Preface

This series of reports, entitled *Strategic Technology Infrastructure for Regional Competitiveness in the Network Economy* and packaged in eleven Volumes, is the culmination of a dedicated effort of the following individuals and organizations. Each Volume can be viewed as a stand-alone publication; however, it should be noted that each Volume was written in the context of the overall project. The project utilized the Southside and Southwest Virginia regions as a model for a low-cost Geodesic Mesh network design and viable financial model that could be replicated in any region of the U.S.

Volumes

1) Rationale, Environment, and Strategic Considerations
2) Connecting the Regional Infrastructure to National and International Networks
3) A Fiber Optic Infrastructure Design for Southside and Southwest Virginia
4) Fiber Optic Infrastructure Design Guide
5) Financial Feasibility and Investment Rationale
6) Leveraging Advanced Optical and Ethernet Technologies
7) Speculative and Alternative Technologies
8) Community, Applications and Services
9) Demographics for Southside and Southwest Virginia
10) Health Information Technology and Infrastructure
11) Education in the 21st Century
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Background

The work of the “Strategic Technology Infrastructure for Regional Competitiveness in the Network Economy” project was organized around 11 functional teams comprised of University, community, and private sector collaborators having expertise in particular elements of the project. The project followed that structure in producing output in the form of 11 Volumes as listed below:

Volume 1: “Rationale, Environment and Strategic Considerations” — introduces the overall rationale and political issues associated with Virginia Tech’s “Strategic Technology Infrastructure for Regional Competitiveness in the Network Economy.”

Volume 2: “Connecting the Regional Infrastructure to National and International Networks” — explains that the maximum value of infrastructure in a locality is a function of who and what that network is connected to, both locally and externally.

Volume 3: “A Fiber Optic Infrastructure Design for Southside and Southwest Virginia” — utilizes the Southside and Southwest Virginia regions, counties, and cities to produce a detailed optical infrastructure in order to demystify the technical choices to be made in developing an optical infrastructure and the considerations related to topology and routing.

Volume 4: “Fiber Optic Infrastructure Design Guide” — serves as a guide for use in applying the infrastructure design concepts contained in this report as a replicable model.

Volume 5: “Financial Feasibility and Investment Rationale” — discusses some of the business reasons for why enabling network infrastructure is not available in rural areas and demonstrates that public intervention in such cases is rational and reasonable financially and on a regional basis.

Volume 6: “Leveraging Advanced Optical and Ethernet Technologies” — makes the argument that by leveraging some of the most advanced Ethernet and network
technologies it is possible for special interest entities to create special purpose networks that fully leverage the proposed optical infrastructure at reasonable cost for health, education, or specific private sector purposes.

Volume 7: “Speculative and Alternative Technologies” — discusses some of the currently hyped technology choices that are available for communities to develop experimental projects for first mile access to the home or business. It also identifies several alternative deployment techniques that have the potential to effect deployment costs.

Volumes 8-11: “Community, Applications and Services” — discusses ways in which communities, citizens, and businesses can leverage the benefits of advanced network infrastructure for the public good.
Introduction

Given the critical attention that the public is beginning to give to leading-edge, advanced telecommunications and associated policies governing use and access, this Volume introduces the overall rationale and organization of Virginia Tech’s “Strategic Technology Infrastructure for Regional Competitiveness in the Network Economy” project, discusses the political and economic environment for these issues, and discusses strategic considerations relevant to a publicly-guided communications infrastructure initiative.
Rationale

Underpinning the new economy is access to advanced information and network technology infrastructure. Its driving force is creativity, inventiveness, and new knowledge, all enabled and multiplied by technological advantages that allow access to the right information, producers, and consumers at the right time.

Regions having an advantage in knowledge workers and technology infrastructure are diverging in economic vitality from those that do not at an alarming rate. One can easily conclude that catching up is impossible. Ironically, in the context of technologies (the Internet Protocol, advanced optical systems, high bandwidth wireless communications, microprocessors) designed to maximize distribution of information and economies of scope in computing capabilities, patterns of infrastructure deployment leveraging these technologies have instead led to the most significant concentration of production capacity and wealth in modern history.

The fact that this new economy is still in its infancy is reason for optimism — both this economy, and its enabling technologies, are still developing and changing at an incredible rate. **It is possible to leverage two critical circumstances:**

First, state and federal regulators, legislators, and policy makers are beginning to comprehend the price their constituents are paying for the telecommunications industry’s rational reluctance to deploy technologies that do not sustain current ways of doing business and profit margins. Promises by these traditional players to meet new economy requirements for telecommunications services and protectionist pleadings are received with increasing skepticism and with more critical assessment. **Policy is rapidly tilting towards accepting and encouraging innovators, new service providers and increased competition.**

Second, **new emerging optical, wireless, and “next generation” Internet technologies** are eliminating the barriers-to-entry (high cost of equipment, right-of-way access, core competencies of incumbents in traditional telecommunications systems and services, past requirement to leverage politically protected/regulated services such as
the Public Switched Telephone Network) for new players in the advanced network services industry (e. g. internet service providers, community cooperatives, electric utility companies, municipalities, new startup’s).

In this twenty-first century network economy, being first to market with a great idea is imperative. Varying levels of regional competitiveness and productivity tend to be a function of having critical masses of people with the facility to gather new information and to develop insight about new things on, or just over, the horizon.

The communities in Virginia’s Southside and Southwest regions are aware that it is not sufficient to chase what other regions, dominant in this 21st century economy, have today. They demand a plan that looks ahead, that with calculated risk, gives their communities a chance to have an advantage in our networked world. Senator Hawkins has perhaps expressed it best, “We need a competitive advantage; we need something relevant to this new economy that no one else has, but will someday need and want.”

The dilemma is that the telecommunications industry is having great difficulty in justifying a business case for the deployment of advanced communications network and information technology infrastructure. For all but the most urban (and currently the most productive) regions in our network economy, it is well documented that most service providers do not intend to serve the majority of end users with sufficient network access to allow them to become producers of next generation applications and services. Many are beginning to realize that stopgap measures designed to utilize outdated infrastructure, such as DSL and cable modems, will not be sufficient to provide the leapfrog advantage they are seeking.

Virginia Tech’s eCorridors Program uses a very specific (and somewhat unique) definition when using the term “broadband” throughout this project. From our perspective, next generation broadband implies a network that provides symmetrical, high bandwidth (multi-megabit up to gigabit per second) access for an array of Internet Protocol-based network applications and telecommunications services.
There are two major technology elements to the problem of creating a “producer advantage” in communities throughout rural Virginia regions. The first is the need to have Internet access points, (in industry parlance points of presence), and multipurpose optical backbone infrastructure in close proximity to every community in these regions. The second is to have the infrastructure within these communities to extend access to businesses and citizens. (Typically referred to as the “last mile” by telecommunications companies, it is the element of a communications infrastructure that attaches a consumer to the community, regional, or national communications infrastructure. Advocates of advanced network access to the consumer refer to it as the “first mile”, and is the term used throughout this project.)

Two sympathetic regional industry leaders articulate these problems best.

- Verizon:

  “Unfortunately, many of the rural communities are still isolated from high-speed backbone access, and due to their proximity to high-speed Internet points of presence (POPs), the cost to extend these POPs to these rural communities can be costly. As a result, without affordable high-speed backbone access available in these communities, there have been few requirements to develop the basic local high-speed network infrastructure. This has created a “chicken and egg” scenario where local companies will not invest in the required infrastructure to compete in the “new economy”, thus making it difficult for these communities to compete for businesses that require high bandwidth services.”

- Old Dominion Electric Cooperative:
“Current demographics of the area to be served, and anticipated demand from current residences, businesses, and government, simply cannot support…the kind of investment that is required to construct an advanced telecommunications network across the entire region.”

“The most important conclusion is that based on the current demographic profile, the overall market for advanced broadband services in the e58 corridor is extremely unattractive....”

The tone and conclusions of the traditional players in the telecommunications arena lead to the second point of contention concerning the deployment of advanced communication network infrastructure in the regions of interest to the Commission: first, that it is prohibitively expensive to develop such an infrastructure in all but the most urban 25 to 30 areas of the nation; and second, that potential consumers do not exist in these regions to be the anchor tenants willing to pay an amount sufficient to cover the initial investment and ongoing operating costs.

There is a contingent of players, including representatives of the computing industry, network and communications component providers, federal agencies involved in research and development, and research universities who know that alternative technologies, alternative deployment strategies, and new business models exist that make possible reasonably priced, millions to billions of bits per second access to virtually every U.S. community. In a recent speech, Andy Grove, CEO of Intel, expressed the frustration of these technology players when he said, “The ability of end users to pull technology through the telecommunications industry structure is virtually non-existent.” In that same speech, he added, “This industry has proven itself incapable or unwilling to adapt to the needs of mass deployment of broadband technologies.”

Much debate at the national level concerns the correct strategy for attacking the problem of developing advanced network access and producer capability throughout the nation. Andy Grove, representing the computer industry, leaders among the network and communications component industry, key players in this arena from the research university community, and the telecommunications industry all agree there are only a few obvious strategies:
Volume 1: Rationale, Environment, and Strategic Considerations

- Free all providers of telecommunications services from restrictions on what they provide, who they can serve, where they can provide services, and on limits to return on investment. The traditional telecommunications industry prefers this choice. But it is beyond our power to have much effect in this direction.

- Recognize that such services are critical and essential, that significant market failure exists in the provisioning of these services as essential public goods, and facilitate active local, state, and federal government roles in the development and deployment of the requisite infrastructure and services.

- Invest in new players and business models to facilitate the deployment of large scale network infrastructure based on leading-edge and, in some special cases, on disruptive technologies that can radically alter the economics of, and the types and levels of service available in, regional and community telecommunications markets. Work with communities to aggregate demand and to develop incentives for private sector participation in the provision of new broadband technologies and services.

The advanced network infrastructure initiative described herein leverages the third strategy — deployment of large scale communication network infrastructure based on leading edge technologies that can radically alter the economics, types and levels of communications services. The initiative will demonstrate cost-minimizing tactics and reveal current and potential revenue sources for advanced network services that could anchor major deployments. An important outcome will be to stimulate private sector participation and competitiveness. Such a network infrastructure can be developed based on solid, proven technology available today.

Today’s challenge and opportunity are to design from scratch an even more advanced telecommunications paradigm by leveraging the most advanced optical technologies. The research community, followed by other public and private service entities including technology-based companies, major medical institutions, and government facilities, can be the anchor tenants for such an infrastructure. Ultimately, this advanced infrastructure could reach all education entities, local health care and government facilities, businesses, farms, and individual households.
In next generation networks, intelligence, and therefore the bulk of the cost, will be at the edge, with the potential for the users of the network to have more economical access to essentially limitless transport capacity. “Big science” and national defense requirements have driven technology development over the last 60 years. We cannot anticipate the full range of network requirements for the most unique and sophisticated applications.

This is an important driver in the move towards “user controlled” networks and the “asset based telecom” business model for development of wide-area, large-scale technology infrastructure. As a result, at the physical media level, the most powerful architecture is one which enables maximum distribution and movement of information. In such an architecture, any access point has approximately the same advantage in cost efficiency and effectiveness as any other; there is no top, there is no bottom.

This is in stark contrast to most of our public communications network infrastructure, and even several of our national advanced research communications networks. To be economically and technically feasible, the enabling communication infrastructure must reflect the full functional and economic potential of today’s communications technology, plus be able to quickly integrate emerging new capabilities. This is not a prevailing characteristic of the nation’s embedded communications infrastructure.

The geodesic optical mesh architecture utilized in the regional network design (see Volume 3) has several notable characteristics ideally suited to enabling broad community access, and which optimally leverage the most advanced network and communications technology. It trades the more traditional maximum protection of a limited number of links and routes at maximum capacity (e.g. conduit buried deep, often in concrete, containing hundreds of fibers) to obtain many low cost, diverse links and routes (e.g. direct buried cable containing less than a hundred fibers). Increased network reliability and infrastructure security is obtained through the utilization of the increased redundancy, in other words, the multiple paths from any single location to any other location. It results in maximum access points, and it leverages the strength of the most advanced packet switching and optical technologies in facilitating the maximum potential distribution of information and vital networked resources. In a geodesic optical mesh, there is no top or bottom; no single access point within the mesh has advantage over any other.
It is these factors that continue to drive the most significant collaborations among industry, university research, and government, and have resulted in enormous transfer of technology to the private sector with extraordinary economic development effects. The “hot” problems today require technology and communications infrastructure supporting bioinformatics, material sciences, genomics, computational science, telemedicine and a host of emerging new fields. Required today are networks designed to provide greater capacity, control, and function. Where these communications capabilities exist will determine where the secondary economic development effects will occur.

Over the next twenty years, we will see the most significant and fundamental changes in the technology underpinning our national telecommunications infrastructure in our history.

These changes in communications capability and economics have the potential to act as extraordinary multipliers of productivity and efficiency. For certain economy driving information and advanced technology based products, these changes will dictate what is produced and where it is produced. The question is what places, what regions, will have access to these capabilities first. The answer is that the first regions to have access to these communications capabilities on a broad scale will be those that are the first to have deployed in their regions the leading edge, developmental communications networks.
Role of the Private Sector

This section discusses the current state of the telecommunications industry important to Virginia and the legitimate business factors that make it unlikely that existing private sector telecom companies will be able to serve the immediate needs of Virginia’s rural communities. The conclusions drawn in this section build upon the assumed intent that communities wish to “leap frog” to advanced telecommunications infrastructure; that they wish to participate as “producers” of network services and content; and that advanced telecommunications infrastructure is essential to economic viability in today’s global market and information-rich environment.

Virginia’s telecommunications providers are subject to the same chaotic forces that are evidenced at the national level: numerous bankruptcies and mergers as the industry shakes out after the Internet boom/bust of the late 90’s. U.S. News and World Report estimates that telecommunications companies defaulted on bonds totaling $15.4 billion during the first six months of 2001, and predicts that more than $100 billion will end up in default over the next two years. As a result, long-term strategy and investment have taken a backseat to short-term survival and profit maximization.

The combination of the sector’s anemic growth outlook, the cannibalizing competitive mega-trends of cell phone usage and e-mail substituting for land-line phone usage, voice to data migration, Bell entry into long distance combined with local competition, and the bubble-induced excesses in debt and over-capacity all create a powerful wealth destroying dynamic. Telecom’s ‘debt spiral’ has become so severe that even the strongest players who are still able to raise significant capital are reluctant to assume any more liabilities or business risk.¹

¹ “The Enronization of Telecom” by David S. Isenberg; Precursor Watch Feb. 5, 2002
Table 1: Verizon Statistics

<table>
<thead>
<tr>
<th>Verizon</th>
<th></th>
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<tbody>
<tr>
<td>Total local phone lines</td>
<td>61 million</td>
</tr>
<tr>
<td>Lines cut off, last 12 months</td>
<td>1.7 million</td>
</tr>
<tr>
<td>Capital expenditures per year</td>
<td>$16 billion</td>
</tr>
<tr>
<td>Revenue growth</td>
<td>0</td>
</tr>
</tbody>
</table>

“Tele-trouble” Table from Forbes, August 12, 2002

Unlike every other information technology industry, the incumbent local exchange carriers engage in virtually no research and development. With the exception of 1999-2000, their network capital spending has remained flat for over a decade. However, their political spending has increased sharply.

As discussed above, the supply of advanced telecommunications fiber-optic infrastructure is severely lacking from the private sector, and this is particularly true for rural areas. That supply is not likely to increase in the near future. On the demand side, while consumers in urban areas have access to and are demanding more high bandwidth networks, demand for bandwidth from new customers is stagnant. The reasons for this have been the subject of debate on a national scale for some time and include the high price of service, the perception that broadband is only needed for business applications and not for home use, and the lack of compelling applications that fully utilize broadband capabilities. It is this last point that seems to dominate current discussions of the issue, particularly among computing industry leaders who have developed high-end applications but realize there is a lack of network access to end users necessary to fully utilize them. Consumers are often perfectly satisfied using a $30/month dial-up connection to send the occasional e-mail and surf the Web. Most consumers, particularly in rural areas, have not had the opportunity to experience a true broadband connection and related applications to serve as a basis for comparison. Furthermore, cutting-edge applications that require high bandwidth such as online gaming, streaming video or video-on-demand and videoconferencing to the desktop applications are not yet widely available or affordable.

“People starting a household no longer bother to get a land line.” Harvey White, CEO of Leap Wireless, a San Francisco based company that pioneered the sale of cell phone service designed specifically to replace local land lines. Its network now costs less than a penny a minute to operate.

Forbes, August, 2002
It is thought that distance learning and tele-health may be the primary compelling broadband applications that will yield a critical mass of broadband users in rural areas.

It has only been in the past decade or so that rural communities have had the benefit of regular telephone service — there are still some in the most isolated areas of the state that do not. Similar to the provision of electric service in the early 1900’s, rural communities are always the last to receive infrastructure investment by regulated monopoly providers (it took 50 years for the rural communities to obtain the same electric service as urban areas had been getting). In the context of the latest optical communications capabilities, it simply doesn’t make sense from a profit-driven business perspective to deploy fiber to customers that are located miles apart and reside in single family households spread far and few between.

In summary, the economics of providing broadband telecommunications service to rural communities are bleak on both the supply side and the demand side. Telecommunications companies are private businesses, responsible to their stockholders to maximize profits. It does not meet their legitimate business goals to spend millions of dollars to install a network in rural areas where past experience leads them to believe that there are not enough subscribers to provide profitable revenue and return on investment.

According to a report by Ca*Net (a prolific telecommunications industry and research community based in Canada), the telecommunications sector is suffering from a massive debt hangover. It will take years to write down this debt through traditional telecom amortization processes. More importantly, it will be many years before the markets have their faith restored in the financial viability of the telecom sector. As such, for many small telecom companies, financing will continue to be problematic for the foreseeable future and the deployment of next generation broadband to rural areas and to residential homes may take decades to accomplish with current telecom business models.

*Customer (or community) owned networks have the potential to move the financing problem away from the telecom companies to those that require it most. A primary role for private sector telecom companies can be to focus on providing a wide array of essential management functions of the customer owned*
infrastructure as well as offering new and enhanced services that augment the customer owned infrastructure.
Economic Benefits and Job Growth Resulting from Telecommunications Infrastructure

Even in the context of the recent technology industry downturn, the information technology industry remains enormously important to the overall health of a region’s economy. At the national level, from 1994-1998, information technology jobs grew at 30%, adding 1.2 million new jobs. Furthermore, the outlook for information technology jobs is promising; the Bureau of Labor Statistics projects the five fastest growing occupations to be in the information technology sector. The report also states that these information technology jobs pay on average 85% more than other private sector jobs. We see little evidence that this has changed in the current recessionary conditions.

Investment in next generation information technology infrastructure and equipment is one important step that regions can take to revitalize their economy. Once these investments are in place, they provide a platform for creating bandwidth-consuming telecommunications services, applications, software, entertainment, and content. They also allow a region’s citizens and businesses to become network content and service producers, not just consumers.

The potential benefits of a next generation infrastructure to a region’s citizens are significant. Access to such technology provides benefits such as shopping via e-commerce at a global array of stores and services, telecommuting to jobs outside the region, access to advanced tele-health services and medical specialists, and workforce training and education at a distance. Perhaps most important, deployment of optical fiber networks will result in new jobs being created in at least three different ways:

1) Direct labor associated with deploying and maintaining the network, facilities and equipment (supporting and servicing computer networks is labor intensive).

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2) Direct labor associated with manufacturing the infrastructure components and customer premise equipment (companies in this arena tend to emerge where they have access to leading edge information technology and telecommunications capabilities).

3) Indirect labor associated with creating services and applications, including supporting industries that would result once the network is deployed.

When telecommunications infrastructure is built and made accessible to a region’s citizens at reasonable cost, its direct economic impact will spill over into other sectors of the economy resulting in new indirect jobs. This phenomenon is referred to as an employment “multiplier effect”. The employment multiplier measures the number of indirect jobs created for every direct job used to build the infrastructure. For example, advanced telecommunications infrastructure investment will encourage the development of innovative bandwidth-consuming services, applications, and content such as new interactive media, games and entertainment, multicast videoconferencing, and video broadcasting. Many of the new jobs that will be created will spill over into other industry sectors such as healthcare, education, and government. As new jobs are created and filled, a whole host of other services are needed, including transportation, real estate, insurance, and legal services. Employment gains from infrastructure investment cascade throughout much of the economy, creating a sizable stimulus to economic growth.

