



Part II

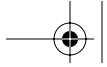
Industry Overview and Public Networks

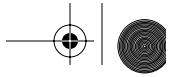
Chapter 3 Industry Overview

Chapter 4 VoIP, the Public Switched Telephone Network, and Signaling

Chapter 5 VPNs and Specialized Network Services





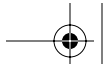


3 Industry Overview

In this chapter:

- The Bell System after the 1984 Divestiture 114
- The Emergence of Local Competition Prior to 1996 119
- The Telecommunications Act of 1996 125
- Post Telecommunications Act of 1996 Developments 126
- Impact of the Telecommunications Act of 1996 127
- State of the Industry . . . Key Segments 128
- CLECs—A Dwindling Industry Segment 135
- Intermodal Competition—Cable TV, Wireless, and Utilities 140
- Regulatory Issues 150
- Appendix 159





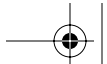
The Modified Final Judgment, also known as Divestiture, deregulated long distance services via a Justice Department–negotiated antitrust settlement with AT&T. The 1984 Divestiture, which was approved by Judge Harold Green, separated AT&T from the local Bell Operating Companies (BOCs). It was enacted to ensure that local telephone companies provided the same quality connections to AT&T’s competitors, other interexchange carriers, as they offered AT&T. These connections spurred competition in long distance services by ensuring smooth transport of calls between long distance networks and local homes and businesses. Divestiture further mandated that AT&T’s 22 former local Bell Operating Companies be merged into seven newly created Regional Bell Operating Companies (RBOCs).

Following Divestiture, interexchange carriers competed for long distance service, but the government limited local calling to the Bell telephone companies because it felt that it was not technologically feasible for competitors to build facilities on the large scale required to serve the millions of local customers. Local competition in telecommunications emerged in the late 1980s in the form of competitive access providers. Competitive access providers (CAPs) initially provided fiber-optic links between customers in major metropolitan areas and interstate long distance providers. These links connected long distance vendors to local customers to avoid the hefty access fees charged by local telephone companies to long distance carriers. Having fiber-optic links in place in major metropolitan areas enabled CAPs to expand their offerings. They became competitive local exchange carriers (CLECs) and started offering additional services, leveraging their investment in fiber-optic cabling.

The Telecommunications Act of 1996 allowed all telephone carriers, utilities, and cable TV companies to sell both local and long distance calling. It also deregulated cable television. Prior to the Telecommunications Act, in most states, interexchange carriers (IXCs) such as AT&T, MCI, and Sprint were allowed to sell only long distance services, and local telephone companies were restricted to local services. When Congress passed the Telecommunications Act, many legislators thought competition would promote development of new high-speed services. Long distance carriers lobbied for the Telecommunications Act in hopes of expanding sales of local services. Bell telephone companies lobbied for passage as a way to offer long distance and data services on an interstate basis. In contrast to Divestiture, the Telecommunications Act of 1996 did not mandate that the local telephone companies form separate companies to supply connections to companies that competed with them. Rather, the RBOCs were expected to provide discounted access to their competitors. This has been a major factor inhibiting competition for local service.

Following passage of the Telecommunications Act of 1996, the seven RBOCs decreased in number to four. Interexchange carrier Qwest purchased US West, and all the others except BellSouth formed mergers with each other. In addition, SBC and Verizon each purchased large, independent, incumbent telephone companies. Verizon





bought the largest independent telephone company, GTE, and SBC bought Southern New England Telecommunications (SNET). SNET was the incumbent telephone company in Connecticut. (Independent phone companies are incumbent telephone companies not previously owned by the Bell system.)

In the years immediately following passage of the Telecommunications Act, CLECs emerged as the most viable competitors to the RBOCs. They sell data services, Internet access, and local toll calling to business and residential customers, although most of their sales are to business customers. Competitive local exchange carriers mainly route calls over facilities that they buy at a discount from local telecommunications companies and also over their own fiber-optic and wireless facilities. They have, in essence, become a combination of local exchange carrier (LEC), inter-exchange exchange carrier, and data communications providers. Interestingly, when RBOCs sell service outside of their home territories, they are considered CLECs. SBC's subsidiary SBC IP, which sells Voice over IP, is an example of this.

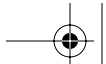
In attempts to weaken the Telecommunications Act, the Regional Bell Operating Companies challenged various aspects in the courts. Until 2004, the courts denied the validity of these challenges. In 2004, the U.S. Circuit Court for Washington, D.C. struck down most of the FCC's most recent ruling on discounts applied to interconnecting to RBOC networks. They also struck down individual state utility commissions' authority to set many discounted rates. The circuit court ordered the FCC to issue new rules on these discounts. The new rulings weakened CLECs by increasing costs to lease facilities from incumbents. Most CLECs are currently operating at a loss.

Losses on the regulatory front as well as low prices and shrinking profit margins for long distance services were major factors in AT&T's and MCI's decisions to be acquired. The announced purchases of AT&T by SBC and MCI's likely purchase by Verizon will give these Regional Bell Operating Companies instant national sales forces and a worldwide infrastructure capable of carrying enterprise voice and data traffic and providing services such as Internet access and Web page hosting. Competition for Internet access, local lines, and long distance services will in the future be between providers that offer wireless as well as wireline access to broadband networks.

The viability of Voice over IP, improvements in wireless coverage, and new technology over utilities' fiber infrastructure hold promise for more choices for residential and commercial customers. This competition, now in its infancy, from different technologies is called intermodal competition. In particular, cable TV providers are expected to be a formidable force because of their large customer base and high-capacity cabling to homes. In addition, new forms of wireless technology will enable fixed and mobile high-speed Internet access and local services.

Events described here illustrate the enormous influence that regulatory issues have on the industry. However, currently regulations often apply differently to cable





TV, Voice over IP, wireless, and wireline services. Creating consistent rulings that protect national interest in a strong infrastructure and that also promote fair competition is critical. Supporting industry growth is a major challenge that impacts residential and enterprise customers, carriers, and economic development.

THE BELL SYSTEM AFTER THE 1984 DIVESTITURE ...

Prior to 1984, AT&T had a near monopoly on local and long distance telephone service in the United States. The first major competitive drive against AT&T was launched in the 1960s by MCI, which utilized microwave to provide voice and data service. Microwave enabled MCI to offer service without the labor-intensive task of laying cable. In 1984, the Divestiture ruling officially sanctioned competition for long distance.

Divestiture of the Bell System from AT&T in 1984

Divestiture, also known as the Modified Final Judgment, mandated the separation of AT&T from its 22 local telephone companies, but local telephone service remained a monopoly. Prior to 1984, the Bell system consisted of 22 local Bell telephone companies that were owned by AT&T. *Customers had one point of contact for all of their telecommunications requirements.* AT&T did all of the following:

- Sold local, interstate, and international long distance
- Manufactured and sold central office switches, customer premises telephone systems, electronics, and consumer telephones
- Provided yellow and white page telephone directories

Long distance carriers such as MCI and Sprint only carried traffic between states. They had no lines to individual homes and businesses. They depended on connections that they leased from local Bell telephone companies to carry calls from their equipment to customers. Without these connections, they not could reach their customers. Access to AT&T's local telephone companies by competitive carriers such as Sprint is illustrated in Figure 3.1.

By 1974, so many complaints had been filed with the Justice Department by long distance competitors about lack of cooperation in supplying connections to local phone companies that the Justice Department filed an antitrust suit against AT&T. The Justice Department dropped the suit in 1982 in return for AT&T's agreement to develop a plan to divest itself of its local phone companies. AT&T ironically chose to keep the long

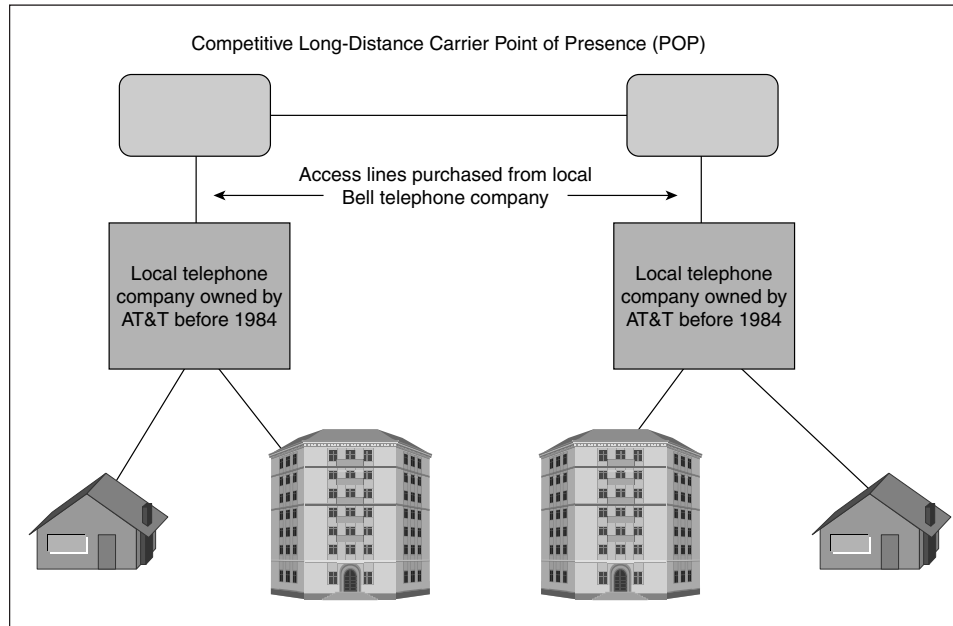
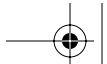


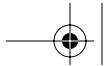
Figure 3.1
Interconnection for local access.

distance portion of their organization, which they saw as more lucrative, and spun off their 22 local telephone companies, which were organized into seven Regional Bell Operating Companies (RBOCs):

- Ameritech (now part of SBC Communications)
- Bell Atlantic (now part of Verizon Communications)
- BellSouth
- NYNEX (now Verizon Communications)
- Pacific Telesis (now part of SBC Communications)
- Southwestern Bell Communications (now SBC Communications)
- US West (now Qwest Communications International Inc.)

After Divestiture, the seven Regional Bell Operating Companies (RBOCs) retained the Bell logo and the right to sell local and toll service within local areas. They also retained the lucrative white and yellow page directory markets. However, they were denied the right to manufacture equipment or sell interstate long distance. A





centralized organization, Bellcore, owned jointly by the RBOCs, was formed. This centralized organization had two functions: It was a central point for National Security and Emergency Preparedness, and it was a technical resource for the local telephone companies. Bellcore has since been renamed Telcordia Technologies, Inc. and in 1997 was purchased by Science Applications International Corporation (SAIC). See Figure 3.2 for each RBOC's territory.

LATAs DEFINED

In 1984, in conjunction with Divestiture, the Justice Department created local access and transport areas (LATAs). LATAs define the contiguous geographic areas in which local Bell telephone companies were allowed to sell local and long distance services. Interexchange carriers and competitive local exchange carriers (CLECs) carried calls between the 197 LATAs. Local exchange carriers were allowed to carry calls within LATAs. States with small populations, such as Maine, Alaska, and Wyoming, are made up of one LATA. Thus, Qwest (formerly US West), the Bell company serving Wyoming, was allowed to provide long distance to all sites within Wyoming. California has eleven LATAs, and New York State has eight. Calls between LATAs in California were handed off to interexchange carriers, as were those between LATAs in New York State.

Now that RBOCs have Federal Communications Commission (FCC) permission to sell inter-LATA long distance, much of the concept of LATAs has lost its significance except for billing. Telephone companies often rate their intrastate *intra*-LATA and intrastate *inter*-LATA calls differently.

The Decline of AT&T

AT&T, which at one time was the largest corporation in the world, suffered revenue declines and failed purchases following Divestiture up to the time of its proposed purchase by SBC. SBC is made up largely of AT&T's former subsidiaries.

The Further Breakup of AT&T

At Divestiture, AT&T retained the right to manufacture and sell telephone and central office systems and to sell interstate and international long distance. AT&T kept Western Electric manufacturing and Bell Labs, its research arms. AT&T sold its switching and

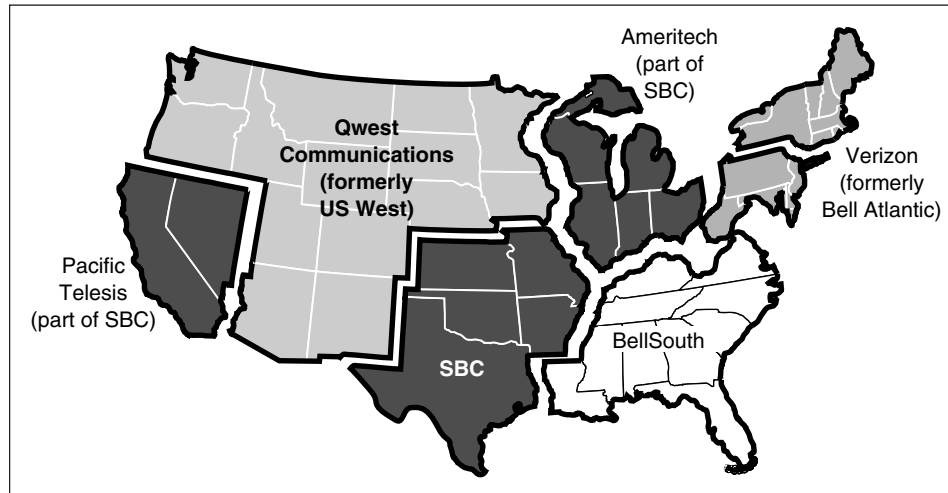
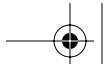


Figure 3.2
Regional Bell Operating Company territories.

