2004 Update: Links to the Future

The Role of Information and Telecommunications Technology in Appalachian Economic Development

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Prepared for the Appalachian Regional Commission

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A. Introduction: Updates of Data and Policy Analysis of *Links to the Future*

This study updates parts of the analysis found in the *Links to the Future* report published in June 2002. This update focuses on analyzing the changes in access to advanced information technologies and telecommunications services over the 2001-2003 period. We also review changes in the policy environment that have occurred over this period and highlight federal and state level legislative proposals that may have important implications for future deployment of advanced information and telecommunications infrastructure (ICT) services.

To better understand patterns of growth and change affecting ICT infrastructure in the Appalachian region, this report updates key measures of access and use of ICT across the region. The most current data available is used to update key telecommunications infrastructure measures in the tables, figures and maps from the *Links to the Future* report of June 2002 (see: http://www.arc.gov/index.do?nodeId=57#telecom).

Fast-paced changes in the character and deployment of the technologies have been accompanied by changes and adjustments in regulatory and investment policies by the various government levels. This report details prominent Federal Communications Commission (FCC) rulings, congressional legislation, and actions by state governments in the Appalachian Regional Commission (ARC) region related to cable modem, Digital Subscriber Lines (DSL) and other high-speed telecommunications services.

Highlights of Findings

The pace of change in ICT adoption has been extremely rapid. The use of computers and Internet services continues to expand across all population segments and the extension of broadband services is reaching into previously underserved areas. This report shows that broadband access has expanded significantly in all parts of ARC region. Especially encouraging is the increased availability of broadband in many rural counties that previously did not have access to this service.

However, the counties of the ARC region still lag significantly behind the rest of the nation in access to cable modem services, DSL services and other forms of high-speed Internet access. It is noteworthy that the gap between the share of zip codes in ARC counties with high-speed providers and the national share widened over the period. The broadband service gap grew to 29 percentage points between the Appalachian region and nation. In December 1999 there were 43 percent Appalachian zip codes with at least one high-speed provider compared to 60 percent for the nation. In December 2002 there were 59 percent in the Appalachian Region compared to 88 percent for the nation.

The recent market environment and proposed and actual changes in regulatory structures have not promoted increased competition among local carriers. In the earlier report we emphasized that the presence of several competing local exchange carriers offering advanced services improved choices for businesses and increased the information available to customers about the adoption and use of new technologies.

Policy makers should carefully consider recent initiatives at federal and state levels that make new network investment by incumbents unavailable to competitors through the unbundled network element platform (UNE-P). While these regulations may promote greater investments by incumbent local exchange carriers, they will limit market entry by competitive local exchange carriers. The overall effect on deployment and service choices from these regulatory changes is not clear.

This update report finds that federal and state investments over the past six years have encouraged broadband deployment and more effective adoption of ICTs in underserved regions. State policies including investments in schools and e-government networks have also encouraged adoption of advanced services. Finally, the report profiles more innovative non-regulatory interventions by state governments such as demand aggregation, resource sharing and partnerships with private providers, and anchor tenancy. These approaches have improved the quality and accessibility of government networks and have provided access to underserved customers in rural areas.

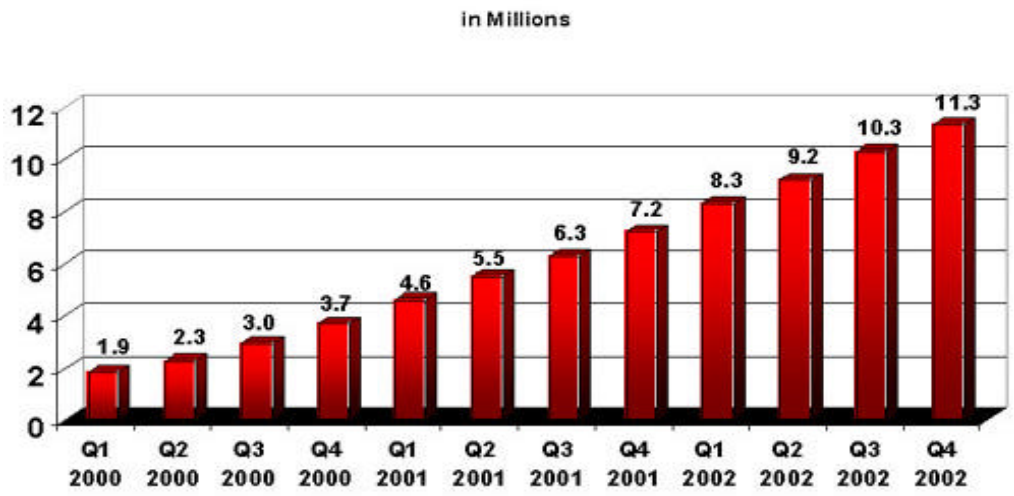
B. Cable Modem Services

1. The National Picture

Cable operators are the single biggest provider of advanced telecommunications services at the national level. This industry provides broadband services via their cable networks, which, to date, account for more broadband connectivity to residential and small businesses than does the wireline industry (such as DSL or T-1 and T-2 lines). In the broadband domain, cable modem services operate quite differently from telephone line based-Digital Subscriber Lines. Cable modem services are more widespread than digital subscriber line services, and although they offer less security they are often faster than DSL.

Crucially, cable modem service providers are not required to unbundle their services—a sore point with the telecommunications companies. Cable operators throughout the country were well positioned to move into Internet service provision because they had made substantial investment in their physical plant in the 1990s in order to offer digital television. Having a digital plant meant that adding on cable modem services as another revenue stream was an easy and profitable move for the industry. Some critics believe the entry of the telephone companies into DSL services was a late response to the early lead that cable television operators established, and that without the spur of cable modem competition, the telephone companies would have moved into broadband later and more slowly.

Figure 1: Cable Modem Subscribers



Source: NCTA, statistics as of December 2002

Of the nation's 107 million television households, the cable industry states that it can provide cable modem service to 83 million, and that 11.3 million households currently subscribe (NCTA, 2003). FCC statistics on households served are considerably lower than National Cable Television Association's statistics (the FCC statistics are from 2002), but still indicate that cable modem outstrips telephone-based broadband services: 5.2 million lines are cable modem services while 2.7 million lines are DSL (FCC, 2002b).

2. The Policy Environment

On March 14, 2002, the FCC adopted a major rulemaking change that sought to grapple with policy uncertainty regarding the regulation of cable modem services. In a declaratory ruling, the agency classified cable modem service as an "interstate information service" subject to FCC jurisdiction. In stating that modem service is not part of "cable service," the agency undercut state claims to regulate cable modem access. Further, the FCC explicitly stated that cable modem service is not a separate "telecommunications service" and therefore cannot be subject to common carrier regulations. This was prompted in part by state claims that cable modem service is more properly treated as a common carrier component of cable service and therefore should be regulated in such as way as to require cable operators to open their networks so that other would-be competitors could use those facilities to provide broadband access.

One very significant impact of this ruling is to eliminate state jurisdiction over Internet services provided via cable operators. In the current environment, there remains little that state or local jurisdictions can do to directly accelerate the deployment of cable modem services to underserved areas. However, as noted above, the extension of basic cable services involving digital plant and equipment often brings with it the extension of cable modem broadband services.

3. Cable Modem Service in the ARC Region

The two maps below show cable modem access characteristics in ARC counties. The first map in Figure 2(A) shows that Appalachian region was sparsely served by this technology in 2000 (this map is equivalent to Figure 3 on page 27 of the original *Links to the Future Report*). The second map in Figure 2(B) shows some significant expansion of cable modem service by 2003. There were a number of counties in Ohio, Tennessee, Northern Alabama and Mississippi that acquired cable service between 2000 and 2003. Yet there are still wide swaths of central Appalachia that remain without cable services of any type.

Furthermore, it is important to note that these maps overstate cable access because they display counties where there is cable modem service available anywhere in a county even though many parts of a county may not actually receive service. Cable modem service typically is available only within towns, not in outlying rural areas. On balance the Appalachian region seems underserved in this type of Internet access in both 2000 and 2003, although service has undoubtedly improved over the period.