A recent study conducted by Telenomic Research\(^3\) found that building and using a robust, nationwide network will expand U.S. employment by an estimated 1.2 million new and permanent jobs, specifically:

- 166,000 jobs in the telecommunications sector
- 71,700 manufacturing jobs generated by the direct purchase of network plant and equipment and customer premise equipment; and
- 974,000 indirect jobs created if a next generation optical fiber network were built

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\(^3\) Much of the data and conclusions in this section come from a study performed by Stephen B. Pociask of Telenomic Research, LLC, Feb. 2002.
One might speculate on the potential economic and job growth for Southside and Southwest Virginia if it were to deploy a next generation optical telecommunications infrastructure. With an overall population of just over one million (see Volume 9: Demographics for Southside and Southwest Virginia of this report), Southside and Southwest Virginia has .36% of the U.S. population\(^4\). Based on the study cited above, one could make a very conservative argument that job growth effects for a Virginia regional broadband initiative in the short term could be anticipated in the range of:

- a minimum of 500 jobs in the telecommunications sector
- a minimum of 200 manufacturing jobs generated by the direct purchase of network plant and equipment and customer premise equipment; and
- a minimum of 3,500 indirect jobs created if a next generation optical fiber network were built

Of course, we would expect that the potential for extraordinary long term effects exceed this estimate by 1-2 orders of magnitude.

Following are some examples of real world situations in which telecommunications infrastructure investment is occurring in regions anticipating the resulting job growth.

**Michigan Statewide Initiative**

03/15/02: Lansing, MI (As appearing on the Governor's web site): Governor Engler today signed Senate Bills 880, 881 and 999 to help make high-speed Internet connections available and affordable to consumers statewide no matter where they live. Michigan is the first state in the nation to take these pioneering steps that tear down barriers and provide incentives for the expansion of broadband. Experts estimate the plan will create an additional 500,000 jobs over the next decade and expand economic output by $440 billion.

"The fast lane to new jobs, new investment and new opportunities is now open," said Governor Engler. "Let's get on it and get Michigan connected."

\(^4\) As of April 1, 2000, the U.S. population according to the census was 281,421,906
Governor Engler also named William G. Rosenberg to be the Chairman and President/CEO of the Michigan Broadband Development Authority.

In the Michigan House and Senate, the Governor's broadband initiative was approved by nearly unanimous, bipartisan votes. The plan was also supported by a coalition of more than 50 statewide associations, local groups and companies.

"The bipartisan support for broadband is a credit to leaders from both parties who understand how important high-speed access is to Michigan's future," said Governor Engler. "Thanks are also due to the more than one thousand people who e-mailed their support and ideas."

Sponsored by Senator Joe Schwarz, SB 880 creates a statewide right-of-way authority, eliminating excessive fees and permit delays and leveling the field for all service providers. The bills also shield phone customers from rate increases.

Sponsored by Senator Leon Stille, SB 881 creates a broadband finance authority that will provide low interest loans to expand broadband access in areas across the state that are underserved.

Sponsored by Senator Valde Garcia, SB 999 provides tax credits to telecommunications providers who invest in new broadband infrastructure, and provides, upon certification of the state Public Service Commission, for a dollar-for-dollar tax credit for right-of-way fees paid under SB 880.

**Case Study: Economic Impacts of Broadband in South Dundas Township**

South Dundas Township, with a population of 10,783, is just south of Ottawa Canada and they officially launched their fiber network in July 2001. As of August 2002 the South Dundas Economic Development Commission has documented the following impacts:

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5 From a recent report prepared by Michael Curri, Strategic Networks Group.
Volume 1: Rationale, Environment, and Strategic Considerations

- Increased housing starts and retail
- Increased manufacturing
- 537 new jobs in 18 months

In terms of attributable impacts from the fibre network, South Dundas has experienced $2.8 million in real estate expansion and/or development.

In terms of economic indicators, using macroeconomic impact modeling we have estimated the following impacts directly attributable to the fibre network:

- $16.7 million increase in retail sales
- 145 person years of employment
- $2.2 Federal and $1.6 million Provincial in tax revenue

Most benefits can be shown to be attributable directly to project, or to the environment created by the project.

Fiber Optic Infrastructure Leading to New Job Creation in Rural North Dakota

Killdeer Mountain Manufacturing, a company located in a small town at the edge of the North Dakota badlands, was founded in 1988 by a native son who returned to start a new business manufacturing electronic circuit board assemblies, cables, harnesses, and ground support equipment. The firm employs more than 140 people at four locations, making cables and other parts for aerospace companies. Some of the work is done in communities with up to 100 residents. The company’s long-term vision is to locate ten plants in similarly tiny towns across the state, networked together via a high-speed fiber-optic network.
Federal, State, and Local Regulatory Policies that Help or Hinder Infrastructure Development

This section provides a very broad overview of federal, state and local laws and regulatory policies that affect the ability of communities to gain access to advanced broadband network infrastructure. A number of policy recommendations are described as a means of generating a dialogue as to what is desired and what is possible. As the regulatory environment is extremely dynamic and complex, it is recommended that additional reading be used to supplement the information below (some of which can be found in the references and attachments to this report). In addition, it should be noted that no regulatory policy or law related to technology infrastructure is capable of guaranteeing that investment in technology will be risk-free. It is recommended that communities and regions examine their technology investments in light of what makes rational sense for creating the greatest benefit to the community and work to gain governmental and legislative support for those efforts.

Federal Policy

Over the next few months, a single federal agency will begin to fundamentally alter the nation's communications and mass-media landscape, rewriting a broad swath of rules that affect the choices available for broadband technology and for the variety of television and radio programming. In doing so, the Federal Communications Commission (FCC) has the daunting task of following a deregulation rhetoric even though the original sponsors of the 1996 Telecommunications Act are increasingly concerned that it is not resulting in the expected increases in competition.

According to the FCC's own data, the telecommunications industry in the U.S. has become a duopoly, with the Bells and Cable Companies providing what arguably some
would call “broadband” service\(^6\). In its early attempt to open up the facilities-based industry to increased competition, the FCC developed regulations stipulating that the Bell companies open their local networks to competitors. However, in a more recent ruling regarding cable service, just the opposite occurred. Cable modem service was classified by the FCC as an unregulated interstate “information service” rather than a telecommunications service and was not forced to open the cable infrastructure to competitors. This ruling means that local governments may experience a significant reduction in the amount of compensation they receive from cable operators for the use of public rights-of-way. ISPs wishing to serve these communities will be faced with increased barriers-to-entry due to the high capital requirements for building additional infrastructure into communities. Regulatory experts predict that the FCC is even now considering reversing the ruling on the Bell companies. The result may be that the Bell Operating Companies may not have to allow competitors use of their infrastructure.

If all of the changes being reviewed by the Federal Communications Commission are enacted as proposed, major telecommunications and media corporations will be less regulated, and more free to grow and merge, than at any time in decades.

The rules in question govern how much telephone companies need to open their lines to competitors for local phone and high-speed Internet service, set restrictions on how many TV and radio stations can be owned by one company, and determine whether a company can own both newspapers and TV stations that serve the same community.

FCC officials say they expect to begin making decisions as early as February 2003, after more than a year of intense debate and lobbying over sharply different visions of the best way to spur growth and competition in the country’s information economy.

\(^6\) Industry Analysis Division, *Local Telephone Competition: Status as of June 30, 2001*, (Common Carrier Bureau, Federal Communications Commission, February 2002)
Federal Policies to Facilitate Broadband Infrastructure Development

The Alliance for Public Technology published a report entitled, “Advanced Services, Enhanced Lives,” in which several policies were recommended for accelerating the deployment of broadband to all Americans. Their recommendations include:

- **A fair and open regulatory environment**: Policies should foster investment in high capacity network services on terms of equality among all providers in the broadband market and respond quickly to the changes in technology and the organization of the industry. Broadband services must be allowed to flourish regardless of the platform. True competition in broadband cannot occur until the regulatory policies are neutral. Within this technology neutral framework, the existing principles of common carriage and interconnection must be maintained. Regardless of the platform, the systems must be open and able to interface with each other. The goal is a network of networks, with different technologies, service and content providers able to interconnect. This framework protects consumers by ensuring their access to the network and content providers by guaranteeing they are not blocked by the service providers. Consumer choice increases and costs decrease because all the systems will have to compete with each other on equal ground.

- **Creation of investment incentives**: Broadband deployment will gravitate toward areas with high return rates on investment, but it is the marginalized communities, where investment returns are less, that must be assisted. Incentives for investment in these areas must be created. Tax credits are an option for helping broadband providers make the decision to invest in deployment to low return areas. Several tax credit proposals have been introduced in Congress, particularly the Rockefeller-English version, that would provide a 10% tax credit on investment in current broadband technologies and a 20% tax credit for investment in next generation technology. (See attached <list of broadband legislation> amendments to H.R. 1542).
• **Removal of regulatory barriers**: Many federal regulations were created for technologies of a previous era. Video and voice regulations are still ruling the broadband world, even though broadband service does not conform to the properties of the video and voice worlds. LATA boundaries constrain broadband transport. These arbitrary lines were drawn to foster long-distance competition as part of the breakup of the AT&T monopoly. They were not designed to regulate end-to-end data transmission. In the broadband world, where data travels around the globe, LATA lines should not constrain transport in local areas. Removal of such barriers allows for capitalization of economies of scope and scale. More traffic on the network creates more opportunities for investment and lower prices for consumers.

• **Aggregation of demand**: One of the greatest issues for underserved areas is lack of sufficient market demand for broadband access. Policies can encourage aggregation of demand as a solution to slow deployment. Governments, state agencies or municipalities can act as facilitators, uniting the various community institutions in stronger networks and facilitating dealings with the service providers and giving them more economic incentives to invest. The E-rate program for wiring schools and libraries is an example of this principle as an effective strategy.

**Regulation of Wireless Spectrum**

From a recent publication by Telecommunications Reports International, FCC Commissioner Kathleen Q. Abernathy is quoted on the topic of policy discussions regarding spectrum management and broadband deployment. She’s optimistic that wireless services will compete with current wireline offerings in the "[first] last-mile" marketplace.

“Spectrum-based broadband services have the ability to transform this debate. Why? Because every spectrum authorization we grant could be a new facilities-based `[first] last mile,"” Ms. Abernathy said in a speech at a Federal Communications Bar

7 Paul Kirby, pkirby@tr.com
Association seminar in San Diego. "If we facilitate the development of such multiple spectrum-based [first] last miles, we can pull back some of the regulatory burdens that may restrain existing services and allow the broadband marketplace to thrive."

She added, "I am convinced that spectrum-based services will provide that next pipe to the home or to wherever you are - and I believe it is essential that our regulatory policies not hinder the development of that third (or fourth or fifth) platform."

Ms. Abernathy also noted the difficulties the Commission faces in trying to find spectrum for various services. She stressed the importance of the agency completing its rules to encourage the development of secondary markets, which would make it easier for licensees to share and lease spectrum. Such markets are imperative "if the property-like, rights-driven license model is to succeed," she said. "Licensees must be granted certainty about the bundle of rights they have acquired to enable investment and innovation."

In cases where frequency sharing is not possible, the Commission must decide whether it is prudent to relocate incumbents to other bands, Ms. Abernathy noted. She said she is reluctant to force incumbents to move to other frequencies "on the basis of some asserted ‘better understanding’ of what is the ‘right’ service offering in a band." But she said there are three situations where relocation might be warranted: (1) when secondary markets fail, (2) when there is an "irrational holdout problem," or (3) when there is a "temporal urgency" to "enable some new service essential to the public welfare."

**State and Local Policies**

A major handicap that Virginia municipalities have had in being able to provide necessary services to their citizens is the Dillon Rule. This rule essentially means that localities are allowed to do only those things that are expressly granted to them as powers by the Virginia Code of Law. Unless permission is given, localities cannot legally provide telecommunications services or own dark fiber infrastructure for municipal use. This is a significant disadvantage for Virginia municipalities in that they are prevented from adopting creative solutions to local problems. Municipalities are often more aware of local problems and, given free reign, may be able to develop unique solutions that
best meet their communities’ needs. The present system, where local government officials or their hired lobbyists must travel to Richmond each year to request the needed legislation, is not conducive to fostering a sense of direct accountability and confidence with regard to the development of proactive, creative solutions for local issues.

The main federal regulation that impacts municipal governments’ ability to provide telecommunications services is the 1996 Telecommunications Act. Specifically, section 253(a) became the focus of debate and has remained so in Virginia throughout recent legislative sessions. This section states, in part, “No state or local statute or regulation, or other state or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.”

In 1998, the Virginia General Assembly (under heavy lobbying from the telecommunications industry) amended Virginia Code 15.2-1500, enacting a prohibition on local governments offering telecommunications equipment, infrastructure, or services except to other governmental entities. This law subsequently became the subject of a lawsuit by the City of Bristol Virginia Utilities Board (BVUB), which had built a fiber-optic infrastructure and wished to provide services to its citizens. The BVUB argued that the Virginia law was in contradiction to the federal Telecommunications Act, which stated “any entity …”, and is therefore unconstitutional. BVUB won the lawsuit in Circuit Court, which essentially meant that the Dillon Rule in Virginia no longer applies to telecommunications. However, the Attorney General quickly filed an appeal. The appeal was later dropped due to Virginia state legislation described below which allows Bristol to proceed with its telecommunications service objectives.

In a similar case, on August 14th, 2002 the United States Court of Appeals for the Eighth Circuit issued a decision reversing the FCC’s prior determination that it could not preempt a Missouri law that prohibited municipalities from providing telecommunications services to the public (Missouri Municipal League v. FCC, U.S. Ct. of App. 8th Cir., No. 01-1379, issued Aug. 14, 2002). In strong language very similar to that in the Bristol

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9 Circuit Court Judge James P. Jones ordered summary judgment for the plaintiff (BVUB) and declared the Virginia State statute unenforceable under the Supremacy Clause of the Constitution on May 16, 2001.
decision last year, the Eighth Circuit interpreted Section 253(a) of the Telecom Act of 1996 in holding that Congressional intent was clear - that Congress intended that "any entity", plainly including municipalities, should be able to provide telecommunications service. The Eighth Circuit decision goes on to explain why the other Federal Appellate Court decision in this matter (City of Abilene v. FCC, D.C. Circuit 1999) was improperly decided. In other words, in the 8th Circuit's opinion, states can't pass laws that prohibit municipal entry into the telco business.

In considering the regulatory environment for broadband telecommunications in Virginia, it is important to keep in mind that Virginia lawmakers are faced with an inordinate amount of new legislation at each General Assembly session. It is a feat in itself to read it all, and even more so to understand the intricacies of new technologies and the interrelated effects pertaining to network fiber infrastructure, cable, and telephony facilities. For every new telecommunications law that is proposed, special interests are relied upon to inform lawmakers who have few other convenient sources of credible information about the impacts and long-term implications of telecommunications legislation.

During the Spring 2002 General Assembly session, the issue of municipal telecommunications provision was again on the table. The resulting legislation, SB245/HB1021, allows for two ways in which municipalities can provide telecommunications service. The first (and most straightforward) is for municipalities that own an electric utility to apply for Certified Local Exchange Carrier (CLEC) status to the State Corporation Commission (SCC). The municipalities would be subject to the same standards as other CLECs, with some exceptions yet to be determined. The second way is termed the “service gap” scenario, in which a municipality may qualify to offer telecommunications services if there are fewer than three existing providers of such service and the SCC approves it. The details and implementation of this legislation are still very vague and will need to be determined. The SCC has indicated that they are supportive of municipalities’ efforts to provide telecommunications services, and has invited input from them on how the new rules will be carried out.
Summary

In such a tumultuous environment, it would be easy for Virginia municipalities to believe they can do nothing to alleviate regulatory barriers to telecommunications service. Nothing could be further from the truth. It is an oft-stated observation by telecommunications providers that Virginia is one of the most difficult states for deploying telecommunications facilities and infrastructure because of its rigorous, time-consuming and expensive local permitting and right of way policies. As an example, if a telco wishes to install fiber infrastructure across a 50-mile portion of Southside Virginia, it would have to obtain permitting and approval from as many as five or six municipal and county governments, each with its own unique procedures and requirements. For this reason, municipalities that join together to take a regional approach and that succeed in streamlining and easing permitting and right of way procedures are able to significantly reduce those barriers and make their locale more attractive for telecommunications service provisioning.

Right of Ways

Issues of right of way typically involve access to land owned by the municipality, fees associated with opening and closing streets, and fees associated with access to telephone and power poles. Most municipalities have a fee for digging up roads ranging from a fixed amount (typically a few hundred dollars for any street cut) to a variable amount depending on the amount of digging planned.

Municipalities might consider creating a notification system for contractors wishing to open, close, or block a street. Municipalities would notify other potential contractors of the date and duration of the street opening, closure or blockage. Contractors wishing to participate would then request simultaneous approval to use the opportunity for their own construction projects at the same location. As an incentive to coordinate activities, contractors who choose not to participate at the specified time could be barred from cutting or blocking the same street for a period of six months. This would result in multiple cost and convenience savings, as well as increased cooperation among contractors and municipal representatives.
Suggestions for State Regulatory Policies That Could Help

The following regulatory policies were developed as part of this report effort and have not been reviewed by legislative or legal professionals. They are presented here as potential starting points for brainstorming new legislative approaches to facilitating advanced network infrastructure deployment.

**Right of Ways:** Policies could be implemented that would ease requirements for access to right of ways with the potential to drive the transaction cost for access to right of ways to near zero. Such a policy might apply to all secondary roads in designated tobacco region counties. If this would be difficult to apply statewide, an alternative would be that it would apply only for right of ways needed for expressly endorsed tobacco region fiber and conduit. In addition, municipalities and counties could be encouraged to work cooperatively in documenting and sharing rights of way ownership and usage requirements to more quickly facilitate infrastructure development.

**VDOT:** This policy would encourage VDOT to partner with Tobacco Commission-endorsed entities in exploring leading-edge, cost-cutting deployment of cable as an alternative to the traditional, buried installations.

**State agency procurement of tobacco region infrastructure:** This policy would allow state facilities and services to become critical anchor tenants by allowing them to acquire services or infrastructure from the project without being subject to state procurement requirements.

**Tax Credits:** To create incentives for investment in broadband infrastructure anywhere in the Tobacco Region, tax credits could be made available. For example, a 10% tax credit on investment in current broadband technologies and a 20% tax credit for investment in next generation technology.

**Statewide Participation:** As a means of ensuring tobacco region project relevance and impact statewide, a policy could be proposed that allows non-tobacco region counties to opt in to the benefits and policies implemented for tobacco region infrastructure. This
option may be contingent on a number of factors including investment in regional infrastructure (perhaps based on a 20-year amortization).

Examples of Broadband Infrastructure Development Legislation in Other States

These examples are provided for reference only and are not necessarily to be considered as recommendations for the Virginia Tobacco Region (see the attached list of community networks for more information on these and other efforts):

The state of Michigan has taken notable initiative in introducing legislation to facilitate the deployment of broadband to its citizens. Of particular interest are the following bills:

- SB-880, which pre-empts local authority over the use of rights-of-way by telecom providers by setting a state ROW fee instead of a local ROW or franchise fee.
- SB-881 creates a state authority to make low-interest loans for extending broadband facilities to underserved areas.
- SB-999 creates tax incentives aimed at encouraging investment in broadband network infrastructure.

The Colorado State Legislature passed HB 991102, an Act "Concerning encouragement of private sector telecommunications investment by providing incentives for the public sector to serve as "anchor tenant", and making appropriation therefore" in the 1999 session. This bill appropriates 5 million dollars on a pilot project basis, which may lead to an additional appropriation of up to 25 million dollars. This bill is also known as the "Community Incentive Fund" and "Beanpole Bill". HB 991102 will fund the purchase of equipment and services to implement a local Aggregated Network Access Point (ANAP) or local loop in each county connected to a statewide network.

Connecting Minnesota is a public/private effort to build a fiber optic network across the state of Minnesota. The network will be laid within the interstate right of ways. The network will reach within ten miles of 80% of the state population at an estimated cost of about $195 million. The cost will be completely funded by the contractor who won the competitive bid for the project. Two loops will be built that intersect in Minneapolis and
St. Paul. The DOT in Minnesota gave up the right of way fees in exchange for telecommunication services. Minnesota has declared that 20% of the network must be saved for public use.

The state of Florida has a similar project in development.
The So-Called “Fiber Glut”

This section addresses the oft-stated concern that there is plenty of unused (or under-used) fiber in the ground already so why not use that rather than build new fiber infrastructure. In response to this concern, we have compiled and paraphrased the responses of the following: Erv Blythe, Vice President for Information Technology at Virginia Tech; Jeff Crowder, Director of Net.Work Virginia; and James Bacon, former CEO and Publisher of Virginia Business magazine.