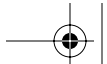
data equipment to businesses and telephone companies through separate sales forces. However, it started competing for local service against its own telephone company customers in the late 1980s through its purchase of competitive access provider (CAP) Teleport. (See the section on CAPs later in this chapter.)

In 1996, to protect its central office sales and avoid being perceived as a competitor to its largest customers, AT&T spun off its customer premises, carrier sales, and manufacturing businesses. The new company was called Lucent Technologies. Lucent kept Bell Labs and Western Electric and the central office, networking, and customer premises equipment (CPE) divisions. AT&T also spun off NCR in 1996, the failing computer systems and services business it had purchased in 1991. In September 2000, Lucent spun off its customer premises business to newly formed Avaya Inc.

AT&T's Forays into Wireless and Cable TV and Its Subsequent Purchase

AT&T, which had originally developed and implemented cellular mobile service in 1984, entered cellular service by purchasing Craig McCaw's cellular assets. It bid for spectrum from the U.S. government and purchased spectrum from others as well. It spun off AT&T Wireless to raise capital for its other ventures and to create value for shareholders. AT&T Wireless had consistently outperformed other portions of AT&T.





In the mid-1990s AT&T invested heavily in cable TV, purchasing the cable TV properties of TCI and MediaOne at premium prices. AT&T envisioned using these assets for bundled TV, Internet access, and telephone service. The combined costs of upgrades and purchase for these investments totaled \$115 billion by 2000. AT&T also invested heavily in upgrading its high-speed backbone long distance network. In the meantime, losses at AT&T piled up as customers defected to competitors and long distance revenues dropped sharply due to lower prices and increasing substitution of e-mail for voice calling.

Falling revenues in its long distance operations were a major factor in AT&T no longer being able to support the debt levels in its cable properties. Thus, AT&T sold its cable properties to Comcast in 2002 for \$41 billion plus the assumption by Comcast of \$25 billion of debt. Its former wireless unit, AT&T Wireless, made an agreement to be purchased by Cingular in 2004 after operating at a loss. By 2005, operating at a loss and after consecutive rounds of staff layoffs and additional customer defections, AT&T announced its purchase by SBC.

Independent Telephone Companies— Mostly in Rural Areas

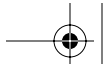
In addition to the RBOCs, there are close to 1,270 independent telephone companies. The four largest are Sprint, ALLTEL, Citizens Communications Corporation, and CenturyTel. (Sprint is an interexchange carrier, a wireless carrier, and an independent telephone company.) Following its announced purchase of Nextel, Sprint stated its intention to spin off its local phone company. Most independent telephone companies are in rural areas such as northern Maine and parts of California. According to the Federal Communications Commission's December 21, 2004 report *Trends in Telephone Service*, as of December 2002, independent telephone companies supply dial tone to 14% of the telephone lines in the United States.

Independent telephone companies sell all of the same services that RBOCs sell. Unlike provisions affecting the RBOCs, the Telecommunications Act of 1996 did not prohibit them from selling interstate long distance or cable TV and wireless services from within their territories. However, they are required to offer cable TV and wireless services through separate subsidiaries.

Interestingly, during the slowdown in telecommunications that impacted the rest of the industry in the early 2000s, most independents, while not growing, were stable. They received steady revenue streams of government subsidies and had little competition from other wireline carriers that didn't see a payback in investing in sparsely populated areas.

Rural telephone companies receive federal subsidies through the Universal Service Fund that compensates carriers for building facilities in areas with few customers





per central office switch and low-income areas. (See the section on the Universal Service Fund later in this chapter.) Rural carriers are reimbursed because the lines between the telephone company and customers are longer, serve fewer customers, and are thus more expensive to build and maintain and generate less revenue. Universal service subsidies enable telephone companies to keep prices comparable to those for basic dial tone in urban areas.

Independent telephone companies also receive a steady stream of revenue from long distance carriers in the form of access fees. Interexchange carriers pay access fees to local exchange carriers for carrying their calls between the long distance network and local customers. (See the section on access fees later in this chapter.) Access fees are set at higher than cost to subsidize local telephone service. According to Citizens Communications Corporation's year-end 2003 Form 10-K, 24% of their incumbent local exchange carrier (ILEC) revenue came from federal and state subsidies and access fees. However, due to federal legislation, access fees paid to incumbent telephone companies are decreasing. Some of these reductions have been offset by end-user fees in the form of subscriber line charges for each local line. In addition, access fees are decreasing due to fewer long distance calls because of substitution of wireless, e-mail, and Voice over IP traffic.

THE EMERGENCE OF LOCAL COMPETITION PRIOR TO 1996

The idea that it was economically and technically feasible to compete for local telephone service, as well as long distance, gradually took hold starting in the late 1980s and early 1990s. It was fostered by technological improvements in fiber-optic cabling, wireless technologies, and lowered costs for switches. Improvements in signaling technology also played a role in lowering the cost of provisioning telephone service. Sophisticated signaling systems link single databases containing applications such as billing and messaging to multiple switches so that carriers don't have to maintain, for example, a separate billing system for each switch.

Competitive Access Providers (CAPs) to Bypass Access Fees

Customers' and carriers' desire for lower-priced local access and egress (exit) was a major factor in the development of local competition. The first local service competitors were competitive access providers (CAPs), which emerged in the 1980s and in the early 1990s. CAPs provided access to long distance at lower prices than the Bell Operating Companies (BOCs). They transported calls to and from interexchange carriers to customers mainly in large cities.





The cost to carry the local access portion, access and egress (exit), was paid by interexchange carriers to local telephone companies and was passed on to consumers. In 1984, access charges amounted to 5.24 cents of the 32 cents per-minute average cost of long distance. BOCs typically received a third of their revenue from business customers, a third from residential customers, and a third from access fees paid by interexchange carriers, of which AT&T was the largest. Because of these access fees, AT&T was the Bell telephone companies' largest customer.

CAPs were the first carriers to use fiber-optic cabling to transport calls from business customers (initially, primarily financial institutions in large cities) to interexchange carriers' points of presence (POPs), bypassing access fees. A *point of presence* is the location in a metropolitan area where a long distance company has its switch. T-1 between customers and POPs enabled institutions to eliminate (bypass) per-minute access fees charged by the Bell telephone companies to interexchange carriers and passed on to end users. T-1 carries 24 channels of voice and/or data calls on two pairs of copper cable or one pair of fiber cabling (see Figure 3.3).

IDENTIFYING CARRIERS—CIC CODES

The North American Numbering Plan Administrator assigns four-digit carrier identification codes (CICs) to every wireline and wireless carrier. CIC, which is pronounced *kick*, identifies carriers for billing and routing purposes. Carriers often transport each other's traffic because no carrier has coverage everywhere. The CIC code identifies the carrier associated with each call so that carriers can bill each other various fees for carrying each other's traffic.

AT&T's main CIC code is 0288, MCI's is 0222, and Sprint's is 0333. Local telephone companies automatically insert CIC codes based on the carrier the customer chooses for their long distance service. However, callers can also select a carrier manually by dialing a CIC code preceded by the carrier access code 101. For example, someone dialing 1010222 before they dial a long distance number will have his or her call routed on MCI's network.

The CIC code format was changed in 1998 from three digits to four digits. This increased the number of CIC codes from 999 to 9999. Thus, MCI's CIC code changed from 222 to 0222. According to the FCC, as of the first quarter of 2004, 2,452 CIC codes were in use. Many carriers have multiple CIC codes, some assigned previously to businesses they purchased and some for subsidiaries or particular lines of business.



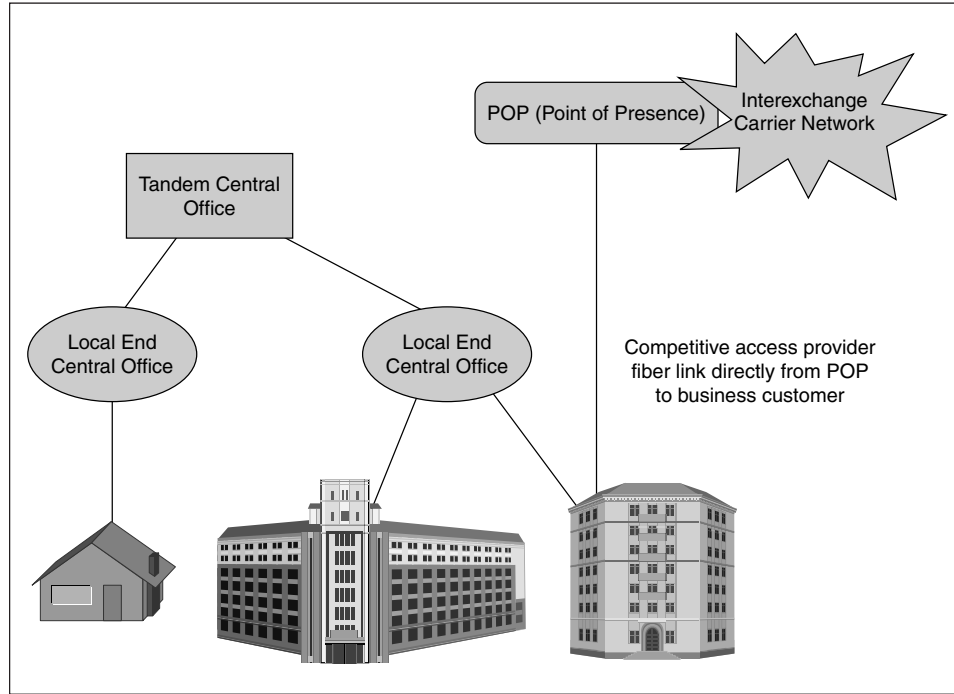
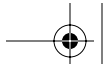


Figure 3.3

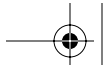
Alternative access link to a long distance provider, bypassing the local telephone company.

Uneven Competition for Local Telephone Service Throughout the U.S.

Prior to 1996, competitive access providers (CAPs) such as Metropolitan Fiber Systems, later purchased by WorldCom (now called MCI), and Teleport Communications Group, purchased by AT&T, as well as long distance giants AT&T, Sprint, and MCI sold local telephone service. However, market penetration of these services was low, 0.7% by December 1995. Local telecommunications was, for the most part, regulated by state public utility commissions.

Each state allowed incumbent local telephone companies different levels of monopolistic control of local and intra-LATA toll calling. As state utility commissions opened intra-LATA toll calling, interexchange carriers and competitive access providers (CAPs) heavily promoted ways that customers could use their services for local





toll calling by dialing 101 plus a CIC code. This is referred to as *dial around*. A great deal of competitive activity took place in California because of its 25% share of the local calling marketplace. Southern states had little competitive activity.

Impact of Competitive Access Providers (CAPs)— Fiber and T-1 Availability

Competition from CAPs in the 1980s motivated the Bell and independent telephone companies to lay fiber more quickly in large cities, directly to customers' buildings. The local telephone companies at this time, the early to mid-1980s, transported calls from customer premises on copper cabling, which is less reliable than fiber. Competition also pushed the Bells to shorten intervals and lower prices for high-speed digital access to long distance carriers. Thus, the telephone companies made digital T-1 connections over fiber available more quickly and at lower costs than they had planned. Competition from alternative access providers was a factor in the speed of upgrading the Bells' cabling from copper to fiber.

The Transition from CAPs to Competitive Local Exchange Carriers (CLECs)

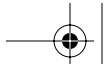
Competitive access providers became competitive local exchange carriers in the 1990s when they branched out from providing bypass, which is access to long distance on their facilities, and started selling connections to the Internet, data networks within metropolitan areas, and local calling services using the fiber networks they had installed for bypass.

They initially entered the interexchange business by constructing fiber-optic links between major metropolitan areas in the East and West Coast corridors. For example, once Los Angeles and San Francisco had fiber within the cities, the next step was to link these two locations with fiber for the purpose of selling long distance. The same is true for New York City to Washington, D.C. These high-capacity fiber-optic lines carried data as well as voice services. In routes other than those with the heaviest traffic, they routed traffic over other carriers' networks.

Collocation—CLEC Switches in RBOC Central Offices

On September 17, 1992, the FCC allowed the local Bell telephone companies, at their discretion, to open up competition by permitting collocation and virtual collocation.





The Telecommunications Act of 1996 *mandated* that Bell companies provide collocation services. With *collocation*, competitors install their own central office switch or other equipment in the same building as the local telephone company's switch. This gives competitors access to Bell telephone company lines for egress and/or termination of telephone calls from the competitors' customers. *Egress* is the exit of traffic from the customer that initiates the call.