Figure 2(A): Cable Internet Access Available, 2000
(In Parts or Whole of County)

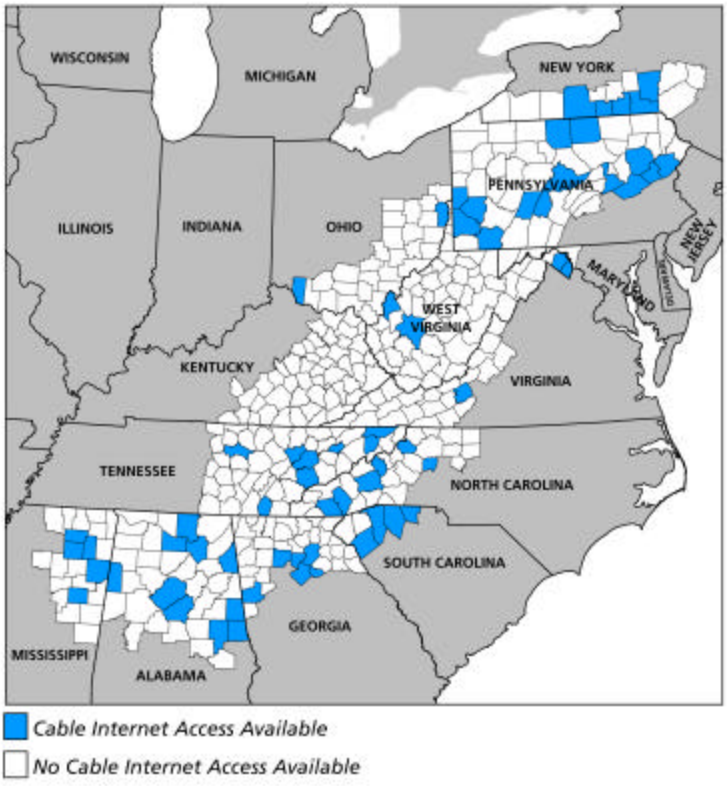
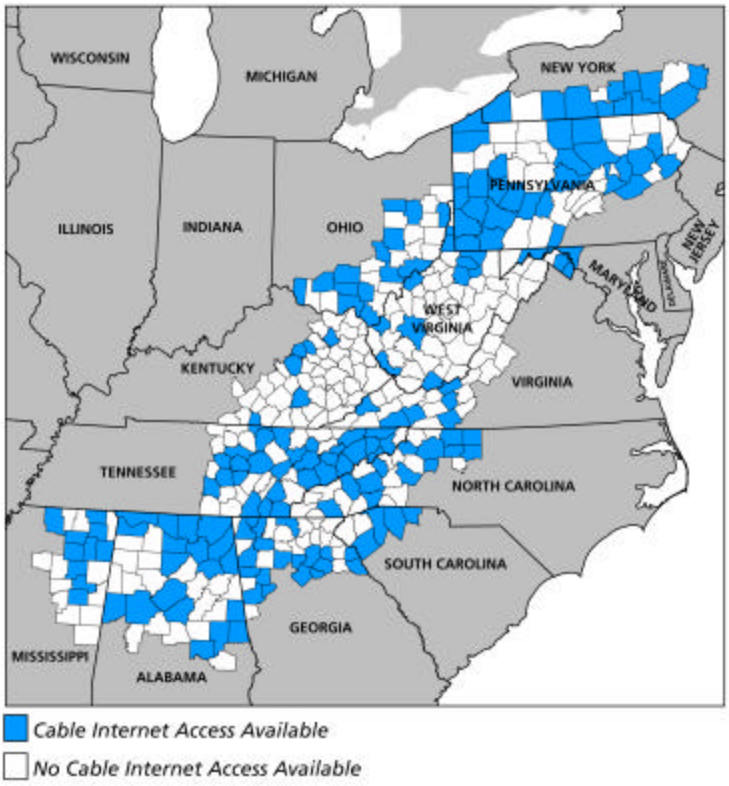


Figure 2(B): Cable Internet Access Available, 2003
(In Parts or Whole of County)



4. Sources and Methods for Cable Modem Service Estimates in the ARC:

CableDataCom News. (2001, March 7). Commercial Cable Modem Launches in North America. [Online]. Available: http://www.cabledatacomnews.com/cmic/cmic7.html; Cable Modem Deployment Update. (2000, March). Communications, Engineering and Design (CED) Magazine. M, cited in National Telecommunications and Information Administration & Rural Utilities Service. (2000, April). Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans. pp. 46-59. [Online]. Available: http://www.ntia.doc.gov/reports/ruralbb42600.pdf; CNET Networks. (no date). The Ultimate Guide to Cable Internet Access. [Online]. Available: http://att.cnet.com/internet/0-3762-8-3741984-2.html; CNET Networks. (no date). CNET's Ultimate Guide to Cable Access for 2003. [Online]. Available: http://att.cnet.com/internet/0-3762-8-20828110-1.html?tag=hl; Authors' search in the Cable Service Locator database at Cable Television Laboratories website, http://cpss.go2broadband.com/default.asp?id=10790000000000000000; Authors' search in the Deployment by States database at CATV CyberLab website, http://www.catv.org/frame/cmsa_state.html

The Cable Service Locator website (see above) that was used for cable Internet data collection runs searches based on a unique street address. To fill the gap between this feature and our goal (i.e., the county-level data for cable Internet availability), we first chose the county seat of each county as the representative location, then, used the street addresses of the chamber of commerce and/or Post Office locations in each county seat municipality as the representative addresses to perform our search. County seats and their chambers of commerce or Post Office locations typically represent the locus of economic resources and activities in most counties, and we thus reasoned that these were appropriate samples for our purpose, which was to identify counties with at least one cable Internet system in operation (and not necessarily to study the extent of cable Internet deployment among the communities within each county).

C. Digital Subscriber Line Services (DSL)

1. The National Picture

DSL is a second major broadband service. DSL is based on new switching and line conditioning technologies to provide high-speed access to households and businesses. This service is especially important to potential small business users because it is usually affordable and offers more secure lines than cable modem service. The FCC estimates that there were 2.7 million DSL lines to households in 2002, although this number is likely greater and has continued to grow over the past five years (FCC, 2002b).

The deployment of DSL and other business oriented high-speed services such as T-1 lines (which provide a dedicated circuit of 1.544 megabits per second bandwidth—significantly faster than DSL) comes under the purview of FCC and state regulation. Deployment of these technologies is strongly influenced by the competitive actions of private telecommunications companies both large and small.

The landscape of competing telecommunications providers pits the services of incumbent telecommunications companies (ILECs), composed of the former Regional Bell Operating Companies (RBOCs) and various smaller, often rural telephone companies, against competing telecommunications companies (CLECs) that may enter local markets. CLEC companies have three choices in establishing their services: they can build new facilities; they can lease or purchase unbundled network elements facilities from the incumbent at discounted rates under the unbundled network element platform, or they can take advantage of resale opportunities to use the incumbent's network. The latter two options are under threat from the pressures of the large ILEC firms and recent FCC rulings that are discussed below.

Over the past three years, CLECs have been hurt by the technology sector downturn of the last several years, as funding for expansion and new ventures in new service areas dried up. Many CLEC companies have downsized or closed. The remaining companies often rely heavily on the unbundled network element access to compete with incumbents. The *Links to the Future* report argued that CLEC activity is an important driver of competition in area markets and an important indicator of service alternatives. The potential changes being proposed at the federal level that limit access of CLECs to the unbundled network elements of the ILECs is a policy change that in our view warrants close scrutiny as it may further limit competition, especially in rural markets.

2. The Policy Environment

With the passing of the 1996 Telecommunications Act, Congress envisioned that incumbent telephone companies would make their physical facilities such as switches and lines available to would-be competitors on a lease or resale basis. In this way, competitive services would grow without the initial, large expense of building entirely new facilities. The dominant ILECs are the former Regional Bell Operating Companies (RBOCs), including Verizon (the product of Bell Atlantic's merger with GTE), but they also may be small rural telephone companies. After the 1996 Act, telecommunications companies and the FCC decided which equipment at a central office was to be "unbundled," and made available to competitors. CLECs could challenge the ILECs in

providing local services by tying into the existing infrastructure. Most studies report that CLECs target businesses rather than residential users.

The FCC began to gather data on what it calls 'advanced services' in 1999 as part of its obligations under Section 706 of the Telecommunications Act. Its definition of advanced services is a conservative 200 kbps (kilobits per second) or greater, and distinguishes symmetric services from asymmetric services (designated as 'high speed' by the FCC), in which upload times or speeds are slower than are download speeds. Its reports have examined the national telecommunications backbone, so-called middle mile facilities, as well as last mile infrastructure (FCC, 1999, 2000, 2002). To date, each of its three reports concludes that broadband deployment is proceeding in a "reasonable and timely fashion," (FCC, 2002, p. 2) although it notes that certain groups of consumers (for example, people on Indian reservations, rural populations) are more vulnerable to "untimely" access than others.

The FCC's recent Triennial Review of February 2003 is a controversial regulatory development that will affect the viability of CLECs and possibly broadband deployment. That decision addresses the unfolding of competition—local services, long-distance and data—between incumbent service providers and competitors, and alters the terms under which the would-be competitors can use incumbents' networks in order to provide local and advanced (broadband) services (FCC, 2003). In specific terms, the 1996 Telecommunications Act anticipated that competition in telecommunications services would unfold through three mechanisms: facilities-based entry, in which a competitor would make the substantial investment in building entirely new infrastructure; the purchase or lease of unbundled network elements from the incumbent local exchange company; and resale of the incumbent's retail services. The 2003 Review sought to assess how well these mechanisms are working, and to modify the conditions of competition if necessary.

The full elaboration of the new rules was released in August 2003, and its language signals that competitors' access to unbundled network elements will change in the near term. The original decision (in February 2003) itself elicited five separate statements from the FCC Commissioners, and was the product of internal brokering among them. So too, the final implementation document, hundreds of pages long, was the product of much internal negotiating.