Fiber infrastructure is frequently touted as being abundant in the U.S. but in reality, the so-called “fiber glut” exists only between and within the large metropolitan areas. The “fiber glut” access points do not lie within economical reach of the vast majority of Virginia communities. This same circumstance applies to over 90% of the communities in the southern region of the US.

Most likely, the seeming controversy on this issue is due to a misunderstanding over the definition of "backbone". It is true there is excess fiber in the national backbone between major cities (for example, long haul routes between DC and Atlanta). However, there remains a great shortage of accessible fiber in rural areas, including the Southside and Southwest regions of Virginia.

In addition, as described below, even where the long haul fiber passes by, it cannot be broken for access. This fact has been acknowledged in writing by Verizon in their initial proposal to the Tobacco Commission. The "geodesic optical mesh" architecture being developed for the Tobacco Commission creates a different type of backbone interconnecting all communities and is not a long haul intercity network. It is a network focused on enabling low-cost, reliable advanced network access, particularly for rural communities.

Through its administration of the statewide broadband network known as Net.Work Virginia, Virginia Tech is knowledgeable of the number and types of fiber optic facilities encompassing the state. We can confidently say that there is no surplus of accessible fiber infrastructure in this region.
Another element of the fiber glut myth is a result of the difficulty that municipalities and economic development entities encounter when attempting to ascertain the extent of fiber that has been deployed in a particular geographic area. Telecommunications companies have legitimate reasons for guarding their data closely. If the location of every fiber path and facility were laid out on publicly accessible maps, competitors could easily identify where the profitable, big-bandwidth customers are — and create a competitive threat in those locations. More recently, there are security concerns about revealing such information.

Complicating matters, an increasing number of different types of players are entering the telecom space — traditional land-line telephone companies, cable companies, media and publishing companies and wireless companies — and most of them either deploy their own, or purchases leases for an array of continually evolving technology facilities and infrastructure.

It’s one thing to plot the route of a fiber-optic trunk line, for instance; it’s quite another to figure out how ownership of that line has been parceled out to different telecom players. It’s one thing to know that a certain neighborhood receives broadband service; it’s quite another to know how fast that service is and how much bandwidth it will support with what level of service (and at what cost!).

In summary, James Bacon’s article (see it in the Attachments of this report) says it best: Verizon, Sprint and the other telecoms may risk tipping off competitors if they share data, but they also have the most to gain from a broadband- anywhere initiative. Instead of focusing on what they might lose, they could:

- take the lead to stimulate Virginia’s appetite for bandwidth
- work with businesses to develop new and creative uses of broadband
- participate with public-private partnerships to extend broadband’s reach to under-served geographic markets
- work with economic developers to attract large, bandwidth-intensive businesses into the state.

If the market for telecommunications services grows in Virginia, everyone wins.
Volume 1: Rationale, Environment, and Strategic Considerations

Attachments


Quick Reference to Frequently Asked Questions

1) Why is it difficult for an established telecommunications company to make this investment? (Volume 1, Volume 5)

2) There is already too much fiber in the ground. Why not use what’s there? (Volume 1, Volume 2, Volume 6)

3) The principal design criterion driving the development of this infrastructure is that every user has the potential to be a “producer” in the network economy. Is this the same as “broadband”, as it is currently hyped in the industry? (Volume 1)

4) Can we quantify the potential jobs that will be created if a region invests in building advanced telecommunications infrastructure? (Volume 1)

5) What should be the Tobacco Commission’s role in the deployment of first mile technologies? (Volume 1, Volume 3, Volume 5, Volume 7, Volume 8)

6) How can localities ensure that they get early access to the network? (Volume 1, Volume 5, Volume 8)

7) What kind of success have other regions had with the development of network infrastructure for economic development? (Volume 1)

8) What regulatory factors should be considered when investing in wireless technologies? (Volume 1, Volume 7)

9) Why do we need to connect to network points outside of the tobacco regions? (Volume 2)

10) Once the network is in place, what do we do with it? (Volume 2, Volume 8)

11) Since the business model for inter-regional and inter-county infrastructure did not include the use of conduit facilitating blown fiber strands, what are the circumstances in which this technology is appropriate and financially feasible? (Volume 3, Volume 7)

12) How do existing community networks fit into the overall design? (Volume 3, Volume 5, Volume 6)

13) What are some examples for deployment in the first/last mile? (Volume 3, Volume 7)

14) What type of fiber is recommended? (Volume 3)

15) What would a network design for my county look like? (Volume 3)
16) How much would all this cost? (Volume 3, Volume 5)

17) What is the appropriate organization model for managing and sustaining the Tobacco Commission’s investment in critical technology infrastructure? (Volume 5)

18) Tobacco region communities are underserved because the private sector does not see a profitable business case. What makes this feasible from a business perspective? (Volume 5)

19) If the traditional investment model for developing critical technology infrastructure has failed, what is the alternative? (Volume 5)

20) How much would it cost for consumers in the region to use the network? (Volume 5)

21) What technologies enable use of the fiber? (Volume 6)

22) How does the choice of technology to light the fiber impact the cost? (Volume 6)

23) How do wireless technologies fit into this framework? (Volume 7)

24) What is meant by the term “open access”? (Volume 8)

25) What is the difference between the broadband hype and the “next generation” networks? (Volume 8)

26) What are some next generation Internet (NGI) applications? (Volume 8)
June 2000

Trench Warfare: Cities’ Roles in the Telecommunications Revolution
by Denise Brady, Rich Esposto and Paul Valle-Riestra

This article is a synopsis of a presentation made to the League’s Transportation, Communications and Public Works Policy Committee on March 23, 2000.

The telecommunications revolution is upon us and shows no signs of ending any time soon. Internet traffic has been doubling every 100 days. Telecommunications capacity is tripling every 18 months. It seems that everywhere people are talking about what’s on the Internet or news of the latest dot-com company.

The stakes for cities are enormous, since ammunition for the revolution runs under city streets in the form of fiber optic cables, reshaping local economies and the social fabric of communities.

Throughout California, cities are facing the revolution in different ways. Some larger jurisdictions, where many of the 100+ certified telephone companies are digging into city streets, are fairly up-to-speed. But many cities are just now seeing the revolution on their radar screens.

Given the enormous stakes, cities need to catch up. Cities need to understand and facilitate the development of the telecommunications infrastructure and its uses within their communities. Cities also need to work together in the face of attacks from industry and from state and federal governments.

Two basic policy directions will successfully guide cities through the telecommunications revolution:

1. Do whatever it takes to get universal broadband deployment; and
2. Retain local authority over public property.

Do Whatever it Takes to Get Universal Broadband Deployment

Broadband is the term used for “big-pipe” telecommunications systems that can physically transfer large amounts of data at high speed. Broadband systems typically rely heavily upon fiber optics, which are strands of glass that carry data via light waves at incredibly high speeds.

Broadband is the key to the Internet. Before a community can truly participate in the Internet revolution, it must have broadband infrastructure available to all community members.

Many companies and at-home workers now rely on broadband services to survive. Broadband services also greatly enrich the Internet experience, making a variety of video, 3-D graphics and other data-intensive applications available.
The emphasis in this policy should be on “universal.” At the national level and among academics, there has been much discussion about the “digital divide” — the gap between those who have and can afford broadband connectivity and those who cannot. Access to information is power. A lack of access to broadband services may help drive the disadvantaged further into poverty and isolation.

The economic and social health of a modern city demands deployment of and universal access to broadband. In pursuing this policy, cities should consider the following:

1. View citywide broadband connectivity as essential infrastructure similar to water, power and sewer.

2. Understand that the telecommunications industry is extremely fast-paced. Offering expedited processes is an important marketing incentive to attract broadband deployment.

3. Establish subdivision and street-access specifications that place city-owned conduit in key locations. This helps protect streets, lessens industry construction costs and potentially provides cities with a revenue source. The idea is to, preferably, place conduit in or under major intersections (often in an “X” configuration with a box around it). The next preferable level is to have conduit running to all municipally owned facilities such as parks, traffic signals, pumps, water sprinkler controllers, tennis court lights and so on. The next level is conduit run under all major streets. The last and least preferable level is conduit everywhere, under all streets.

4. Welcome telecommunications providers in an economic development mode and look for ways to partner with them.

5. Whenever possible, treat any entity (whether government or private sector) that accesses streets and rights-of-way according to the same rules, procedures and fees. This level playing field will reduce future lawsuits and expand the opportunities for coordinating projects.

Retain Local Authority

City authority over the public streets that house much of the information superhighway infrastructure is a key tool in pursuing universal broadband deployment. However, this authority is under siege. City authority over access to streets by telecommunications systems currently varies, depending on whether the system is used for telephone, cable television or other purposes. The scope of existing city authority over streets has become muddied, because the regulatory structure has not kept up with changes in the telecommunications industry. Further, the telecommunications industry and the state and federal government are all attempting to weaken even this existing authority.

Under federal and state law, the extent of city authority over use of public streets by a telecommunications company varies, depending upon the nature of the telecommunications system. Cities have the least authority over the installation of telephone lines by telephone corporations. While cities retain authority to regulate the time, place and manner of such installations, California Public Utilities Code section 7901 pre-empts cities from requiring telephone corporations to obtain a franchise or to pay compensation for maintaining telephone lines on city streets. (In most other states, cities do have the authority to require franchises from telephone corporations.)

Cities have greater authority to regulate cable television and open video systems (OVS, which are essentially cable systems required to make two-thirds of their capacity available for lease to independent entities). Cities can impose time/place/manner regulations on cable systems and OVS, and they can also require franchises and the payment of compensation.

Finally, city authority to regulate access to city streets by other telecommunications companies, such as private data lines installed by nontelephone corporations, is extremely broad.

Regulatory Categories Need Updating

However, these regulatory categories have not kept pace with advancements in the telecommunications industry. Modern telecommunications systems simply don’t fall neatly into one of these categories — modern
telecommunications systems are “converged” systems capable of carrying a full spectrum of voice, video and data. When a company proposes to install a modern telecommunications system, it is difficult for a city to determine the scope of its authority to regulate — particularly when the company resists disclosing all of the intended uses of the system. Further, while a telephone corporation has a right to install “telephone” facilities, it is unclear whether this right is limited to facilities for voice communications (the literal definition of telephone) or whether it is much broader in scope. To the extent that this right is broader in scope, it is also unclear whether a certified “telephone corporation” has an automatic right to install telecommunications facilities, even if it never actually provides telephone services.

Meanwhile, city authority is under attack by much of the telecommunications industry, as well as by state and federal governments. Some industry players, seeking further de facto subsidies, continually attempt to chip away at city authority through the courts and proposed pre-emptive legislation. The Federal Communications Commission (FCC) and the California Public Utilities Commission (CPUC) are currently considering regulations that would further pre-empt city authority. Some of the potential bills that would pre-empt e-commerce taxation (which in itself presents a danger to municipal finances and makes ERAF pale in comparison) go further than the sales tax issue and would undermine various fees for using city streets. Other pre-emptive state and federal legislation is always a danger.

Unfortunately, cities are not defending themselves well against such attacks. Often these attacks occur before the FCC and the CPUC, forums that are unfamiliar to most cities. And despite the importance of the issues, telecommunications issues are often considered a lower priority by many cities.

Why Should Cities Care?

It is vital that cities retain control over the streets that they own for a number of reasons. Telecommunication is becoming central to local economies, education, health care, traffic reduction and the very social fabric of communities. Just as cities manage other aspects of their destinies through planning and zoning, they need to retain the tools to manage the development of telecommunications infrastructure.

Cities also need the ability to require telecommunications companies to pay their fair share for the use of public property, both to compensate for damage done and to pay a fair share of the overall cost of maintaining streets. To do otherwise is corporate welfare, plain and simple.

Cities also need to retain the tools to facilitate the rapid deployment of infrastructure, such as the ability to require joint uses of trenches. Further, the space under some streets is a limited commodity, and cities need to ensure that this space is allocated in a way that maximizes productive use. Cities also need the authority to mitigate the impacts of a proliferation of above-ground cabinets and grade-level vault covers.

Finally, cities need the authority to mitigate the construction impacts of telecommunications projects, such as traffic, noise and hitting other utility lines.

What Cities Can Do: Organize!

Faced with the importance of retaining authority over city streets, an unclear regulatory scheme and attacks from the industry and from the federal and state governments, cities need to get organized, both internally and collectively.

Many city ordinances haven’t kept pace with changes in the industry. Numerous telecommunications projects are essentially approved by mid-level engineering staff who are good at issuing standard encroachment permits, but have not been trained on broader telecommunications policy issues.

Cities also need to get better organized collectively. In particular, cities often have not been active players before the FCC and the CPUC, where many fundamental issues are being decided. Cities should consider joining the National Association of Telecommunications Officials and Advisers, which does a yeoman’s job of representing cities in Washington, D.C. and providing training. The League is considering retaining a representative at the CPUC, and forming a Telecommunications Technical Advisory Committee to discuss late-breaking issues.
The revolution is here, and it's traveling at the speed of a byte rushing down an optical fiber. Cities cannot afford to wait any longer to get organized. Without collective action, cities will continue to lose ground in the ongoing trench warfare.

City attorneys interested in joining a discussion group about telecommunications issues should contact Paul Valle-Riestra at valle-riestra@ci.walnut-creek.ca.us.

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The Paradox of the Best Network

David Isenberg and David Weinberger

The communications revolution has been thwarted

Just a few short months ago, it seemed that humanity stood on the edge of a communications revolution. New technology promised to topple barriers of space and time. We were on the verge of inventing new ways for the world to work and play together. We were giddy with possibility. Now a grim face replaces yesterday's optimism. Prospects of new connectedness recede as capital markets tighten, existing telephone companies back off on capital expenditures, established communications equipment suppliers falter, and ambitious new telecom companies fail.

But not by technology

Despite the darkened outlook, new communications capabilities are within reach that will make the current Internet look like tin cans and string. The technical know-how exists. Radically simplified technologies can blast bits a million times faster than the current network at a millionth of the cost. These are sitting in laboratories undeveloped, in warehouses undeployed, and in the field underutilized.

Or even by greedy telcos

It's not even that the communications revolution has been derailed by inept or self-aggrandizing behavior by incumbent telephone companies and their government regulators. Something more fundamental is at work. The situation has been shaped by a paradox inherent in the very nature of the new technology:

The best network is the hardest one to make money running.¹

A paradox has stopped us.

This is the Paradox of the Best Network. It lies beneath the sudden stoppage of infrastructure innovation and growth in 2001. It provokes incumbent companies to mass lawyers and lobbyists to thwart the development of a competitive communications market. It causes investment capitalists to drive their stakes into firmer economic ground far away from telecommunications.

The best network has the fewest added features and functions

The paradox arises from the meaning of "best." If "best" meant, "generate the most cash for the network owner," there would be no paradox. But if we accepted this meaning of best, we'd have to be content with the tightly-controlled, relatively thin stream of bits that the telephone companies currently grant us. Communications networks have a more important job than generating return on investment — their value comes from their connectivity and from the services they enable. Therefore, the best network delivers bits in the largest volumes at the fastest speeds. In addition, the best network is the most open to new communications services; it closes off the fewest futures and elicits the most innovation.

The best network just moves bits

Designing a network that is intelligently tuned (optimized) for a particular type of data or service — such as TV or financial transactions — inevitably makes that network less open. As software engineers say, "Today's optimization is tomorrow's bottleneck." Thus, the best network is a "stupid" network that does nothing but move bits.² Only then is the network truly open to any and all services that want to use it, no matter how innovative or how unexpected. In the best network, the services live at the edges of the network and use the network to transport bits; they do not rely on any special characteristics of the network itself.
The Paradox of the Best Network comes about because as a network gets stupider, connectivity becomes a commodity. Those who own and operate the network have less to charge for. After all, they’re just moving bits. The high-value services, the ones that command premium prices, reside at the edge of the best network. Because the best network is simple, it is low-cost to operate. In a competitive market, this means it is low priced. Low price also lowers barriers to innovation at the edges of the best network.

The telephone companies are impaled on the horns of this dilemma. Historically, their high-margin services have been built into the middle of their network, which has been optimized for a single application — voice. Their business is based on this special-purpose network. They know that implementing the new commodity network threatens the very basis of their business.

In contrast, the Internet is not optimized for any specific application. Its strength is its generality. It’s designed simply to move bits across all kinds of wired and wireless infrastructures. As a result of this simplicity, the Internet has proven to be the most scalable, most robust communications infrastructure humans have ever built. It has proven itself effective at encouraging innovation: of all the winning networked applications of the last decade — email, web browsing, instant messaging, chat, music sharing, streaming audio, ecommerce, etc. — every one appeared on the Internet. Not one was invented by a telephone company. And not one needed any special mechanism within the network itself.

This fact frightens the telephone companies. It should. The Internet’s bits-are-bits simplicity even threatens to turn their cash cow — voice telephony — into something anyone can do just by installing simple software onto an everyday PC. Hook a PC to a high-bandwidth, always-on connection and anyone can make high-quality Internet phone calls without telephone company involvement. Further, innovations like document sharing, collaborative whiteboarding, and add-on video conferencing, which are difficult on the old telephone network, are relatively easy additions to an Internet telephony program. Because the Internet is a commodity network, Internet telephony is cheaper. Because it’s a stupid network, innovation is easier. Further, the value is added at the edge of the network, outside of telephone company purview.

But, the real threat to the incumbent telephone companies isn’t the Internet. It’s the Paradox of the Best Network. The paradox means that companies that run the old, closed, special-purpose telephone network have an unfit business model for running the new network. No amount of technological upgrading will fix this. To survive, the incumbents must become different businesses. But there’s no guarantee that they’ll be the best companies to run the best network.

Established communications companies have tried to distract our attention with DSL and cable modems, as if these would complete the new network. But these are crippled compromises at best, touted precisely because they are not disruptive. They milk already-depreciated assets without overturning established business models. And that is precisely why the current communications companies are pushing them so hard.

There are alternatives. Incumbent communications company clout has forestalled delivery of a variety of radically simplified, extremely affordable technologies — from software-defined radios arrayed in self-organizing architectures to Ethernet-over-fiber-optics — that are storming the gates of the telephone companies’ existing network. These promise
every home more bandwidth than a medium sized town uses for all of its conventional telephony — for about the price of a monthly bus pass. These will be developed and deployed wherever established companies hold less sway.

**Bandwidth threatens content providers, too**

Telephone companies are not the only institutions goaded by new network technology. We can see from the reaction to today's Internet that the Paradox of the Best Network is not kind to the recording industry, to book publishers, or to any other group that makes its living by controlling access to content. These groups have already called in the lawyers and lobbyists to protect their current business models. Nor will the new network be popular with any institution — economic, political or religious — that seeks to shield itself from conflicting cultures and ideas.

**This is about politics, not just business**

In fact, the best network embodies explicit political ideals — it would be disingenuous to pretend it didn't. The best technological network is also the most open political network. The best network is not only simple, low-cost, robust and innovation-friendly, it is also best at promoting a free, democratic, pluralistic, participatory society; a society in which people with new business ideas are free to fail and free to succeed in the marketplace.

**It’s about our destiny**

More than the fate of telephone companies is at stake. We must not allow the short-sighted self-interest of the incumbent telecommunications industry to thwart the connectedness that will enlarge us as social creatures. Our destiny as a species has always been to be connected. The new network — open, fast and out of control — will change what is most important about us lonely humans: the way we join together with others to become more than we are alone.

**So, how do we do it?**

But the best network is the hardest to make money running. So who builds it? Who runs it? Who fixes it when it breaks? And who develops the next generations of faster, simpler infrastructure?

**Let the government do it?**

Arguably, building the best network is a Public Good. It will boost the economy, open global markets, and make us better informed citizens, customers and business people. So, perhaps we should let the government do it. Perhaps we should insist that the government do it.

**Big government is bad**

But governments tend to make mistakes. Big governments tend to make big, costly, persistent mistakes. We do not want government to lock us into particular technologies or certain ways of doing things, no matter if they seem to be the most promising technologies and methods today.

**A purely open market approach won't work either**

A purely governmental solution, therefore, is too risky. But so is a pure reliance on the invisible hand of the market. Left to itself, the market would favor larger network owners both because they benefit from economies of scale (the more connections you provide, the lower each connection costs) and because they have financial resources to withstand the low operating margins of a commoditized market. Even starting from a mythical "level playing field," larger network owners would acquire smaller ones. And once again, large carriers would become monopoly-like, with little incentive to hook up less-populous and poorer areas. More important, these regenerated monopolies would be as loath to open their network or to invest in new technology as the current crop of telephone company incumbents. The Paradox of the Best Network is not resolved by the free market; indeed it is a consequence of it.