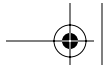
Cream-Skimming—Concentrating on Profitable Markets

When competition for local telecommunications began, CLECs concentrated their initial sales efforts in highly populated metropolitan areas. They saw a high-profit potential in areas such as downtown New York City, where one fiber run had access to thousands of customers in a single skyscraper. This concept is known as “cream-skimming.” Cream was skimmed from lucrative markets. There is more potential for profit when an investment in new technology reaches thousands of potential customers in a concentrated area. CLECs competed in part by setting their prices lower than incumbent local exchange carriers.

The Critical Nature of Facilities

While framers of the Telecommunications Act of 1996 envisioned cable TV, commercial mobile services, and utilities as viable competition, the industry initially focused most of its attention on CLECs. In states where rates to lease Bell networks decreased, many CLECs used resale as their primary strategy. The 2004 circuit court ruling jeopardized discounted connections to Bell equipment and made this strategy no longer feasible.

As other technologies mature and regulatory rulings make reliance on Bell facilities a poor choice, the industry is directing attention to competition between facilities-based providers. The focus is increasingly on wireless, cable TV, and utilities' use of their own fiber as well as Voice over IP technology that operates on existing broadband facilities. (See Chapter 4, “VoIP, the Public Switched Telephone Network, and Signaling,” for information on Voice over IP network services.) These services depend for the most part on upgrading, adding to, and modifying rather than completely rebuilding infrastructure to reach customers. In the case of wireless service, cabling is not needed to each premise.



Factors Leading to Passage of the Telecommunications Act of 1996

The framers of telecommunications reform hoped that the Telecommunications Act of 1996 would increase choices for local services for residences, small businesses, and large organizations. Demand for passage of the Telecommunications Act of 1996 had been building up in Congress for many years, and Congress had attempted in the early 1990s to pass reform bills. The Republican congressional leadership that took office in 1995 wanted to deregulate cable TV and broadcasting. Through intense lobbying by RBOCs and long distance companies, a compromise was struck. The Telecommunications Act promised to open interexchange competition to Bells after they proved they had opened their networks to competition.

It was envisioned that the growth of competition for local telephone service would encourage advancements and business opportunities for entrepreneurs. After the 1984 Divestiture, interexchange carriers had an incentive, in the form of competition, to add innovative services. They offered data services such as frame relay, ATM, and virtual private data networks and new toll-free services not available at that time from incumbent local telephone companies.

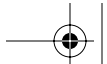
The following were important factors in pushing passage of the Telecommunications Act of 1996:

- A desire in Congress to allow competition for local telecommunications services (the “information superhighway”) uniformly in all of the states
- A government effort to make access to high-capacity telecommunications services universal and affordable
- Improvements in fiber-optic and signaling technologies
- The Bell telephone companies’ lobbying efforts for permission to enter interstate long distance and manufacturing
- The interexchange carriers’ push for entry into the local calling market
- Cable TV and utilities’ desire to enter new markets
- Viability of wireless services as a substitute for wired local telephone lines

Wireless Services for Local Exchange Service—Spectrum Auctions

In 1993, President Bill Clinton mandated that auctions be held for frequencies within the higher, personal communications services (PCS) airwaves. Frequencies in each metropolitan area would be awarded to the five highest bidders, with some awards given to minority and small businesses. This was seen, in addition to adding to the





federal coffers, as a way to open up competition to cellular service providers. It was thought that this would drive down the cost of wireless services to the point where people would use their cellular phones for local calling. Prior to the auctions, there were only two cellular carriers in each metropolitan area, a subsidiary of the incumbent Bell telephone company and one other provider, selected by lottery from eligible carriers. These early cellular carriers were given free spectrum.

THE TELECOMMUNICATIONS ACT OF 1996

The Telecommunications Act of 1996 opened up local telephone service to interexchange carriers, cable television operators, utilities, wireless operators, and new entities that wanted to offer telecommunications services. Section 271 of the Telecommunications Act specified that each of the former Bell telephone companies would be allowed to sell interstate and international telecommunications services and manufacture and sell customer premises equipment once each state in their territory was shown to have local competition. Each state's regulatory agency and the Justice Department were to assess whether the incumbent telephone company had met the guidelines for connecting competitors to its network. The Federal Communications Commission made its final rulings following these assessments.

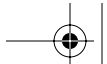
Qwest (for Arizona) was the final RBOC to receive FCC approval to sell interstate and international service in December 2003, seven years after passage of the Telecommunications Act.

More detail on the Telecommunications Act of 1996, including local number portability, is included in the Appendix section at the end of this chapter.

Universal Service Fund— Affordability and Availability

The commitment to affordable universal telephone service was established in 1913 when AT&T was given a monopoly for building a nationwide public switched telephone network in exchange for providing affordable, universal service to all residential consumers. The Telecommunications Act of 1996 expanded universal service. Every interstate carrier, cell phone company, and paging company must pay a percentage of its interstate and international revenues to the fund. Voice over IP providers are exempt from Universal Service Fund contributions because they are not currently regulated as telecommunications companies. The contribution percentage is adjusted quarterly based on the fund's projected needs and revenues. The third quarter of 2004 percentage was set at 8.9%. State commissions may also create funds for universal service.





The purpose of the Universal Service Fund (USF) is to provide schools, rural healthcare facilities, low-income consumers, high-cost-to-reach areas (for example, rural areas), and libraries telecommunications services at reasonably comparable rates charged for similar services in urban areas. The portion of the Universal Service Fund that applies to schools and libraries is known as the E-rate. The E-rate subsidizes Internet access and infrastructure costs needed for high-speed Internet access. In 2000, subsidies were extended to Native American reservations.

With the exception of the E-rate and subsidies to rural health care providers, the Universal Service Fund covers only basic dial tone, not broadband services for high-speed Internet access. President George W. Bush has recommended that, by 2007, all Americans have access to affordable broadband technology. To date, no regulations or rulings have been enacted to ensure universal, affordable broadband availability.

POST TELECOMMUNICATIONS ACT OF 1996 DEVELOPMENTS.....

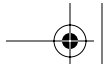
Implementation of the Telecommunications Act of 1996 was hampered by RBOC legal challenges. Furthermore, implementation and order-placing snafus hindered competitors that wanted to sell service using incumbents' facilities.

FCC Rulings, Legal Challenges, and Progress Toward Deregulation

The Telecommunications Act of 1996 mandated that the very organizations that compete with new entrants, the RBOCs, must supply connections and services for competitors. Thus, conflicts erupted in pricing for and arranging for resale and connections to Bell resources. It is no surprise that these issues were contested in court. (See Table 3.5 in the Appendix at the end of this chapter.)

Enforcement of provisions and details of implementation of the Telecommunications Act were left, for the most part, to the FCC. Its rulings on wholesale rates and its rights to set rates were challenged by the state public utilities, local telephone companies, and independent telephone companies. State public utilities contended that the 1934 Communications Act granted state utilities the prerogative of setting resale and wholesale discounts in their states. In a major blow to CLECs, in March 2004, the United States Court of Appeals for the District of Columbia struck down an FCC order on the availability of unbundled network element (UNE) discounts for CLEC connections to RBOC facilities. UNE discounts mandated that RBOCs use replacement costs rather than original cost when setting lease rates. Replacement rates are lower than those based on original cost of equipment.





FCC Enforcement of Access to Local Networks after Bells Gain In-Region Long Distance

The Telecommunications Act of 1996 granted the FCC post-approval enforcement powers to monitor Bell Operating Company (BOC) adherence to rules providing access to central office and other Bell facilities (unbundled network elements) at fair rates. A Bell Operating Company refers to the 22 local entities that are now part of the Regional Bell Operating Companies.

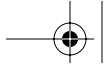
Following final approval by the end of 2003 for the Bells to provide long distance service everywhere in the United States, no RBOC state entity has been stripped of its authority to provide long distance service.

IMPACT OF THE TELECOMMUNICATIONS ACT OF 1996

According to the United States Telephone Association booklet *Phone Facts 1998*, the local telecommunications market was \$96 billion in 1997. At that time, RBOCs and independents had a 97.7% market share of local lines. In the latest period analyzed, June 2003, CLECs had a 14.7% share of local lines. These statistics do not reflect the fact that the two largest CLECs, AT&T and MCI, will be purchased by Regional Bell Operating Companies, greatly reducing CLEC penetration once the acquisitions are finalized. According to the FCC, 38% of CLECs' lines and 22% of incumbents' lines served medium and large businesses, institutional customers, and government customers in 2003. SBC's planned purchase of AT&T and Verizon's announced purchase of MCI will increase these RBOCs' share of large business lines.

The Telecommunications Act initially spurred new investment in equipment and services. Capital investments decreased after 2001, and many providers went out of business due to the high cost of building infrastructure, the cost and delays associated with connecting to incumbent facilities, unfavorable regulatory rulings, and low retail prices offered in response to competitive bids. However, small businesses have particularly benefited from increased competition, which triggered widespread affordable, high-speed Internet access. However, regulatory decisions, high startup costs, and low margins for competitive services have greatly reduced the impact of the Telecommunications Act. The major impact of the Telecommunications Act is the entrance of cable operators into telecommunications services.





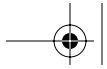
STATE OF THE INDUSTRY . . . KEY SEGMENTS

The major segments of the telecommunications industry are wireless mobile operators, cable multiple service operators (MSOs), and incumbent telephone companies.

Regional Bell Operating Companies (RBOCs) Post-1996 Mergers

The flurry of merger announcements in 2005 between AT&T, MCI, and RBOCs will, if the mergers are approved, result in RBOCs having even more industry clout. RBOCs are also referred to as incumbent local exchange carriers (ILECs). Verizon and SBC are the largest local telephone companies in the United States. Between them, they control 61% of the local lines as well as a major percentage of the long distance market and Internet access market. The four Regional Bell Operating Companies are as follows:

- *Verizon Communications* was formed when Bell Atlantic purchased GTE, the largest independent telephone company. At the time, GTE had more access lines than Qwest. Bell Atlantic had previously purchased NYNEX, whose territory covered New England and New York State. Verizon, the largest incumbent telephone company, is the majority owner of Verizon Wireless, and Vodafone is the minority owner with 45%. Verizon Wireless accounts for 40% of revenues. In 2005, Verizon announced its intention to purchase MCI.
- *SBC*, formerly Southwestern Bell Communications, is the second-largest incumbent local exchange carrier. It purchased Pacific Telesis and Ameritech as well as former independent telephone company Southern New England Telephone Company of Connecticut (SNET). It merged its wireless assets with those of BellSouth to form Cingular Wireless, and Cingular purchased AT&T Wireless in 2004. In 2005, SBC announced it would purchase AT&T. If approved, this merger will make SBC the largest telephone company in the United States. Cingular is the largest mobile carrier.
- *BellSouth* is the third-largest local exchange carrier. Its territory is made up of nine southern states. BellSouth owns 40% and SBC 60% of Cingular Wireless. BellSouth is expanding its broadband facilities in hopes of attracting enterprise customers and adding video on demand for residential customers.



- *Qwest Communications International Inc.* was formed when long distance carrier Qwest purchased US West. It covers 14 western states, not including California and Nevada. Qwest resells cellular service via resale on other carriers' networks. Its fiber-optic long distance business incurs large annual losses and has left Qwest with a large debt and interest expense on the debt. Qwest has been the subject of shareholder lawsuits and investigations by the Securities and Exchange Commission and the Justice Department.

Incumbent Local Exchange Carriers (ILECs)

The RBOCs, the four largest incumbents, have enormous regulatory influence and economic clout in the telecommunications industry. Their combined annual revenues make up close to half the revenue of the entire telecommunications market in the United States, including wireless, broadband cable, DSL modem service, local, long distance, and international services (see Table 3.1). The RBOCs' main strengths lie in their skills in influencing regulatory bodies, their engineering expertise, and their sheer economic size.

Table 3.1 Annual Combined RBOC Statistics¹ (Dollar amounts are in millions)

	2003	2002	2001
Total employees	491,569	533,288	580,469
Total revenue	\$145,518	\$148,253	\$153,281
Net income*	\$16,998	-\$27,413	\$4,241
Total capital invested	\$22,359	\$26,363	\$43,505
Capital invested by largest CLECs ²	\$3,895	\$4,150	\$17,017
Number of CLECs in survey	62 CLECs	66 CLECs	120 CLECs
Total industry revenue ³	\$303,614	\$297,767	\$305,188

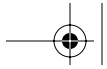
* Reflects Qwest net losses of \$38,468m in 2002 and \$5,603m in 2001

¹Source: RBOC annual reports.

²Source: New Paradigm Resources Group, Inc.

³Source: FCC statistics, which include CLECs and wireless carriers.





