

**The Transformation of  
the Telecommunications Industry**

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## **I. Introduction**

When the U.S. Court of Appeals vacated the Triennial Review Order in March of this year,<sup>1</sup> the status of the UNE Platform (UNE-P) was called into question. After months of industry discussions and the issuance of an interim order by the Federal Communications Commission,<sup>2</sup> there is still a high degree of uncertainty about the future of UNE-P. Because competitive local exchange carriers (CLECs) have used UNE-P almost exclusively to provide local service to residential customers, the question arises: if UNE-P were no longer available, what would be the effect on competition for telecommunications to residential customers? This paper addresses that question in the context of the development of competition in the telecommunications industry since the passage of the Telecommunications Act of 1996 (“Telecom Act” or “the Act”). It provides a perspective on the growth in competitive services, the structure of the industry today and the prospects for growth in competition going forward.

Section II of this paper examines the growth of intermodal and intramodal competition since the passage of the Telecom Act. It shows that there has been rapid growth in competition from providers of facilities-based intermodal services – mobile wireless, Internet services and broadband services – resulting in increased choice, innovative services and reduced prices to consumers. There has also been substantial growth in intramodal services, which, for residential customers, was enabled by UNE-P. Industry revenue data show that communications is no longer dominated by voice calling over traditional circuit-switched network, but is conducted in multiple ways using multiple technologies.

Section III describes the forces of industry change, explaining why competition will intensify in the foreseeable future.

Section IV discusses the affect on competition if UNE-P were no longer available. As the competitive analysis presented in this paper shows, benefits of competition to consumers are not dependent on UNE-P. Also, CLECs would not be precluded from competing without UNE-P, because, like AT&T, they have the option of providing services to consumers using voice over Internet protocol (VoIP). If UNE-P were no longer

available, CLECs would have greater incentives to develop facilities-based services, which would strengthen competition.

## II. Growth in Telecommunications Competition

Since the passage of the Telecom Act, there has been a surge in facilities-based competition from wireless and Internet-based services. Competition from wireline competitors has also grown significantly, but because of regulatory conditions, the growth of competition for residential lines has primarily been through UNE-P rather than facilities-based competition. This section describes first the growth in intermodal competition and then the growth in intramodal competition.

### A. Wireless Services

The provision and adoption of mobile wireless services has increased rapidly in the last eight years. In 1995, there were two mobile wireless carriers serving throughout the U.S. The build-out of new mobile wireless networks beginning in 1995 increased the number of carriers in some markets to more than seven. By the end of 2002, the vast majority of Americans had additional mobile wireless choices as 95 percent of the U.S. population lived in counties with three or more mobile wireless providers and 83 percent of the population lived in counties with five or more providers.

**Figure 1**  
**Availability of Mobile Wireless Services 1995 and 2003**

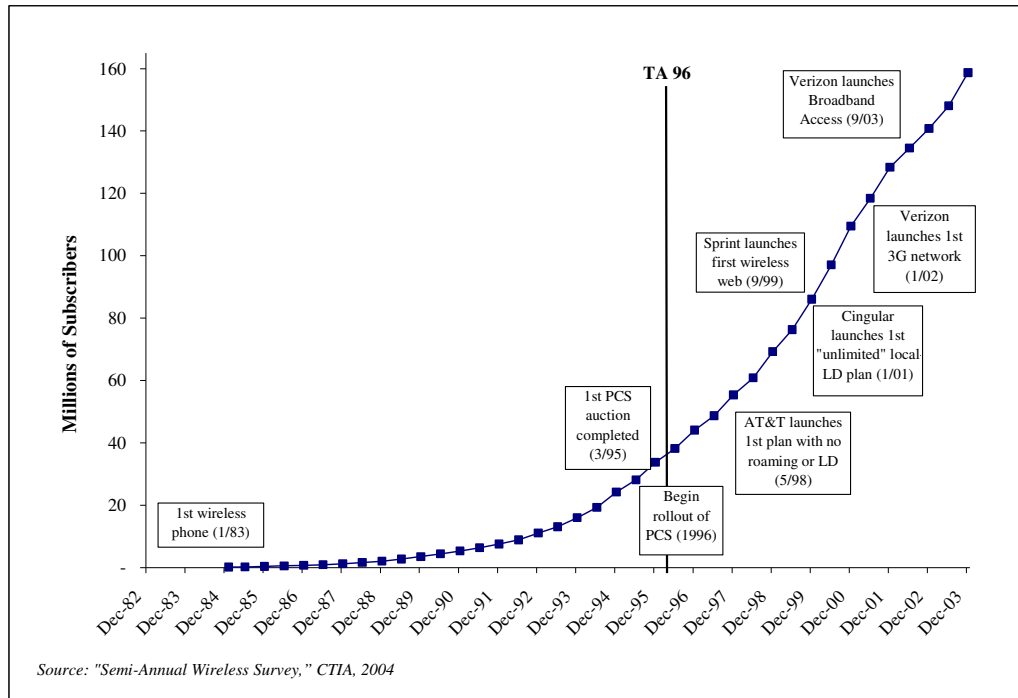
1995	2003
<ul style="list-style-type: none"> <li>• 2 cellular providers in most geographic markets</li> </ul>	<ul style="list-style-type: none"> <li>• &gt; 7 providers in some geographic markets</li> <li>• 95% of population in counties with 3+ providers</li> <li>• 83% of population in counties with 5+ providers</li> </ul>