**Here are some ideas**

So, we are stuck between the Scylla of big government and the Charybdis...
of free market dynamics. We need to find wise ways to proceed. If we
don’t, telephone company lobbyists will write the next chapters of the
communications story.

We propose that:

<table>
<thead>
<tr>
<th>Set a goal</th>
<th>The U.S. government should set a national goal: every citizen will have high bandwidth, open access to the Internet within five years, beginning with schools and public buildings, then businesses, other private enterprises and homes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate wire and services</td>
<td>Just as the Internet separates transport from service, the incumbent telephone companies should be separated into transport companies and service companies. The transport companies would be have government incentives (e.g., assured return on investment), to make fiber, pole attachment, and right of way available to all service providers. The service companies, in contrast, would be completely deregulated and freed to compete with other service providers in the newly revitalized marketplace at the edge of the network.</td>
</tr>
<tr>
<td>In addition, since we do not yet know what kinds of initiatives will succeed in bringing high speed connectivity to our homes and businesses, a variety of experimental initiatives should be encouraged. One such proposal, end-user financing, springs from the fact that because high-speed Internet connectivity costs just a few thousand dollars per home, home owners should be able to buy their own connectivity. Another proposal would make special homeowner loans available for this purpose. Still another, condominium ownership of fiber, would permit private groups to install, own and operate their own connectivity.</td>
<td></td>
</tr>
<tr>
<td>Get out of the way</td>
<td>In addition, municipalities, utilities, and other non-traditional entities should be encouraged to provide high-speed connectivity. Some states have laws that prohibit such entities from owning or operating communications networks; these should be swept off the books.</td>
</tr>
<tr>
<td>Help the municipalities</td>
<td>Some municipalities and rural areas may need additional help providing connectivity where economic conditions are less favorable or low population density means higher per capita infrastructure costs. The Rural Electrification Act of 1936 provides one demonstrably successful model for this.</td>
</tr>
<tr>
<td>Keep the IP stupid</td>
<td>Even without high speed connectivity, the Internet Protocol has been a powerful source of innovation. As the Internet has assumed economic importance there have been calls to alter the Internet Protocol, e.g., to increase security or strengthen copyright protection. In virtually every case, such concerns can be satisfied at the edge of the network or by adding more bandwidth to the network. The Internet Protocol itself must remain simple, stupid and best.</td>
</tr>
<tr>
<td>Restore the role of copyright</td>
<td>These steps to keep the infrastructure open will be in vain if vested interests use other means (legal and technological) to expand restrictions to content and reduce free flow of ideas in the public domain. The laws governing copyright should be brought back to their original purpose to ensure the free flow</td>
</tr>
</tbody>
</table>
of information that is critical to the functioning of a free, open society.

Connect. Steps like this must be taken if only to save the incumbent network from meeting the fate foretold by the Paradox of the Best Network. Our destiny is one short mile from us. We need only connect.

# # #

1 We first encountered this formulation in the September 2001 issue of Roxane Googin's High Tech Observer. She wrote, "The perfect network is perfectly plain, and perfectly extensible. That means it is also the perfect capital repellant, [which] implies a guaranteed loss to network operators, but a boon to the services on the 'ends'."

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Bills under the 107th Congress:

1. **H.RES.350**: Providing for consideration of the bill (H.R. 1542) to deregulate the Internet and high speed data services, and for other purposes.
   - **Sponsor**: Rep Linder, John
   - **Committees**: House Rules
   - **Latest Major Action**: 2/27/2002 Passed/agreed to in House. Status: On agreeing to the resolution Agreed to by the Yeas and Nays: 282 - 142 (Roll no. 42).

2. **H.R.267**: To amend the Internal Revenue Code of 1986 to provide an incentive to ensure that all Americans gain timely and equitable access to the Internet over current and future generations of broadband capability.
   - **Sponsor**: Rep English, Phil
   - **Committees**: House Ways and Means
   - **Latest Major Action**: 1/30/2001 Referred to House committee. Status: Referred to the House Committee on Ways and Means.

3. **H.R.1416**: To provide grants and other incentives to promote new communications technologies, and for other purposes.
   - **Sponsor**: Rep LaFalce, John J.
   - **Committees**: House Energy and Commerce

4. **H.R.1542**: To deregulate the Internet and high speed data services, and for other purposes.
   - **Sponsor**: Rep Tauzin, W. J. (Billy)
   - **Committees**: House Energy and Commerce; House Judiciary; Senate Commerce, Science, and Transportation
   - **Latest Major Action**: 2/28/2002 Referred to Senate committee. Status: Received in the Senate and Read twice and referred to the Committee on Commerce, Science, and Transportation.

5. **H.R.1693**: To improve science, mathematics, and technology education in elementary and secondary schools, advance knowledge on the effective uses of
information technologies in education, increase participation in science, mathematics, and engineering careers by groups underrepresented in those fields, provide for more effective coordination of public and private sector efforts to improve science, mathematics, and technology education, and for other purposes.

**Sponsor:** Rep Hall, Ralph M.

**Committees:** House Science; House Education and the Workforce

**Latest Major Action:** 7/20/2001 Referred to House subcommittee. Status: Referred to the Subcommittee on 21st Century Competitiveness.

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**6. H.R.1697:** To amend the Clayton Act to ensure the application of the antitrust laws to local telephone monopolies, and for other purposes.

**Sponsor:** Rep Conyers, John, Jr.

**Committees:** House Judiciary; House Energy and Commerce

**Latest Major Action:** 5/22/2001 House committee/subcommittee actions. Status: Committee Hearings Held.

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**7. H.R.1698:** To ensure the application of the antitrust laws to local telephone monopolies, and for other purposes.

**Sponsor:** Rep Cannon, Chris

**Committees:** House Judiciary; House Energy and Commerce

**Latest Major Action:** 5/22/2001 House committee/subcommittee actions. Status: Committee Hearings Held.

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**8. H.R.1858:** To make improvements in mathematics and science education, and for other purposes.

**Sponsor:** Rep Boehlert, Sherwood L.

**Committees:** House Science; House Education and the Workforce; Senate Health, Education, Labor, and Pensions

**Latest Major Action:** 7/31/2001 Referred to Senate committee. Status: Received in the Senate and Read twice and referred to the Committee on Health, Education, Labor, and Pensions.

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**9. H.R.2038:** To amend the National Telecommunications and Information Administration Organization Act to encourage deployment of broadband service to rural America.

**Sponsor:** Rep Stupak, Bart

**Committees:** House Energy and Commerce; House Agriculture

10. **H.R.2120**: To ensure the application of the antitrust laws to local telephone monopolies, and for other purposes.
   Sponsor: Rep Cannon, Chris
   Committees: House Judiciary; House Energy and Commerce
   Latest Major Action: 6/25/2001 Referred to House subcommittee. Status: Referred to the Subcommittee on Telecommunications and the Internet, for a period to be subsequently determined by the Chairman.

11. **H.R.2139**: To authorize the Secretary of Agriculture to make loans for the development of broadband services in rural areas.
    Sponsor: Rep Smith, Lamar
    Committees: House Agriculture; House Energy and Commerce
    Latest Major Action: 6/25/2001 Referred to House subcommittee. Status: Referred to the Subcommittee on Telecommunications and the Internet, for a period to be subsequently determined by the Chairman.

12. **H.R.2330**: Making appropriations for Agriculture, Rural Development, Food and Drug Administration, and Related Agencies programs for the fiscal year ending September 30, 2002, and for other purposes.
    Sponsor: Rep Bonilla, Henry
    Committees: House Appropriations; Senate Appropriations
    Latest Major Action: 11/28/2001 Became Public Law No: 107-076 [Text, PDF]

13. **H.R.2401**: To bridge the digital divide in rural areas.
    Sponsor: Rep McHugh, John M.
    Committees: House Energy and Commerce; House Ways and Means; House Science
    Latest Major Action: 7/16/2001 Referred to House subcommittee. Status: Referred to the Subcommittee on Telecommunications and the Internet.

14. **H.R.2597**: To amend the Internal Revenue Code of 1986 to provide incentives to ensure that all Americans gain timely and equitable access to the Internet and to promote employer and employee participation in telework arrangements.
**15. H.R.2646**: To provide for the continuation of agricultural programs through fiscal year 2007, and for other purposes.

**Sponsor**: Rep Combest, Larry  
**Committees**: House Agriculture; House International Relations  
**Latest Major Action**: 5/13/2002 Became Public Law No: 107-171 [Text, PDF]

**16. H.R.2669**: To improve access to telecommunications and Internet services in rural areas.

**Sponsor**: Rep Moran, Jerry  
**Committees**: House Agriculture; House Energy and Commerce  
**Latest Major Action**: 8/10/2001 Referred to House subcommittee. Status: Referred to the Subcommittee on Telecommunications and the Internet, for a period to be subsequently determined by the Chairman.

**17. H.R.2847**: To encourage the deployment of broadband telecommunications in rural America, and for other purposes.

**Sponsor**: Rep Boswell, Leonard L.  
**Committees**: House Agriculture; House Ways and Means; House Energy and Commerce; House Education and the Workforce  

**18. H.R.3090**: To provide tax incentives for economic recovery.

**Sponsor**: Rep Thomas, William M. (Bill)  
**Committees**: House Ways and Means; Senate Finance  
**Latest Major Action**: 3/9/2002 Became Public Law No: 107-147 [Text, PDF]

**19. H.R.4641**: To allocate spectrum for the enhancement of wireless telecommunications, and to invest wireless spectrum auction proceeds for the military preparedness and educational preparedness of the United States for the digital era, and for
other purposes.

**Sponsor:** Rep Markey, Edward J.

**Committees:** House Energy and Commerce

**Latest Major Action:** 5/17/2002 Referred to House subcommittee. Status: Referred to the Subcommittee on Telecommunications and the Internet.

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**20. S.CON.RES.100:** An original concurrent resolution setting forth the congressional budget for the United States Government for fiscal year 2003 and setting forth the appropriate budgetary levels for each of the fiscal years 2004 through 2012.

**Sponsor:** Sen Conrad, Kent

**Committees:** Senate Budget


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**21. S.88:** A bill to amend the Internal Revenue Code of 1986 to provide an incentive to ensure that all Americans gain timely and equitable access to the Internet over current and future generations of broadband capability.

**Sponsor:** Sen Rockefeller IV, John D.

**Committees:** Senate Finance

**Latest Major Action:** 1/22/2001 Referred to Senate committee. Status: Read twice and referred to the Committee on Finance.

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**22. S.150:** A bill to amend the Internal Revenue Code of 1986 to provide an incentive to ensure that all Americans gain timely and equitable access to the Internet over current and future generations of broadband capability.

**Sponsor:** Sen Kerry, John F.

**Committees:** Senate Finance

**Latest Major Action:** 1/23/2001 Referred to Senate committee. Status: Read twice and referred to the Committee on Finance.

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**23. S.428:** A bill to provide grants and other incentives to promote new communications technologies, and for other purposes.

**Sponsor:** Sen Clinton, Hillary Rodham

**Committees:** Senate Commerce, Science, and Transportation

**Latest Major Action:** 3/1/2001 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.
24. **S.430**: A bill to provide incentives to promote broadband telecommunications services in rural America, and for other purposes.
**Sponsor**: Sen Clinton, Hillary Rodham
**Committees**: Senate Commerce, Science, and Transportation
**Latest Major Action**: 3/1/2001 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.

25. **S.966**: A bill to amend the National Telecommunications and Information Administration Organization Act to encourage deployment of broadband service to rural America.
**Sponsor**: Sen Dorgan, Byron L.
**Committees**: Senate Commerce, Science, and Transportation

26. **S.1126**: A bill to facilitate the deployment of broadband telecommunications services, and for other purposes.
**Sponsor**: Sen Brownback, Sam
**Committees**: Senate Commerce, Science, and Transportation

27. **S.1127**: A bill to stimulate the deployment of advanced telecommunications services in rural areas, and for other purposes.
**Sponsor**: Sen Brownback, Sam
**Committees**: Senate Commerce, Science, and Transportation

28. **S.1206**: A bill to reauthorize the Appalachian Regional Development Act of 1965, and for other purposes.
**Sponsor**: Sen Voinovich, George V.
**Committees**: Senate Environment and Public Works; House Transportation and Infrastructure
**Latest Major Action**: 3/12/2002 Became Public Law No: 107-149 [Text, PDF]
29. **S.2048**: A bill to regulate interstate commerce in certain devices by providing for private sector development of technological protection measures to be implemented and enforced by Federal regulations to protect digital content and promote broadband as well as the transition to digital television, and for other purposes.  
**Sponsor**: Sen Hollings, Ernest F.  
**Committees**: Senate Commerce, Science, and Transportation  

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30. **S.2430**: A bill to provide for parity in regulatory treatment of broadband services providers and of broadband access services providers, and for other purposes.  
**Sponsor**: Sen Breaux, John B.  
**Committees**: Senate Commerce, Science, and Transportation  
**Latest Major Action**: 4/30/2002 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.

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31. **S.2448**: A bill to improve nationwide access to broadband services.  
**Sponsor**: Sen Hollings, Ernest F.  
**Committees**: Senate Commerce, Science, and Transportation  
**Latest Major Action**: 5/2/2002 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.

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32. **S.2582**: A bill to require a report to Congress on a national strategy for the deployment of high speed broadband Internet telecommunications services, and for other purposes.  
**Sponsor**: Sen Lieberman, Joseph I.  
**Committees**: Senate Commerce, Science, and Transportation  

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33. **S.2863**: A bill to provide for deregulation of consumer broadband services.  
**Sponsor**: Sen McCain, John  
**Committees**: Senate Commerce, Science, and Transportation  
**Latest Major Action**: 8/1/2002 Referred to Senate committee. Status: Read twice and referred to the Committee on Commerce, Science, and Transportation.
34. S.2869: A bill to facilitate the ability of certain spectrum auction winners to pursue alternative measures required in the public interest to meet the needs of wireless telecommunications consumers.
Sponsor: Sen Kerry, John F.
Committees: Senate Commerce, Science, and Transportation; House Energy and Commerce

35. S.AMDT.4148 to S.2514 To add $1,000,000 for Other Procurement, Air Force, for the procurement of technical C-E equipment, Mobile Emergency Broadband System, and to offset the increase by reducing the amount provided for the Navy for other procurement for gun fire control equipment, SPQ-9B solid state transmitter, by $1,000,000.
Sponsor: Sen Santorum, Rick
Latest Major Action: 6/26/2002 Senate amendment agreed to

Summary of Bills Affecting Broadband Internet Access in the 106th Congress

This page summarizes the following bills:

- S 877, Broadband Internet Regulatory Relief Act (Brownback-Nickles-Craig).
- S 1043, Internet Regulatory Freedom Act (McCain).
- S 2307, Rural Broadband Enhancement Act (Dorgan).
- S 2321, Rural Telecommunications Modernization Act of 2000 (Rockefeller-Snowe).
- HR 1685, Internet Growth and Development Act (Boucher-Goodlatte).
- HR 1686, Internet Freedom Act (Goodlatte-Boucher).
- HR 2420, Internet Freedom and Broadband Deployment Act (Tauzin-Dingell).
- HR 2637, Consumer and Community Choice in Access Act (Blumenauer).

Introduction. Each of these bills, except HR 2637, is designed to speed the deployment of broadband Internet access in the U.S. They all have have particular regard for areas not likely to receive cable Internet access. Each of these bills is being sponsored and cosponsored by
Representatives or Senators from rural areas with low cable penetration, but almost universal telephone service penetration. Hence, these sponsors represent areas where, in the short run, high speed Internet access will likely be provided by ADSL via an incumbent local exchange carrier (phone company). Each bill would reduce existing regulatory burdens on ILECs imposed by Section 251 of the 1996 Telecom Act when they provide ADSL service. The rationale is that the ILECs will have a greater incentive to invest in ADSL technology if the regulatory burden is reduced, and their return on investment is increased.

HR 2637 is an open access bill. It would require companies which provide broadband Internet access via cable to provide open access to competing ISPs.

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**S 877, Broadband Internet Regulatory Relief Act.**

**Sponsor.** Sen. Sam Brownback (R-KS). Initial Cosponsors. Don Nickles (R-OK) and Larry Craig (R-ID). Additional Cosponsors. Conrad Burns (R-MT), Spencer Abraham (R-MI), Pat Roberts (R-KS).

**Summary.** There are many technologies by which high-speed, or broadband, Internet access may be delivered. These include cable, ADSL cable copper telephone lines, satellite, electricity lines, and T-1, T-3, and other high bandwidth lines. However, in the short run, the two technologies that are likely to provide access to large numbers of people are cable and ADSL. However, cable networks are prevalent in urban, but not rural areas. S 877 IS is designed in part to assure that rural and small town America are not left out of the broadband revolution.

Sen. Brownback, who represents Kansas, stated that his "bill is intended to speed up the deployment of broadband networks throughout the United States and to make residential high-speed Internet access a widely-available service." However, it primarily provides "regulatory relief to telephone companies willing to deliver broadband connections to rural areas." (See, Statement in Congressional Record.)

First, the bill defines advanced service to include Internet access that is at speeds of 200 kbps downstream and 128 kbps upstream, or greater.

One key provision provides that incumbent local exchange carriers (ILEC, i.e., the phone company) will not have to sell or make available their broadband access services to their competitors, under Section 251 of the 1996 Telecom Act, if they make 70% of their loops ready to support broadband access. Specifically, the bill reads:

"an incumbent local exchange carrier shall not be subject to the requirements of -- '(1) section 251(c)(3) with respect to facilities and equipment used exclusively to provide advanced service; and '(2) section 251(c)(4) for the provision of advanced service, in any
State in which 70 percent of the incumbent local exchange carrier's loops in its service territory are DSL-capable, as determined by that State."

This provision is designed to give create an economic incentive for the ILECs to invest in ADSL technology.

Moreover, the bill provides that the Federal Communications Commission shall not regulate prices for broadband Internet access offered by the ILEC, if it has a competitor. Specifically, the bill reads:

"the prices, terms, and conditions of any advanced service by an incumbent local exchange carrier shall not be subject to regulation if the Commission determines that advanced service is being offered by an unaffiliated advanced service provider in competition with the incumbent local exchange carrier within a geographic area served by a central office."

Sen. Brownback described the substantive provisions of his bill as follows:

"First, incumbent local exchange carriers that make seventy percent of their loops ready to support high-speed Internet access will not have to resell their advanced services to competitors and will not have to make the network elements used exclusively for the provision of advanced services available to competitors. Second, the prices for advanced services offered by incumbent local exchange carriers that face competition in the provision of such services will be deregulated. Third, where incumbent local exchange carriers are offering advanced services but do not face competition, the companies will receive pricing flexibility. Fourth, competitive local exchange carriers will not be required to resell their advanced services."

Status. S 887 was introduced on April 26, 1999, and referred to the Senate Commerce Committee.

Legislative History with Links to Related Materials.

- TLJ story.

S 1043, Internet Regulatory Freedom Act.

Sponsor. Sen. John McCain (R-AZ). Cosponsors. Mike Enzi (R-MN) and Jesse Helms (R-NC).
Summary. Like the Brownback bill (S 877), this bill would also relax the requirements of Section 251 for ILECs which deploy ADSL service. The key language of the bill provides:

"Notwithstanding any other provision, including section 271, of this Act, nothing in this Act applies to, or grants authority to Commission with respect to---

"(1) the imposition of wholesale discount obligations on bulk offerings of advanced services to providers of Internet services or telecommunications carriers under section 251(c)(4), or the duty to provide as network elements, under section 251(c)(3), the facilities and equipment used exclusively to provide Internet services;

"(2) technical standards or specifications for the provision of Internet services; or

"(3) the provision of Internet services."

The McCain bill also includes a statement of policy: "it is the policy of the United States to assure that all Americans have the opportunity to benefit from access to advanced Internet service at affordable rates by eliminating regulation that impedes the competitive deployment of advanced broadband data networks."

Status. This bill was introduced on May 13, 1999.

Legislative History with Links to Related Materials.

- 5/13/99. S 1043 IS introduced in the Senate. See also:
  - Statement by Sen. McCain in Congressional Record.
  - TLJ story.

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S 2307, Rural Broadband Enhancement Act

Sponsor. Sen. Byron Dorgan (D-ND). Original Cosponsors. Max Baucus (D-MT), Sen. Tom Daschle (D-SD), Sen. Tom Harkin (D-IA), and Tim Johnson (D-SD). Additional cosponsors. Patty Murray (D-WA), Jeff Bingamon (D-NM), Bob Kerrey (D-NE), Paul Wellstone (D-MN).