Since 2001, the number of local access lines in service at each RBOC has declined. Much of this decline can be attributed to the substitution of DSL and cable modem service for users' second phone lines and the use of wireless phones for long distance. Many families use wireless "buckets of minutes" plans that negate the need for a second line for teenagers and children. In addition, each Bell has lost local lines to competitive local exchange carriers. The RBOCs have captured a large share of the residential and small business long distance market and are now marketing long distance and data services to large enterprises. However, profits on long distance are lower than profits for local telephone lines.

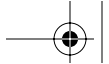
RBOCs are making up for losses in local service by increased sales of DSL, reductions in the size of their work force, and increases in wireless subscribers. They're also attempting to retain their customer base by offering bundles of wireless, DSL Internet access, long distance, and local service and reselling satellite television service. BellSouth, Qwest, and Verizon resell satellite DirecTV service, and SBC resells EchoStar service. The RBOCs provide billing, marketing, and customer service, and the satellite companies do the actual installation and transmission.

The satellite offerings are a response to cable TV's triple-play array of entertainment, telephone, and Internet access. It is also recognition that future revenues may be derived from interactive services such as video-on-demand. The RBOCs have announced plans to build fiber to customer premises or deeper into neighborhoods. They are also researching ways to provide two-way video over copper so that they can offer entertainment on their own networks. They are raising capital for these upgrades in part by attempting to sell lines in rural areas of their networks and by selling investments in international wireless and wireline carriers.

They also hope to capture a larger share of the enterprise and government nationwide data networking business. To do this, they are building extensive interstate fiber networks based on IP protocols. Many of them lease rights to fiber and add their own multiplexing equipment. The term for these long-term leases is *Indefeasible Right of Use (IRU)*. IRUs are analogous to condo ownership. Another carrier arranges for rights of way and lays the fiber. The carrier that purchases the IRU has the sole right to use the fiber it has leased. Just as a condo owner adds furniture and carpeting, the carrier that leases the fiber adds equipment to the fiber strands and monitors traffic on it.

The RBOCs have higher labor expenses than much of the industry due to the fact that the landline side of their operations is unionized. However, their large customer base is an enormous strength in marketing new offerings. They promote new services and plans in bill inserts and telemarketing campaigns that are no longer available to competitors barred by "Do Not Call" regulations from calling people that register on the federal government's Do Not Call registry. These "Do Not Call" regulations do not apply to corporations calling their own customers.





HOW TELEPHONE NUMBERS ARE ASSIGNED FOR WIRELINE, WIRELESS, AND VOICE OVER IP PROVIDERS

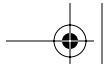
The North American Numbering Plan Administration assigns telephone numbers to state-certified wireline carriers in each state. Wireless carriers also receive numbers from the North American Number Plan Administration. However, they don't need to register on a state-by-state basis because the FCC, not individual states, licenses them to offer service. Carriers such as Vonage, Broadview Networks, and SBC for their IP services are required to obtain telephone numbers from local exchange carriers (LECs) in each state. The LECs can be either the incumbent or a competitor to the incumbent. The reason for this requirement is that VoIP is not defined at this time as a telecommunications service. Thus, VoIP carriers or the department and subsidiaries within carriers that offer VoIP must enter into agreements with a licensed carrier to obtain local telephone numbers in each state in which they wish to offer Voice over IP service. SBC IP has asked the FCC for a waiver of the requirement to obtain numbers from other carriers. In their own territory, they receive numbers from their parent, SBC. However, when they offer VoIP outside of their home territory, they have to enter agreements with other LECs. Prior to the announced merger with SBC, AT&T objected to SBC IP's request for a waiver, saying this would be unfair to other VoIP providers.

The North American Numbering Plan Administration assigns numbers in blocks of 1,000. This is called the *number pooling system of allotting numbers* because pools of 1,000 unused numbers are created. Prior to the year 2000, numbers were assigned to carriers in blocks of 10,000. This resulted in wasted numbers because many smaller carriers who did not use up all of their numbers could not share them with other carriers. To further conserve numbers, in 2000, the FCC mandated that phone companies must first use up 60% of their assigned phone numbers before being given new ones. As of June 30, 2004, that percentage increased to 75%.

Agents

Agents act as independent representatives for carriers. The Regional Bell Operating Companies started agent programs as a way to lower the cost of selling services to small businesses. Many agents offered interstate and local data services to their





customers as an adjunct to sales of telephone and data systems. Agents are certified and receive some training from the telephone companies they represent. They receive a monthly commission on the telephone services they sell, but customers receive bills and customer service support directly from the carrier. Long distance carriers and CLECs also use agents.

Retail outlets are agents for cellular providers. Staples is an agent for Sprint PCS and Nextel. It is also an agent for prepaid cellular from Cingular and Tracphone. Radio Shack is an agent for Verizon Wireless and Sprint PCS.

Resellers

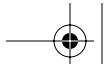
Like agents, resellers do not own network infrastructure. Unlike agents, however, they do provide billing and customer service for their customers. In addition, unlike agents, they market the service under their own brand. Resellers sell wireline service such as data services (for example, T-1, T-3, and other high-speed services), calling cards, Internet access, local, long distance, Voice over IP, and international calling. They also resell cellular service. For example, Qwest resells Sprint PCS wireless service.

Resellers purchase services at discounts, mark them up, and often offer them at below retail cost. Resellers offer services carried on networks owned by Regional Bell Operating Companies, MCI, AT&T, Sprint, Global Crossing, Level 3, and other carriers worldwide.

TRUTH IN BILLING—TAXES, FEES, AND SURCHARGES

According to the FCC, as of 2002, taxes, 911 costs, and universal service fees make up 38% of consumers' local monthly telephone charges. In addition to these charges, long distance and wireless carriers impose a variety of fees on consumers' and enterprises' monthly phone bills. The surcharges carriers have tacked onto telephone bills increase the cost of telephone service and make it confusing for consumers and commercial organizations to compare costs between competing carriers. The National Association of State Utility Consumer Advocates (NASUCA), a 43-state organization of consumer advocates, filed a request on March 30, 2004 asking the FCC to prohibit long distance and wireless carriers from imposing surcharges unless such fees are (1) mandated or authorized by federal, state, or local government and (2) conform to the amount authorized by government.





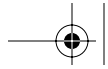
TRUTH IN BILLING—TAXES, FEES, AND SURCHARGES (CONTINUED)

The following charges are added to bills in addition to monthly usage and line charges:

- Taxes such as local, state, and federal taxes assessed by legislative bodies and sent directly to the government by carriers.
- Regulatory fees mandated by the FCC and paid to carriers:
 - Universal Service Fund fees described earlier for high-cost rural and nonrural areas, healthcare providers, educational institutions, and libraries.
 - Subscriber line charges (SLCs) used to recover the cost of access lines between long distance and local exchange carriers. SLCs are intended to replace the lower access fees that local telcos charge long distance carriers for carrying their calls.
 - E911 and local number portability charges to subsidize the cost of upgrading equipment to provide these services.
- Carrier assessments that are not mandated by federal, state, or local government. Wireline and wireless carriers charge fees that range from 41 cents to \$4.95 monthly and label them variously as Federal Programs Cost Recovery, Regulatory Cost Recovery Fee, Regulatory Assessment Fee, Carrier Cost Recovery Charge, and Regulatory Fee.

According to NASUCA, most carrier assessments cover nothing more than the carrier's costs of doing business and should be folded into per-minute charges or monthly fixed charges so that consumers can more easily compare prices between carriers. In 1999, the FCC issued a "Truth-in-Billing" order that prohibits carriers from switching customers' long distance company on an unauthorized basis (slamming), adding unauthorized services to customers' bills (cramming), and utilizing confusing billing practices. However, the National Association of State Utility Consumer Advocates contends that the FCC's order did not cover most carrier assessments appearing on consumers' bills today and that the assessments confuse and mislead consumers since, for example, they are not advertised in conjunction with low usage or calling plan rates. NASUCA also believes that the carrier assessments frustrate Congress's goal of a competitive telecommunications market because inefficient carriers can recover their greater operating costs through surcharges while continuing to advertise, and offer, comparatively low rates.





Wholesale Carriers—Carrier-to-Carrier Sales

Carriers sell services directly to end users as well as to other telephone companies. For some carriers, such as Level 3, wholesale is the major part of their business; for others, such as the RBOCs, AT&T, Sprint, and MCI, it either is a way to sell spare capacity on their networks or is the result of regulatory requirements. There are many types of wholesale models in telecommunications. For example, CLECs swap and/or sell fiber routes to each other in metropolitan areas where they either have a need for fiber or have overcapacity. Sprint sells wholesale long distance, 911, and directory services to cable TV providers Time-Warner Cable, USA Companies, and Mediacom Communications Corporation. The cable operators, in turn, use these services in conjunction with their Voice over IP telephone service. Wholesale services that carriers sell include the following:

- Prepaid card platforms for wireline and wireless calling
- Signaling System 7 for cellular and wireline carriers
- Interstate fiber-optic routes
- International, cross-border calls to mobile phones
- Fiber runs between central offices in metropolitan areas and in rings throughout cities
- Equipment to carry Voice over IP traffic
- Dark fiber that has no electronics connected to it
- Directory assistance service
- Audio conferencing service
- The local lines from homes and businesses to central offices
- Ports on central office switches for carriers who don't have their own switches
- Internet access
- Data services

Because of fiber build-outs in long interstate routes and metropolitan areas, prices for fiber capacity have dropped to the point where the wholesale price for T-3 in the metro area is often only \$500 per month. Metropolitan fiber drops are still costly to bring from the rings to enterprise and mid-size customer sites because of trenching, right of way, and labor expense. Even so, the impact of this additional infrastructure is the higher availability and affordability of high-speed data services such as SONET and Gigabit Ethernet for enterprises. (See Chapter 5, “VPNs and Specialized Network Services,” for discussions of SONET, T-3, and Gigabit Ethernet.) These data services are used for disaster recovery, site-to-site connectivity, and Internet access.





Because of the glut of fiber and increased competition, revenues for wholesale switched voice services are declining.

CLECS—A DWINDLING INDUSTRY SEGMENT.....

Competitive local exchange carriers (CLECs) compete against incumbent telephone companies and each other for local, long distance, Internet access, and data services. However, competitive local exchange carriers (CLECs) lost key regulatory battles and have decreasing revenue as a result of price competition, and many operate at a loss. In a final blow to CLECs as a key industry segment, SBC announced an agreement to purchase AT&T, and Verizon announced an agreement to purchase MCI. AT&T and MCI are the two largest CLECs and sell the largest share of corporate and government long distance and data services.

CLECs—Local, Data, and Long Distance Services

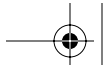
Large, facilities-based competitive local exchange carriers' (CLECs) main strengths are in the following:

- Breadth of their infrastructure
- International data offerings
- Large enterprise, commercial sector, and government customer base
- Complex data network offerings

AT&T, MCI, and Sprint own more of their own interstate network than any other carrier in the United States. (See Table 3.2 later in this chapter for North American wireline carriers.) AT&T, MCI, Sprint, and other large CLECs have the lion's share of corporate, nonprofit, and government long distance and data customers.

Like cable TV and incumbent telephone companies, long distance companies are exploring and developing services to replace shrinking revenues, margins, and decreased long distance traffic, which is now considered a commodity. According to telecommunications strategic consulting and market research firm Atlantic ACM, total interexchange long distance revenues shrank from \$102 billion in 1999 to \$86.3 billion in 2003. Combined factors of improved technology, increased competition, and elimination of long distance revenue to subsidize local service has caused marked decreases in average revenue per minute for interstate and international calls. The following figures, restated in 2002 dollars and reported by the Federal Communications





Commission's Industry Analysis Division, illustrate the declining per-minute costs of interstate and international long distance:

- 1930 \$2.96
- 1984 56¢
- 1999 15¢
- 2002 9¢

In addition, scores of customers have replaced long distance with e-mail. Because of dwindling margins and the high cost of connecting to incumbent local exchange carriers to reach customers, long distance carriers for the most part have stopped promoting long distance to residential customers as a standalone product. When they do offer long distance to consumers and small businesses, it is part of a bundled package with local service. Total minutes of outbound and toll-free calling is shrinking due to substitution of e-mail and implementation of the Do Not Call registry by the Federal Trade Commission. The Do Not Call registry, in particular, resulted in large decreases in outbound traffic generated by call centers.

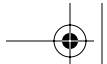
CLECs are evaluating and starting to offer Voice over Internet Protocol-based services. They see this as a lower-cost way to provide service. Because residential and small business VoIP offerings operate over DSL and cable modem lines, these services are less dependent on connections to ILECs. In addition, access fees currently don't apply on the portion of Voice over IP traffic that bypasses the public switched telephone network, the portion carried from the end users' broadband connection to the network. See the discussion later in this chapter on access fees and local loop leasing, including unbundled network elements (UNEs) from the RBOCs.

Pending Purchases of AT&T and MCI— The Impact of Consolidation

The decisions by SBC to purchase AT&T and Verizon to purchase MCI are directly related to their desire for a worldwide presence and a foothold in enterprise and government sales. In an interview with the *Wall Street Journal*, SBC CEO Edward Whitacre, Jr. discussed his organization's strategy in pursuing a merger:

“The telecommunications industry is taking the logical next step in its evolution. Companies that want to compete coast-to-coast and around the world are combining to create the size, scale, and product scope needed to be effective.”