The Triennial Review includes the decision that incumbents do not need to unbundle any fiber-to-the-home loops, nor do they need to unbundle bandwidth for providing broadband services that use fiber loops for loops deployed further into the neighborhood but short of the customer's home (hybrid loops). However, competing carriers that currently provide broadband services over high capacity facilities will continue to get that same access. But, the Commission will no longer require that line-sharing be available as an unbundled element. The net effect may well be that certain competing companies that have not invested in facilities will drop out of the marketplace.

The Commission also found that switching, a key element of the unbundled network element platform, for business customers served by high-capacity loops will no longer be

unbundled based on a presumptive finding of no impairment.[1] States had 90 days to rebut the national finding, but this process was halted in early 2004 as a result of a court decision. For mass market customers, the Commission establishes criteria that states can apply to determine whether economic and operational conditions exist in a particular market that merit different treatment. The decision anticipated a three-year period for competing carriers to move from the unbundled network element platform (UNE-P) to facilities-based services.

Pertinent to DSL and more advanced broadband services, the intention of the Triennial Review decision is to make new network investment by incumbents unavailable to competitors through the unbundled network element platform (UNE-P). This is a response to claims by ILECs that there is a severe disincentive for new investment when facilities must immediately be shared with competitors. The overall prospect for spurring new competition in broadband under the Triennial Review's orders appears dim. Commissioner Copps was particularly pessimistic about the new rules' effect on competition in the broadband arena.

The argument that the unbundled network element platform requirement of the 1996 Act suppresses investment by the large telecoms has also influenced several legislative initiatives at the federal level. The most famous is the Tauzin-Dingell bill.

Neither this bill nor its siblings has been passed by Congress as of early 2004, but its provisions are similar to many others that have been submitted. It includes major provisions that would allow the Regional Bell Operating Companies (RBOCs) to engage in inter-LATA data transport, a line of business that currently is available to them only when they are in compliance with Section 271 of the Telecommunications Act.[2] More widespread and speedy deployment of broadband services was offered as the primary benefit of the bill,[3] with the justification that such infrastructure is linked to improved economic development opportunities (Curtis, 1998). Indeed, the Tauzin-Dingell bill (H.R. 1542) has been lauded as a rural broadband deployment opportunity by incumbent telecommunications operators.[4]

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[1] The FCC defines impairment in its press release on the Triennial Review as follows: "**Impairment Standard** – A requesting carrier is impaired when lack of access to an incumbent LEC network element poses a barrier or barriers to entry, including operational and economic barriers, which are likely to make entry into a market uneconomic. Such barriers include scale economies, sunk costs, first-mover advantages, and barriers within the control of the incumbent LEC. The Commission's unbundling analysis specifically considers market-specific variations, including considerations of customer class, geography, and service." FCC (2003) FCC adopted new rules for network unbundling and obligations of incumbent local phone carriers.

[2] Local Access and Transport Areas, or LATAs, are the basic geographic units differentiating local from long distance service.

[3] 1542 essentially would allow the former RBOCs to carry long distance data traffic without meeting the section 271 standards established in the 1996 Telecommunications Act. Section 271 establishes the process by which local exchange providers are allowed to offer long distance services.

4 Ordinarily, compliance with 271 requirements depends on having demonstrated to both state-level utility commissions and the FCC that these incumbent networks have sufficiently opened their markets to competitors such that they should be allowed to enter competitive, inter-LATA services such as long distance telephony. The idea is to allow competitors access to incumbents' network elements so that they can offer new services such as Internet connections and high speed data connections. H.R. 1542 would permit RBOCs to provide high speed data transmission service without demonstrating that their networks

H.R. 1542 essentially would allow the former RBOCs to carry long distance data traffic without meeting the section 271 standards established in the 1996 Telecommunications Act. Section 271 of the 1996 Act establishes the process by which local exchange providers are allowed to offer long distance services. H.R.1542 forbids the Federal Communication Commission or any State from regulating the rates, charges, terms or conditions for offering or entering into high-speed data services, Internet backbone service or Internet access service. It likewise prescribes that Bell companies must upgrade their central offices to provide high-speed data services within the five years following the bill's passage, although the definition of upgradeable loops is limited to those under three miles from the central office. In other words, the logical candidate loops for Digital Subscriber Line (DSL) services would receive the appropriate infrastructure so that the former RBOCs could offer high-speed data services to subscribers.

In summary, some federal policymakers approach the problem as one of greater investment in networks, but that investment always seems to carry "strings" that advantage one element of the industry at the expense of others, or at the expense of ratepayers. The deregulatory thrust of the 1996 Act prompts policymakers to find solutions to such problems in market dynamics rather than government subsidies, although government incentives can be favored mechanisms. On the whole, various approaches at the state and federal levels aim to enhance broadband infrastructure. Some proposed legislation as well as FCC regulations attempt to enhance competitive circumstances by prescribing which network elements an incumbent must share with a competitor. Some agencies channel subsidies directly to telecommunications providers, as with the Rural Utility Service's low interest loans. Some proposals would reduce entirely state government restrictions or oversight of industry behaviors in the broadband arena.[5] The prospect of additional high-speed or "advanced" services serving rural regions is highly attractive, but may come with high prices for service if competition is stifled.[6]

It is unclear how the recent policy discussions from FCC Triennial Review recommendation, the never-passed Tauzin-Dingell bill, and similar bills offered in State Legislatures have affected the deployment of DSL over our study period (2000-2003). However, in the near term, these policy discussions may well affect the market and investment climate and slow the entry of competitors into underserved areas.

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are available to competitors as well. A corollary provision of the bill withdraws or modifies some of the obligations on incumbents (BOC and others) to share network elements that enable would-be competitors to use their facilities for high speed data services, limiting that obligation to line sharing provisions already spelled out in Section 251 of the 1996 Telecommunications Act, but exempting access to remote terminals. Previously, such access had been permitted. For access to the high frequency portion of a loop, incumbents can charge requesting carriers an amount equivalent to what they impute to their own provision of the service. H.R.1542 mandates that incumbents must resell, at wholesale rates, any high speed data service they offer for a three year period following the bill's enactment.

[5] Several state-level Tauzin-Dingell types of bills, often called 'broadband parity' legislation, are currently under consideration.

[6] The National Exchange Carriers Association has defined broadband as a service supporting data rates above 1.544 megabits per second, a much higher threshold than the FCC's definition. In H.R. 1542, high speed service is defined as transmitting data at 384 kilobits per second in at least one direction, using packet-switched technology. This exempts technologies such as ISDN service from the definition. Dial-up modems can support speeds of only up to 56 kilobits per second (although the typical top speed is less).

3. DSL-Equipped Central Offices in the ARC Region

The two maps below show that the number and locations of DSL-equipped central offices in the ARC counties have expanded significantly between 2000 and 2003. The first map in Figure 3(A) shows that DSL was not broadly available to subscribers in the ARC region in 2000 (this is the equivalent of Figure 4 on page 28, *Links to the Future* report). Kentucky, Ohio, Virginia and West Virginia were especially light in DSL-equipped central offices. The second map in Figure 3(B) shows evidence of significant expansion of DSL service, especially in Central Appalachian states such as Kentucky and West Virginia, and Ohio.

In 2000, we found that 81 percent of ARC distressed counties had no DSL-ready central offices. By 2003 only 39 percent of ARC distressed counties had no DSL-ready central offices. In the case of transitional counties, 63 percent had no DSL-ready central offices in 2000, but by 2003 only 32 percent had no DSL-ready central offices.

Table 1: DSL Capable Office by County Type (September 2003)

RAW NUMBERS	Distressed	Transitional	Competitive	Attainment
0 DSL switches	46	83	3	2
1-3 DSL switches	63	133	8	3
4 or more DSL switches	9	42	7	7
Total	118	258	18	12

PERCENTAGE	Distressed	Transitional	Competitive	Attainment
0 DSL switches	39%	32%	17%	17%
1-3 DSL switches	53%	52%	44%	25%
4 or more DSL switches	8%	16%	39%	58%
Total	100%	100%	100%	100%

Two important caveats to this generally positive picture should be borne in mind. First, as in the case of cable modem service, the presence of central office DSL switches does not mean that service is widely available throughout a county, especially in more remote rural areas. Even if the telecommunications company's local central office is equipped with the appropriate technology in order to offer DSL to its neighborhood, DSL services are limited to about 18,000 feet from a central office location. Therefore, in counties with between 1-3 switches it is more likely that significant areas still cannot access the service. In addition, as we found out in research for *Links to the Future*, the presence of a DSL-ready central office does not necessarily mean that the local service provider is actively offering and marketing the service to customers.