Summary. S 2307 IS would amend the Communications Act of 1934 to extend universal service subsidies to include deployment of broadband services to rural areas. The technologies enumerated are DSL, cable, wireless, and satellite.

The bill would also create a new $3 Billion loan program to be administered by the Rural Utilities Service of the Department of Agriculture to make loans to telecommunications
carriers providers to finance the deployment of broadband telecommunications services to rural communities. Loans would be for 30 years and carry 2% interest.

The bill is also significant in that it treats broadband Internet access as a telecommunications service. The word Internet does not appear in this bill. However, it is clear that the bill is referring to Internet access services, through its references to "broadband" service, "digital subscriber line", and its definition:

The term `broadband service' includes, without regard to any particular transmission medium or technology, high-speed, switched, broadband telecommunications capable of delivering not less than 1.0 megabits of data per second to the user and 0.5 megabits of data per second from the user that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications.

This is the companion bill to HR 4122.

**Status.** This bill was introduced on March 28, 2000. No action has been taken.

**Legislative History with Links to Related Materials.**

- 3/28/00. [S 2307 IS](#) introduced in the Senate. See also:
  - 3/28/00. S 2307 referred to the Senate Commerce Committee.

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**S 2321, Rural Telecommunications Modernization Act.**


**Summary.**

**Status.** This bill was introduced on March 29, 2000. No action has been taken.

**Legislative History with Links to Related Materials.**

- 3/29/00. S 2321 IS introduced in the Senate.

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**S 2698, Broadband Internet Access Act of 2000**
HR 1685, Internet Growth and Development Act.
(Summary of broadband access provisions only.)

Original Cosponsor. Rep. Bob Goodlatte (R-VA) (web site | bio). Additional Cosponsors. Additional Cosponsors. Martin Meehan (D-MA), Joe Skeen (R-NM), Norman Dicks (D-WA), Ciro Rodriquez (D-TX), Mac Thornberry (R-TX), Michael Capuano (D-MA), James Talent (R-MO), John Olver (D-MA), James McGovern (D-MA), Solomon Ortiz (D-TX), John Peterson (R-PA), Gary Miller (R-CA), Merrill Cook (R-UT).

Summary. HR 1685 IH is a broad bill which covers more than just speeding the deployment of broadband Internet access. For a complete summary of the bill, see Summary of HR 1685. This page summarizes only those sections which pertain to broadband Internet access. This bill also has sections relating to electronic signatures (Title I), spam (Title II, and Sec. 505 of Title V), and online privacy (Title III).

Title IV pertains to "Broadband Deployment." It has two sections. Section 401(a) amends the definition of InterLATA service to exclude the transmission of data by the Internet. But, Section 401(b) then provides that no Bell Operating Company (BOC) may provide two-way, voice only, interLATA telecommunications services until the FCC approves its Section 271 application.

Section 402(a) requires local exchange carriers (LECs) to prepare for the state telephone commission in each state which it does business a "plan to provide broadband telecommunications service in all local exchange areas in which such carrier has telephone exchange service customers as soon as such broadband telecommunications service is economically reasonable and technically feasible." Once approved by the state commission, the LEC must follow the plan. However, the LEC is then "free of Federal and State price, rate, rate of return, and profit regulation." Also, once the state commission finds that either the LEC has a broadband services provider competitor, or the LEC has made broadband service available to 70% of the access lines in an exchange, the LEC is no longer bound by the plan. Finally, the FCC is cut out of the process.

Section 402(b) provides that incumbent local exchange carrier's (ILEC) provision of broadband services shall not be subject to Sections 251(c)(3) and (4) of the 1996 Telecom Act if they certify three things to their state commissions: first, that "in central offices in which it provides local loops that are conditioned for broadband services, it provides such loops to other carriers at least as quickly as it provides them for its own customers"; second, that "in central office in which it does not currently provide local loops that are conditioned for broadband services, but in which such service is economically reasonable and technically feasible, it will provide such loops within 120 days of a request for such conditioning from another carrier"; and that disagreements over prices and terms shall be submitted to commercial arbitration.
Title V is designed to force broadband access transport providers, including ILECs with DSL conditioned loops and cable companies to unbundle their broadband transport and Internet access. It accomplishes this with three sections that amend antitrust law. Basically, the purpose is to stop the practice of cable companies to bundle their cable modem services with their Internet access services, and to protect the competitiveness of the many ISPs, online services, and other Internet access services.

First, Section 501 provides that ILECs which fail to provide conditioned loops are presumed to violate the Sherman Act. If an ILEC with market power in the market for broadband services fails to provide broadband conditioned "unbundled local loops when economically reasonable and technically feasible" it shall be presumed to be in violation of the Sherman Antitrust Act.

Second, Section 502 provides that broadband access transport providers (BATP) which enter into discriminatory contracts are presumed to violate the Sherman Act.


Status. This bill was introduced on May 5, 1999, and referred to the Commerce and Judiciary Committees.

Legislative History with Links to Related Materials.

- 5/5/99. HR 1685 referred to the House Commerce Committee and the House Judiciary Committee.
- 6/30/99. House Judiciary Committee held a hearing on HR 1685.

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HR 1686, Internet Freedom Act.
(Summary of broadband access provisions only.)

Original Cosponsor. Rep. Rick Boucher (D-VA). Additional Cosponsors. George Gekas (R-PA), Lamar Smith (R-TX), Martin Meehan (D-MA), Thomas Ewing (R-IL), Joe Skeen (R-NM), Stephanie Jones (D-OH), Richard Neal (D-MA), Michael Capuano (D-MA), James McGovern (D-MA), John Olver (D-MA), Roscoe Bartlett (R-MD), Richard Baker (R-LA), Pete Sessions (R-TX), Kevin Brady (R-TX), Norman Dicks (D-WA), Ray LaHood (R-IL), James Talent (R-MO), Rick Hill (R-MT), Ciro Rodríguez (D-TX), John Peterson (R-PA), Merrill Cook (R-UT), Asa Hutchinson (R-AR), Nick Rahall (D-WV), Curt Weldon (R-PA), Steven Kuykendall (R-CA), Mac Collins (R-GA), Tom DeLay (R-TX), Mark Foley (R-FL), Tammy Baldwin (D-WI), Sheila Lee (D-TX), John Doolittle (R-CA).

See also, full summary of HR 1686.
Summary. **HR 1686 IH** is a broad bill which covers more than just speeding the deployment of broadband Internet access. Also, everything in this bill is in the HR 1685. HR 1686 is a subset of HR 1685.

This bill has two Titles. Title I is almost identical to Title V of HR 1685. Title II is almost identical to Title IV of HR 1685. So, read the above summary of HR 1685.

See also, [Rep. Goodlatte's summary](#).

**Status.** This bill was introduced on May 5, 1999, and referred to the Commerce and Judiciary Committees.

**Legislative History with Links to Related Materials.**

- 5/5/99. HR 1686 referred to the House Commerce Committee and the House Judiciary Committee.
- 6/30/99. House Judiciary Committee held a hearing on HR 1686.

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**HR 2420, Internet Freedom and Broadband Deployment Act**

**Sponsor.** Billy Tauzin (R-LA). **Original Cosponsors.** John Dingell (D-MI), Mike Oxley (R-OH), David Bonior (D-MI), John Lewis (D-GA), Nathan Deal (R-GA), Lindsey Graham (R-SC), Rick Boucher (D-VA), Bobby Rush (D-IL), John Shimkus (R-IL), Charlie Norwood (R-GA), Pete Sessions (R-TX), Vito Fossella (R-NY), Norman Dicks (D-WA), James Barcia (D-MI), Rick Hill (R-MT), Roy Blunt (R-MO), Robin Hayes (R-NC), Al Wynn (D-MD), Joe Barton (R-TX), Bob Etheridge (D-NC), Lee Terry (R-NE), James Greenwood (R-PA), Greg Ganske (R-IA), Richard Burr (R-NC), Paul Gillmor (R-OH), Ed Bryant (R-TN), John Shadegg (R-AZ), Henry Bonilla (R-TX), Thomas Reynolds (R-NY), John Sweeney (R-NY), Sue Myrick (R-NC). **Additional Cosponsors.** Ed Whitfield (R-KY), Sherwood Boehlert (R-NY), Charles Gonzalez (D-TX), Gregory Meeks (D-NY), Richard Baker (R-LA), Earl Hilliard (D-AL), Alcee Hastings (D-FL), Gene Green (D-TX), Robert Ney (R-OH), Ileana Ros-Lehtinen (R-FL), Michael Bilirakis (R-FL), Mark Foley (R-FL), Corrine Brown (D-FL), Dale Kildee (D-MI), Peter King (R-NY), Ron Lewis (R-KY), Lincoln Diaz-Balart (R-FL), Robert Wexler (D-FL), Carrier Meek (D-FL), Wayne Gilchrest (R-MD), Walter Jones (R-NC), Allen Boyd (D-FL), Johnny Isakson (R-GA), Roscoe Bartlett (R-MD), Sonny Callahan (R-AL), John Peterson (R-PA), Jim McCreery (R-LA), David Vitter (R-LA), Ken Lucas (D-KY), Jack Metcalf (R-WA), Anne Northup (R-KY), Spencer Bachus (R-AL), John Baldacci (D-ME), Terry Everett (R-AL), Loretta Sanchez (D-CA), Richard Pombo (R-CA), Elijah Cummings (D-MD), Dave Weldon (R-FL), Kevin Brady (R-TX), Ernest Fletcher (R-KY), Merrill Cook (R-UT), Tom Sawyer (D-OH), Adam Smith (D-WA), William Goodling (R-PA), Matthew Martinez (D-CA), William Thornberry (R-TX), Nick Lampson (D-TX), Max...
Sandlin (D-TX), Harold Ford (D-TN), Ruben Hinojosa (D-TX), Jesse Jackson (D-IL),
Ken Calvert (R-CA), Ciro Rodriguez (D-TX), Jim Gibbons (R-NV), Charles Taylor,
Silvestre Reyes, Nick Rahall (D-WV), Paul Ryan (R-WI), Connie Morella (R-MD), Wes
Watkins, Ron Packard (R-CA), David McIntosh, John Cooksey, Benjamin Cardin, Phil
English (R-PA), John Duncan, Joe Moakley (D-MA), Julia Carson, Curt Weldon (R-PA),
John Murtha, Major Owens, Sam Farr, Donald Payne, George Radanovich, Steve Buyer,
Cynthia McKinney (D-GA), Robert Brady, Christopher John, Mark Green, Tim Holden,
Rod Blagojevich, Jack Quinn, Steven Kuykendall (R-CA), Sander Levin, Jim Saxton,
William Jefferson, Peter Visclosky, Sanford Bishop, Michael Simpson, Jim McDermott,
Joseph Pitts, Frank LoBiondo (R-NJ), Alan Mollohan, Danny Davis, Robert Menendez,
E.B. Johnson (D-TX), Ron Kind, Carolyn Kilpatrick, Martin Frost, Juanita McDonald
(D-CA), Ken Bentsen (D-TX), Eva Clayton, Robert Andrews, Deborah Pryce (R-OH),
David Phelps, Matt Salmon (R-AZ), Mac Collins, Don Sherwood, Carolyn Maloney,
Gary Condit, Charles Bass, Neil Abercrombie (D-HI), Solomon Ortiz, Tom DeLay (R-
TX), Van Hilleary, Robert Weygand, Kenny Hulshof, Paul Knajorski, Charles Stenholm,
Sheila Lee (D-TX), John Sununu (R-NH), Thomas Ewing, Joe Scarborough (R-FL), Bill
Pascarella, James Talent, Bill Clayton, Stephanie Jones, Jim Turner, Michael Capuano (D-
MA), James McGovern, Duke Cunningham (R-CA), Bob Stump, Joe Knollenberg, Jo
Ann Emerson, Jim Ryun (R-KS), Thomas Allen, Steve LaTourette, John Doolittle (R-
CA), Grace Napolitano (D-CA), Jerry Costello, Tom Coburn, William Lipinski, Tammy
Baldwin (D-WI), Jerry Weller (R-IL), Richard Neal, John Boehner, Gerald Kleczka,
Gary Miller, Duncan Hunter, Joe Sweeney, Todd Tiahrt, Charles Rangel (D-NY), Bob
Clement, Baron Hill, Bob Filner, Thomas Petri, Joe Baca, Jay Dickey, John Olver (D-
MA), Mark Souder, James Walsh, Don Young (R-AK), John Hostetler, Robert Matsui
(D-CA), J.D. Hayworth (R-AZ), Elton Gallegly (R-CA), Christopher Smith, Bud Shuster,
Dave Camp, John McHugh, Benjamin Gilman (R-NY), Pat Danner, Donald Manzullo,
Virgil Goode, Jose Serrano, Brad Sherman (D-CA), Eliot Engel (D-NY), Carolyn
McCarthy (D-MO).

Summary. HR 2420 IH amends both Section 254 and Section 271 of the Telecom Act of
1996 to provide regulatory relief for phone companies providing "high speed data
services", which it defines as the "packet switched" transmission of information at at least
384 kbps in at least one direction. The bill also includes a broad deregulation clause.

The bill does several things.

- It deprives the Federal Communications Commission and state and local
  authorities of regulatory authority over high speed data service or Internet access
  services.
- It amends Section 271 of the 1996 Telecom Act to exempt high speed data
  services and Internet access services from the prohibition on RBOC's provision of
  interLATA telecommunications services without prior FCC approval.
- It amends Section 251 of the 1996 Telecom Act to provide that the obligations of
  resale and unbundled access that apply to voice services do not apply to any high-
  speed data services offered by ILECs.
• It requires ILECs to allow ISPs to collocate equipment and acquire facilities and services for the provision of Internet access service, and to allow Internet users to access any ISP that interconnects with its high speed data service.

Section 4 of the bill provides that "neither the Commission, nor any State, shall have authority to regulate the rates, charges, terms, or conditions for, or entry into the provision of, any high speed data service or Internet access service, or to regulate the facilities used in the provision of either such service."

However, the bill goes on to clarify this broad language with the provision that "Nothing in this section shall be construed to limit or affect the authority of any State to regulate voice telephone exchange services, nor affect the rights of cable franchise authorities to establish requirements that are otherwise consistent with this Act."

Section 4 of the bill also adds a new subsection to Section 251 of the Telecom Act of 1996 that provides that the FCC shall not require an ILEC to "provide unbundled access to any network elements used in the provision of any high speed data service ... or offer for resale at wholesale rates any high speed data service."

Also, Section 5 provides that each ILEC has the duty to provide:

"(1) Internet users with the ability to subscribe to and have access to any Internet service provider that interconnects with such carrier's high speed data service; (2) any Internet service provider with the right to acquire the facilities and services necessary to interconnect with such carrier's high speed data service for the provision of Internet access service; and (3) any Internet service provider with the ability to collocate equipment in accordance with the provisions of section 251, to the extent necessary to achieve the objectives of paragraphs (1) and (2) of this subsection."

**Status.** This bill was introduced on July 1, 1999, and referred to the House Commerce Committee.

**Legislative History with Links to Related Materials.**

• 7/1/99. [HR 2420 IH](#) introduced in the House. See also:
  • [Statement](#) by Rep. Dingell.
  • [TLJ story](#).
• 7/1/99. HR 2420 referred to the [House Commerce Committee](#).
• 7/21/99. HR 2420 referred to the House Telecom Subcommittee.
• 12/17/99. Rep. Dingell wrote a [letter](#) to AT&T CEO Michael Armstrong, and a [letter](#) to FCC Chairman William Kennard, regarding open access and HR 2420.
• 5/25/00. The House Telecom Subcommittee held a hearing on broadband access, and HR 2420.
**HR 2637, Consumer and Community Choice in Access Act**


**Summary.** HR 2637 IH is an open cable access bill. It would require companies that provide Internet access over cable to provide competing ISPs open access to its cable facilities.

The sponsor, Rep. Blumenauer, was a member of the Portland City Council prior to his election to Congress in 1996. It is the City of Portland which first asserted the authority to impose an open access requirement on AT&T. AT&T has challenged that decision in court. The matter is pending before the 9th Circuit.

HR 2637 IH provides that the FCC "may require cable operators that provide interconnection, using cable system facilities, with the Internet to offer such interconnection on terms and conditions that are fair, reasonable, and nondiscriminatory."

In addition, "Such requirements shall include the obligation to provide direct or indirect interconnection with the facilities and equipment of any Internet service provider on terms and conditions that are functionally and economically equivalent to the interconnection provided to any other Internet service provider, whether or not affiliated with the cable operator. If the Commission determines, after notice and comment, that a cable operator is not complying with such obligation, the Commission may establish the terms and conditions of such interconnection."

**Status.** This bill was introduced on July 29, 1999, and referred to the House Commerce Committee.

**Legislative History with Links to Related Materials.**

- 7/29/99. HR 2637 referred to the House Commerce Committee.
- 8/27/99. HR 2637 referred to the House Telecom Subcommittee.

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**Other Bills.**

HR 3850, the Independent Telecommunications Consumer Enhancement Act of 2000, sponsored by Rep. Barbara Cubin (R-WY) and S 2572, the Facilitating Access to Speedy Transmissions for Networks, E-commerce, and Telecommunications (FASTNET) Act, sponsored by Sen. Conrad Burns (R-MT) would provide various forms of regulatory relief to local exchange carriers with fewer than two percent of the Nation's subscriber lines.
S 1153, the Rural Telecommunications Improvement Act of 1999, sponsored by Sen. Tom Daschle (D-SD), would set up an Office of Rural Advocacy at the Federal Communications Commission. One of its responsibilities would be to "develop proposals" for speeding the availability of "advanced telecommunications services in rural areas."


Tauzin-Dingell Broadband Legislation (H.R. 1542) (highly controversial)

Included an amendment that increased the amount of fines telephone companies had to pay when they are in violation of the law

Summary of Tauzin-Dingell High Speed Internet Access Bill

**Major Provisions:**

Limits on Regulation of High Speed Data Services. The bill prohibits the Federal Communications Commission (FCC) and each State, with few exceptions, from regulating any high speed data service or Internet access service, or to regulate the facilities used to provide these services.

Broadband Deployment Guarantee. The bill requires each Bell operating company (BOC) to upgrade 100% of their central offices to offer high-speed service (through DSL or an alternative technology such as satellite) within five years. Each company must have high-speed service available from 20% of offices within one year, 40% within two years, 70% within three years, and 100% within five years.

Consumer Choice of Internet Service Providers. The bill requires each incumbent local exchange carrier (ILEC) to provide Internet users with the ability to subscribe to the
Internet Service Provider of their choice. It further requires the ILEC to make its network available to any ISP wanting to interconnect to it.

InterLATA Data Services. The bill permits Bell operating companies (BOC) to operate high speed data networks (Internet backbone) throughout the country. The bill further states that, until the date a BOC is authorized to offer interLATA (long distance) voice services, that company may not bill, collect, market for, or provide long distance voice services.

Preservation of Line-Sharing. The bill allows competitive local exchange carriers (CLECs) to continue accessing the high-frequency portion of copper loops to provide DSL through "line-sharing." The bill also requires ILECs to offer DSL at a wholesale discount for three years after the date of enactment.

The bill does not:

limit or affect the authority of any State to regulate voice telephone exchange services;
affect the ability of the FCC to retain or modify the ISP exemption from interstate access charges;
prohibit the FCC from modifying the number of network elements subject to its unbundling requirement(http://www.connectconnecticut.org/issues/high_speed/tdsummary.htm, retrieved January 5, 2003).

Amendments to this Bill:
Summary of Amendments Submitted to the Rules Committee on H.R. 1542 - Internet Freedom and Broadband Development Act

(in alphabetical order)
Bachus #10 - Withdrawn
Bachus #11 - Withdrawn

Bass #6 - Eliminates Operations Support Systems from the competitive checklist and from the list of items that must be sold to competitors under a system of price control.

Bonilla #8 - Allows the Bell companies to negotiate prices with the CLECs in those areas where the FCC has approved their Section 271 application.

Burr #3 - Repeals the authority of the Justice Department with respect to the Bell company provision of interLATA services.

Buyer/Towns #16 - Guarantees that CLECs have access to customers served by Bell company high speed networks under FCC-regulated rates, terms, and conditions.
Preserves rules governing CLECs access to Bell facilities, including a rule that permits CLECs to “line share” on Bell copper facilities exclusively for the purpose of providing high speed Internet service. Requires Bell companies to allow CLECs to connect their own high speed Internet facilities to Bell services and equipment.