The preceding quote appeared in the February 15, 2005 page one article “After a Year of Frenzied Deals, Two Telecom Giants Emerge” by Almar Latour. It is a reflection of the worldwide nature of telecommunications. Large enterprises expect carriers to support both their domestic and international telecommunications needs. Verizon and SBC are desirous of adding large enterprises to their customer base. These customers spend large sums of money and require less support per dollar of revenue than do residential customers, each of whom requires a monthly bill, repair service, and customer service. Thus, the RBOCs are gearing up to encroach into competitors’ data networking and enterprise long distance business.

By early 2005, the RBOCs had made steady gains in adding long distance customers. The RBOCs had also taken steps to form national sales forces to offer service to enterprises. However, for the most part, their long distance customers were residential and small business customers or organizations such as hospitals and universities that have mainly in-state voice and data networks. In addition to their enterprise customer base, the large CLECs have an advantage of being able to provide a single bill that covers nationwide services rather than generating different bills for each part of the country. They also have nationwide marketing and sales forces, and AT&T and MCI have worldwide IP-based data networks as well.

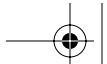
By combining forces with AT&T and MCI, SBC and Verizon will have interstate, international, and local connections needed for Internet access, long distance, and many data communications connections. They will have completed their strategy, begun when they started lobbying for passage of the Telecommunications Act of 96, of being major contenders for nationwide as well as local services.

Interestingly, they already have 25% to 40% of total long distance revenue through the fees they charge long distance carriers to connect to transport traffic to local customers. Because there was never any serious competition for these local connections, the former Bells were able to keep these prices higher than those for interstate services. Having a lock in many areas on local connections to the Internet will give the incumbents with both local access and broadband long-haul networks a tremendous advantage. Integrating these former competitors with their different corporate cultures will be a major challenge.

Impact of Consolidation on Consumers and Business Customers

These industry consolidations will result in fewer choices for consumers for local and long distance service. The main alternative to incumbent telephone companies will be cable operators, whose voice offerings are becoming more widely available. However, having two main options, cable operators and former Bells, does not generally lead to





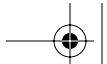
price decreases. In particular, the presence of fewer competitors may keep broadband service costly. Because Voice over IP depends on relatively costly broadband connections, low-income consumers may have less access to lower cost, more innovative VoIP service. In addition, if the trend of less regulatory oversight continues, cable operators and incumbent telephone companies may have the option of cutting off access to competitors such as Vonage or charging high fees for access to incumbents' broadband links needed for VoIP service. For example, SBC implemented a service called Tiptop that levies higher fees to VoIP providers than other traditional carriers to connect to their network for sending Vonage-originated traffic to SBC customers. The service triggered criticism by the FCC, which said it would not tolerate incumbents charging high prices that might hurt rivals.

However, as cellular service matures, it will gradually replace more landline service for voice service, giving residential customers another option for voice telephony. In addition, wireless may also become acceptable for broadband-speed Internet access. But this is still very much a future.

Enterprise customers who expected to have offerings from incumbents as well as CLECs for long distance services will find no increase in the number of choices. Actually, because of regulatory changes, offerings from smaller CLECs will become more costly, and options will decrease. Moreover, in the short term, these mergers may mean lower levels of service. Once these mergers are approved, integrating operation and support systems for billing, maintenance, and installation will be a massive undertaking and may lead to service snafus. Unlike consumer bills, large companies often have custom contracts that require complex billing arrangements. These are already complex to administer, and many enterprises spend enormous amounts of time working with suppliers to correct billing errors. Mergers may exacerbate these problems. In addition, corporate customers will have the added confusion of dealing with staff changes when sales and customer service departments are combined.

In the long run, the industry may benefit from a slimmed down structure with fewer customers divided up among a more limited number of carriers. Moreover, over the next decade, new, lower cost, fixed wireless technologies may be viable and available for high-speed Internet access and voice services. In addition, cable multiple service operators (MSOs) have stated their intention and are starting to offer services to business customers. If newly consolidated incumbent telephone companies keep prices high, this will leave more opportunities for new competitors and lower cost access technologies. See Chapter 9, "Wi-Fi, Wireless Broadband, Sensor Networks, and Personal Area Networks," for information regarding wireless broadband access.





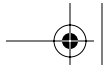
Shrinking Numbers of Competitors— Financial Turmoil

The Association for Local Telecommunications Services (ALTS) listed 410 CLECs in its 2001 directory. By November 2004, Chicago-based research firm New Paradigm Resources Group, Inc. announced there were only 63 CLECs in the United States. Many of the surviving entities have filed for bankruptcy or reduced the scope of their operations. WorldCom (now MCI) and Global Crossing filed for bankruptcy in 2002. The MCI filing was the largest bankruptcy in history. The number of carriers is also shrinking due to mergers. Investors have paid rock-bottom prices to purchase carriers in bankruptcy or near bankruptcy. For example, IDT bought WinStar, Teligent, and STAR Telecommunications. IDT paid \$55 million for bankrupt WinStar, which had previously spent \$5 billion on equipment for fixed wireless service.

Between 2000 and May 2003, 600,000 people lost their jobs in the telecommunications industry in the United States. This statistic appeared in the May 12, 2003 online article “Feet to the Fire” by Mairin Burns in *Investment Dealers’ Digest (IDD)*. In addition to jobs, hundreds of thousands of people lost their entire pension and huge portions of savings they had invested in companies that subsequently filed for bankruptcy. The investment community lost billions of dollars of equity in telecommunications companies. To cite one example, Cincinnati Bell purchased interexchange carrier IXC Communications for \$3.2 billion in 1999 and sold it for \$108.5 million to Cequel III (owned by Corvis) in 2003. According to the *Washington Post’s* July 23, 2002 article “WorldCom Files Record Bankruptcy Case” by Christopher Stern and Carrie Johnson, WorldCom’s bankruptcy resulted in a loss of \$180 billion in stock value from its peak in 1999. Many carriers have emerged debt-free from bankruptcy. However, shareholders, creditors, and pension holders lost billions of dollars.

What Went Wrong?

Too many competitors, mismanagement, and high costs, as well as overcapacity in interstate fiber networks, were key factors in the industry shakeout. Moreover, competitors often underestimated the costs and difficulties in attracting sufficient customers to cover the ongoing capital required to build infrastructure and provide marketing, billing, and customer service. Competitive local exchange carriers also underestimated the Regional Bell Operating Companies’ enormous lobbying clout, which resulted in their ability to influence the FCC and particularly Congress to pass regulations favoring incumbents. Because of the large number of competitors, prices dropped dramatically, making it difficult to cover operating expense from revenue. Finally, in the early days after passage of the Telecommunications Act of 1996,



acquiring connections to incumbent facilities often took longer than expected and resulted in implementation snafus, followed by customer defections.

Moreover, the Circuit Court of Washington, D.C. overturning of the FCC’s Triennial Review Order on leasing discounts resulted in competitors essentially losing the regulatory battle against incumbent local exchange carriers. (See “Regulatory Issues” later in this chapter.) The FCC’s implementation of new rules dramatically increases costs to lease incumbents’ facilities and decreases the viability of resale. Unfortunately, for the years that discounts were in place, many CLECs built whole strategies around using these services to sell bundles of Internet access, local calling, and long distance to residential and small business customers. Many competitors are refocusing their strategy around Voice over IP and, in the future when the technology matures, wireless technologies such as WiMAX to reach customers independent of Bell local loop facilities. (See Chapter 9 for a discussion of wireless broadband access.)

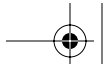
INTERMODAL COMPETITION—CABLE TV, WIRELESS, AND UTILITIES.....

Intermodal competition is competition between services based on different media and technology. Challenges to incumbents based on wireless, cable TV, and Internet protocol (IP) technologies are examples of intermodal competition. Competition from cable TV operators, which are introducing voice service using Voice over Internet Protocol, is in early stages but is expected to grow quickly. According to the National Cable & Telecommunications Association 2003 Year-End Industry Overview, by the end of the third quarter of 2003, cable TV operators supplied only 2.5 million of the approximately 183 million local lines in service. Most of these early implementations use circuit switched rather than IP technology. Wireless providers will also pose competitive threats as the quality, technology, and reach of their networks improve. However, utilities, some of which will offer Internet access over their fiber networks, will likely serve smaller niche markets in rural areas and developing nations. Table 3.2, shown later, lists the major wireline carriers in North America.

Cable TV Multiple Service Operators (MSOs)—Wired to the Max

According to consulting firm Kagan Research LLC, as of December 2003, cable systems are available to 95% of occupied homes that have television service. Infrastructure capable of supporting multimedia service gives cable operators a formidable head start in selling a mix of “triple-play” services: television, telephony, and Internet access. Cable companies hope to increase their share of local telephone customers by implementing Voice over IP. They are attracted to the lower cost of implementing





VoIP. In addition, because VoIP compresses voice, removes silences, and puts voice into packets that are interleaved with data and TV signals, it uses less capacity than traditional circuit switched telephony, which requires dedicated bandwidth. This leaves more capacity on cable operators' fiber and coaxial cable infrastructure for advanced service such as movies and television on demand.

Like RBOCs, cable operators have an enormous customer base, hefty monthly cash flows, billing expertise, and vast networks. However, they are losing television subscribers to satellite companies. According to media research firm Kagan Research LLC, in the first six months of 2004, cable operators lost about 300,000 customers. Satellite operators started gaining market share when they won the right to offer local programming in 1999. Cable operators, who until recently had no real competition, have raised prices consistently, to the dismay of cost-conscious consumers who are turning to lower cost satellite TV.

Cable multiple service operators (MSOs), all of whom spent large sums of money to upgrade their facilities for Internet access, interactive video, and recently for voice telephony, have plans to market more of their services to small and medium-size businesses. In many cases, their networks are already in place near businesses. All that is required is new fiber from the cable network to the customer premises.

According to Reuters' online story "U.S. Cable Rates Rose 5.2 pct in Latest Year-FCC" dated January 28, 2004, the four largest cable operators, Charter Communications, Comcast Corporation, Cox Communications, and Time-Warner Inc. serve about 50.5% of the cable TV market.

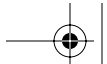
Mobile Wireless Services

As data speeds, coverage, capacity, and quality improve, mobile wireless service providers will become important competitors to landline service. In the midst of revenue declines and layoffs in landline companies, the mobile wireless market experienced increases in total revenue, capital investment, and number of employees. Moreover, in November 2003, local number portability was extended to allow subscribers to change their landline numbers to their wireless phone. This increased the likelihood of substitution of wireless phones for landlines. Mobile wireless is also evolving as a way to access the Internet.

However, cellular networks need to improve their coverage, capacity, and data speeds to increase the number of customers who use wireless as their only voice service or as their Internet access. Cellular operators have the enormous advantage of not needing to lay cable to every customer they serve. Although they don't have the burden of laying fiber to each customer, they do face large infrastructure expense.

These improvements require upgrades or replacements at the 162,986 cell sites in the United States that the FCC's May 2004 *Trends in Telephone Service* reported





are in service. A cell site consists of the antenna and equipment that manages the traffic within the cell site's coverage area. In addition, upgrading mobile networks often requires adding new cell sites and purchasing rights to additional spectrum (air waves). In 2003, the Cellular Telecommunications Internet Association reported that wireless providers invested \$19 billion in capital improvements.

Cellular providers, in response to competition from nationwide competitors, lowered their prices and earned reduced average revenue per minute (ARPU) on voice services. However, sales of data services such as short messaging service, e-mail access by corporate customers, and downloadable ring tones have started to reverse the trend of lower revenue per user. A challenge for carriers is lowering churn, customers changing wireless carrier. Churn costs carriers billions of dollars annually because of the cost to activate and deactivate service. The five largest carriers lose between 1.7% and 3.3% of their customers per quarter.

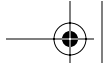
It is possible that industry consolidation will reduce price competition and improve margins. Until mid-2004, there were six nationwide cellular carriers. In 2004, Cingular purchased AT&T Wireless, and in January 2005, Sprint announced its agreement to merge with Nextel, leaving four nationwide carriers when the Sprint merger is completed. Verizon Wireless and T-Mobile are the other two nationwide mobile carriers. According to the Cellular Telecommunications Internet Association, as of June 2004, there were 170 million wireless mobile subscribers. There are 183 million landlines.

Utilities—The Third Pipe

Because electric utilities have enormous fiber-optic networks, which they use for signaling, they are potential competitors for high-speed Internet access and voice telephone service. Some subsidiaries of utilities offer wholesale service to other carriers. For example, they sell dark fiber to cellular companies who use it to connect their antennas to mobile switches. Some utilities are considering a technology called broadband over power lines (BPL) to provide retail telecommunications services. BPL is being offered in 18 states to a limited number of customers on a mainly trial basis. In addition, Current Communications offers it in a joint venture with energy company Cinergy near Cincinnati, Ohio. The Federal Communications Commission has termed broadband over power lines a potential "third pipe" (in addition to cable and DSL modems) for rural areas that sometimes have no broadband service for consumers and in which Internet access available for businesses is expensive. Lack of affordable Internet access hampers rural and sparsely developed areas from keeping and attracting commercial development.