Figure 3(A): DSL-Equipped Central Offices, 2000
(by County)

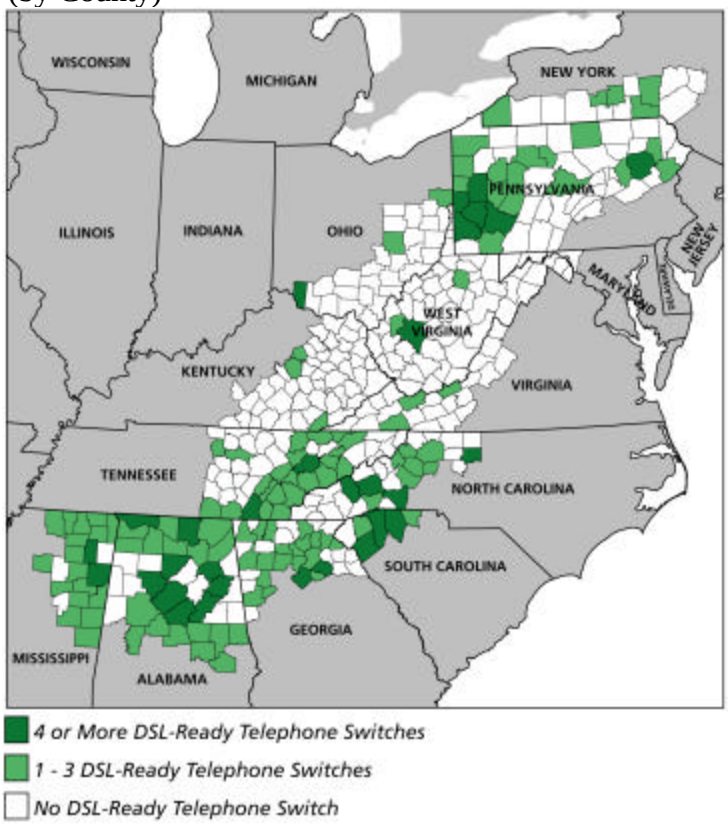
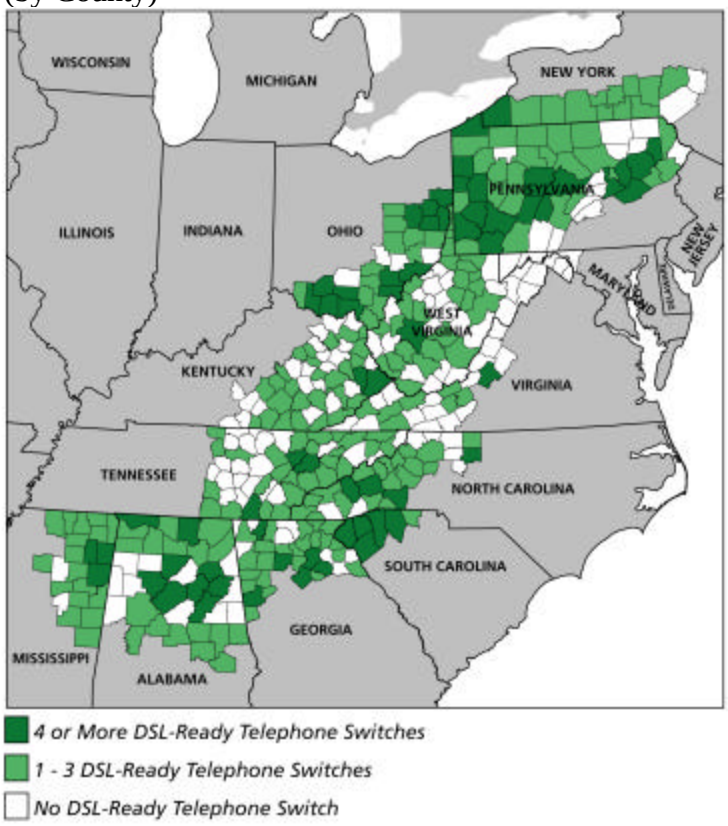


Figure 3(B): DSL-Equipped Central Offices, 2003
(by County)



4. Sources and Methods for DSL-Equipped Central Offices the ARC:

Author's search in the Central Office Finder database at DSL Reports website, http://www.dslreports.com/coinfo; National Telecommunications and Information Administration & Rural Utilities Service. (2000, April). Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Service to All Americans, pp. 60-72. [Online]. Available: http://www.ntia.doc.gov/reports/ruralbb42600.pdf

D. All High-speed Service Activity

1. The National Picture

The deployment of DSL and higher capacity services for larger business and government users has advanced at a rapid pace over the past three years. In addition, wireless broadband services have been spreading over the past three years, and are seen by some to offer attractive lower cost broadband access in rural regions with accommodating topographic and geographic features. We do not, however, present data on wireless services.

The rapid pace of telecommunications company consolidation was not entirely anticipated by the 1996 Telecommunications Act. The original eight "Baby Bells" now stand at four (BellSouth, Southwestern Bell or SBC, Verizon, and Qwest), and these companies dominate wireline high-speed services. The range of regulatory issues discussed above in the context of DSL services apply to all of wireline advanced services. In addition, the 1996 Act shifted much of the regulatory burden over these services to the states. This reality was not entirely anticipated and many states took years to build the capacity and expertise to design regulatory and investment responses to the new market environment and the spread of new ICT technologies. In what follows we profile the various regulatory and non-regulatory approaches that the Federal government and the ARC states have carried out to encourage quality basic and advanced telecommunications services.

2. The Policy Environment: Federal and State Initiatives for Broadband Deployment

Federal Investments to Encourage Access to Advanced Services

Federal activities around advanced services deployment have occurred in several agencies that administer programs to encourage investment in broadband. The most prominent set of investment programs are related to the FCC's universal service programs, which are administered by the Universal Service Administrative Company. These include the High-Cost, Interstate Access, Interstate Common Line, Low-Income, Rural Health Care, and Schools and Libraries programs. The last program, commonly called E-rate, is probably the best known of the universal service programs oriented to broadband deployment, and it accounts for roughly half the universal service budget (the High-Cost fund is somewhat higher, at $3.15 billion in 2002). With the amount of E-rate funding indexed against a school's percentage of students eligible to participate in the National School Lunch Program and a school's or library's rural location, the discounts can be sizable (up to 90% off of market charges). The E-rate program is currently capped at an annual funding level of $2.25 billion. There is an analogous program that supports connections and equipment for rural, not-for-profit medical facilities under the Rural Health Care label. As noted in the *Links to the Future* report the E-rate program has had a very important impact on rural communities in Appalachia, although a number of states in the region seemed not to be capturing their fair share of funding as of 2000.

The Rural Utility Service (RUS) within the Department of Agriculture has several programs designed to improve telecommunications, including broadband deployment, in rural regions. Its loan program is available to rural telephone carriers and has been

credited with dramatically improving Internet access in rural regions. For 2003, the RUS announced $1.4 billion in loans and loan guarantees for broadband access, defined at 200 kpbs or more, available to communities with up to 20,000 people. It also maintains a Distance Learning and Telemedicine program directed at providing funds to schools and health facilities in rural regions. This sub-agency supported a Broadband Pilot Program that provided $100 million in loans to enhance the rate of technology deployment technology to rural areas, and this has been superceded by the larger loan program.

Finally, a number of agencies within the federal government including the Department of Education (DoE), Housing and Urban Development (HUD), and the National Telecommunications and Information Administration (NTIA) within the Department of Commerce have initiated certain programs that support broadband deployment. NTIA's Technology Opportunities Program is probably the best known and oldest of these programs. It began funding telecommunications-based projects that reflect innovative technologies targeting underserved communities, but as of 2003 its funding was cut to only about $15 million dollars. The Department of Education's Community Technology Center program provided matching grants to states and localities for programs to improve technology training for low-income communities, but in the budget downturn of 2000 onward it too has had its budget cut and its future threatened. HUD has supported some technology programs within housing units. While this set of programs received relatively positive performance evaluations and helped bring both improved connectivity and training to underserved communities, they have been severely cut over the past two years

Overview of State Initiatives

A review of how states have addressed broadband deployment and related issues may help to initiate policy discussions and frame possible approaches that other states might consider. The following is a brief review of some state-level programs or endeavors to encourage broadband deployment. They represent a varied collection, ranging from explicit state legislation to state agency efforts to Governor's "blue ribbon" studies or commissions, to using state-controlled networks to leverage the infrastructure capabilities more broadly available to the public.

Many states have initiated programs designed to use telecommunications more effectively or to broaden capabilities, with many focusing programs on broadband infrastructure. Some states have used programs such as state universal service funds or special initiatives—often under the aegis of Governor's Commissions or Task Forces—while others, such as Mississippi and Maryland, have enacted explicit legislation to address broadband deployment and access. Each state has a unique context in terms of its telecommunications regulatory systems and relationships with dominant incumbents (typically the Bell South or Verizon), and existing infrastructure.

Ohio's National Regulatory Research Institute undertook a survey of state strategies regarding broadband in 2001 (National Regulatory Research Institute, 2001). Their results, based on 39 responses from state regulatory commissions, sought to ascertain state definitions of advanced services, how states handled advanced services, their approaches to open access, and their programs on advanced services. The overwhelming finding was that at that time, the state regulatory commissions were not regulating advanced services. The public utility commissions' most direct approach occurred through their work to insure fair competition through interconnection agreements,

handling service quality complaints, or configuring universal service funds. Most of the state regulatory attention is directed at the large ILECs. Several commissions reported that their states have other non-regulatory mechanisms that are being used to encourage broadband (tax incentives, line discounts, grants), and some noted that their state networks are being used to leverage better consumer network capabilities. Many of such efforts are documented below.