Cannon #12 - States that it is the sense of the Congress that broadband deployment will be spurred by new, bandwidth-intensive applications. Points out that entertainment applications were driving broadband demand prior to litigation-related interruption of service and that broadband demand dropped significantly when Napster shut down. It concludes that the Congress should review copyright laws to ensure that they keep up with technology while at the same time protecting artists and copyright holders from widespread infringement.

Cannon/Conyers/Markey/Luther/Flake and Nadler #17 - Line by line change to H.R. 1542: protects competitive investments by preserving the existing rules for telecommunications services that the competitive local exchange carriers and preserves State authority and consumer safeguards from the broad preemption of such authority granted under H.R. 1542. Preserves State authority and consumer safeguards from the preemption of such authority granted under H.R. 1542.

Cannon/Conyers/Markey/Luther/Flake and Nadler #18 - Replaces section 4 of H.R. 1542 with a new section which: protects competitive investments by preserving the existing rules for telecommunications services that the competitive local exchange carriers and preserves State authority and consumer safeguards from the broad preemption of such authority granted under H.R. 1542. Preserves State authority and consumer safeguards from the preemption of such authority granted under H.R. 1542.

Cox #26 - (offered Dec. 13, 2001) Withdrawn

Cox #30 - Requires Bell Operating Companies to open their local telephone markets to competition within one year, in return for receiving the bill’s deregulatory benefits. Late

Gonzalez #13 - Provides that Section 271, which requires prior FCC approval before a BOC can offer interLATA service, will expire on 1/1/03.

Gonzalez #22 - Provides both the FCC and the appropriate state PUC with a 90 day window to either approve or reject the Sec. 271 application. If the FCC or PUC fails to act within their 90 window, the application is deemed approved. If either the State or the FCC rejects the application, they must provide a written point-by-point explanation as to why the application was rejected. Stops the practice of allowing states to add additional conditions to the 14 point checklist. Late

Gonzalez #23 - Provides incentives to carriers to deploy new fiber optic facilities. Late
Gonzalez #24 - Prevents ILECs from being required to provide unbundled access to the high frequency portion of the loop at a remote terminal nor shall such carrier be required to provide collocation in or at a remote terminal. Late

Green (TX) #19 - Requires the FCC to conduct an annual review of the CLECs agreements with ILECs to ascertain the total number of loops leased from the ILEC for the provision of high speed data service. Specifies that the FCC will report on the number of high speed data loops used to serve traditionally underserved areas. The FCC analysis will be broken down by State to give a clearer picture of which carrier is serving whom with respect to high speed data service.

Green(TX)/Menendez #20 - Requires the FCC to conduct an annual review of CLECs agreements with ILECs to ascertain the total number loops leased from the ILEC for the provision of high speed data service. Specifies that at least 5% of all the loops leased from the ILECs must be used to serve “high-cost” areas. High cost is defined as underserved urban and rural consumers. Failure to meet the 5% service requirement will lead to FCC fines of up to $10,000 a day.

Hinchey #9 - Requires Regional Bell Operating Companies that wish to provide high-speed Internet services to provide funds to cover the costs of wiring and monthly services for broadband capability in all public elementary and secondary schools and public libraries.

Jackson-Lee #21 - Requires the Attorney General to conduct a study of the impact of the amendment made in this section on the deployment of high speed data services to urban and rural underserved areas, the rates for telephone data services, the number and quality of the choices available to consumers in selecting providers of telephone and data services and growth and the level of competition in telephone and data services. Requires the FCC to report to Congress within one year after the date of enactment of the Act. Includes a Sense of Congress that nothing in this Act shall impact negatively on the closing of the digital divide in rural and underserved communities.


Eddie Bernice Johnson #7 - Ensures that the FCC retains authority to require providers of high speed data services to contribute to the e-rate programs.


Largent #1 - (submitted Dec. 13, 2001) Withdrawn

Lucas (OK) #25 - Authorizes the current USDA program run by the Rural Utilities Service to provide loans and grants to rural areas to gain broadband capability. Changes the current program by allowing the Secretary of Agriculture some discretion over the
speed and capabilities of new broadband technologies used in the program. Changes the current definition of a rural area from 20,000 persons to 25,000 persons. Late

Radanovich #5 - Limits the Internet service provider access obligation to the larger carriers.

Tauzin/Sensenbrenner #15 - Clarifies that the antitrust laws are not repealed by, not precluded by, not diminished by and not incompatible with the Communications Act of 1934 or the Telecommunications Act of 1996. Requires a Bell Operating Company to notify the Department of Justice thirty days prior to offering an interLATA high speed data or Internet backbone service originating in any in-region State in which the company has not received the authority from the FCC to provide interLATA services.

Terry #4 - Provides a two-tiered tax credit for investment in current or new technology. Tier one provides a 10 percent tax credit for the investment and deployment of current broadband technology in rural and underserved areas. Tier two provides a 20 percent tax credit in any taxable year for the investment and deployment of next-generation broadband services and technologies in non-business areas. Only investments between December 31, 2001 and January 1, 2007 will be eligible.

Upton/Green (TX) #14 - Increases the FCC’s forfeiture penalties for phone companies which violate the telecommunications law by elevating the current cap from $1.2 million to $10 million and increasing the current $120,000 fine per violation or each day of a continuing violation to $1 million. For repeat offenders, the amendment doubles these increased forfeiture penalties to $2 million per violation or each day of a continuing violation, capped at $20 million. The amendment doubles from 1 year to 2 years the statute of limitations for the FCC to bring enforcement actions against phone companies, gives the FCC clear, statutory “cease and desist” authority to use against phone companies which violate any of the telecommunications laws and directs the FCC to study the impact of the enhanced penalties under the bill and report back to Congress within one year after enactment.

Velazquez #2 - (submitted Dec. 13, 2001) Creates a secondary fund to the Universal Service Fund. Small businesses will be able to apply for assistance under this fund to offset both the hook-up fee for the broadband services (up to $30) and a monthly discount (up to $10 per month).

Broadband Internet Access Act of 2001 (H.R. 267)

- Present law does not provide a credit for investments in telecommunications infrastructure.

Your bill:

- Provides a tax credit of 10 percent of the qualified expenditures needed to deliver broadband services to subscribers in rural and underserved areas.

- Provides a tax credit of 20 percent of the qualified expenditures needed to deliver "next generation" broadband services to subscribers in rural areas, underserved areas, and to residential subscribers.

- Current generation broadband services means the transmission of signals at a rate of at least 1.5 million bits per second to the subscriber and at a rate of at least 200,000 bits per second from the subscriber.

- Next generation broadband means the transmission of signals at a rate of at least 22 million bits per second to the subscriber and at a rate of at least 5 million bits per second from the subscriber.

- Providers can substantiate their claim with statistics that show they have provided all relevant subscribers required transmission rates.

- The fact that subscribers are not able to access the improved broadband services due to equipment limitations outside of the control of the provider will not be taken in account.

- Rural areas: Any area 10 miles outside of areas with a population of more than 25,000 and not in a county with a population density of more than 500 people per square mile.

- Underserved areas: Any area located in an empowerment zone, enterprise community, renewal zone or low-income community.

- Residential subscriber: Anyone who purchases broadband service for their home.

- Qualified expenditures are those chargeable to the capital account for purchase and installation of qualified equipment for which depreciation is allowable.

- The broadband service must be delivered to at least 10 percent of the specified type of subscribers which the qualified equipment is capable of serving. That number is determined by the least capable link in the system.
• Although the credit only applies for qualified expenditures during specified periods (Dec. 2001 to Jan. 2006), the fact that the expenditures are not taken into account until a later period will not affect the taxpayer’s eligibility for the credit.

• For example, if a taxpayer incurs qualified expenditures in 2004, but the taxpayer does not satisfy the 10 percent subscription threshold until 2005, the taxpayer will be eligible for the credit in 2005.

• In the case of a taxpayer that incurs expenditures for equipment capable of serving both subscribers in qualifying areas and other areas, qualified expenditures are determined by multiplying the qualified expenditures by the ratio of the number of potential qualifying subscribers to all potential subscribers the qualified equipment would be capable of serving, as determined by the least capable link in the system.

• Qualified equipment must be capable of providing services at any time to each subscriber, who must be able to receive the transmission rates in at least 99 out of 100 attempts.

• Telecommunications carriers: Qualified equipment is equipment that extends from the last point of switching to the outside of the building in which the subscriber is located.

• Commercial mobile service carrier: Qualified equipment extends from the customer side of a mobile telephone switching office to a transmission/reception antenna (including the antenna) of the subscriber.

• Cable or open video system operators: Qualified equipment extends from the customer side of the headend to the outside of the building in which the subscriber is located.

• Satellite or other wireless carriers: Qualified equipment extends from a transmission/reception antenna (including the antenna) to a transmission/reception antenna on the outside of the building used by the subscriber.

• Although a taxpayer must incur the expenditures directly in order to qualify for the credit, the taxpayer may provide the requisite broadband services either directly or indirectly (http://www.house.gov/english/hr_267s.htm, retrieved January, 5, 2003).
Broadband Regulatory Parity Act of 2002  S.2430


Title: A bill to provide for parity in regulatory treatment of broadband services providers and of broadband access services providers, and for other purposes.

Jump to: Titles, Status, Committees, Related Bill Details, Amendments, Cosponsors, Summary

TITLE(S):  (italics indicate a title for a portion of a bill)

SHORT TITLE(S) AS INTRODUCED:

Broadband Regulatory Parity Act of 2002

OFFICIAL TITLE AS INTRODUCED:

A bill to provide for parity in regulatory treatment of broadband services providers and of broadband access services providers, and for other purposes.

STATUS:  (color indicates Senate actions)

4/30/2002:

Read twice and referred to the Committee on Commerce, Science, and Transportation.
5/9/2002:

Star Print ordered on S. 2430.

--------------------------------------------------------------------------------

COMMITTEE(S):

Committee/Subcommittee: Activity:

Senate Commerce, Science, and Transportation Referral

--------------------------------------------------------------------------------

RELATED BILL DETAILS:

***NONE***

--------------------------------------------------------------------------------

AMENDMENT(S):

***NONE***

--------------------------------------------------------------------------------

COSPONSORS(12), ALPHABETICAL [followed by Cosponsors withdrawn]:  (Sort: by date)
SUMMARY AS OF:

4/30/2002--Introduced.

Broadband Regulatory Parity Act of 2002 - Amends the Communications Act of 1934 to require the Federal Communications Commission to prescribe regulations to ensure that: (1) all broadband services and broadband access services are subject to the same regulatory requirements (or no such requirements); (2) all providers of such services are subject to the same regulatory requirements with respect to such services and the facilities and equipment used to provide such services; and (3) the above requirements are met without increasing current regulatory requirements with respect to such services, facilities, or equipment. Prohibits such services and related facilities and equipment from being subject to the jurisdiction of any State.

Requires each incumbent local exchange carrier to provide all Internet service providers with the telecommunications necessary for the provision of broadband access service to subscribers at just and reasonable rates.
A Letter to FCC Chairman Michael Powell:
Support "Fail Fast"

The Hon. Michael Powell
Chairman
Federal Communications Commission

Dear Mr. Chairman:

We thank you for your leadership in FCC efforts to understand the causes of the current telecom debacle, and especially for convening the FCC's October 7, 2002, Telecom Recovery En Banc hearing.

We were dismayed that several of the En Banc speakers confused causes with effects. We believe that balance sheet weakness, long-haul overcapacity, and even the recent speculative bubble, are effects, not causes. If we attempt to treat the symptoms, we risk missing the causes and prolonging the agony.

We hold that the primary cause of current telecom troubles is that Internet-based end-to-end data networking has subsumed (and will subsume) the value that was formerly embodied in other communications networks. This, in turn, is causing the immediate obsolescence of the vertically integrated, circuit-based telephony industry of 127 years vintage. CLEC, IXC and ILEC bonds used to purchase now-obsolete infrastructure assets have become (or inexorably are becoming) bad debt. Weak last-mile competition prevents the most powerful technological advances from reaching all but a few customers; this is the largest cause of long-haul over-capacity.

One En Banc participant, NYU Professor Larry White, had views that seem consistent with ours. He recommends that we let firms that are failing fail as quickly as possible. We believe that it would be harmful if government actions prevent, delay or interrupt this evolution. It must proceed if the United States is to continue to be a leading contributor to communications progress, and if its citizens are to benefit from the technologies that are now available and the applications that they enable.

The telecom debacle is not a cyclical phenomenon. The telephone network's technological base, and the business model under which this old technology thrived, are obsolete. Recovery is not an option. We can only move forward; how far and how fast will be determined by our continued freedom to innovate. Let the United States learn by not duplicating the Japanese banking experience in the telecom arena.

We need to see the current situation not as a disaster, but as a natural event; part of a revolution in productivity and human benefit as big as the agricultural and industrial revolutions.

Given these views, we urge the FCC to:

- Resist at all costs the telephone industry’s calls for bailouts. The policy should be one of “fast failure.”

- Acknowledge that non-Internet communications equipment, while not yet extinct, is economically obsolete and forbear from actions that would artificially prolong its use.

- Discourage attempts by incumbent telephone companies to thwart municipal, publicly-owned and other communications initiatives that don’t fit the telephone company business model.

- Accelerate FCC exploration of innovative spectrum use and aggressively expand unlicensed spectrum allocation.

Mr. Chairman, we note with gratitude your impatience with antique regulatory structures, and your attempts to embrace new technology. Also, we acknowledge the burden inherent in the FCC’s duty to ensure the continuity of communications, especially basic dial-tone continuity, in the face of such
changes; we are prepared to lend assistance as the FCC grapples with this issue. Notwithstanding, we urge you to continue against the inevitable onslaught of those seeking to preserve an impossible status quo. Sincerely,

Signed:

Izumi Aizu, Asia Network Research
Jay Batson, CEO, Pingtel
Robert J. Berger, President, Internet Bandwidth Development, LLC
Dan Berninger, pulver.com
Scott Berry, telecommunications consultant, Darien CT
Michael Bialek, President, InfoComm Inc.
Scott Bradner, Harvard University
Richard Campbell, Worcester Polytechnic Institute
Douglass Carmichael, individual, dougcarmichael.com
Judi Clark, individual, ManyMedia.com
Anders Comstedt, Managing Director, Stokab
Gordon Cook, publisher, The Cook Report on Internet
Sky Dayton, founder, EarthLink, founder & CEO, Boingo Wireless
Timothy Denton, Internet attorney, tmdenton.com
Greg Elin, independent software developer
Tom Evslin, CEO & Chairman, ITXC
David J. Farber, Moore Professor, University of Pennsylvania
Bob Frankston, individual, frankston.com
Dewayne Hendricks, CEO, Dandin Group
Roxane Googin, editor, High Technology Observer
Charles W. K. Gritton, President, Broadword Technologies, Inc.
David S. Isenberg, Principal Prosultant(sm), isen.com, LLC
Johna Till Johnson, President, Nemertes Research
Peter Kaminski, individual, peterkaminski.com

Shumpei Kumon, Executive Director, GLOCOM
Bruce Kushnick, Executive Director, New Networks Institute
Andrew Maffei, individual, Falmouth MA
Jerry Michalski, sociate.com
David Newman, President, Network Test Inc.
Matthew Oristano, former CEO, SpeedChoice, People's Choice TV
Mark Petrovic, individual, Pasadena CA
Jeff Pulver, founder, pulver.com
Frank R. Robles, CEO, Neopolitan Networks, Inc.
David P. Reed
Charles Rybeck, Managing Director, Benchmarking Partners
Paul Saffo, individual, pls@well.com
Doc Searls, Senior Editor, Linux Journal
Clay Shirky, telecommunications consultant, shirky.com
Porter Stansberry, publisher, Agora Inc.
Ted Stout, CEO and founder, The ROI Institute
Steve Stroh, Editor, Focus On Broadband Wireless Internet Access
Brough Turner, CTO and co-founder, NMS Communications
David Weinberger, JOHO editor and Cluetrain co-author
Kevin Werbach, technology analyst, Supernova Group LLC
Additional signers:
Dana Blankenhorn, Business journalist
Ken Freed, Media journalist
Andrius Kulikauskas, founder, Minciu Sodas
Kevin Marks, instigator of MediAgora
Joy Pinsky, CEO MindMyth, Inc.
Mitch Ratcliffe, President, Internet/Media Strategies Inc.
Broadband Everywhere

Virginia localities gotta have it. But telcom companies give up crucial mapping data only when someone pries it out of their cold, dead fibers.

When Jean Tingler fires up her Sun Sparc workstation in the Virginia Economic Development Partnership office, she taps into one of the most sophisticated economic development databases in the country. On a large, wall-mounted screen, she can display the location of industrial and office parks and their proximity to highways, railroads, airports, water lines, gas lines and electric transmission lines. She can overlay political jurisdictions, terrain features, property lines, employment data, business location data and just about any site-selection intelligence that can be reduced to map form.

But one critical set of data is riddled with holes – the location of fiber-optic trunk lines, SONET rings, points of presence and other elements of Virginia’s telecommunications infrastructure. “Every prospect wants to know [this information],” says Tingler, director of information technology for the VEDP. “I can’t think of a project in the last couple of years when they didn’t want to know.”

Telcom companies do share the information when responding to location-specific inquiries, Tingler says, but economic developers could use the information much earlier in the site-selection process. For one, VEDP can’t wow prospects with the data in the state’s state-of-the-art presentation facility. For another, the Partnership can’t integrate the information into its marketing initiatives.

VEDP isn’t the only group seeking the telecoms’ mapping data. Local economic developers lust for it, too. So do local leaders who want to extend the
geographic reach of broadband access to their regions and localities. By identifying the holes in local telecom infrastructure, many hope to cobble together a critical mass of unserved customers, supplemented perhaps by federal grants or tobacco-indemnification funds, to induce telephone, cable or wireless companies to extend their service.

But telecommunications companies have legitimate reasons for guarding their data closely. If the location of every fiber line and switching station were laid out on a map, competitors could easily identify where the profitable, big-bandwidth customers are – and spot pockets that were underserved. In the wake of 9-11, phone companies also worry about terrorists. Some even fret about corporate sabotage. A loss of service to a bandwidth-dependent customer could be devastating, says Earl Bishop, executive vice president of the Virginia Telecommunications Industry Association. It’s something to be guarded against.

The issue has heated up since the telecommunications crash. Devastated by the collapse of capital markets, declining profits, a glut of capacity and the realization that the demand for big bandwidth will be slower to materialize than once hoped, telecommunications companies have curtailed their capital investments drastically. If a community doesn’t have broadband now, no one’s likely to deliver it any time soon.

At the same time, the conviction is near universal that access to broadband is vital for any community, urban or rural, to be economically competitive in the information-intensive Knowledge Economy. In Virginia’s strategic plan for technology, the Warner administration set the ambitious goal of extending high-speed, high-quality, affordable access to “100 percent of all households and businesses” that request it by January 2006. Similarly, in a recent task-force meeting to guide the development of the administration’s strategic plan for economic development, the goal of extending “broadband everywhere” was one of the few proposals to generate enthusiastic and broad-based endorsement.

Meanwhile, telecom mapping initiatives are under way in other states. Ohio, Michigan, Kentucky and Maryland have launched serious programs to ascertain the quality of broadband service in their
states. As the May 2001 report of LinkMichigan puts it: “Improving access to high-speed telecommunications services is the most important state infrastructure issue for the 21st century.”

Virginia has several broadband-related initiatives underway, too, but there’s no central direction. VEDP and regional economic development groups are focusing mainly on building their map of telecommunications infrastructure for use in attracting industry. Meanwhile, Virginia’s Center for Innovative Technology is examining broadband from a customer perspective to ascertain the quality and affordability of service, particularly in rural areas.

By partnering with regional economic developers, many of whom are developing their own maps, and collaborating with CIT and other groups, Tingler has made some progress in assembling a statewide telecom map. But it hasn’t been easy. She has leased data from a number of telephone companies, which gives the VEDP a better idea of what’s out there, but the leasing provisions restrict the Partnership’s ability to share the data with its regional partners. “We got worn out by the whole thing,” she says.

Meanwhile, Karen Jackson, director of eBusiness Outreach for CIT, coordinates a mapping committee that includes virtually everyone in the state with an interest in the subject. The issues get complex very quickly, says Jackson. Virginia is well served by monster fiber-optic trunk lines, but knowing the location of the information highways doesn’t tell you how well positioned a particular region is to bridge the “last mile” gap between the trunk lines and the customer. Identifying the on-ramps to the information superhighway is critical.