*Source: FCC Eight CMRS Report, Table 10.*

Figure 2 shows the growth in mobile wireless subscriptions from the introduction of mobile wireless services in 1983 through 2003. It shows that in the 1995 to 1996 time frame, subscribership growth passed an inflection point, with adoption escalating after that time. This rapid growth was fueled by the rollout of PSC networks beginning in 1996, a

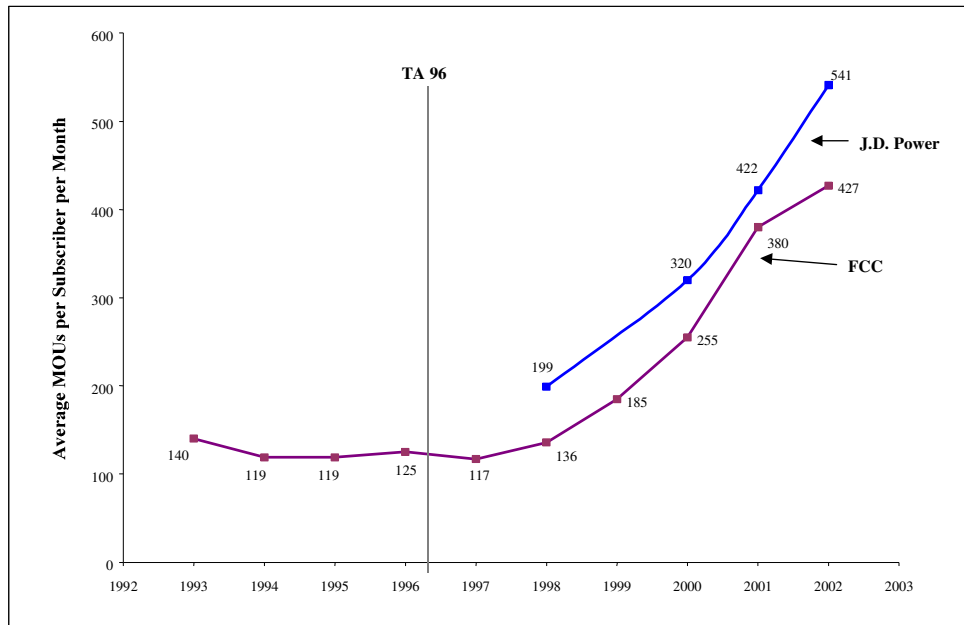
host of marketing plans that included free phones and packages of local and long distance calling with many popular features, increased functionality, and reduced prices. Between 1995 and 2002, average revenue per minute for mobile wireless plans decreased by nearly 75 percent, from 43 cents per minute to 11 cents per minute.<sup>3</sup>

**Figure 2**  
**Growth in Mobile Wireless Subscribers 1983 to 2003**



During the 1996 to 2003 period, minutes of use per subscriber also accelerated. As shown in Figure 3, between 1994 and 1997, mobile wireless subscribers used an average of approximately 120 minutes per month.<sup>4</sup> Usage began increasing in 1998, and by 2002 average minutes per subscriber reached over 400 minutes per month.<sup>5</sup> To put these numbers in perspective, in 1995 approximately 18 percent of adults used mobile wireless phones an average of 4 minutes per day. In 2003, 73 percent of adults used mobile wireless phones an average of 15 minutes per day.

**Figure 3**  
**Average Minutes of Use Per Month by Wireless Subscribers – U.S.<sup>6</sup>**



That mobile wireless usage is displacing wireline service is evident in consumer and business surveys. A recent survey by In-Stat/MDR indicates that 14.4 percent of all consumers currently use their mobile phones as their primary phone, and of those who consider their wireline phone to be primary, 26.4 percent would consider replacing it with a wireless phone.<sup>7</sup> Another recent survey sponsored by the Small Business Administration shows that small businesses have come to rely heavily on mobile wireless. Seventy-three percent of small businesses use mobile wireless phones, and their expenditures for wireless are approximately the same as for local service.<sup>8</sup>

Increasing dependence on wireless phones is leading not only to the substitution of wireless usage for wireline usage, but also to the substitution of wireless phones for wireline phones. A 2004 Yankee Group survey shows that six percent of all mobile phone subscribers have “cut the cord,” up from three percent in 2002. The percent is highest among young adults; 12 percent of this group use mobile wireless exclusively.<sup>9</sup> The willingness of young adults to rely solely on wireless is also seen on university campuses.