In addition to existing fiber networks, utilities have expertise in billing and customer service and lists of customers to whom they can market services. Moreover, technology that helps them retain business and consumer customers in their coverage





area benefits their overall business. Utilities that implement BPL may have the added benefit of using the technology internally to read meters, be notified of outages, and generally manage their network of power grids.

Broadband over power lines (BPL) overcame a regulatory hurdle in October 2004 with an FCC ruling. The FCC had been looking at whether BPL signals interfere with other services, including ham radios and emergency services, offered by the Federal Emergency Management Association (FEMA). In its ruling, the FCC stated that it will allow a small amount of interference in conjunction with the BPL service. However, it restricted the service in areas such as around airports and near Coast Guard stations where the interference might interfere with public safety. The FCC set up a system to monitor interference.

Municipally Controlled Utilities in Telecommunications

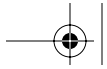
According to the American Public Power Association, 14.3% of customers in the United States get their power from publicly owned utilities, utilities that are departments of city governments or created by city governments with government controlled boards. Five hundred seventy of these public utilities offer some type of broadband service in their mainly rural areas. A February 12, 2004 article by Tim Kridel “Supremes Mull Municipal Broadband,” which appeared in *Light Reading*, quoted Render, Vanderslice & Associates, “In 2003, municipalities and public utility districts made up 32% of the fiber-to-the-home market and have accounted for the single largest builds.”

In March 2004, the Supreme Court ruled that states can block or limit telecommunications sales by municipalities. Thirteen states have various barriers to entry, including taxes and special regulatory approval requirements. Missouri has banned municipalities from telecommunications except those already in place. The RBOCs actively lobbied in states against municipalities providing broadband. The ruling did not impact cable TV and Internet services, both of which are not now classified as telecommunications services.

Previous Utility Telecommunications Losses

Many utilities, attracted by growth in telecommunications, entered telecommunications in the 1990s and lost millions of dollars. Examples include Enron, Williams, and Westar Energy. Montana Power & Light, which sold telecommunications on a wholesale basis, sold its utility business in 2001, changed its name to Touch American, and entered the retail market. Touch America purchased Qwest’s long distance assets in





Qwest's 14-state region, and later Qwest and Touch American sued each other over billing and other issues. Touch America lost its court case, filed for bankruptcy, and was purchased by Canadian telecommunications firm 360networks. Like failed CLECs, utilities underestimated the level of competition and swift drop in retail prices and overestimated the number of customers they would attract to cover infrastructure and ongoing operational costs.

Table 3.2 Major North American Wireline Carriers

Carrier	Primary Businesses	Background
AboveNet, Inc.	Metropolitan fiber rings	Formerly Metromedia Fiber Network, emerged from bankruptcy in September 2003. Owns largest independently provided metropolitan fiber network. It's in 13 U.S. cities and Europe. Sells high-speed data services to retail customers and carriers on its metropolitan networks. Offers backup data storage at its data centers. Craig McCaw through Fiber, LLC has a large stake in AboveNet.
Adelphia Communications Corporation	Multiple service operator (MSO) Cable TV	Adelphia provides cable TV service to 5.3 million subscribers. It is currently in bankruptcy. Adelphia's founder John Rigas and his son were convicted of criminal fraud charges by the federal government. Comcast is purchasing 2 million and Time Warner is purchasing 3.3 million of Adelphia's customers.
Aliant Inc.	Canadian incumbent local exchange carrier (ILEC) and wireless provider	Service provided in New Brunswick, Newfoundland, Labrador, and Nova Scotia. Provides wireline as well as wireless service. BCE owns 53%.
ALLTEL Corporation	Independent ILEC Cellular provider	ALLTEL is the sixth largest LEC in the United States with over 3 million local lines in 15 states. It sells cellular service and in 2002 purchased CenturyTel's cellular operations. It is a CLEC in some states outside of its home territory.



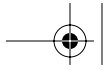
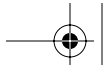


Table 3.2 Major North American Wireline Carriers (continued)

Carrier	Primary Businesses	Background
AT&T	CLEC Data network services Internet backbone Hosting	The number-one long distance provider with the largest nationwide network and an extensive international network. Its consumer division markets only Voice over IP and DSL services. Signed a merger agreement with SBC.
BCE Inc.	Canadian ILEC Mobile wireless Interexchange fiber network	Canada's largest telecom company. Owns Bell Canada, Bell Mobility, and satellite organizations. It has stakes in broadcasting, newspaper, and portal firms and owns 360networks' fiber network. Until 2000, it had a stake in equipment supplier Nortel Networks.
Broadview Networks	CLEC	New York City-based provider of voice and data services to small and medium-size businesses in the northeastern and mid-Atlantic United States. Purchased Network Plus of Massachusetts, which had filed for Chapter 11. Merged with CLEC BridgeCom Holdings in 2005.
CenturyTel Inc.	Independent ILEC Interstate fiber network Cable TV	CenturyTel is the eighth largest local exchange carrier in the United States. It also owns an interstate fiber network. CenturyTel purchased local lines in rural areas from Verizon. Its services are scattered over 20 states in mostly rural and some suburban areas. It also sells cable TV service.
Charter Communications	MSO Cable TV	Charter is the third largest cable TV multiple system operator (MSO). Paul Allen, a cofounder of Microsoft, is the majority owner of Charter. It was established through the purchase of smaller cable TV operators.

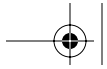
continues



**Table 3.2** Major North American Wireline Carriers (continued)

Carrier	Primary Businesses	Background
Citizens Communications Company	Independent ILEC CLEC	A former utility, Citizens, is the seventh largest independent telephone company. It operates under the Frontier brand. It purchased the Frontier lines from Global Crossing and other lines from GTE (now Verizon). It owns CLEC Electric Lightwave. Citizens is for sale.
Comcast Corporation	MSO Cable TV TV networks	Comcast is the largest MSO cable TV operator in the United States with 21.5 million subscribers. It purchased AT&T's cable properties, TCI and MediaOne. Comcast owns Outdoor Life Network, game network G4techTV, The Golf Channel, and E! Entertainment Television.
Corvis Corporation	CLEC Wholesale fiber Optical network manufacturing	Sells voice and data service mainly to enterprises. Purchased CLEC Focal Communications and fiber network provider Broadwing, previously owned by Cincinnati Bell. Corvis manufactures the optical networking equipment used by Broadwing.
Covad Communications Group, Inc.	CLEC Hosted IP Wholesale and retail DSL	Covad installs DSL equipment in Bell offices. Large CLECs resell its DSL service. Purchased Voice over IP provider GoBeam. Covad offers Voice over IP to resellers as well as directly to small and medium-size business customers. Emerged from bankruptcy in 2001.
Cox Communications	MSO Cable TV Video on demand	Cox Communications is the fourth largest multiple system operator cable TV in the United States. It owns video-on-demand provider IN DEMAND and has a 25% ownership in Discovery Communications. Its parent company, Cox Enterprises, owns newspapers, radio and television stations, and auto auction organizations. It has announced its intention to become a private company.



**Table 3.2** Major North American Wireline Carriers (continued)

Carrier	Primary Businesses	Background
Equant N.V.	International data Hosting	International, Netherlands-based data network services carrier. Offers international data connectivity, Web hosting, and network design services to global companies. France Telecom owns Equant.
Global Crossing Ltd.	Undersea cables Retail and wholesale telecommunications	International carrier in the United States, Europe, and Asia. Global Crossing filed for bankruptcy in 2002. The SEC and the Justice Department investigated it for questionable accounting and business practices. Now owned by Singapore Technologies' Telemedia (ST Telemedia). Bought and later sold independent ILEC Frontier.
IDT Corporation	CLEC IP wholesaler Prepaid calling cards	Sells retail and wholesale IP and traditional long distance services as well as prepaid calling. Purchased bankrupt carriers Winstar, Teligent, ICG Communications, and Star Telecommunications. Has a stake in Voice over IP provider Net2Phone.
ITC^ DeltaCom, Inc.	Regional CLEC Wholesale fiber	Largest CLEC in southern and southeastern United States. Owns fiber network provider BTI Telecom. DeltaCom sells to retail customers and provides wholesale capacity to other carriers. Emerged from Chapter 11 bankruptcy.
Level 3 Communications, Inc.	Wholesale fiber Undersea cable Software distribution	Sells wholesale voice and data service on its IP-based fiber rings in North America and Europe as well as undersea in the Atlantic ocean. Purchased most of bankrupt Genuity, parts of which it then sold. Derives 50% of its revenue from its software distributors, CorpSoft and Software Spectrum. Owns 24% of cable TV competitor RCN.

continues

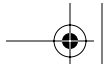


Table 3.2 Major North American Wireline Carriers (continued)

Carrier	Primary Businesses	Background
MCI, Inc.	CLEC Internet backbone Hosting Data service Wholesale	Second largest long distance provider in the United States. Operates in 200 countries worldwide. Changed its name to MCI following bankruptcy as WorldCom. WorldCom grew by purchasing the largest competitive access providers (CAPs), MFS and Brooks Fiber, as well as MCI, WilTel, IDB, and Metromedia Communications. It expanded its data services via purchases of Web hosting company Digex and Internet backbone provider UUNET. Has agreed to be purchased by Verizon Communications.
McLeodUSA Incorporated	CLEC	A facilities-based CLEC that operates in 25 states in the western and midwestern United States. Emerged from bankruptcy in 2002. Investment firm Forstmann Little owns a controlling interest. McLeodUSA sold its directory business and data services units to raise capital.
RCN Corporation	Cable TV overbuilder Long distance Dial-up Internet	Largest overbuilder in the United States. (An overbuilder competes with cable TV operators by running fiber to its cable TV customers.) Filed a plan to emerge from bankruptcy. Level 3 owns 23% and Paul Allen's Vulcan Investments 16%. Offers service in metropolitan Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, and Washington, D.C.
Rogers Communications Inc.	Canadian MSO cable TV Mobile wireless	Rogers is the largest cable TV provider in Canada, operating mainly in the eastern sections of Canada. It also owns 45% of Rogers Wireless. Rogers' media unit owns radio stations, 2 TV stations, magazines, and 270 video stores.



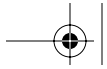


Table 3.2 Major North American Wireline Carriers (continued)

Carrier	Primary Businesses	Background
Shaw Communications Inc.	Canadian MSO cable TV Satellite TV	Shaw is Canada's second largest cable TV operator, with franchises in the western parts of Canada. It offers satellite TV through its Canadian Satellite Communications company.
Sprint Corporation	Retail and wholesale long distance Mobile wireless Internet backbone Independent ILEC	Sprint is the third largest long distance company in revenue and third largest wireless provider. Sprint operates a large Internet backbone. It owns 17% of ISP EarthLink and 50% of Virgin Mobile, USA, which resells Sprint PCS wireless service in the United States. It has announced its intention to spin off its local phone company. It has announced its purchase of Nextel.
Telefonos de Mexico, known as Telmex	Mexican ILEC Mobile wireless	Telmex is the incumbent telephone company in Mexico. It has stakes in many Latin American wireline and wireless carriers. It is majority owned by Carlos Slim Helu.
TELUS Corporation	Canadian ILEC Mobile wireless CLEC	Second largest telecom company in Canada and the incumbent LEC in British Columbia and Alberta. Owns TELUS Mobility. Will become the largest carrier in Canada if successful in its bid for wireless provider Microcell. TELUS is a facility-based CLEC in eastern and central Canada.
Time-Warner Cable	MSO cable TV ISP	Time-Warner Cable is the second largest multiple system operator in the United States. It owns ISP Road Runner, which it uses in conjunction with its Internet access for e-mail and Internet services. Its parent media conglomerate Time-Warner owns America Online, HBO, Warner Brothers, Turner Broadcasting, TNT, <i>Time</i> magazine, and Time-Warner Books.

continues



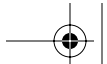


Table 3.2 Major North American Wireline Carriers (continued)

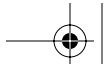
Carrier	Primary Businesses	Background
Time-Warner Telecom Inc.	CLEC Wholesale fiber	Sells wholesale fiber capacity to wireline and wireless carriers and retail long distance to small and medium-size businesses in 22 states. Time Warner owns 44%.
VarTec Telecom, Inc.	Long distance, wireless, and DSL reseller CLEC	Started out in 1989 as a 10-10 “dial-around” provider. Later purchased long distance reseller Excel Communications. It resells long distance, DSL, and wireless service. Its subsidiary eMeritus is a facilities-based CLEC. Large, privately owned carrier with 2003 sales of \$1.3 billion.
Vonage Holdings Corporation	Voice over IP	Sells Voice over IP to residential customers and small businesses that access the service over cable and DSL modems. In January 2005, Vonage announced it had 390,000 customers.
XO Communications, Inc.	CLEC	XO is a facilities-based CLEC that operates fiber rings in metropolitan areas and a national fiber network. It serves some customers via fixed wireless. It operates in 21 states. Investor Carl Icahn invested in the company when it emerged from bankruptcy in 2003. It purchased Allegiance Telecom in 2004. XO was originally called NEXTLINK when Craig McCaw founded it.