State Legislative Actions on Deregulation

The RBOCs, particularly SBC, introduced Tauzin-Dingell-style legislation in several states in 2002-2003. These legislative efforts were labeled "broadband parity"—referring to parity with cable companies' lack of an unbundling requirement. These bills were introduced in a number of states as of 2004 and had passed in Oklahoma (SB 2796), Indiana, Illinois and South Carolina.[7] Bills in Texas, Connecticut, and Missouri have not yet passed. Such bills represent a way to bypass the federal layer of authority on regulating high-speed Internet services. Most of these bills are extremely brief (and many are identical). They generally prohibit any regulation of high-speed Internet services. Language from the pending bill in Texas (H.B. 1658, 2003) below is typical:

> "Notwithstanding any other provision of this title, the commission may not require the unbundling of a network element used in the provision of high-speed Internet access service or broadband service, the resale at a discount of a high-speed Internet access service or broadband service, or any other obligation prescribed by 47 U.S.C. Section 251(c), as amended, as that obligation relates to the provision of high-speed Internet access service or broadband service, unless the Federal Communications Commission specifically authorizes state regulatory agencies to impose such a requirement."

[7] A bill advanced by BellSouth in the South Carolina legislature in January 2003 would have deregulated all broadband services capable of transmitting information at rates exceeding 144 kb/s in at least one direction, or services that combine wire routing and transmission to allow users to access the Internet.

Non-regulatory State Strategies for Encouraging Broadband Deployment

States have adopted other non-regulatory strategies in order to push faster network capabilities out toward rural regions and different user groups. The three modes that characterize such efforts (and discussed in *Links to the Future*) include demand aggregation, resource sharing, and using the state's own telecommunications traffic as an anchor tenant for build and finance a network that can be used more broadly by additional users. Various purchasing programs, consortium-building efforts, and state-sponsored grants can facilitate these approaches. Some of them are detailed in Appendix 1, which provides thumbnail descriptions of different state practices.

Table 2: State Network Strategies

	Goals	**Mechanism**	**Adopted in**
a. Demand Aggregation	• To lower telecommunications costs for the state and other government users.	The state government receives volume discounts from telcos by consolidating telecommunications service demands of various state government agencies and offices into a single large purchasing unit.	• Virginia
b. Resource-Sharing	• To lower telecommunications costs for the sate and other government users. • To maximize the efficiency of existing and new telecommunications infrastructures in key routes.	The state government and a telco barter free access to the state's highway rights of way and free telecommunications services to the state government and/or telecommunications infrastructure ownership. The state government and the vendor usually make a commitment to a long-term partnership that may last for several decades.	• Maryland • New York • South Carolina
c. Anchor Tenancy	• To lower telecommunications costs for the sate and other government users • To upgrade public telecommunications infrastructure in all parts of the state.	The state government and a telco or telcos enter a contract to make advanced telecommunications available to the state government. Telecommunications service to the state government is provided through public telecommunications networks, which would receive switching and transport capability upgrading as specified in the contract. Such an infrastructure improvement benefits all telecommunications users in the state (i.e., businesses and residents) because all types of users use public telecommunications networks.	• Alabama • Georgia • Kentucky • Mississippi • New York • North Carolina • Ohio • Pennsylvania • Tennessee • West Virginia

Source: Oden and Strover (2002)

Mechanisms include using state networks to extend broadband communications opportunities to non-profits or small businesses, using utility commission approval over mergers or network unbundling proceedings to leverage concessions from carriers, establishing special programs targeting rural digital inequities, and establishing unique joint ventures with carriers in order to achieve improved statewide infrastructure. Certain

cities and towns also have initiated telecommunications projects to enhance local connectivity and opportunities for economic development. Table 2 above shows the different approaches that the ARC states have used.

3. Advanced Services Deployment in the ARC Region

It is important to assess whether these various policy and regulatory efforts have contributed to more rapid deployment of all forms of high-speed services across the ARC region. In particular it is noteworthy that broadband deployment over the 2000–2003 period was influenced by a slightly higher level of federal investment which occurred prior to the effects of recent regulatory initiatives limiting CLEC access to the unbundled network element platform (UNE-P) of incumbent service providers (ILECs).

The FCC's data from Form 477 categorizes high-speed providers as any service providing at least 200 kbps in at least one direction (user-to-provider or provider-to-user). In the original *Links to the Future Report,* only about 48 percent of the Appalachian region's zip codes had one or more high-speed service subscribers in 2000, compared to the nationwide average of 60 percent—a statistically significant difference.

This update reports zip code data on high-speed service providers from December 1999 through December of 2002. The maps in Figures 4(A) and 4(B) below are corrected and presented using a clearer mapping procedure than in *Links to the Future* (these figures are similar to Figure 5 on page 29 of the *Links to the Future* report although the original 2000 map used dots rather than centroids to plot occurrences in the 2002 map). Here, the data and maps also provide evidence of significant broadband growth across the region.

Figure 4(A): Competition & Service of High-Speed Internet Providers, 2000
(by ZIP Code)

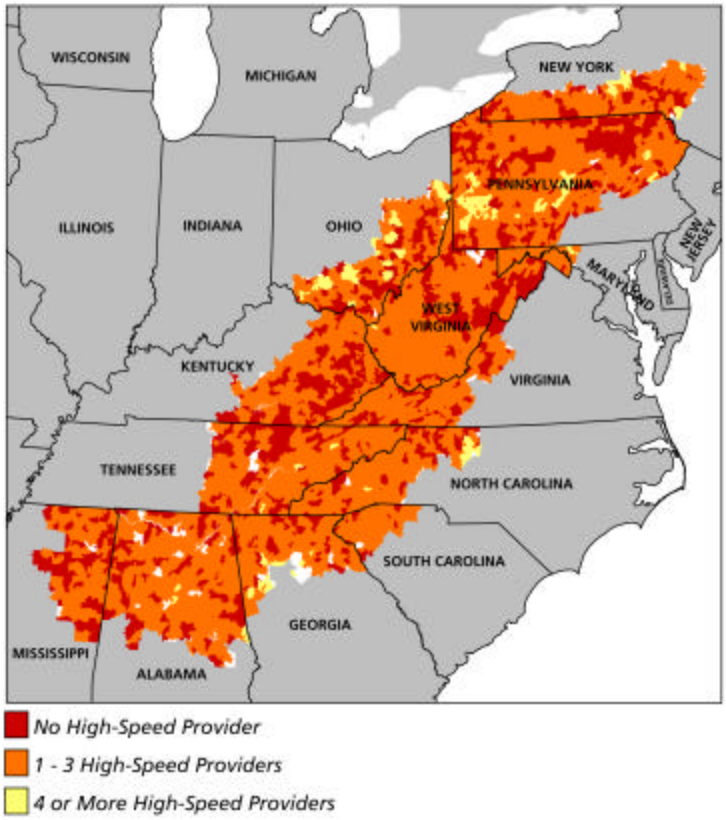
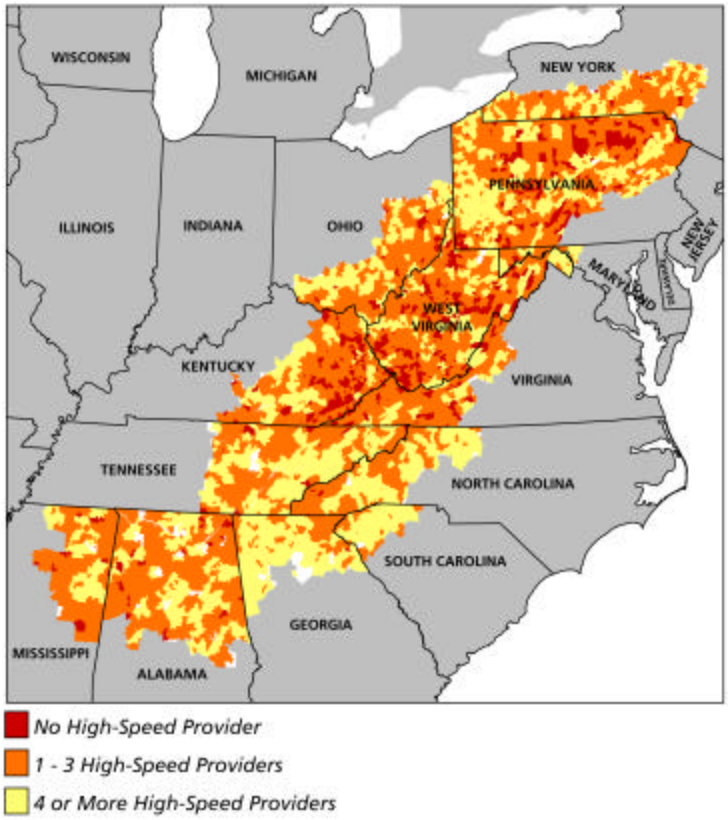


Figure 4(B): Competition & Service of High-Speed Internet Providers, 2003
(by ZIP Code)



In Table 3, below, we can see that percentage of ARC zip codes with at least 1 high-speed service provider grew from 43 percent of the region's zip codes in December of 1999, to 59 percent by December of 2002. It is noteworthy that the gap between the share of zip codes in ARC counties with high-speed providers and the national share widened over the period. The broadband service gap grew to 29 percentage points between Appalachia and the nation by December of 2002. In December 1999 there were 43 percent Appalachian zip codes with at least one high-speed provider compared to 60 percent for the nation (a 17 percentage point difference). In December 2002 there were 59 percent in the Appalachian Region compared to 88 percent for the nation.