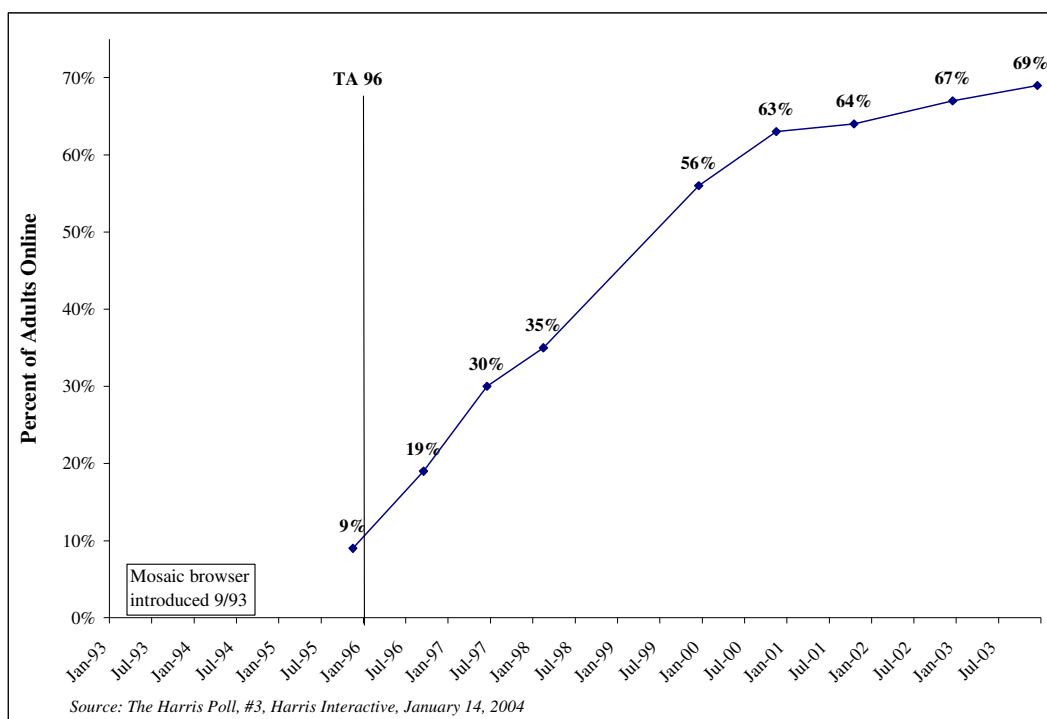
At Stanford University, 75 percent of undergraduates have mobile wireless phones, and over the last five years, there has been a 25 percent decrease in wirelines to undergraduate rooms.<sup>10</sup>

In summary, mobile wireless phones play a much larger role in our daily communications than they did eight years ago, and this trend shows no sign of abating.

### ***B. Internet-based Services***

Internet-based services are also transforming the way we communicate. Although various forms of the Internet had been used by government and academic institutions for decades, it was not until the introduction of a common addressing scheme and the point-and-click Mosaic web browser that the Internet became readily accessible to everyone. Figure 4 shows the growth in the percentage of adults who use the Internet (online adults) since 1995. There was a rapid increase in adoption of the Internet between 1996 and 2001, and by July 2003, 69 percent of adults were using the Internet.

**Figure 4**  
**Growth in Percent of U.S. Adults Online**



### *1. Electronic Messaging Services*

In a just a matter of years, the Internet changed the way we communicate, first through electronic messaging, and more recently through voice calling over the Internet. There are many forms of electronic messaging that can substitute for voice calls over traditional wireline networks. These include: email, instant messaging (IM), chat rooms, the process of researching information on the World Wide Web, or making a purchase on the Web. All of these are used extensively by consumers. Surveys completed by Pew Internet & American Life Project in 2001 through 2003 reveal that 93 percent of online adults use email, and half of these use email in a typical day.<sup>11</sup> Forty-six percent of online adults, two-thirds of young adults (18 to 29) and three-fourths of teens use IM.<sup>12</sup> The use of email and IM by teens to communicate with friends has likely eliminated the need for a second phone line in many households.

Consumers are also actively using the Internet to make a purchase or perform research that might otherwise be done by phone. Survey results show that 53 percent of online users have made travel arrangements, 61 percent have purchased a product online, and 83 percent do research on the Internet.<sup>13</sup> Another survey explored how obtaining information over the Internet affected voice calling. It showed that 58 percent of Internet users would go online the next time they needed government information while only 28 percent would use the telephone.<sup>14</sup> In addition, 46 percent of Internet users would use the Internet to obtain information about a medical or health condition, while 47 percent would contact a medical professional.<sup>15</sup> These statistics confirm that electronic messaging is a significant form of competition.

### *2. Voice Over Internet Protocol*

Voice over Internet Protocol (VoIP) is poised to continue the growth in competition by enabling the delivery of voice calls over data networks using Internet Protocol technology. With VoIP, voice signals are converted into data streams and transmitted across private or public data networks in a manner that has significant cost and

functionality advantages over traditional wireline services. Because VoIP calls are carried on data networks, they are not subject to the regulated access charges imposed on voice calls over the traditional circuit switched network. Also, due to significant excess long haul fiber optic capacity, long distance transmission costs are very small.<sup>16</sup> Businesses that have installed VoIP phone systems report savings of as much as 50 percent on their local and long distance calls.<sup>17</sup> VoIP packages for consumers, which include unlimited local and long distance voice calling and several features, are typically priced 30 to 40 percent below similar packages offered by carriers using traditional wireline networks.<sup>18</sup>

While businesses and consumers today are purchasing VoIP services largely on the basis of cost savings, VoIP's longer-term competitive advantage is its configurability. VoIP offerings today include many features that are not available on traditional wireline networks such as the ability of the consumer to choose the area code of his phone number, programmable call forwarding to multiple wireline or wireless phones, do not disturb capabilities that ring through only calls from specified numbers, and the ability to retrieve a voicemail message from an email. In addition, new functionality can be developed and deployed more rapidly on VoIP systems than on traditional circuit switches.

In the fall of 2003, the leading VoIP providers were small, start-up companies such as Vonage and 8x8, Inc. In just one year, several major telecommunications providers and several large cable carriers have either begun offering VoIP services to consumers or have announced deployment of these services in the near term. Below is a summary of several of these new offerings.