Making the job even more difficult, different types of players – traditional land-line telephone companies, cable companies and wireless companies – deploy different, continually evolving technologies. Someone with a fiber fixation may not appreciate the fact that DSL service provided through an old-fashioned copper line can provide broadband service that suits the needs of most people. For consumers, it’s the quality and price of the service – not the technology – that really matters.

There are other complexities to consider. It’s one thing to plot the route of a fiber-optic trunk line, for
instance; it’s quite another to figure out how ownership of that line has been parceled out to different telecom players. It’s one thing to know that a certain neighborhood receives broadband service; it’s quite another to know how fast that service is. The state of Kentucky has found that Internet-access speeds vary widely over the same kinds of pipes.

Then there’s the job of integrating data that’s formatted differently by a myriad of sources. VEDP can fill in some of the picture. Two state buying cooperatives – COVANet, which supplies broadband mainly to state agencies, and Network Virginia, which serves mainly state universities, schools and libraries – have other pieces of the puzzle. The Virginia Economic Bridge is undertaking a mapping initiative in Southwest Virginia, while the Richmond and Charlottesville regions have assembled their own local data. Meanwhile, the Federal Communications Commission can provide certain categories of data. “Who’s going to end up owning all this stuff?” asks CIT’s Jackson. Who’s going to tie it all together in a usable format? “I don’t have a clue.”

The Secretary of Technology’s strategic plan for technology provides some general guidelines for what comes next. The plan recommends designating “an entity” to act as a central clearinghouse and coordinate the state’s broadband initiatives. It’s not yet clear who that entity will be.

Additionally, the Department of Information Technology, in partnership with the state’s geographic information network, “will develop maps of broadband coverage” that will incorporate information gleaned from the COVANet and Network Virginia contracts, as well as FCC data and local exchange carriers’ central offices. This will be plotted against demographic data from the latest Census report such as income, education, computer ownership and cable television access.

That’s all very nice, but there still will be gaps in the data. If Virginia is serious about mapping its telecom infrastructure and service, the state needs the guys at the top to get involved. The governor needs to hold a pow wow with five or six of the top telecom executives in the state and sell the vision of broadband everywhere. He should acknowledge the executives' legitimate concerns, but he also should insist that they work creatively with his top policy
guys on ways to address those concerns. If legislation is needed, say, to modify the Freedom of Information Act, by which sensitive data might be leaked to the public, he should bring key members of the General Assembly into the process as well.

Verizon, Sprint and the other telecoms may risk tipping off competitors if they share data, but they also also have the most to gain from a broadband-anywhere initiative. Instead of focusing on what they might lose, they should be taking the lead to stimulate Virginia's appetite for bandwidth. They should be showing businesses new and creative uses of broadband. They should be actively soliciting proposals for public-private partnerships to extend broadband's reach to under-served geographic markets. They should be working with economic developers to attract large, bandwidth-intensive businesses into the state. If the market for telecommunications services grows in Virginia, everyone wins -- the telcos most of all.

-- October 14, 2002

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**Local Utility Company Initiatives**
Local utility companies initiated the following projects. These companies decided to expand and improve the telecommunications infrastructure in the area that they serve.

**Ashland Fiber Network**
[http://www.ashlandfiber.net](http://www.ashlandfiber.net)

Ashland Oregon is a city with a population of 19,000. The city’s power company decided to build a fiber optic network throughout the city. The reason for building the network was to help the company cope with the deregulation of the industry. The project was funded through revenue bonds and by loans. A cable modem is used to connect citizens to the fiber network with the cable modem they can receive about 3-5Mb/s of bandwidth. The Ashland Fiber Network also offers Digital cable TV over their fiber. Business customers can receive 10 Mb/s or 100Mb/s, whichever suits their needs.

**Prince Rupert**
[http://www.citytel.net/internet/brdbnd/hispeed.html#background](http://www.citytel.net/internet/brdbnd/hispeed.html#background)

Prince Rupert is a city in Canada with a population of about 17000 residents. The local municipally owned telephone company (Citytel) decided to upgrade the infrastructure of the city to fiber optics. Citytel completed the fiber optic backbone in 1997. Most of the connections to the backbone are made through ASDL unless more bandwidth is needed, and then direct fiber is used. Citytel now has 6000 residential subscribers, and 1000 commercial subscribers. The fiber network comes within 500 meters of any location in Prince Rupert. With direct access to the fiber the transfer rates are 10Mb/s to 100Mb/s. With an ASDL connection the transfer rates are 2.4Mb/s downstream, and 1.1 Mb/s upstream.

**Murray City, Utah**
[http://www.murrayfiber.com/services.html](http://www.murrayfiber.com/services.html)
I have sent a request for information and received the files.

Murray City Power Department has laid a fiber optic backbone for its own usage. The company plans to provide services to the general public to recoup its investment. The initial investment is $3.5 Million. The requirements for the project call for a Gigabit Ethernet (1.25Gb/s). The fiber is already in the ground, the request for proposal to “light” it up and place the necessary equipment on it has been approved.

**Newnan Utilities, Georgia**

Newnan Utilities has built a hybrid coaxial and fiber network for the town of Newnan and parts of the surrounding county. They offer a wide variety of services to the residents including, CATV, Telephone services, high-speed internet (cable modem), and home automation services.
Cedar Falls Utilities
http://www.cfunet.net/

Cedar Falls Utilities offers residential subscribers and businesses alike high-speed internet connectivity. They use a 750-Megahertz HFC platform developed in 1994. The services they offer are telecommunications, CATV, and internet access. Subscribers can choose from T1 connectivity (1.544Mb/s), Ethernet (10Mb/s) point to point or metro area, and DS-3 point to point connectivity for businesses.

Palo Alto
http://www.city.palo-alto.ca.us/utilities/

The city of Palo Alto has laid a fiber optic backbone. The city has pricing information posted for laying new dark fiber. The city of Palo Alto is experimenting with a pilot project. They are connecting 70 residents with FTTH. The FTTH has the capability for three phone lines, a video link, and a high-speed internet line. The internet connection is capable of 4.5 Mb/s upload and 7Mb/s download.

ChelanPUD
http://www.chelanpud.org/fiber/

Chelan County Washington’s PUD is upgrading its infrastructure to a fiber optic network. The purpose of the upgrade is to increase the communications infrastructure between the offices, dams, substations, and control systems. The Chelan County PUD has also made this a public network and where appropriate is selling bandwidth at wholesale to telecommunications companies. This PUD is involved in a three pilot projects. The first one is a residential project, it involves directly connecting a college, a school and about 200 homes (FTTH) to the fiber network. This PUD has fiber running down numerous streets in the community. The second project is an industrial project, it involves connecting an industrial park to the fiber optic network. The third pilot program is a commercial project, any commercial entity in the downtown area has access to a fiber connection to the network. The pricing the PUD will charge service providers (local loop, and bandwidth) are quoted on the following web page: http://www.chelanpud.org/fiber/GettingStarted.pdf.

Phone interview: 509-663-8121, Mike
The projects are still in the pilot phase.
Last mile technology for residential: Fiber
Last mile technology for business: Fiber
Last mile bandwidth for residential: 5Mb/s
Last mile bandwidth for business: 2.5Mb/s burstable up to 10 Mb/s avg. 6Mb/s

Click Network Tacoma Power
Tacoma Power is a publicly owned energy utility. Tacoma Power initially planned to build a fiber optic backbone to control its power utilities. Upon review Tacoma Power decided expanding the network to offer telecommunications needs to the citizens would prove to be beneficial. Now in the downtown area a T3 line connects every block and alley. The available bandwidth to businesses ranges from DS1 to OC 48.

Kitsap county

http://www.pudwhatcom.org/feasibility%20study.html
http://seattlepi.nwsource.com/local/60824_kitsap05.shtml
http://www.okpudtelecom.org/about/network.htm
http://www.wpuda.org/

A publicly built fiber optic cable was buried throughout the peninsula in Kitsap County Washington. The fiber is linked to NOAnet, and is OC – 48, they are using a Nortel networks OPTera Metro 3500 platform, which is upgradeable to oc-192.

A full market analysis, cost benefit analysis, future usage forecasting, and more for the Kitsap fiber can be found in the Infinet feasibility paper (http://www.pudwhatcom.org/feasibility%20study.html).
Non-Profit
The following projects were efforts involving non-profit organizations. These non-profit organizations have been specifically formed with the goal of enhancing the technology infrastructure for their respective areas.

La Plaza Co. New Mexico (Last mile)
http://www.comtechreview.org/article_body_print.asp?article_id=84 **printer pop-up error, just move it down to the bottom of the screen**

La Plaza Co. is a non-profit organization. The organization started by providing free public access sites for rural New Mexican residents. In 1998 La Plaza developed a wireless solution for rural parts of New Mexico. This solution involved a microwave network that provided T1 speeds to the end users. The first project involved providing a wireless service to a school, a forest service tower was used to as a broadcast station. La Plaza used Tsunami radios, which utilize a 2.5 Ghz frequency, and do not require permits. These radios are not affected by the weather. This project provided T1 connectivity for the school at a one-time cost with no recurring monthly charges.

Graham County
http://www.ruraltel.net/gced/fiber.htm
http://www.graham.k12.nc.us/administration/gcestech/Infrastructure.htm
http://www.ruraltelephone.com/

Graham County Kansas, dubbed Rural Telephone Country, has a 500-mile fiber optic network throughout Graham County. All of the county’s schools have been connected and all of the classrooms in the schools will be connected to the backbone. The schools have a five year plan to upgrade all existing copper wiring to fiber, and continue to improve the hardware as is needed. Rural Telephone Inc. is responsible for deploying the fiber optic network. Rural Telephone Inc. started as a cooperative in the 1950’s by a group of farmers who wanted better telephone service. Rural Telephone is a non-profit company highly driven towards providing high bandwidth connectivity to rural communities in northern Kansas. Everyone that joins, has to pay $1 to purchase equity for his or her first bill. All revenues collected over expenses are paid out. Rural Telephone Inc. will provide loans to communities for economic expansion projects.

Phone interview: Justin McClung 877-625-7872
OC-12 SONET ring backbone, some of the schools have upgraded to fiber connections.

NOAnet
http://www.noanet.net/index.html
http://newsroom.cisco.com/dlls/prod_031802b_print.html

NOAnet is a regional not-for-profit open access provider in Washington state. NOAnet leased most of the 2400 miles of OC that it controls from the Bonneville Power
Administration (BPA). NOAnet only received 4 strands of OC so used the CISCO 15454 OTP (http://newsroom.cisco.com/dlls/prod_031802b_print.html). The NOAnet website goes into detail about the technologies used on their network (i.e. active vs. passive DWDM, etc.).

Email response to question: Are there any standards for bandwidths, protocols, for the individual loops that will connect to the NOAnet system?

Answer: There is no direct technical coordination between PUD's to establish standards. For the most part, each PUD has developed their own technical solutions. However, because NoaNet has standardized on Cisco gear, specifically the 15454, we offer the bandwidth rates and protocols support by this gear. For example, we offer optical interfaces for SONET (OC-3, OC-12, and OC-48) with the ability to provision channelized STS-1's and STS-3's or concatenated OC-x. Also, we allow GigE and FastE interfaces for Ethernet, and currently we offer the only regional Ethernet solution in the Northwest. By NoaNet setting interface parameters, the PUD's have to at least support what we offer to provide regional solutions.

**CMON Columbia Mountain Open Network**

http://www.cmon.ca/index.html
http://www.sparwood.bc.ca/speed/index.htm

CMON is a non-profit corporation in Canada. The goal of the corporation is to provide the region with high bandwidth, an open access network, and last mile connectivity for every community in the region (about 140 communities). Furthermore the network will connect the region with the rest of the world. The network goal is to provide 10 Mb/s to small schools, and 100 Mb/s to large schools and small hospitals, and 1Gb/s to larger institutions and large hospitals. The region is rural and the demand is not there (or at least not aggregated) to warrant the local telecommunications companies to invest in upgrading the infrastructure. Currently there is not even ADSL connectivity in the region. The network is underway, and some communities are developing their own FTTH solutions.

**New Hampshire**

**Monadnock Connect**

http://www.monadnockbroadband.org/Page,%20about.html
http://www.monadnockbroadband.org/Article,%20Release%20-%20NH%20Brings%20Broadband.html

Monadnock Connect is a Non-profit organization. The goal of Monadnock Connect is to aggregate demand from public and private sources. The organization is funded through government money, grants, and it charges a membership fee.
Monadnock Connect set up a successful competitive bidding process to select the telecommunications company to build the network.

   About 40 towns will be included in the network. The backbone of the network will be an OC – 48 capable of 2.4 Gb/s.

Franklin-Hampshire Connect

http://www.franklinconnect.org/

-Focusing on aggregating demand

North Country Connect

http://www.northcountryconnect.org/

-Aggregating demand

****All of the above NH programs are modeling themselves after the Berkshire Connect (see above)****

Georgia

http://www.atdc.org/atdcletter/november/gpw.html
http://www.townware.com/exec/site/?mid=6

Georgia Public Web Inc. is a non-profit organization that is providing internet and telecommunication services to many underprivileged Georgian communities. GPW is using a 1000-mile fiber optic network to reach many of these communities. The organization has achieved the status of a competitive local exchange carrier (CLEC) this allows GPW to offer telecommunications services to customers. GPW offers DS-1 thru OC-48 for private lines from its backbone. The backbone has the capacity to offer 1Gb/s of bandwidth.

SURFnet

http://www.surfnet.nl/en/

SURFnet is a non-profit research leader for advanced networks. SURFnet’s efforts are part of the Gigaport project, a national project in Netherlands to develop the latest next generation Internet. SURFnet connects universities, schools, or any high-speed network in the area together to form a network. End users are connected to the network using ASDL, GPRS (high speed via GSM), and optical cable. SURFnet also offers a wide variety of services, conferencing, consulting, directory services (LDAP), E-mail, FTP, helpdesk, IP, search engine, network security, NTP (time service), WAP, and more.
UCNET Upper Canada
http://www.uppercanada.net

UCNET (Upper Canada net) is a not for profit multi-partnered organization. It has received millions in funding from the Canadian government and the Ontario government. Some of the private stakeholders have agreed to match the government funding for the project. Its goal is to connect the rural parts of Eastern Ontario. UCNET has a plan to bring high bandwidth wireless system into the area. The expected rates will be lower than competitors can offer (Currently 28.8 or 56K modems are the only alternative). The wireless network will transfer data at a rate of 45 Mb/s, it will be scalable, and make a complete wireless loop. UCNET has begun installing 17 towers and a fiber optic network in 212 communities. When the project is complete, the cost for high capacity T1 for businesses will run $200/mo, and $40-50/mo for residential customers. UCNET expects the network will be used by the citizens, healthcare facilities, local governments, farmers, educational institutions, and more.

807 Northwest Network (Ontario)
http://807net.net/index.shtml

The 807 Northwest Network is a non-profit organization aiming to build a broadband infrastructure across Northwest Ontario. A group of telephone companies will be responsible for actually building the network. Northwest Ontario consists of mostly smaller communities. Various funding agencies have funded the operations of the 807 Northwest Network.

Adnet Ontario
http://www.adnetalgoma.ca/

Adnet is a community driven effort to bring a broadband infrastructure into the Algoma District of Northern Ontario. Adnet is an association of public and private sector organizations. Adnet is a not for profit venture, and is part of a larger effort across Northern Ontario. The funding for the project has come from various Canadian government sources as well as goods and services from the many partners. The goal of the organization is to provide high-speed internet access at affordable prices. So far a fiber optic ring has been laid and two of the twenty-five targeted communities have been connected to this ring.
Private Efforts
The following examples are private efforts. Commercial, for profit, outfits have determined that it would be feasible and profitable to embark on an infrastructure development program.

Cisco’s roaming broadband
http://newsroom.cisco.com/dlls/corp_062601.html

Cisco has teamed with two other companies to provide business professionals with roaming wireless broadband internet access. Their wireless network allows service providers to offer internet access to people in many locations under one bill. Some common places where the service is available is in airports, hotels, convention centers, and other public places. The broadband access will take the form of a VPN network so that it is secure. There are over 600 “hot spot” locations worldwide right now. “The Cisco Internet Mobile Office program brings together a wide range of Cisco products including: Cisco Aironet 350 Series of wireless LAN products, Cisco Catalyst 2950 Series and 3550-12T Switches, WAN connectivity products, Cisco PIX Firewall, and many Cisco VPN products, with a complementary set of service providers, application service providers, and enabling technology providers (http://newsroom.cisco.com/dlls/corp_062601.html, halfway down, retrieved Aug 9, 2002). One of Cisco's partners in this offers about 1200 dial up locations around the world.

Daniel Island
http://www.danielisland.com/

Great example of a more suburban planned community built with fiber to the home (FTTH) technologies, good for benchmarking future FTTH communities.

Phone interview: 1-843-388-1321 5Mb/s FTTH, spoke with Heather.

Mid-Maine Communications

Mid-Maine and Main Communications are connecting their fiber optic networks together. It will be the first alternative to Bell Atlantic in the region. The prices are expected to be 10-40% lower than the Bell Atlantic prices. Mid-Maine communications has laid 137 miles of fiber through the region. They are using Copper SDSL, and T1 to serve their business customers with 128 Kb/s – 2.3Mb/s of bandwidth. They are also in the consulting business and lay point-to-point fiber for increasing or creating Wide Area Networks.
South Korea Wireless  
http://www.atip.or.jp/Wirelesspresentation.pdf

KT, a telecommunications company in South Korea, has launched a wireless network objective. South Korea has more broadband subscribers than anywhere else in the world, it is estimated at about 50%. KT has been making substantial profits off of these customers by serving them with DSL lines for their broadband needs. The demand for broadband access has started to level off, it is expected to be saturated at 65%. In an effort to make more money off of these broadband subscribers, KT has chosen to set up a wireless network in thousands of “hot spots”. These hot spots are planned for convention centers, airports, hotels, train stations, and more. The service would charge existing DSL customers $10 more to be able to use the wireless internet in any of these hot spots.

Korea and Japan have rolled out a 3G wireless service. In Korea they are using the CDMA 1xRTT wireless network, have three million subscribers, and a transfer rate of 144Kb/s. A 4G network (3-8GHz) is in the works for the near future. Japan is looking towards a 3.5G (30Mb/s) cellular network for 2005, and a 4G (50-100Mb/s)SDR cellular network by 2010. Japan is also looking into developing a 100Mb/s wireless network. The vision of these projects is the convergence of wireless devices, mobile virtual reality (3D) multimedia, and always best connected (http://www.atip.or.jp/Wirelesspresentation.pdf, retrieved Aug 8, 2002).

Ennis Ireland  
http://www.ennis.ie/

Ennis is a small town in Ireland where before some of the 5,500 residents did not even have telephone lines. A private sector company created a competition in which the winner would receive 15 Million pounds to create an intelligent community. Ennis was the winner and has spent 9 million pounds as of late 2000. They have installed a fiber optic ring and a digital exchange to all of the residents. The effort also provides free PC’s to all of the residents provided they go through a basic computing course.

Missouri  
http://www.mnatele.com/

The Missouri Network Alliance is and LLC, the corporation formed as a result of 14 smaller telephone companies pooling together. The goal of the corporation is to serve the rural community’s telecommunications needs. The corporation was formed to pool the local companies fiber networks to provide a complete network to rural communities. Phase one of the fiber project includes a 1500-mile fiber optic network across the northern portion of the state. About 1000 miles of the network is preexisting and belongs to the MNA, about 300 will be leased, 100 built in urban areas, and 100 built in rural areas. The network had 48 POP’s in rural communities.

Phone interview: 816-361-8821, got to Mike from the Operator
Backbone: OC-48
Last mile to Residents: HDSL, equivalent to T1 – 1.544Mb/s, and etherloop by Paradyne, shared loop technology.
Consortias

The following projects have come to fruition by regional governments, businesses, and others in need of broadband services joining forces to enable their specific projects. These seemingly different groups have come together to form a consortia. The goal of forming a consortia is to consolidate demand thereby attracting private firms to develop their infrastructure.

Marietta, OH

http://www.sequelle.com/next.html
http://www.sequelle.com/whitepaper1.htm

A consortium was formed between the city of Marietta, and Washington County OH. The goal of the consortium was to introduce broadband access into the region. Sequelle Inc., a non-profit company, developed a low cost wireless broadband network for the community of Marietta, OH. The project received an estimated 3 million in funding from the state. The wireless network will use two-way digital licensed FCC frequencies (http://www.sequelle.com/f.html#fone, 1/8th down the page, retrieved Aug. 7, 2002). The network will be using three ITFS channels, and one MDS group. “We are implementing a high capacity, low latency system using MDS, ITFS and MMDS frequencies (2-10 Mb synchronous throughput) Quotes should be based on transmission in the 3.5 Ghz spectral range, using base station technology. Channel groups A,B,C are available for immediate use; Channel Group F is anticipated to be available, as is MDS-1. Response should be based on usage of the A,B,C channel groups (http://www.sequelle.com/news/05_04.html, 1/6 down the page, retrieved Aug, 7, 2002).”