Moreover, the FCC data are somewhat misleading in that the high-speed provider is indicated through the existence of any provider serving in a zip code however the type of service the customer receives is not specified. Therefore, the high-speed service could be one T-1 line to one company, or it could be residential cable modem service to a broad community. Moreover, the FCC aggregates its data at the low end, grouping 1 to 3 services providers in one single category. Thus, the data cannot provide evidence on competition or choice among high-speed services in much of the U.S. These data generally illustrate that the more populous regions of Appalachia have obtained high-speed services, but many other regions have none.

Hence, the availability of high-speed service can be extremely misleading as an indicator of broader regional connectivity. In our fieldwork for *Links to the Future*, we saw that even in economically distressed counties, the largest businesses had T-1 connectivity or better, but that fact said nothing about broader connections and capabilities in the county or zip code. Again, a T-1 line registers in the FCC database simply as a "1-3" subscribership entry in a zip code.

Table 3: Percentage of Zip Codes with at Least One High-speed Provider (1999-2002)

State	Dec-99	Dec-00	Dec-01	Dec-02
Alabama	46%	60%	66%	69%
Georgia	40%	60%	70%	70%
Kentucky	13%	28%	36%	44%
Maryland	52%	61%	44%	56%
Mississippi	32%	51%	60%	73%
New York	38%	72%	68%	72%
North Carolina	52%	58%	66%	67%
Ohio	42%	51%	56%	64%
Pennsylvania	49%	54%	49%	57%
South Carolina	59%	57%	60%	61%
Tennessee	53%	55%	67%	75%
Virginia	50%	67%	49%	62%
West Virginia	44%	47%	33%	46%
ARC average	**43%**	**53%**	**51%**	**59%**
National average	**60%**	**73%**	**79%**	**88%**

Note: Annual variations in state percentages by zip code may be due to sampling or reporting differences in the FCC Survey (http://www.fcc.gov/wcb/iatd/comp.html).

An additional important measure of the degree and quality of high-speed service provision is the percentage of zip codes in the ARC counties in each state that have four or more service providers. This measure is a better indicator of areas that have more extensive service and adoption of broadband services. Unfortunately we did not develop this data for the earlier report so we report data for 2001 and 2002 for the ARC counties in the various states in Table 4.

Table 4: Percentage of Zip Codes with Four or More High-speed Providers (2001-2002)

State	Dec-01	Dec-02
Alabama	15%	26%
Georgia	23%	46%
Kentucky	0%	6%
Maryland	9%	17%
Mississippi	2%	15%
New York	14%	21%
North Carolina	12%	35%
Ohio	5%	18%
Pennsylvania	12%	20%
South Carolina	11%	45%
Tennessee	11%	36%
Virginia	3%	9%
West Virginia	0%	8%
ARC average	**9%**	**23%**

These data on the availability of high-speed services paint a generally encouraging picture, but with some causes for continued concern. Clearly advanced services have reached a number of previously underserved areas over the past three years. And from Table 4 the number of zip code areas with multiple service providers has increased significantly signaling both increased adoption of high-speed services and perhaps increasing competition in a number of areas.

On the other hand, 37 percent of zip code areas in the ARC region still have no advanced service provision, a much higher percentage number than in the nation as a whole. Moreover, in all but six ARC states the number of zip codes with four or more providers is less than 20 percent. While this percentage is strongly influenced by population density or the number of urban ARC counties in each state, this result suggests that levels of adoption and competition may remain somewhat limited in a number of areas.

4. Sources and Methods for High-Speed Internet Access Tables and Maps

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E. Conclusions

This report shows that broadband access has expanded significantly in all major parts of ARC region. Especially encouraging is the increased availability of broadband in many rural counties that previously did not have access to this service. The issue of access to advanced telecommunications services in underserved areas remains, however, an important concern in light of the new data presented in this report.

An important question to address is whether the mix of state investment and policy initiatives correlates with these rough measures of access and use of advanced services. The evidence developed here does not provide a clear cut answer to this question. Federal and state investments have clearly made a difference over the past six years as schools and e-government networks have also encouraged adoption of advanced services and helped with the building of skills by youth and adult ICT users.

Many states that saw the greatest growth in the number of zip codes with at least one high-speed service provider (Alabama, Georgia, Kentucky, Mississippi, New York and Ohio) have implemented some form of an "anchor tenancy" strategy to push broadband into underserved areas. While numerous other factors clearly influenced deployment rates, it is noteworthy that this strategy was employed in all of the states that saw the greatest increase in broadband access. At the same time states that had more multi-layered and systematic strategies such as North Carolina seem to have a greater number of zip codes with multiple high-speed providers. A more systematic analysis would be required to link deployment rates to specific regulatory and non-regulatory actions by state governments.

The relationship between cable modem services and DSL or other wireline high-speed services is also important to consider. The FCC's 2002 ruling that classified cable modem service as an "interstate information service" subject to FCC jurisdiction took away any ability of state or local governments to directly push for extension of services to underserved areas. Large areas of the ARC region do not have cable services. Policy makers at the state and local levels might consider indirect ways to encourage cable and cable modem deployment to underserved areas.

The different regulatory environments among cable and wireline carriers has also driven the pressure on the FCC and State Legislatures to consider the demands of large ILEC companies for "broadband parity." The large companies (mostly the Regional Bell Operating Companies) have claimed that doing away with unbundling requirements would stimulate investments in new digital facilities and level the playing field with cable operators. This is a critical issue that should draw careful scrutiny from regulators and policy makers at all levels of government to ensure that real competition and more rapid deployment occurs.

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Appendix 1: Activity in ARC States: Infrastructure and Policy Initiatives to Encourage Broadband Services

Some states implemented deregulation in advance of the 1996 Telecommunications Act. Most utilized price cap or so-called incentive regulation plans to reduce explicit pricing obligations. New York's aggressive pro-competition activities are broadly taken as models for several other states around the country, although the size and expertise of its regulatory staff are not duplicated in any other state. New York was one of the first states to adopt incentive regulation, whereby a carrier would meet certain performance thresholds in one realm and have an incentive to undertake (or to price) other activities without regulatory policies or tariffs defining them; prices for the latter would be set at "market rates" rather than rates determined within a utility commission's hearings. New York's policies attempted to ease competition into an environment in order to create a level playing field for new entrants.

Ohio joined several other states grappling with a competitive push from the dominant exchange companies. It deregulated in 1995, and revisited its rules in 1999 in order to make adjustments for a competitive process that seemed to be working for businesses but not for residential users. Pennsylvania had numerous hearings and regulatory actions around deregulating telecommunications within the state as early as 1993 when it adopted a competitive telephone framework (Chapter 30, Public Utility Code, 66 Pa C. S. Sections 3001-3009) that provided for alternative regulation.

Subsequent to these deregulation efforts, complaints escalated around the country regarding service quality as well as incumbent reticence to comply with opening their networks to competitors. CLECs alleged that the Bell Operating Companies were unfairly slow in making their networks available to competitors, and many states held hearings on that matter, levied fines against the incumbents, and attempted to establish standards to cope with the RBOCs' behaviors.

Since the late 1990s, states have developed a number of regulatory and non-regulatory strategies to expand and extend advanced services to underserved areas. In what follows we offer an industry assessment of state environments for broadband deployment and access and follow with thumbnail sketches of recent state initiatives in the ARC Region.

Assessments of Broadband Activities

The Technology Network (TechNet), with over 200 CEOs and senior executives of the technology and biotechnology industries, released an assessment of state policies that they believe affect broadband deployment. According to the assessment, Michigan was first on the list, while Georgia was not listed in the 25 rankings provided. The report ranks the top 25 states and includes a Best Practices Guide to the most innovative state broadband initiatives. The report's indicators include: the absence or presence of legislation that streamlines rights-of-way permitting; whether a state has adopted a state-wide broadband strategy and created a broadband agency; whether it has undertaken comprehensive infrastructure mapping; what sorts of policies it has adopted to facilitate municipal networks; how it facilitates increased private sector deployment of broadband; any plans for financial incentives for reaching underserved communities; and its efforts to promote consumer use of broadband, including enhanced e-government. The report breaks out specific rankings in terms of supply-side and demand-side programs, as well as state "regulatory climate." The ARC states that are noted in the top 25 are: Ohio at #5; Virginia at #8; North Carolina at #19; South Carolina at #20; Pennsylvania at #22; and Kentucky at #24. [http://www.technet.org/resources/State_Broadband_Index.pdf]

Another study focusing specifically broadband deployment in rural regions of the world— many of them in the US—was released by the US Telecommunications Industry Association. While this study does not offer statistical comparisons, it profiles several efforts to develop broadband. The cases of LaGrange, Georgia and Danville, Virginia are among the examples offered here. [See The Telecommunications Industry Association, The Economic and Social Benefits of broadband deployment, October, 2003, available at http://www.tiaonline.org/policy/broadband/Broadbandpaperoct03.pdf.]