- AT&T is offering its CallVantage service to consumers in 121 major metropolitan areas around the country.<sup>19</sup>
- Verizon introduced VoiceWing to all households in the U.S.; at this time customers can choose a phone number from selected area codes in 36 states.<sup>20</sup>
- Cablevision has already deployed the service to its four million customers in the New York City area.<sup>21</sup>
- Time Warner has announced that it will offer VoIP service to the 18.8 million households in its service area by the end of 2004.<sup>22</sup>

- Comcast announced that it will offer VoIP services to half of the 40 million households in its service area by the end of 2004 and 96 percent by the end of 2005.<sup>23</sup>
- Cox currently provides circuit-switched telephony to a portion of the 10.5 million customers in its service area, but it has tested a VoIP service in Roanoke, Virginia and has announced that it will provide VoIP telephony to the customers who do not already have telephony service.<sup>24</sup>

Based on these announcements, nearly 60 percent of households in the U.S. will have the option of choosing telephony services from their cable provider by the end of 2005.

Most VoIP offerings support limited E911 service and do not provide back up power if there is a power outage. Solutions to these limitations are being addressed by equipment manufacturers and industry associations.<sup>25</sup> Nonetheless, at this time many consumers consider the benefits of VoIP to outweigh the limitations. Also, while some cable companies do not require the customer to have a high speed connection to the Internet as a requirement for purchasing VoIP services, non-cable providers do. This requirement, however, is not likely to inhibit VoIP growth, as over 25 million households currently have a broadband connection, and approximately two million connections are added each quarter. Moreover, many households that do not have broadband today may view the substantial savings from VoIP services as a reason for getting broadband. Thus, VoIP may stimulate broadband adoption.

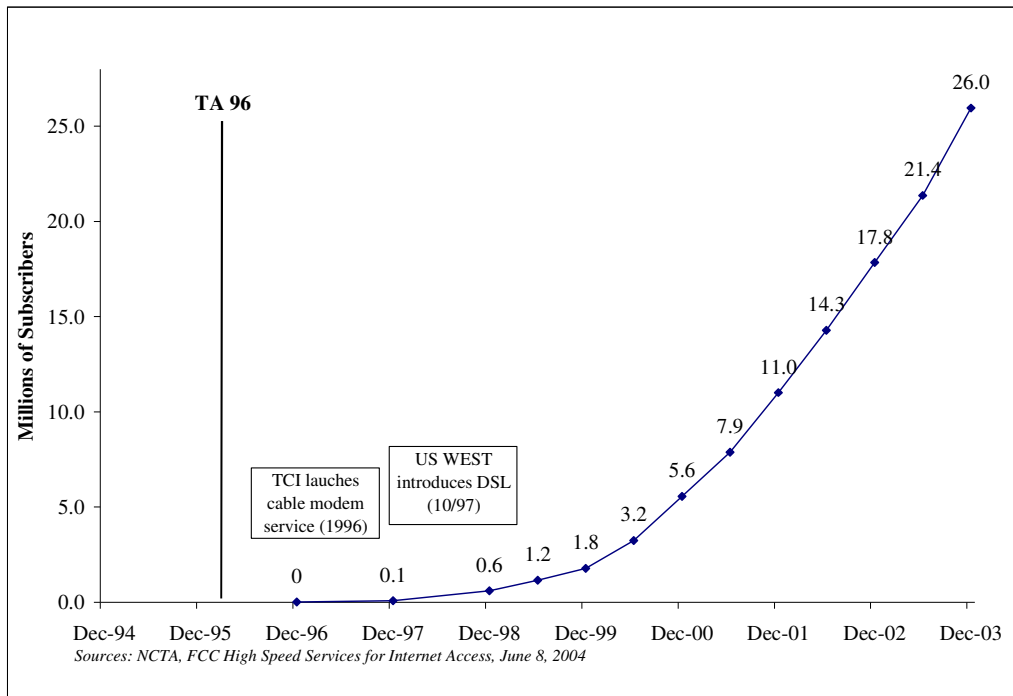
VoIP technology is not limited to wireline networks, but also works with wireless service. Cisco, SpectraLink and other manufacturers provide IP phones that operate with wireless LANs, providing users with mobility around a building or campus. These solutions are being implemented today in hospitals, warehouses and retail stores to reduce costs and improve efficiency.<sup>26</sup>

### C. Broadband Services

The growth in Internet usage spawned a new application for high speed telecommunications services – consumer broadband Internet access. Broadband services compete for ILEC second lines. The two leading consumer broadband services are cable modem, which is provided over cable TV networks, and digital subscriber line (DSL), which is provided over ILEC wireline networks.