REGULATORY ISSUES

Regulatory rules are critical factors in the success or failure of carriers. They impact pricing, billing practices, and decisions on whether to build or lease network infrastructure. The following is a quote from BellSouth’s 2003 annual report:





“Our future operations and financial results will be substantially influenced by developments in a number of federal and state regulatory proceedings. Adverse results in these proceedings could materially affect our revenues, expenses, and ability to compete effectively against other telecommunications carriers.”

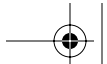
Unbundled Network Elements (UNEs)— Competitors Leasing Parts of RBOCs’ Networks

When the Telecommunications Act of 1996 was enacted, Congress felt that it was not economically feasible for the RBOCs’ rivals to build all their own facilities. They therefore mandated that incumbents like SBC make their local networks available at replacement cost plus a reasonable profit to competitors such as MCI and AT&T. Replacement cost discounts are known as Telric, total element long-run incremental cost. Telric calculations were used to price *unbundled network elements (UNEs)* and UNE-P for unbundled network element platforms. Unbundled network elements included the local copper loop from the incumbent to the customer, high-speed lines between the CLEC and the incumbent central office, RBOC central office switch ports connected to local loops, operator services, and signaling services to link central offices to, for example, billing systems.

Many competitive local exchange carriers including MCI, Sprint, and AT&T often leased entire platforms, UNE-P, at a discount rate to offer service without building facilities. Some CLECs used this strategy primarily for residential service, and others built their whole business around the resale of UNE-P. Other CLECs built their own facilities in areas where they had concentrations of business customers and used UNE-P in other areas.

Telric Rates—Total Element Long-Run Incremental Cost

The FCC specified that unbundled network element discounts were to be based on the cost to replace facilities rather than the original cost to build them. Because of technological advancements and lower manufacturing costs, the use of Telric to calculate leasing rates resulted in the former Bells often leasing equipment to competitors at prices below their original cost.



Elimination of Most UNE Fees

In March 2004, the United States Court of Appeals for the District of Columbia struck down the FCC's February 20, 2003 Triennial Review Order. The Triennial Review Order had mandated that individual state utility commissions rule on pricing and availability of UNE discounts when competitors lease facilities to reach residential and small business customers. The Triennial Review Order also gave states the right to decide on UNE pricing and availability for various services provided to large and medium-size enterprise customers by CLECs. Rates and availability were to be based on the viability of competition in each state.

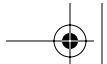
The Court of Appeal's March 2004 ruling struck down state authority and ordered the FCC to develop nationwide pricing rules for competitive access to incumbent facilities such as central office switch ports, local loops, and high capacity T-1 (1.54 megabits), T-3 (44 megabits), and optical carrier (155 million bits per second and higher) lines.

To the disappointment of competitive carriers, the FCC and the Justice Department did not appeal the circuit court's ruling to the Supreme Court. The circuit court's ruling will end most of the deep discounts available to competitors in metropolitan areas under the unbundled network element (UNE) pricing. The FCC did spell out a limited number of conditions where eliminating UNE rules impairs competition.

The Impact of Higher Leasing Rates

In the weeks following the FCC and the Justice Department's decision not to appeal the circuit court's ruling, nine CLECs announced major layoffs. Five of the nine either went out of business or declared bankruptcy. AT&T announced that it stopped marketing public switched telephone service to consumers. As a result of the circuit court's decision, costs for carriers without their own local central office switches, fiber networks, and local lines will increase dramatically. As the FCC finalizes rates, more CLECs have decreased the range of their offerings or ceased operations entirely.

According to the FCC's May 2004 *Trends in Telephone Service*, as of June 2003, CLECs own about one-fourth, or 6.3 million, of the local loop facilities over which they sell services. This figure exaggerates the number of premises served by CLEC facilities. According to the FCC's Industry Analysis and Technology Division, each T-1 and T-3 high capacity trunk is counted as multiple lines. The division assumes that each trunk uses a percentage of their 24 or 672 channels for voice. For the most part, CLECs depend on incumbents' local loops to reach customers. In addition, the two largest CLECs, AT&T and MCI, owned many of the 6.3 million lines cited above. They will both soon be purchased by Regional Bell Operating Companies that will then own these facilities.



Small businesses will feel the biggest impact of these changes. According to the Small Business Administration, 29% of small businesses in metropolitan areas use CLECs. The FCC set rules in December 2004 spelling out conditions under which T-1 and T-3 UNE rates can be phased out. The capability for RBOCs to phase out UNE discounts apply to about 47 metropolitan central offices for T-1 and about 100 for T-3. The FCC has also ordered that discount access to central office ports be phased out. This will impact the over half of the CLECs who use UNE-P for most of their offerings.

Local loops that competitors lease from incumbents are referred to as UNE-L for unbundled network element loop (see Figure 3.4 for UNE-L). Analog local loops have not been impacted so far by FCC rulings. However, as RBOCs build out fiber closer to customers, these analog loops will disappear. The FCC has ruled that former Bells do not have to share fiber facilities they build within 500 feet of customers. Thus, where fiber replaces copper or is within 500 feet of customers, local loops will not be available to competitors. UNE-L makes it more feasible for competitors to invest in central office switches and fiber facilities between switches because it leaves in place a way for CLECs to economically extend service to small and medium-size customers. The CLECs are expected to appeal the FCC December 2004 ruling in court.

Where UNE-L is not available, consumers and small and medium-size businesses will have to rely on emerging technologies for competitive choices. These choices include intermodal options previously discussed and possibly new fixed wireless substitutions for local loops such as WiMAX (see Chapter 9 for a discussion of

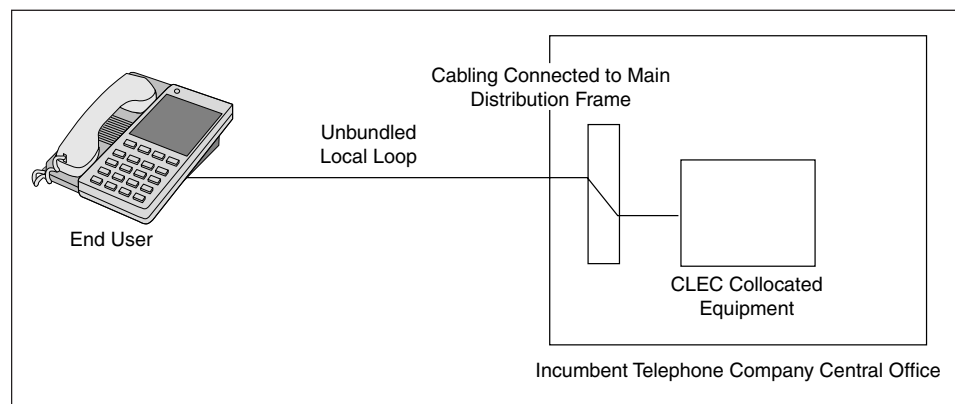
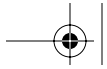


Figure 3.4
A local loop leased by a CLEC.





WiMAX). To date, these wireless services are not widely available. However, cable offerings will become more readily available to businesses.

According to an August 2004 interview with Jerry Watts, ITC^DeltaCom vice president of government and industry affairs and president of CompSouth, a trade association of 19 carriers serving customers in the southeast:

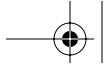
“Relative to the circuit court decision’s ultimate impact on the industry, at this point, it’s too early to tell. There are many issues still undecided. Some of those decisions have to do with jurisdictional issues. For example, how much jurisdiction do state commissions retain relative to the establishment of replacement rates for Telric UNEs that are discontinued? I’m still disappointed and amazed that the Bush administration did not appeal the court’s order and was willing to essentially let the D.C. circuit court rewrite the Telecom Act.”

The most troublesome thing is the potential impact on the availability of the UNE-Platform at cost-based Telric rates. The vast majority of competitive carriers’ lines serving small business and residential customers are UNE-P lines that the carriers purchase from the various Bell companies. If, in fact, this order results in these no longer being available, then I think there will be a pretty dramatic impact on the ability of a lot of smaller carriers to compete. Our company is a substantially facilities-based company, and UNE-P is just a piece of our market strategy that we use for some residential and small business offerings. We use high-capacity loops and transport to connect customers to our switches, and these UNE’s are also being reviewed. I hope that we get some rational policy from the FCC when they make final rules.”

Regulating Cable Modems— Cable, Information, or Telecommunications Services?

Three possible regulatory classifications for cable modems are as information, as cable, or as telecommunications services. Cable modems are currently regulated as an information service. However, DSL modem service is regulated as a telecommunications service. This puts DSL service at a disadvantage.





Services classified as telecommunications service must do the following:

- Provide enhanced 911 services so that the emergency answering agency receives the caller's telephone number, which is associated with an address in the agency's database.
- Contribute to federal and state Universal Service Funds.
- Allow competitors access to their networks for services to competitors' customers.
- Open their networks to the FBI for court-ordered surveillance under Communications Assistance for Law Enforcement Act (CALEA).
- Provide privacy to subscribers by not revealing customers' information to other companies. Information can be revealed to telcos' affiliates unless customers choose to "opt out."
- Report major outages to the FCC.

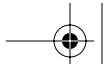
The issue of whether cable modem service should be classified as a cable service (and be subject to local franchise fees), a telecommunications service, or an information service has been the subject of a series of court cases. In October 2003, the U.S. Court of Appeals for the Ninth Circuit ruled that the FCC should classify cable broadband as a telecommunications service, not as an information service. This ruling has not been implemented, and the Federal Communications Commission along with the Justice Department is expected to appeal the ruling to the Supreme Court.

Currently, cable operators do provide access to Voice over IP competitors, including AT&T, Vonage, Skype, and Net2phone. This enables cable modem customers to use these companies' Voice over IP over their cable modem connections. Some cable operators also allow ISPs such as EarthLink to access their networks and sell competing Internet service provider services such as e-mail to cable modem customers. If the Supreme Court upholds the Ninth Circuit Court ruling that cable modems are telecommunications services, cable operators will be required to open their networks to competition. Regardless of the ruling, the FCC has stated that it intends to require cable operators and Voice over IP suppliers to open their networks for surveillance as required in the 1994 Communications Assistance for Law Enforcement Act (CALEA).

Voice Over IP—Regulatory Issues

In February 2004, the FCC ruled that voice calls carried from personal computer to personal computer are information services and thus are not subject to common carrier regulations. However, Voice over IP calls from personal computers to telephones





connected to the public switched network are currently considered telecommunications services. However, the FCC is reviewing these rules. The FCC does allow states to provide Voice over IP customers protection against fraud and other state laws governing marketing, advertising, and other business practices.

In another ruling, in November 2004, the FCC further ruled that Voice over IP traffic should be regulated as an interstate service at the national, not the state, level because it's not always clear where calls originate or terminate. This makes it less cumbersome for VoIP providers, as they will not be required to obtain state-by-state approval to offer service. The FCC did state that VoIP providers are required to provide emergency 911 services equivalent to that provided by incumbent telephone companies.

Regulatory issues are still very much up in the air. The commission has stated that it will look at whether VoIP should be classified as an information or telecommunications service later. It also stated its intention to address in 2005 VoIP providers' obligations to pay access fees and contribute to universal service fees. Currently, information services are exempt from these fees. Also not addressed yet is the issue of states' rights to tax Internet phone service. This is likely to be addressed by Congress.

More regulatory uncertainty was created when public utility commissions in California and Minnesota appealed the FCC's November 2004 decision to two different appeals courts. The courts can accede to the FCC's decision or strike it down. In the event that it strikes it down, the FCC may appeal to the Supreme Court. The states expressed concerns about losing state-imposed access fee subsidies used for poor and rural areas. They are also concerned about regulation on the national level of local 911 capabilities.

Access Fees—A Shift in Balance Between Local and Long Distance Costs

Carriers pay access fees to local telephone companies for transporting long distance traffic to and from local customers. The FCC sets access fees for interstate traffic, and state utility commissions set access fees for intrastate traffic. Access fees are designed to recover local exchange carriers' (LECs') variable costs for originating and terminating long distance calls. Historically, intrastate access fees tended to be higher than cost as a way to subsidize local service so that telephone companies could keep rates for residential customers affordable.

Rules promulgated by the FCC on May 7, 1997 lowered access fees by \$18.5 billion over five years. This action shifted costs to residential and business users in the form of higher monthly subscriber line charges (SLCs). The decrease in access





fees is one factor in lower long distance rates and the resultant cost shifts to consumers in the form of subscriber line charges.

Traffic Exempt from Access Fee Rules— Voice Over IP and Wireless

Access fees for toll traffic do not currently apply to Voice over IP calls that originate and terminate on the Internet. Nor do access fee regulations apply to wireless carriers. Rather, wireless carriers are required to negotiate contracts with each carrier to which they connect so that the wireline carrier is able to cover its costs for transmitting calls between wireless networks and the public switched telephone network.