Recent State Actions toward Broadband Deployment (as of January 2004)

Alabama

Alabama has undertaken no new regulatory activity with regards to broadband since 2002. Currently under comment before the Public Service Commission are two issues that may have implications for telecommunication users, including a tangential impact on broadband users: the commission is taking comments on a policy to clarify rules governing IP telephony, and taking comments on a revision to its price cap and local competition regulatory structure. [http://www.psc.state.al.us/Telecom/webpage3.htm]

Georgia

We find no recent broadband policy activity in Georgia. The FCC granted BellSouth Section 271 entry into the long distance markets in Georgia in May 2002.

Kentucky

With the exception of the low-income housing initiative described below, there have been few notable broadband policy developments in Kentucky in the last two years.

In February 2003, the Kentucky Housing Corporation mandated that all housing funded with more than 50 percent state funding must be wired for broadband Internet access.

This policy is believed the first policy of its type in the United States. The KHC is also taking steps to get computers and low-cost Internet service to residents so they can find useful information on things such as employment and health care online. [http://www.kyhousing.org/news/resources/PR10-01-02.pdf]

In May 2002, the Kentucky Office of the New Economy (established by HB 572, The Kentucky Innovation Act of 2000), several private companies (including Bellsouth, Qwest, Cincinnati Bell, and others), Kentucky's universities and the Center for Information Technology Enterprise formed *connectkentucky* to promote high tech within the state. The *connectkentucky* project has three goals: increase public awareness of e-commerce, e-government, and e-learning; create and implement market-driven strategies to increase use of technology; and implement public policy initiatives to promote competition and eliminate regulatory barriers to Internet and broadband. *connectkentucky* has implemented a program of e-Business workshops around the state and funded an initiative, KY120, to promote best practices for technology in each of Kentucky's 120 counties. [http://www.connectkentucky.org]

The FCC granted BellSouth Section 271 entry into the long distance markets in Kentucky in August 2002. In December 2002, the Kentucky Public Service Commission began a review of the contracting practices of BellSouth in response to complaints from two ISPs, accusing BellSouth of providing preferential pricing to some wholesale and large volume customers. The Kentucky PSC had earlier alleged in a 2001 ruling that BellSouth was engaged in discriminatory pricing. No other action on these complaints has been reported. [http://psc.ky.gov/agencies/psc/press/122002/1219_r03.pdf]

The Kentucky General Assembly used a small portion of the state's tobacco settlement money to fund the Rural e-Learning Agricultural Program (REAP) in 2003. The Center for Information Technology Enterprise will administer the project, which is based on a $48,750 grant to bring computers, high-speed Internet access and online learning to Kentucky tobacco growers dealing with deep quota cuts and attempting to find alternative crops. [http://www.connectkentucky.org/Report2003/ruralelearning.html]

Maryland

Most significant for our purposes, the state legislature passed House Bill 697 in April 2003, which would establish a Task Force on Broadband Communications Deployment in Underserved Rural Areas. The legislation focuses on bringing broadband capabilities to state government units all over the state, and to facilitate providing high bandwidth services to other users as well. The bill states that it does not intend to compete with commercial access providers, "but rather to complement it where it exists, to provide access where commercial access is lacking, and to foster fundamental efficiencies in government and education for the public good" (HB 697, Section 7, 2003).

Network.Maryland, the statewide fiber backbone built in the late 1990s, had been the focus of some discussion. A 2003 study titled *eReadiness Maryland: Assessing our Digital Opportunities*, commissioned by Maryland Technology Economic Development Corporation (a task force created by the Governor), concluded that the network is not operational, much of the fiber is still dark, and few public buildings in the state are connected to the network. [http://www.marylandtedco.org/programs/eReadiness.html]

Part of the intent of the HB 697 would be to better manage the state's own telecommunications infrastructure.

The Public Service Commission of Maryland had been engaged in a court action (*Verizon Maryland v. Public Service Commission of Maryland*) that was argued before the US Supreme Court over federal jurisdiction in state utility board disputes. On May 20, 2002, the U.S. Supreme Court issued its opinion holding that federal courts have jurisdiction over a claim that a state utility commission decision violates federal law. The case was based on Verizon's refusal to follow the PSC's order to compensate a competitive carrier for calls routed to the Internet under Verizon's interconnection agreement with MCI Worldcom. The decision allows PSC orders to be challenged in both state and federal court if an argument can be made that the order violates federal law. [http://www.oyez.org/oyez/resource/case/1481/] This case may be related to telecommunications decisions in the future.

Mississippi

Following the passage of the Mississippi Broadband Technology Development Act in 2003, BellSouth announced its intent to extend broadband services throughout the entire state. The new law provides tax credits of up to 10% and sales tax exemptions of up to 100% to companies who expand their broadband capabilities to the least populated areas in the state. BellSouth announced it would invest approximately $10 million dollars in the project. The Mississippi legislation is available at http://www.mississippi.gov/frameset.
[Source: Office of Governor Ronnie Musgrove, USA Today]

New York

Deregulation began in 1985 well before similar efforts at the federal level were successful. The state opened competition with the local exchange companies by lifting the previous regime of price controls. In 2001, the New York Public Service Commission created a new incentive regulation framework for Verizon (formerly Bell-Atlantic). By creating incentive mechanisms and measuring the performance of the carrier in meeting customer satisfaction (as well as other metrics), New York has enhanced its competitive environment and expanded services into underserved areas. An evaluation of the progress of this system can be viewed on the Public Service Commission's website: http://www.dps.state.ny.us/telecom/telanalysis.htm.

The Wired Buildings program, which was first outlined by Governor Pataki in his 2000 State of the State Address, helps developers to wire and outfit existing buildings to accommodate the needs of small information technology businesses by providing grants for the deployment of advanced telecommunications infrastructure and related amenities necessary for business growth. The program also works in conjunction with the Quality Communities Technology Advancement Task Force to expand access to broadband services in rural areas of New York. A number of grant projects in the second round of funding will target the North Country and Catskill Watershed regions for demonstration projects.

North Carolina

North Carolina took a detailed approach to infrastructure assessment as it mapped telecommunications infrastructure at the wire exchange level of detail for each county in the state. This became the basis for a state program attempting to ensure that every county has flat-rate dial-up modem access to the Internet. In its second phase the program is attempting to insure that each county has broadband access to the Internet through its Rural Internet Access Initiative (created through SB 1343, An Act to Create the North Carolina Rural Internet Access Authority and to Direct the Regional Partnerships, with the Assistance of the North Carolina Rural Economic Development Center, to Study and Report on the Information Technology Infrastructure and Information Technology Needs of the State, passed in August, 2000). The Rural Internet Access Authority was charged with enabling local dial-up Internet access in every telephone exchange by the close of 2001, making high-speed Internet access available to each NC citizen within three years, and establishing two Telework Centers in the state's most distressed areas.

In 2002 the legislature approved a bill that expands the definitions for the types of infrastructure that can be funded with money from its Industrial Development Fund (IDF) (Ch. SL 2002-172). The expanded definition includes expenditures on telecommunications and high-speed broadband lines and equipment.

In 2003, BellSouth teamed with America Connect to test wireless broadband in two rural North Carolina counties. BellSouth holds FCC licenses throughout the Southeast in the 2.3 GHz WCS band, and the two companies will make use of that band to conduct the trials with a view to providing fixed wireless services to underserved rural areas. The state's Rural Internet Access Authority is helping fund the trial.

The Internet Access Authority's website at http://www.e-nc.org/ is a resource that allows users to identify public Internet access points in each county and to examine GIS maps of telecommunications infrastructure. The goal of the e-NC initiative is to work through the social structures in localities to ensure that not only is high quality Internet access available but also that communities learn how to use that access creatively and for their own local development purposes.

Ohio

The Ohio Community Computing Network (OCCN) was established in 1995 as the oversight and evaluation organization for the 14-community computing centers created and funded by the Ameritech Advantage Ohio alternative regulation case settlement. This marked the first time in the United States that a settlement before a state public utility commission included the funding of community computing centers in low-income neighborhoods. This settlement has made computers and telecommunications technology accessible to people of all incomes through community technology centers. OCCN has expanded and is currently working with over 40 community technology centers in urban and rural areas of Ohio. The centers are located in libraries, community centers, schools, churches, social service agencies, and residential housing complexes. Since its inception, OCCN has received or distributed to community technology centers $4.45 million from Ameritech and $90,000 from Cincinnati Bell.

Pennsylvania

Pennsylvania joined other states in approving price cap regulation for incumbent local service providers in the early 1990s. Around the country at that time several telecommunications companies sought to deregulate certain categories of service, and in exchange for opportunities to move into new lines of business with charges that were supposedly responsive to the market, they agreed to cap or freeze their prices on certain other services. Pennsylvania's rate deregulation is embedded in the Public Utility Code, particularly under Chapter 30, and the incumbents subject to its provisions, particularly Bell Atlantic and later Verizon, have been scrutinized and criticized repeatedly for not conforming to the intent of the reform.