Cable modem service was first offered in 1996, while DSL was first offered in late 1997. As of December 2003, cable modem was available to 88 percent of households.<sup>27</sup> As Figure 5 shows, broadband access began taking off in 2000, and as of the end of 2003, approximately 26 million (24 percent) of U.S. households and over one-third of online adults used broadband connections.<sup>28</sup>

**Figure 5**  
**Growth in Cable Modem and DSL Users – U.S.**



Wireless Fidelity (Wi-Fi) offers another means of high-speed access to the Internet. Wi-Fi is a stationary wireless technology that transmits data at speeds faster than cable

modem or DSL. It is used in businesses, homes and public places. In just the last four years, Wi-Fi access has been installed in thousands of airports, restaurants and hotels around the country, allowing customers to connect portable computers or handheld devices to the Internet. Also, Wi-Fi is used in rural areas by wireless Internet Service Providers (WISPs) to provide high-speed access to households that do not have wireline alternatives.<sup>29</sup>

#### ***D. Wireline Services***

In wireline local service markets, regulatory policy defines key market conditions, and regulatory requirements determine rules of competitive engagement. These market conditions and rules affect the types of customers and geographic areas served by competitors as well as the timing of competitive entry. Regulatory market conditions are largely a vestige of regulatory goals and policies established over 50 years ago. A primary policy goal has been universal service – the availability of affordable telecommunications service to all households and businesses. To achieve this goal, regulators set residential basic local service prices at artificially low levels (below cost in some areas) and made up for the loss by setting prices for other services, such as business access lines and features, well above cost. Remnants of this system of cross-subsidies are still in effect in most states.

CLEC entry patterns have been defined by regulatory pricing and the high concentration of demand in business customers located in urban areas. Facilities-based CLECs have built networks concentrated in urban areas to serve business customers. Where residential customers are offered services by CLECs (other than cable companies), the service is, in most cases, provided over the ILEC's network.

Figure 6 summarizes the availability of competitive wireline services in 1995 and 2003. CLEC networks provided competitive access services to businesses in large cities in 1995; by 2003, there were CLEC networks in many urban areas throughout the country, providing a range of telecommunications services to businesses. Also by June 2003, 89

percent of the U.S. population lived in zip codes with two or more wireline CLECs, and 72 percent resided in zip codes with five or more CLECs.

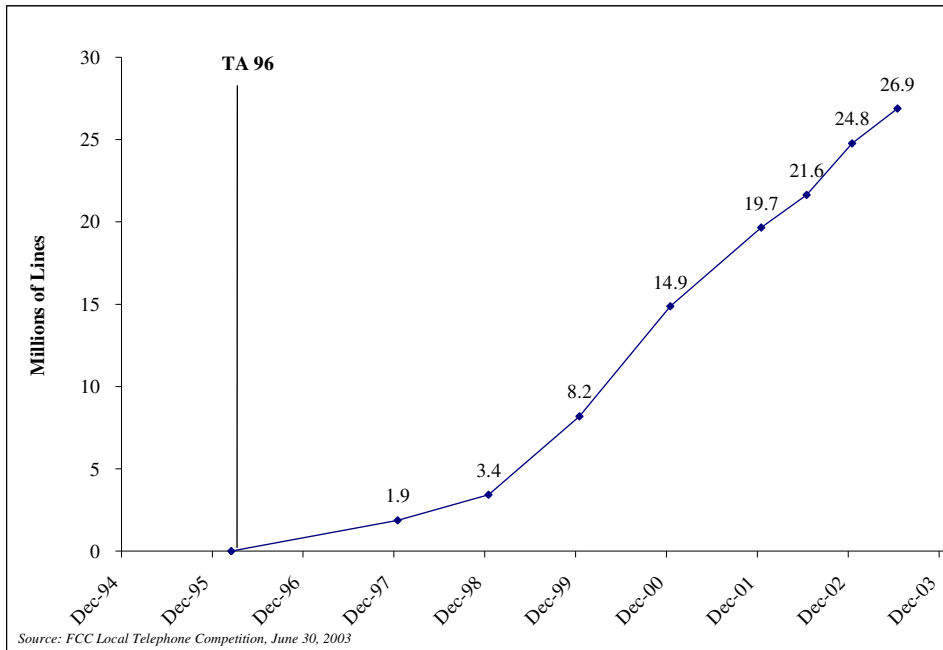
**Figure 6**  
**Availability of Competitive Wireline Services 1995 and 2003**

<b>1995</b>	<b>2003</b>
<ul style="list-style-type: none"> <li>• CAP networks serving large business in downtowns of largest cities</li> </ul>	<ul style="list-style-type: none"> <li>• CLEC networks serving businesses in Tier 1, 2, 3 cities</li> <li>• Cable companies offering telephony in many cities</li> <li>• 2+ CLECs in zip codes with 89% of households</li> <li>• 5+ CLECs in zip codes with 72% of households</li> </ul>

*Source: FCC Local Competition Report, December 2003, Table 15*

Figure 7 shows the growth in CLEC switched access lines, including circuit-switched cable telephony lines. CLEC lines accelerated in 2000, due to the regulatory construct called UNE-P. The Telecom Act set forth a number of rules that govern competitive entry in local and long distance services. The Act requires that incumbents make their network facilities and services available to competitors at regulated prices. Federal and state regulators have interpreted these rules to mean that ILECs must offer a UNE Platform, which is basic local services to competitors at prices determined by prices of unbundled elements. In many states, regulators have set the price of this service at more than 40 percent below residential retail prices, and it has become the primary avenue through which CLECs offer local services. Between June 2000 and June 2003, 94 percent of CLEC lines to residential and small business customers used UNE-P.<sup>30</sup>