If Voice over IP service remains exempt from access fees, the RBOCs will lose an important source of access fee revenue. According to an April 14, 2004 online article “S&P Cautions Bells on VOIP” in *Light Reading* by Justin Hibbard, RBOCs derive 22% of their revenues from access fees.

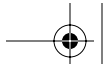
Reciprocal Compensation—Access Fees for Carrying Local Traffic

Carriers pay each other reciprocal compensation fees for terminating and originating local traffic. The FCC ruled in April 2001 that Internet-bound dial-up traffic, largely from incumbent carriers to CLECs, is interstate information access and is not eligible for reciprocal compensation. Rather than eliminating the fees entirely, they were dramatically reduced over a two-year period at transitional rates. Prior to this ruling, many CLECs received a large portion of their revenue in the form of reciprocal compensation for terminating dial-up traffic to Internet service providers.

Access Fee Reform—Making Access Fees Simple to Administer and Fair

In 2001, the FCC released a Notice of Proposed Rulemaking about establishing a unified intercarrier compensation plan to include wireless, local, and Internet-based services as well as wireline voice traffic. The FCC has stated that its goal in reforming access fees is to have one system of access fees regardless of technology. The FCC announced that it is considering eliminating all access fees that carriers pay each other for terminating and originating traffic to each other’s customers. The FCC termed this





approach bill and keep. With *bill and keep*, carriers recoup the costs of originating and terminating traffic from their own customers rather than from other carriers.

Bill and keep will transfer more costs to end users in general. It will impact rural customers the most. Rural telephone companies depend on higher-than-national-average access fees as well as universal service fees to subsidize their high costs of providing telephone service. They are concerned that a major decrease in access fees will force them to raise prices for basic dial tone.

Industry groups convened to reach agreement on access fee reforms have to date failed to reach a consensus. Dissatisfaction with bill and keep occurs among carriers who don't send each other a roughly equivalent amount of traffic. Incumbent local exchange carriers are concerned that bill and keep will raise their costs by decreasing access fees, making them less competitive. The National Association of Regulatory Utility Commissions feels states should continue to have a key role in determining intrastate access fees. They do agree that local phone companies should charge a single rate to terminate any type of traffic, including wireless, Voice over IP, and circuit switched calls to consumers.

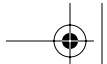
GAMING THE ACCESS FEE SYSTEM

To make up for decreasing margins, lower revenue, and increased competition, some carriers in recent years have attempted to "game" the access fee system to either save money or earn extra revenue using access fee schemes.

For example:

- In one lawsuit, AT&T accused MCI of disguising interstate traffic as local so that calls from MCI customers to AT&T would incur lower access charges.
- In another lawsuit, one CLEC accused another CLEC of charging unlawful access fees for toll-free traffic that originated at wireless carriers who are not entitled to federal access fees.
- In another plan, CLECs collocate information service providers' audio conference equipment at their central office switch site. A large part of the revenue they receive for conference calling is derived from access fees they charge interexchange carriers to terminate the audio conferencing traffic. When customers call a telephone number connected to the conference equipment, the local CLEC charges access fees to the customers' interexchange carrier for terminating the calls.





APPENDIX

Table 3.3 Major Features of the Telecommunications Act

<p>The Telecommunications Act of 1996 outlined provisions by which competitors were to be allowed to lease and resell portions of incumbent telephone company networks so that they could compete without installing brand new infrastructure in cities and metropolitan areas. Parts of the Telecommunications Act apply also to cable TV providers and broadcasters.</p>	
<p>Bell Company entry into inter-LATA service</p>	<p>The first step in the process was state utility commission approval. The FCC, with feedback from the Justice Department, then granted final permission for the Bell companies to sell in-region long distance.</p>
<p>Approval to enter long distance—the 14-point checklist</p>	<p>Each Bell had to have signed agreements with facilities-based carriers that use predominately their own switches and cabling for carrying customers' calls, unless no facilities-based carrier had requested interconnection. The 14-point checklist spelled out requirements for interconnection agreements.</p>

Table 3.4 Regulatory Highlights

<p>Landmark Acts and Court Rulings</p>	<p>Summary of Acts and Rulings</p>
<p>The Federal Communications Act of 1934</p>	<p>Congress created the Federal Communications Commission and gave it the authority to regulate interstate telephone, radio, and telegraph companies.</p>
<p>The 1956 Consent Decree</p>	<p>The Justice Department allowed AT&T to keep its monopoly but restricted it to common carrier functions. The Consent Decree mandated that any patents developed by Bell Labs, then AT&T, be licensed to all applicants requesting them. This led to microwave technology's availability to MCI and the ability of competitive carriers to build long distance networks.</p>
<p>The 1969 MCI Case</p>	<p>The Federal Communications Commission ruled that MCI, then known as Microwave Communications Inc., could connect its equipment to the public network provided that the network was not harmed. This decision opened the CPE market to AT&T rivals such as Rolm and Executone.</p>

continues



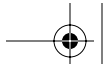


Table 3.4 Regulatory Highlights (continued)

Landmark Acts and Court Rulings	Summary of Acts and Rulings
The 1982 to 1983 Modified Final Judgment	<p>The Justice Department, in agreement with AT&T and with approval by Judge Harold H. Greene, agreed to a settlement that</p> <ul style="list-style-type: none"> • Divested the then 22 Bell Operating Companies (BOCs) from AT&T • Prohibited BOCs from inter-LATA long distance, sale of CPE, and manufacturing • Mandated that the local exchange companies provide equal access (dial 1) from end users to all interexchange carriers
The 1984 Divestiture	<p>The terms spelled out in the Modified Final Judgment were implemented on January 1, 1984. The 22 Bell telephone companies were merged into seven Regional Bell Operating Companies (RBOCs). The RBOCs were allowed to sell local and toll calling within the 197 defined local or LATA areas. They also retained the yellow pages. AT&T kept manufacturing, inter-LATA, and international toll calling.</p>
The Telecommunications Act of 1996	<p>Decreed that cable TV companies, electric utilities, broadcasters, interexchange carriers, and competitive access providers could sell local and local toll calling.</p> <p>Allowed local competitors interconnection to and resale of local telephone companies' facilities.</p> <p>Set fees for interconnection services at the LECs'* costs plus a reasonable profit.</p> <p>Set fees for resale at LECs' costs.</p> <p>Allowed Bell companies to immediately provide out-of-region long distance.</p> <p>Allowed Bell companies to provide inter-LATA toll calling and manufacturing in their regions under FCC approval or by February 1999, whichever is earlier.</p>



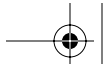


Table 3.4 Regulatory Highlights (continued)

Landmark Acts and Court Rulings	Summary of Acts and Rulings
	Dictated that FCC approval depends on the incumbent LECs meeting conditions of a 14-point checklist of opening its regions for competition.
FCC 2001—Deregulation of devices connected to the public switched network	The FCC will no longer set specifications for modems, phones, and fax machines connected to the public network. This will be turned over to a private agency. The FCC will continue to set standards for wireless devices.
January 2004—Supreme Court restricted phone lawsuits	The Supreme Court ruled that RBOCs cannot be sued under federal antitrust law over claims that they are not opening their networks to competition.

**The term “incumbent LEC,” or “local exchange carrier,” refers to the Bell Operating Companies and independent local exchange carriers.*

Table 3.5 FCC Rulings and Legal Challenges to the Telecommunications Act of 1996

Date	Decision or Action
June 27, 1996	The FCC spelled out rules on service provider portability. It stated that customers must be able to keep their telephone numbers when they change carriers. It also stated they must be able to keep “smart” features such as call waiting when they change carriers.
August 8, 1996	The FCC set rules for calculating the wholesale fees that BOCs could charge competitors for network elements. It also identified seven pieces of the network that must be leased to rivals. The discounts were in the 17% to 25% range. Access fees to wireless companies were reduced by \$1 billion annually.
September 12, 1996	The FCC allowed utilities whose lines cross state boundaries into telecommunications.
October 15, 1996	The U.S. Court of Appeals for the Eighth Circuit stayed (denied) the FCC’s jurisdiction in setting interconnection and wholesale pricing at the local level. Stayed the FCC’s August 8, 1996 ruling.

continues



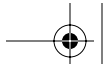


Table 3.5 FCC Rulings and Legal Challenges to the Telecommunications Act of 1996 (continued)

Date	Decision or Action
October 11, 1996	Justice Clarence Thomas refused to lift the October 15, 1996 stay by the Eighth Court of Appeals. Federal regulators had asked that the ruling be overturned.
November 11, 1996	The FCC appealed Justice Thomas's ruling. The Supreme Court upheld the Eighth Circuit's October 15, 1996 stay on the FCC's ability to set pricing guidelines.
May 7, 1997	The FCC lowered access fees, the fees interexchange carriers charge to transmit and receive calls from the local networks, by \$1.7 billion the first year and \$18.5 billion over five years. The FCC also raised end-user line charges by \$2.75 for each business line and \$1.50 for a second home phone line to pay for subsidies for schools and libraries mandated by the Telecommunications Act of 1996.
July 1997	The Eighth Circuit Court of Appeals suspended the FCC's pricing rules.
October 1997	The Eighth Circuit Court of Appeals suspended FCC authority and rules on procedures for interconnection to local networks.
December 31, 1997	The U.S. District Court excluded October's ban of SBC's and US West's entry into long distance. After long distance companies, the FCC, and the Justice Department appealed, the judge delayed implementation of this ruling.
January 19, 1999	The Supreme Court upheld the constitutionality of the Telecommunications Act of 1996 not to allow the baby Bells into in-region long distance before they open their networks to rivals. US West, SBC, and Bell Atlantic had argued that they were singled out because the Telecommunications Act did not apply to GTE, Frontier, and Southern New England Telephone Company.



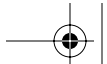
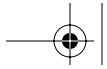


Table 3.5 FCC Rulings and Legal Challenges to the Telecommunications Act of 1996 (continued)

Date	Decision or Action
January 25, 1999	The Supreme Court upheld the FCC's authority to implement the Telecommunications Act of 1996 but directed the Eighth Circuit Court of Appeals to approve the FCC's national pricing plans and allowed exemptions of independent telephone companies to rules of the Telecommunications Act. If a network element is available elsewhere, the Bells should not be required to make it available to competitors (for example, Internet access, voice mail, or high-speed data lines). This effectively reversed the Eighth Circuit Court of Appeals' suspension of FCC jurisdiction of interconnection to local networks.
July 1999 and January 2001	The Eight Circuit Court of Appeals struck down FCC rules for how Bell telephone companies set fees for network elements they rent to CLECs. This ruling would have resulted in higher fees for CLECs. However, the FCC appealed to the Supreme Court, which stated that it would rule on the issue in 2001. The Court also stated it would rule on whether CLECs can rent packages of services if they request them rather than only individual pieces as now required.
September 1999	The FCC increased the number of unbundled network elements the Bells are required to provide competitors. The most important of these is the right for competitors to share the same Bell lines for voice phone service for DSL Internet access service. (See Chapter 5 for DSL service.)
January 2001	The U.S. Court of Appeals struck down an FCC rule that absolved SBC from making connections to data services such as DSL to competitors if the incumbent sold these data services through a separate subsidiary. It appears that instead of a separate subsidiary, SBC will be required to sell data service through a separate division that will be required to lease connections to competitors.
February 2001	On his last day of office, William E. Kennard, the outgoing chairman of the FCC, ruled that Bells must share local loops for voice and DSL when they are made up of a mix of fiber and copper as well as all copper, as is often the case.
May 2002	The Supreme Court ruled that telephone companies can challenge state utility agencies in federal courts on rates that state utility commissions set for leasing network and services to competitors.





To date, service provider and service portability are mandated.

Table 3.6 Four Types of Telephone Number Portability

Service provider portability	An end user's ability to keep his or her telephone number when changing carriers within the same rate center. The method approved by the FCC to accomplish service provider portability is local routing number (LRN). With LRN, every central office switch is assigned a 10-digit number. These switch numbers, or LRNs, reside in network databases. All telephone calls trigger a "dip" into a database to determine to which central office a call should be routed.
Location portability	Keeping a telephone number when moving to another rate center. Rate centers are the points within exchanges used to determine toll rates. Location portability is not mandated. It is thought that implementation of location portability will be driven by customer demand. The capability for large businesses to keep their telephone numbers when they move is significant. Voice over IP, covered in Chapter 4, enables customers to keep their telephone number at various locations.
Service portability	Keeping a telephone number when changing from wireline to wireless service. Service provider portability, which was phased in beginning November 2003, allows users to keep their telephone numbers when they change to wireless providers for their home telephone service or when they move their wireless number to their landline service.
One number for life portability	Keeping a telephone number regardless of location or service used. This opens up the possibility for out-of-area geographic portability between towns and states as well as between carriers. This is the case with toll-free 800, 888, 866, and 877 calling. These numbers are assigned to customers regardless of their location. No date is set or mandated for one number for life portability.