Newaygo County

http://www.ncats.net/challenge_grant/abstract.html
http://www.ncedo.org/technology.html

Newaygo is one of the most rural and one of the poorest communities in Michigan. The county formed Newaygo County Advanced Technology Service (NCATS), a consortium to develop and maintain a fiber optic network in the county. The network connects all of the counties schools, the county seat, and the hospitals. The group has set up the network across the county. Public access points have been provided where citizens can access the internet for free. The Freemont Area Foundation provided funding for the network.

Phone interview: Dr. Larry Ivens, 231-924-8838
Last mile technology is buried fiber to the buildings.
Backbone bandwidth is 1Gb/s.
Last mile bandwidth is 1Gb/s, ???
Currently they are selling excess bandwidth.

Keystone Consortium network

http://www.kcnc.net/consortium/description.html
The goal of the Keystone Consortium Network is to pool money and resources to enable it to offer high bandwidth internet access to the public. However they are still in the planning stage. Some of the objectives of the consortia are to expand existing fiber networks to physically connect three rural educational communities, and then to expand the coverage to the residents in the surrounding rural areas. The backbone for this network is a 2.86 GB/s OC, and the connections to the schools will be capable of 100 Mb/s.

**Fiber Consortium and Fiber South Consortium (OR) (Part of NOANET)**

http://www.ruralfiber.net/lkpage.html  
http://www.ruralfiber.net/fspage.html  
http://216.197.97.151/detail.cfm?ID=19  
http://www.naco.org/programs/comm_dev/rural/story.cfm?Success_Story_ID=96

Lane Klamath and the surrounding regions wanted access to a high bandwidth telecommunications infrastructure. This region is highly rural and was not seen as profitable for the local telephone companies to upgrade the current infrastructure. The local governments joined together to accomplish this task. The governments developed a plan for fiber access to rural communities. The governments negotiated an agreement with Worldwide Fiber to lay 12 strands of new fiber that would run 200 miles through the region. In exchange for the fiber, the governments have agreed to wave the right of way fees and assisted Worldwide Fiber. A Consortium was formed called Lane Klamath Fiber Consortium to manage the fiber.

In lieu of this success another group of communities in Oregon decided to form a Consortia (Fiber South Consortia). Fiber South followed the same rout as The Lane Klamath Fiber Consortia and successfully attracted a private firm to lay the fiber. Fiber South waved all right of way fees through the region. Fiber South received 12 strands of fiber stretching from the Trans Pacific landing site through their region.

The two consortia have now merged into The Fiber Consortia. They have connected both of their fiber networks, and merged technical functions. The sources of funding used for the consortia(s) is/are: local government funds, private firms, and state funding. The Consortia is not willing to enter into the telecommunications industry itself, it has placed requests to light the fiber. So far it has received 12 offers, none of the local telephone companies submitted offers.

**Singapore**

http://archives.seattletimes.nwsource.com/cgi-bin/texis.cgi/web/vortex/display?slug=sing&date=19980930  

Singapore One is a public-private effort to bring broadband access to every citizen and business on the island of Singapore. A consortium of industries called 1-NET Singapore was formed to build, maintain, and run the backbone network. A few large companies have helped fund the project. Many companies have signed to provide internet access
over the backbone. One year into the project 90% of the people in Singapore have high-speed internet access either through special telephone lines or the local cable company using the high-speed backbone.
Government Initiatives
All of the following projects were the result of government initiatives to incorporate high-speed data services in their jurisdictions. Most of these projects came into being by a partnership being formed between local government agencies and private firms.

LaGrange Georgia
http://www.intelligentcommunity.org/art/PDFs/LaGrange.PDF

LaGrange is a rural town outside of Atlanta. The government has formed partnerships with the local telecommunications companies in the area to facilitate the layout of a high-speed network. This network has generated 1 million in revenue for the city treasury each year and had also attracted businesses into the area. The project also provides free internet access to the public. LeGrange negotiated for digital switching, and then for dark fiber to be laid. The city provided the broadband connectivity, and became a CLEC, and an OCC. The city offers DS2, and OC 3 to OC 12 connectivity. The city now has a 57-mile fiber ring that connects about 40 commercial institutions. The city’s development authority fostered the development of a hybrid fiber-coax network to reach the city’s end users. The authority owns the network and leases bandwidth.

Phone interview: 706-883-2010, spoke with David
Back bone: Highest is 1Gb/s for data, it is a SONET ring: OC-12
Backbone connects to an OC-192, and two OC-48s at local POP’s

Multnomah County
http://www.co.multnomah.or.us/dss/info/initiatives/

Multnomah County in Oregon has created a technology organization called Information Technology Organization (ITO). The ITO brings together all of the counties technology functions and expertise under one roof. The ITO oversees a WAN that consists of 70 buildings, manages thousands of computers, accomplishes the counties web development, has an IT council, manages an exchange system, and much more.

Colorado MNT
http://www.state.co.us/mnt/

A partnership was formed between public and private entities to build a high-speed network for the state of Colorado. In 2000 the state government awarded $37 Million to Qwest to build and manage a statewide state of the art fiber optic network. Qwest signed a ten-year contract with the state, and expects to invest at least 60 Million of its own money. If the private sector buys enough bandwidth it will be a profitable venture for Qwest. The state government serves as the key anchor for the network.

The network connects all 64 county seats, is a 100% fiber network using ATM, and SONET. The state estimates that a statewide network built and maintained by the
state would have cost 150-300 Million. The plan is expected to cost the state 15 Million is access and local loop costs. Qwest has laid most of the fiber new, however Qwest has leased fiber where it already existed. Qwest will not connect the “last mile”, the existing infrastructure is 60 years old. Colorado came up with a remarkable piece of legislation for the “last mile” issues, the “Bean Pole Bill”. The bill provides grant money for communities to provide last mile solutions, among many other things.

-Benefits
- State agencies, local schools, institutions, etc no longer have to buy telecomm services in a piecemeal fashion
- Redundancies are eliminated
- The public/private model facilitates build out in rural areas

Phone interview: 303-239-4313, No Name: Guy Mellor is the guy to talk to about last mile business issues.
Q-west’s backbone capacity is confidential.
The state has reserved a minimum of 20Mb/s on Q-west’s buried fiber network into each of its county seats. In most locations the 20Mb/s minimum has been exceeded, it is used by the state government, schools, county governments, and local municipalities. From the county seats they are using the existing infrastructure, ranging from 64Kb/s phone connections to fiber in the more urban areas.

LinkMichigan
http://linkmichigan.michigan.org/
http://www.kazoochamber.com/ost/broadband.htm
http://www3.gartner.com/3_consulting_services/cs_Michigan.jsp

The Michigan Economic Development Corporation (MEDC) set forth the “Link Michigan” plan. The goal of the plan is to dramatically improve the statewide telecommunication infrastructure. The plan consists of four elements.

The first element is to create statewide aggregation. Link Michigan seeks to aggregate the demands of the state government, higher education users, K-12 users, local government users, and other public and private partners. Link Michigan will solicit private contractor for bids to build the network. Link Michigan also will require that the winning firm build out the infrastructure into all regions of the state, and sell the excess capacity in a non-discriminatory way at wholesale prices. The second element of the plan is to incorporate a telecommunications survey. This is to ensure the quality of service, expedite the approval process, and establish procedures. The third element of the initiative is taxing and permitting fairness. This element aims to create a one-stop right of way, taxing, and permitting fees for telecommunications companies. The last element of the plan is to initiate a regional planning program. This program would make funds available for communities to use for last mile solutions, and research.

Analysts have estimated that the plan will create 500,000 jobs and expand economic output by $440 billion (http://www.kazoochamber.com/ost/broadband.htm, second paragraph, retrieved 7/29/02).
Michigan has passed three bills, one to create a statewide right of way authority, one to provide low interest loans to areas underserved, and the third creates tax credits for telecommunication companies who invest in broadband initiatives.

Michigan has created a broadband authority, this authority will issue 20-year state bonds that will fund the deployment of new dark and dim fiber construction. Waypoint Fiber Inc. is planning to build a 500 Million dollar dark fiber optic network to connect parts of rural Michigan to urban areas. The plan is to follow county road ROW’s, and include fiber rings in many urban and smaller communities.

Texas Broadband initiative
http://www.puc.state.tx.us/about/commisioners/perlman/present.ppt/BBTaskForce032002.ppt
http://www.puc.state.tx.us/about/commisioners/perlman/broadband/index.cfm

Texas has considered starting a broadband initiative, a detailed plan could not be found however a generalized plan did surface. The plan recommends using demand aggregation that would be attractive enough so that a private investment would be made. The public governments, and institutions will be used as an anchor tenant for the project. Furthermore, the state is planning on using a tax incentive for broadband deployment, and using state land to ease the right of way issues. The mapping will be done through GIS software.

Arizona (Telecommunications Open Partnerships for Arizona)
http://www.digitaldividenetwork.org/content/stories/index.cfm?key=134
http://gita.state.az.us/telecom/topaz/topaz_summary.htm

Arizona has developed a statewide broadband initiative. It is planning on spending 100 million on the program. The state is currently aggregating the demand and soliciting community demand. The plan will go into effect during the next 2-5 years. The goal is to have all 87 towns with a population over 500 connected with a high-speed connection (1.5 Mb/s).

Iowa
http://www.icn.state.ia.us/

Iowa has set up a state agency to run and administer a statewide network, the Iowa Communications Network (ICN). The network consists of 3000 miles of fiber extending into all 99 counties, every citizen is within 15 miles of a videoconference point on the network. The network was built, not leased, so the state had to take ownership of it. The state has unsuccessfully tried to sell the network. Iowa has setup video conferencing software to facilitate communication across the network between and among various state agencies. A competitive bidding process decided upon the contractor. The fiber optic backbone was buried in state right of ways near highways and
runs about 3,400 miles (at a cost of nearly 200 million). The government used many forms of funds to fund the project however most of the project was funded by debt equity.

Cost Benefit analysis at: http://www.icn.state.ia.us/about/cost/costbenefit.doc

**Minnesota (Connecting Minnesota)**
http://www.mainserver.state.mn.us/connectingmn/

Connecting Minnesota is a public/private effort to build a fiber optic network across the state of Minnesota. The network will be laid within the interstate right of ways. The network will reach within 10 miles of 80% of the state’s population. The estimated cost is about $195 million. The cost will be completely funded by the contractor who won the competitive bid for the project. Two loops will be built that intersect in Minneapolis and St. Paul. The DOT in Minnesota has exchanged the right of way fees for telecommunication services. Minnesota has declared that 20% of the network must be saved for public use.

**North Dakota**
http://www.state.nd.us/itd/

North Dakota’s Information Technology Department is responsible for commissioning a broadband network to serve the state government agencies and schools. The network will connect 222 cities and 544 locations with broadband internet access(http://www.state.nd.us/itd/faq/, bottom of page, retrieved Aug. 07, 2002). The state has set three goals. The first is to build a network that will meet the future needs of the state government, and schools. The second goal is to reduce the cost of the project and communications in general by aggregating demand. The third goal is to stimulate the state economy by introducing broadband into every county in the state. They decided to issue three separate contracts, one to build the network, one to provide the internet services, and one to supply the equipment to connect the end users. This plan is not completed yet.

**e-NC**
http://www.e-nc.org/

e-NC is a grassroots operation in North Carolina. Their goal is to connect every North Carolina resident to the internet. In one year e-NC aimed for every North Carolinian to have dial up access to the internet, which was accomplished in July 2001. In three years, e-NC would like to have every North Carolinian to have access to a high-speed internet connection (128K for residential, and 256K for commercial). E-NC would also like to educate the public about the possibilities and advantages of using the internet. They plan on setting up call centers in the most distressed communities. E-NC also is trying to compile a database of all the ISP’s in the state so that anyone can easily choose which one to use.
Florida
http://www11.myflorida.com/publicinformationoffice/moreDOT/spenews/floridafibernetwork.htm

The Florida DOT along with other state agencies have reached an agreement with a company to lay over 2,000 miles of fiber along Florida’s highways. The DOT will use the network for its own purposes pertaining to the highways it manages. The extra bandwidth will provide industries with much-needed bandwidth and help to service rural area along the Florida highways. The state right of way was used for this network. The company laying the network will also deploy a broadband network across the whole state. Construction of these networks is expected to be complete in late 2003.

Rural Australia

Farmwide is a national organization in Australia owned by the State and Territory Farming Division. The goal of the organization is to seek out commercial opportunities for farmers in all of Australia. The government has allocated funding for Farmwide’s FRAN project. The FRAN project is an attempt to improve the current rural telecommunications infrastructure over the existing dial up modems. The FRAN project will provide face to face and telephone support, local support, and will build user databases. A few trials have gone into implementation, 15 POP’s have been built in conjunction with local communities, 2 high bandwidth satellite hubs have been deployed for the most remote users, and DSL is being used for most of the communities.

Smart Rural Community Pilot Project Tatamagouche and Area (Nova Scotia)
http://www.nsis.com/~expo/SRCdoc.html

North Colchester in Nova Scotia has developed a smart community project. The first mission is to start by making the general community computer literate through educational programs. The plan will provide residents with home internet access. This is to be funded using donated money. The plan will unfold in three phases, the first is to get learning centers connected (56K) and educate the public. Phase two is to extend LAN’s to the schools, and phase three is to set up a Wide Area Network (WAN).

New South Wales
http://www.nswnet.net/rural_link_overview.html

The state library in New South Wales has formed a project called Rural Link. The goal of Rural Link is to provide subsidized internet connectivity for public or non-profit organizations. The region Rural Link provides solutions in contains about 90 communities and is very rural. These communities cannot enjoy the ISDN available in other locations in New South Wales. The rural link program covers all capital costs to connect the terminal or LAN to up to 3 sites. If needed it will cover a satellite hub and
wireless bridges. The two-way satellite has a 400Kb/s downlink, and a 64 Kb/s uplink. The wireless bridges will only work over distances of 2 Km or less.


**New Zealand**

Following a feasibility study, the government of New Zealand is setting a target for all communities to have access to full duplex broadband within the next year. The government will be providing funds to explore ways to aggregate demand, utilize alternate business models, and to set up pilot projects to test different technologies. The project will encompass all five regions of New Zealand. The Far North region is using wireless technology. The other regions are completing a feasibility study, and starting to solicit telecommunication companies.

**Ireland**
[http://www.wired.com/news/wireless/0,1382,51105,00.html](http://www.wired.com/news/wireless/0,1382,51105,00.html)

The Irish government has invested over 300 million euros to build Ireland a fiber optic network. This fiber optic network will run 50,000km and connect over 100 towns. The plan is to have the national government fund 90% of the network and the local municipalities fund 10%. The effort was launched with the goal of moving Ireland out of last place in the broadband race for Europe. The network will be owned by a public/private partnership, which will offer open access. The network itself will consist of a group of fiber rings, later a national network will interconnect all of the rings.

**Shannon Region, Ireland**
[http://www.shannon-dev.ie/shipp/strategy%20home.htm](http://www.shannon-dev.ie/shipp/strategy%20home.htm)

The Shannon region of Ireland has a population of 375,000, it represents 14% of the land area of Ireland, most of the area is rural with some urban pockets. The goal the ShiPP plan is to have 10 Mb/s broadband internet access for the whole region by 2006. The Shannon Development and Esat Telecommunications company have partnered on a project called Shannon Digital Parks. The project plans on using leased and built fiber to achieve the desired bandwidth to a technology park in Ireland. The end users will be connected through, ADSL, cable-TV, and MMDS. The eventual goal of the project is to provide all communities, and residents with high bandwidth access similar to the [Singapore One project](http://www.shannon-dev.ie/shipp/strategy%20home.htm).
Independent Effort
The following projects are the result of smaller scale individual efforts. The goal of these volunteer efforts is to improve the infrastructure of their region since the private firms have not shown an interest.

Abingdon VA Project
http://216.197.97.151/detail.cfm?ID=12

Abingdon, VA is a small rural town with a population of about 8,000. Abingdon volunteers created an initiative to move the town into the digital age. First Abingdon formed an electronic village in 1995. Local volunteers, an ISP, and a local telephone company made the Electronic Village possible. The EVA then provided 25 free PC’s with a 10MB/s connection to the internet for the general public’s use. These computers were located at four different locations and heavily used by the public. The EVA then took on an initiative to connect the four county libraries to the internet. These libraries were located in the four corners of the county. The local government owns the fiber optic network. This is the only fiber optic network owned by local government in Virginia. Virginia restricts localities, including municipally owned utilities, from entering into the telecommunications business; Abington was able to secure an exemption.

Free wireless network in Hawaii
http://www.business2.com/articles/mag/print/0,1643,38492,00.html

On the big island of Hawaii there are almost no DSL or cable modems. The topography is challenging for wireless solutions due to the volcanic mountains. An entrepreneur Bill Wiecking has developed a high-speed wireless network that covers over 300 miles on The Big Island of Hawaii. He has put up about 12 base stations, using his home, friends homes, schools, and even on a roaming bus. He is using an 802.11 2.4 GHz unlicensed band network for his wireless needs. These networks usually only have a range of 300 feet, however he has souped up his towers with cheap equipment and boosted some of his towers to a 26-mile range. The components at each of his base stations only cost $1000. The local schools are making use of his network by receiving streaming video, and other function. One student is monitoring sea turtles via an internet camera. Mr. Wiecking is experimenting with underwater wireless cameras also. Local physicians are also using this technology for monitoring patients, and videoconferencing.
Special Mention
Berkshire Connect is the result of a government effort forming a consortia type of structure to aggregate demand. The organization then decided to become a commercial competitive local exchange carrier. Berkshire connect has successfully combined a couple of different methods to accomplish an upgrade to their telecommunications infrastructure.

Berkshire Connect
http://www.bconnect.org/bus_plan.htm

Berkshire Massachusetts is a rural mountainous area. Berkshire Connect, Inc. is an affinity group of small businesses, schools, cultural organizations, hospitals, major employers and others who have banded together “to enhance economic development and educational opportunities in Berkshire County by facilitating the improvements of telecommunications infrastructure and services available to business and institutional users located in Berkshire County and through other activities and programs in furtherance of the foregoing (http://www.bconnect.org/index.htm, top of page, retrieved Aug. 5 2002)”. Berkshire Connect started using excess capacity on existing networks. The organization does not want to compete with Telco’s, ISP’s, CATV’s, and IXC’s. Instead it seeks to enhance their services as content providers, and wants to use them as demand aggregators.

Berkshire Connect is classified as a competitive local exchange carrier (CLEC). This enables them to purchase dark fiber, local loops, etc at a discounted rate from Bell Atlantic. The sources of capital used are many: private capital, privately placed stock and partnerships, private grants, local and state government money, and conventional loan sources. Berkshire Connect is considering splitting into one for profit and one nonprofit firm. By achieving this it can gain access to more funds.

The end user interfaces for the network are, DS-0 – OC3 (64.4Kb/s-155Mb/s). Currently OC1-OC48 is not available in the area. The target price to provide is $600/mo for DS-1 backbone transit. The current ILEC rate is $1,300-$1,500/mo.

Berkshire Connect is currently using a backbone existing of dark fiber, microwave wireless solutions, and leased Bell Atlantic services. The goal is to migrate away from the leased services and facilities. Berkshire Connect will use more fiber and wireless solutions to reach the more remote users. The wireless solution they are planning to use is a point-to-point radio (SONET capable @6GHz for a 2 mile range) that can deliver one OC-3 payload per channel (155Mb/s), with up to seven channels per cabinet (1.085 Gb/s). They are considering using the 18GHz band and the LMDS 28 GHz band. Environmental permits are required for all microwave links, however they do not see this as a problem. When Berkshire Connect plans on installing its own fiber, it will use any available right of way(high tension wires, direct ground burial, etc.). Berkshire Connect will consider air blown fiber for areas where future demand or development may be uncertain. While planning the network Berkshire Connect produced a market analysis, and a market segmentation of companies dependant on high bandwidth in area. They also identified potential competitors that would possibly build backbone networks. They contacted these potential competitors to try and form partnerships with
them. They are planning on marketing directly to ISP’s, CATV’s, and LXC’s at wholesale prices so they can reach their customers cheaper. The pricing for the network will be about equal to prices for similar services in NYC or Boston, but will vary depending on local loop charges and mileage.