**Figure 7**  
**Growth in CLEC Switched Access Lines**

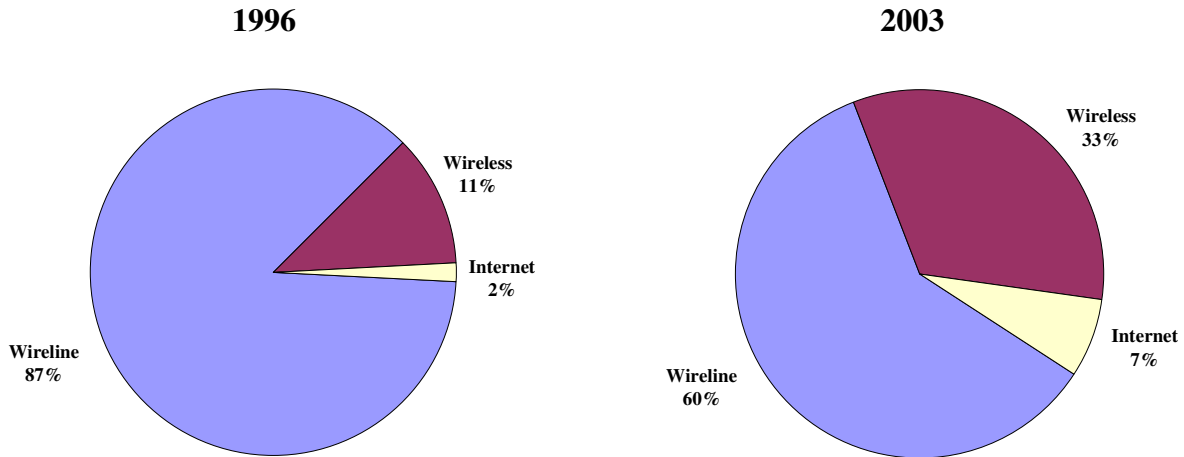


UNE-P has enabled wireline competitors to offer local services profitably with essentially no risk because UNE-P does not require network investments. While CLEC offerings to residential customers do provide a discount on packages of services, they do not provide the full consumer benefits envisioned by the Telecom Act. These benefits depend on innovations and investments in facilities.

***E. Summary of Changes in the Telecommunications Industry***

Figure 8 graphically portrays the distribution of telecommunications industry revenue between traditional wireline service, mobile wireless and Internet services in 1996 and 2003.<sup>31</sup> Revenue from traditional wireline services fell from 87 to 60 percent of industry revenue, while the share of wireless services tripled from 11 to 33 percent and Internet services increased from two to seven percent of industry revenue.

**Figure 8**  
**Distribution of U.S. Telecommunications Industry Revenue**



The shift from wireline to intermodal services is perhaps even more dramatic when viewed in terms of consumer expenditures. As shown in Figure 9, average telecommunications expenditures per household increased from \$757 in 1996 to \$1,228 in 2003. During this period mobile wireless and Internet services each grew by over 300 percent. In 1996, wireline services comprised over 80 percent of household telecommunications expenditures. By 2003, this had dropped to 46 percent of household telecommunications expenditures, and mobile wireless had increased to 40 percent. Due to the increase in the online population and increasing adoption of broadband services, Internet expenditures rose an estimated \$132 per household year and now represents approximately 14 percent of average household expenditures on communications.

**Figure 9**  
**Consumer Telecommunications Expenditures<sup>32</sup>**

	Ave Annual HH Telecom Expenditures			Percent of Total	
	1996	2003	Change	1996	2003
<b>Wireline</b>	\$609	\$563	(\$46)	81%	46%
<b>Wireless</b>	108	492	384	14%	40%
<b>Internet</b>	40	173	132	5%	14%
<b>Total</b>	\$757	\$1,228	\$470	100%	100%

Figure 9 demonstrates that mobile wireless and Internet services play a large and increasing role in consumer communications. The telecommunications industry is no longer characterized by voice services delivered over traditional wireline networks but rather by a wide range of voice and data services delivered over multiple networks using different technologies. Intermodal competition has redefined the telecommunications industry.

### **III. Competition Will Intensify**

Competition in the telecommunications industry will intensify in the coming years for a number of reasons. First, there is an increasing willingness by consumers to adopt new technologies. Today, the majority of adults use both a mobile phone and the Internet, and the adoption of intermodal forms of communications is becoming increasingly widespread across the population. Even children are using intermodal services. A survey of children's use of computers and the Internet completed by the U.S. Department of Education in 2001 shows that 31 percent of five-to-seven year olds use the Internet, and 11 percent use email or instant messaging. Of eight-to-ten year olds, more than half use the Internet and 27 percent use email or instant messaging.<sup>33</sup> For a growing number of children, intermodal communications is commonplace. With each passing year, the population becomes more oriented toward intermodal communications.

Second, the deployment of new technologies will continue to drive change throughout the industry. For example:

- VoIP, with substantially lower prices and more features than traditional phone service, will be available to nearly 60 percent of households within the next two years.
- Mobile wireless providers are making substantial investments in their networks to increase the speed of transmission, spurring additional competition for wireless messaging. Moreover, the capabilities of mobile phones continue to expand, creating additional benefits to consumers and additional reasons to substitute mobile services for traditional landline services.
- Telecommunications equipment manufacturers are developing hybrid cellular-Wi-Fi phones that can switch between mobile wireless and Wi-Fi networks.<sup>34</sup> This new capability will enable more businesses that have Wi-Fi networks in their buildings or on their campuses to reduce their use of traditional wirelines.
- Standards for WiMax, which will extend the reach of high-speed stationary wireless service by miles, are under development.<sup>35</sup> WiMax has the potential of significantly increasing competition for broadband services.