Pennsylvania adopted a competitive telephone framework in 1993 (Chapter 30, Public Utility Code, 66 Pa C. S. Sections 3001-3009) that provided for alternative regulation. Even though it contains language regarding competitive local service, the focus of the reform was on non-basic telephone services. The promises associated with Chapter 30 greatly outstrip the actual language in the legislation. A report on Chapter 30 was issued by the Pennsylvania Legislative Budget and Finance Committee in June, 2003 that elaborates the history and intent of Chapter 30.

Chapter 30 provisions traded pricing flexibility for the incumbent in some retail service classes in return for promises of substantial infrastructure upgrades throughout the state. For example, broadband services were supposed to be available throughout the state by 2015; in fact, at the time that Chapter 30 was being formulated, it was sometimes referred to as the 'fiber optics bill.' The intent of the network upgrade commitment was to improve the voice network (especially by establishing fiber links among central offices) and to eliminate analog switches and multiparty lines, in spite of contemporary interpretations that suggest that network modernization in 1993 had to do with providing DSL service. (DSL is barely mentioned in Chapter 30.) The network modernization component thus had more to do with modernizing the existing voice network than with delivering a mass market Internet connection. The Internet was not mentioned in the legislation, and indeed, with just over 100 sites in 1993, the World Wide Web was inconsequential to this reform at its inception.

When modernization is addressed in Chapter 30, it is in terms of a network reaching speeds of at least 1.5 megabits per second (the maximum speed available on existing copper lines). Bell Atlantic's 1994 Chapter 30 proceeding discussed a 45 megabit per second network, and partly on that basis the financial terms of its rate reform were generous. No particular technology is noted in the legislation. The thrust was to encourage incumbents to innovate in competitive services while shielding basic services from rate increases. A class of services, including basic local dialtone, was included under "protected" services, and their rates were frozen. Each telephone company in the state (roughly 40 including Verizon) was supposed to file a Chapter 30 plan, and most of these were approved in July, 2001. Verizon North was among the last companies to file its Chapter 30 plan (in 1998).

Chapter 30 provisions were supposed to sunset at the end of 2003, and hearings were held beginning in fall, 2002 to evaluate whether Chapter 30 should be revised and extended or allowed to die. The Office of the Consumer Advocate in Pennsylvania, for example, has

argued that Chapter 30 should be extended but with substantial modifications that would insure broadband deployment (Popowsky, 2002). That office commented:

> …it is not enough to throw ratepayer money at their telephone companies in the hope that some of that money will "stick" and will be spent on providing services to communities that would not be served under a business-as-usual approach. Chapter 30 tried to impose such a requirement on our telephone companies, but in retrospect it appears that the requirements were so long (from the year 1993 to 2015) and so vague ("access to broadband service [defined as a bandwidth equal to or greater than 1.544 megabits per second] by each bona fide telephone customer of a local exchange telecommunications company within five day after a request for broadband service is received by any telecommunications company") that it is difficult to assure that these benefits will be achieved in any particular community in a time frame or in a manner that meets that community's needs (Popowsky, 2002, p. 11).

Because competition and infrastructure upgrades did not develop quickly even after Chapter 30 began and because the federal Telecommunication Act required changes in state provisions, the Commission adopted the Global Telephone Order in 1999 to promote additional competition and to adapt its provisions to the new federal law. Its provisions included:

- Capping Bell Atlantic (now Verizon) local rates until the end of 2003;
- Capping the local telephone rates of rural telephone companies at $16/month until the close of 2003;
- Keeping all Internet phone calls local;
- Lowering toll rates;
- Lowered access charges;
- Increasing the number of households eligible for Lifeline service;
- Creating a $30 million universal service fund to offset costs in higher priced areas of the state.

One issue that has arisen alongside discussion of reforming Chapter 30 concerns the line speed assigned to dial-up modem service. The PUC regulations do not require that Internet providers guarantee specific line speeds associated with their services. Consumers, however, have complained to the PUC that their dial-up services for Internet access are sub par, which prompted some critics to query whether guaranteed line speeds should be required under a revised Chapter 30.

The Bell Atlantic-GTE merger in 1999 created another opportunity to examine company commitments to building advanced infrastructure. As part of the merger approval, the company agreed to deploy a universal broadband network in phases, with 20% of it built 1998, 50% by 2004, and 100% by 2015. These obligations, however, have come under scrutiny in 2002-2003.

Frustrated with the continuing slow pace of competition, particularly Verizon's practice of slow compliance with competitors' requests to connect to or use elements of its network in March, 2001, the PUC ordered functional structural separation: Verizon

would continue to operate as one company but the wholesale and retail divisions would be required to operate at arms-length pursuant to a code of conduct. This came on the heels of an earlier decision in 1999 to structurally separate the company into two units, a move that came under fire from Verizon. The Commission reversed itself on the structural separation and adopted functional separation in its stead.

Regarding the smaller, independent or cooperatively based telephone companies serving regions of Pennsylvania, we could find no publicly available information regarding the extent of their system upgrades or Internet services. However, smaller telephone companies – many in rural regions – are more likely to offer DSL than are larger companies serving the same sorts of customers. The National Exchange Carrier Association writes that among the rural companies in its pool, 76% of 1076 smaller telephone companies function as an Internet Service Provider. This figure is based on a survey of its Traffic Sensitive companies (generally serving rural areas, and having fewer lines in service) (National Exchange Carriers Association, 2000, Keeping America Connected: The Broadband Challenge. Access Market Survey of NECA's Traffic Sensitive Pool Members. Available at www.neca.org).

A study by Glasmeier et al. (2003) found that rural Pennsylvania residents and small businesses frequently lack access to broadband facilities.
[http://www.ruralpa.org/broadband_report.pdf]

South Carolina

In March 2003 the South Carolina General Assembly passed H3344, which defined broadband as exempt from regulation by the state public service commission.
[http://www.computeruser.com/news/03/02/19/news2.html]

Tennessee

Tennessee has enacted no notable broadband policy since 2002. In August 2002, the FCC granted BellSouth Section 271 entry into the long distance markets in Tennessee. In 2003, the General Assembly considered a controversial measure (HB 457), one of the so-called "super-DMCA" initiatives that stated "it is an offense for any person to possess, use, make, develop, assemble, sell, lease, distribute, transfer, import into this state or offer, promote or advertise any unlawful communication device for the unauthorized acquisition or theft of any communication service." The proposed law was vaguely worded, enough that it could apply equally to theft of cable services or commonplace online activities such as the transfer of copyrighted music files. Activities that involved more than five "devices" were classified as felony offenses. After much debate, the measure was shelved until the 2004 legislative session. [http://tndf.net/]

The city of Chattanooga announced a major initiative to upgrade its telecommunications infrastructure. At the Tennessee Valley Summit, the local mayor announced that a report commissioned by a consulting company concluded that the region would enjoy robust technology company-based growth if it invested in improved telecommunications facilities and created an Applied Technology Center, among other things.

Virginia

Advanced Communications Assistance Fund- Virginia created this program which provides up to $50,000 per award to communities working to improve local telecommunications infrastructure. This is a program to boost connectivity in smaller communities.

Through VirginiaLink, contracted service providers will offer businesses throughout Virginia "one-stop-shopping" access to unbundled, high-capacity telecommunications services. Businesses access the communications services by joining the VirginiaLink, the consortium buyers' group. The VirginiaLink Consortium is administered by the Virginia's Center for Innovative Technology (CIT), a state-charted, nonprofit organization dedicated to the growth of technology and business in Virginia. In order to acquire the discount services obtained by VirginiaLink, a consumer must purchase a one-year membership, which will cost end users $100 per business location, with a maximum fee per firm of $1,000. Service resellers and Internet service providers (ISPs) also will be able to join for a $500 fee per location, with a maximum cost of $2,500.

Virginia also recanted its legislative prohibition on utilities offering telecommunications services, a response to the City of Bristol's initiative to extend fiber-based connectivity to various clients through its region.

West Virginia

In early 2003 the state's Consumer Advocate's office released its Final Report and Recommendations on Advanced Services from the Advanced Services Task Force in West Virginia (http://www.cad.state.wv.us/Adv%20Services.htm). The report concludes that the deployment of advanced services in West Virginia lags that of national statistics, but that it is growing quickly. In West Virginia, 50% of households have access to broadband, with only 7.7% actually subscribing whereas comparable national statistics are 75% and 15%. The report notes that the best way to monitor deployment of broadband in West Virginia is to require periodic reporting to the PSC by broadband providers, and that the major impediment to deployment of advanced services is the absence of a coherent State plan or policy.

The Task Force's recommendations are to let market forces continue to work to spur deployment, but in the long run the State should promote demand for broadband by providing information on broadband deployment and uses, and it should consider using tax credits and grants to suppliers and users of broadband. The taskforce also noted that a state universal service fund should be considered in order to provide the means to address underserved areas in the future.

A pilot effort in Glenville, W.Va., about 160 miles south of Pittsburgh, is testing wireless access capabilities in mountainous, rural areas. The project is funded by grants from the Appalachian Regional Commission and the Benedum Foundation, each contributing $125,000. The research team will conduct a second pilot in a community in southwestern Pennsylvania. This effort is spearheaded by faculty from Carnegie Mellon University, which established a Center for Appalachian Network Access in 2003. The center works to bring high-speed Internet access to depressed Appalachian communities.