a leap in the deployment and speed of broadband connections, it could become the proving ground for new telecom and other applications, and continue to attract R&D investments and talent from elsewhere in the world, as it has done in the software industry for the past two decades.

³⁹ Ron Sherer, "Telecom Mergers as a Window on the Job Market," *Christian Science Monitor*, February 17, 2005.

⁴⁰ Stephen Pociask, *A Failure to Communicate: Reforming Public Policy in the Telecommunications Industry* (Washington, DC: Economic Policy Institute, 2004).