Third, the integration of two or more intermodal services is increasing competition. The ability to attach voicemails to email messages, the “do not disturb” capability, and the ability to forward calls to mobile or wireline phones, are examples of integrated voice and Internet services offered with VoIP. These services provide consumers with greater flexibility in managing their communications and customizing their phone services to meet their individual needs. The hybrid cellular-Wi-Fi phones will provide users with the convenience of mobility and the cost savings of VoIP delivered over wireless LANs. Because integrated services increase the value of services for consumers and extend the range of services over which carriers compete, the competitive effects of intermodal service integration are greater than the effects of an individual service.

Fourth, wireline, wireless and cable companies have invested, and are continuing to invest, tens of billions of dollars in their networks to expand capacity and provide new, innovative services to businesses and consumers. These investments include services outside of carriers’ traditional offerings as the companies vie for a larger share of the

consumer's wallet. For example, SBC now offers service packages that include local, long distance, broadband and cable TV service, which compete with similar packages offered by cable companies.

These dynamic forces will continue to drive change and increase competition in the telecommunications industry into the foreseeable future. The rapid expansion of intermodal services was not foreseen at the time that the Telecommunications Act was passed. In the same way, it is almost certain that changes in the industry will go well beyond what we can imagine today.

#### **IV. The Importance of UNE-P to Competition in Telecommunications**

Since CLECs have used UNE-P almost exclusively to provide local service to residential customers, the question arises: if UNE-P were no longer available, what would be the effect on competition for telecommunications services to residential customers? The competitive analysis presented in this paper clearly shows that the benefits of competition to consumers are not dependent on UNE-P. Consumers have benefited from multiple competitive options, innovative services and reduced prices of mobile wireless service. Consumers are also benefiting from the rapid deployment of VoIP services, which are not only substantially lower in price than traditional circuit-switched services, but offer many advanced features. Today, approximately 95 percent of the population can choose from three or more mobile wireless providers, and within the next year and a half, nearly 60 percent of households will have a VoIP option from their cable company, and many more households will be able to choose a VoIP service from a non-cable provider. Thus, in a short period of time, the large majority of households will have multiple options for the full range of communications services.

CLECs would not be precluded from competing without UNE-P, because, like AT&T, they have the option of providing services to consumers using VoIP. The startup costs associated with VoIP service are low. According to Bryan Martin, CEO of VoIP provider 8x8, Inc., "Anyone who wants to go into the phone business can do so."<sup>36</sup> UNE-P has arguably slowed down facilities-based competition to the detriment of residential

customers. If UNE-P were no longer available, CLECs would have greater incentives to deploy facilities-based alternatives, which would strengthen the type of competition envisioned by the Telecom Act.

The change in the telecommunications industry since the passage of the Telecommunications Act is remarkable. While much regulatory energy has been focused on the directive of the Act to make key portions of ILEC networks available to CLECs at cost-based prices, the industry has undergone a broad-based transformation. Today it is commonplace for people to make calls on their mobile phone while their wireline phone sits beside them unused and for many, if not most, people to receive more emails than phone calls each day. These changes have not depended on UNE-P, and the continued growth in competition does not depend on UNE-P.

## Notes

- <sup>1</sup> USTA v. FCC, 359 F.3d 554 (D.C. Cir. 2004).
- <sup>2</sup> Order and Notice of Proposed Rulemaking, WC Docket No. 04-313 and CC Docket No. 01-338, Federal Communications Commission, released August 20, 2004.
- <sup>3</sup> FCC, Eighth Report, In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, and Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, FCC, July 14, 2003, Table 10. (Hereafter, "FCC Eighth CMRS Report")
- <sup>4</sup> FCC Eighth CMRS Report, Table 9.
- <sup>5</sup> Berman, Dennis K., "We May Be Reaching Our Limit for Yakking On All of Our Phones," *The Wall Street Journal*, December 23, 2002.
- <sup>6</sup> FCC data is as of year-end. J.D. Power data is reported in September of each year. FCC Seventh CMRS Report, p. C-12. *See also* "J.D. Power and Associates Reports: Wireless Usage Continues to Climb as Flat-Rate Pricing and Free Minutes Become More Prevalent in the Marketplace," J.D. Power Press Release, September 26, 2000; "J.D. Power and Associates Reports: Wireless Phone Penetration Among U.S. Households Climbs Above 50 Percent As More First-Time Subscribers Enter the Marketplace," J.D. Power Press Release, September 26, 2001; and Berman, Dennis K., "BOOMTOWN: We May Be Reaching Our Limit for Yakking On All of Our Phones," *The Wall Street Journal*, December 23, 2002.
- <sup>7</sup> "Landline Displacement to Increase as More Wireless Subscribers Cut the Cord," In-Stat/MDR Market Alerts, February 25, 2004.
- <sup>8</sup> Pociask, Stephen B., "A Survey of Small Businesses' Telecommunications Use and Spending," for the Small Business Administration, March 2004, pp. 10, 44.
- <sup>9</sup> "Cutting the Cord, Generation Wireless Enjoys Mobile Liberation," *Wireless Innovator*, August 18, 2004.
- <sup>10</sup> Foster, Christine, "Totally On," *Stanford*, May/June 2004, pp. 43-49.
- <sup>11</sup> Madden, Mary and Rainie, Lee "America's Online Pursuits," Pew Internet & American Life Project, December 22, 2003, p. 8.
- <sup>12</sup> *Id.*, p. 11.
- <sup>13</sup> *Id.*, pp. 17, 43, 46.
- <sup>14</sup> Horrigan, John B. and Rainie, Lee, "Counting on the Internet," Pew Internet & American Life Project, December 29, 2002, p. 3.
- <sup>15</sup> *Id.*
- <sup>16</sup> See Hecht, Jeff, "An Unsolved Mystery," *LaserFocusWorld*, February 2003, citing to TeleGeography company which "estimates that only 10% of channels are lit in the 10% of fibers that carry traffic."
- <sup>17</sup> Davidson, Paul, "Calling via Internet has Suddenly Arrived," *USA Today*, July 7, 2003, citing to Forrester Research and In-Stat/MDR.

<sup>18</sup> For example, the MCI Neighborhood package for local, long distance and selected features is \$49.99, while AT&T's CallVantage is \$34.99 and Vonage's Premium Unlimited Plan is \$29.99 for similar services.

<sup>19</sup> "AT&T CallVantage Service Expands to 21 New Markets in Seven States in Nationwide Deployment," AT&T News Release, August 19, 2004.

<sup>20</sup> Verizon VoiceWing web site at [www.22.verizon.com/ForYourhome/voip/CallingAreaCodes.aspx](http://www.22.verizon.com/ForYourhome/voip/CallingAreaCodes.aspx).

<sup>21</sup> National Cable & Telecommunications Association website at [www.ncta.com/Docs/PageContent.cfm?pageID=32](http://www.ncta.com/Docs/PageContent.cfm?pageID=32) (Hereafter, "NCTA VoIP Status")

<sup>22</sup> NCTA VoIP Status; Time Warner Cable website at [www.timewarnercable.com/corporate/aboutus/?menu=Aboutus](http://www.timewarnercable.com/corporate/aboutus/?menu=Aboutus).

<sup>23</sup> NCTA VoIP Status; Comcast website at [www.cmcsk.com/phoenix.zhtml?c=147565&p=irol-factsheet](http://www.cmcsk.com/phoenix.zhtml?c=147565&p=irol-factsheet).

<sup>24</sup> Muraskin, Ellen, "Cox Communications to Enter More VOIP Markets," *eWeek*, June 8, 2004, and Cox Communications 2003 Form 10K Annual Report, p. 6.

<sup>25</sup> Even today, solutions are becoming available. 8x8, Inc. states that the Packet8 E911 Service which became available in June 2004, provides location and caller information to the Public Safety Answering Point. (See Packet8 2004 Annual Meeting of Shareholders Presentation, August 2004.)

<sup>26</sup> See Korzeniowski, Paul, "VoIP and WLAN – a dreamy new combo," *Network World*, August 23, 2004 and Brewin, Bob, "Hospitals Eye Wider Use of Wireless IP Phones," *Computer World*, March 1, 2004.

<sup>27</sup> Cable Broadband Availability from National Cable & Telecommunications Association web site at [www.ncta.com/Docs/PageContent.cfm?pageID=316](http://www.ncta.com/Docs/PageContent.cfm?pageID=316).

<sup>28</sup> "More Than One-Third of Internet Users Now Have Broadband," HarrisInteractive, The Harris Poll #3, January 14, 2004. Note: 26 million broadband lines represents approximately 24 percent of households.

<sup>29</sup> See biographies of WISPs that participated in the FCC Rural WISP Showcase, November 4, 2003 at [www.fcc.gov/osp/rural-wisp/rural-wisp-orgs](http://www.fcc.gov/osp/rural-wisp/rural-wisp-orgs).

<sup>30</sup> FCC Local Competition Report, Tables 2, 4.

<sup>31</sup> Wireline and wireless revenue data is from the FCC's "Telecommunications Industry Revenue" report, and it is based on revenues reported to the FCC for purposes of the Universal Service Fund. The 2003 distribution based on revenue reported for 1st three quarters of the year. Providers of Internet services are not required to report to the FCC. Internet expenditures conservatively estimated on the basis of average monthly household spending on Internet services of \$24. See Horrigan, John B., "Consumption of Information Goods and Services in the United States," Pew Internet & American Life Project, November 23, 2003, p. 28.

<sup>32</sup> "Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service," Federal Communications Commission, 2004, Table 2.6. Internet expenditures conservatively estimated on the basis of average monthly household spending on Internet services of \$24. See Horrigan, John B., "Consumption of Information Goods and Services in the United States," Pew Internet & American Life Project, November 23, 2003, p. 28.

<sup>33</sup> “Computer and Internet Use by Children and Adolescents in 2001,” National Center for Education and Statistics, U.S. Department of Education, October 2003, Tables 1, 8.

<sup>34</sup> Howe, Peter, “Hybrid Phone Debuts Today T-Mobile Touts Versatility of WiFi,” *The Boston Globe*, July 25, 2004.

<sup>35</sup> Wingfield, Nick, “Tomorrow’s Wi-Fi,” *The Wall Street Journal*, May 24, 2004, p. R8.

<sup>36</sup> Brown, Ken and Latour, Almar, “Phone Industry Faces Upheaval as Ways of Calling Change Fast,” *The Wall Street Journal*, August 25, 2004, p. A1.