

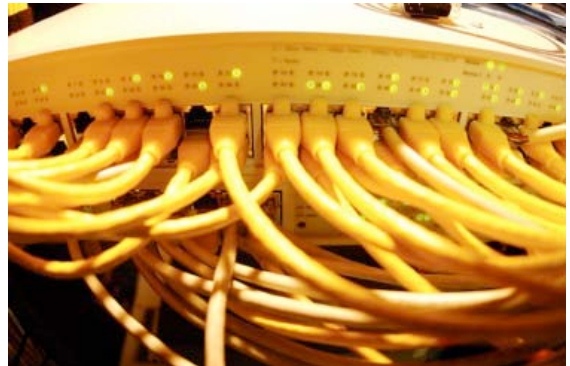
# Broadband Strategies for the LDDs

---

## Recommendations

Prepared for  
The Local Development Districts of Pennsylvania

January, 2007



Prepared for the Local Development Districts of Pennsylvania

#### Disclaimer

The telecommunications business is continually evolving. We have made our best effort to apply our experience and knowledge to the business and technical information contained herein. We believe the data we have presented at this point in time to be accurate and to be representative of the current state of the telecommunications industry. Market changes and new technology breakthroughs may affect our recommendations over time.

Design Nine, Inc. presents this information solely for planning purposes. This document is not intended to be a replacement for formal engineering studies that are normally required to implement a telecommunications infrastructure. No warranty as to the fitness of this information for any particular building, network, or system is expressed or implied. Design Nine, Inc. will not be responsible for the misuse or misapplication of this information.

#### **Design Nine, Inc.**

2000 Kraft Drive  
Suite 2180  
Blacksburg, VA 24060  
Voice: 540-951-4400  
[www.designnine.com](http://www.designnine.com)

# Table of Contents

<b>Executive Summary</b>	<b>1</b>
The current broadband business model is broken	2
What is broadband?	3
Investment Characteristics	3
Future oriented	4
Fiscally conservative	4
Integrated fiber and wireless system	4
Open service provider model	4
Regional design and management	4
Economic development focus	5
Planning for Success	5
<b>Vision for the Future</b>	<b>6</b>
<b>The Intelligent Community</b>	<b>8</b>
<b>Last Mile Connectivity Recommendations</b>	<b>10</b>
<b>Content and Services</b>	<b>16</b>
<b>Organizational and Network Operations Options</b>	<b>18</b>
<b>Funding Strategies</b>	<b>22</b>

# Executive Summary

*By 2015, every businessperson in the LDD regions should have affordable access to a open service oriented broadband infrastructure with as much bandwidth as they need to successfully compete with any other business located anywhere in global economy.*

*By 2015, every citizen in the LDD regions should have affordable access to a open service oriented broadband infrastructure with as much bandwidth as they need to manage their personal affairs, obtain access to world class telehealth and telemedicine services, keep their homes safe, and have the same level and quality of access online goods and services as any other community anywhere in the world.*

*By 2015, every community in the LDD regions should have affordable access to a service oriented broadband architecture with as much bandwidth as needed to effectively and efficiently deliver government services to citizens and businesses, to support the data and communications needs of first responder, public safety, fire, and rescue needs, and to help communities monitor and manage threats to community safety.*

Over the next thirty years, the LDD regions of Pennsylvania will spend, very conservatively, more than \$185 billion on telecommunications services (voice, video, and data). This estimate is based on current average expenditures, and does not consider what is expected to be rapid growth in new kinds of services (e.g. telemedicine, telehealth, IP-based security applications, video on demand, online games, and many other emerging business applications and services. If these future services were included as part of the projection, the total spent on telecommunications in the LDD regions would probably exceed \$400 billion (over 30 years).

LDD	Telecom Expenditures over 30 Years	Cost of 100% fiber build out	Build Out Cost as Percentage of Expenditures	Estimated Funds Returned to Local Government and the Community
NEPA	\$18,247,439,430	\$1,114,488,045	6.11%	\$4,118,662,331
Northern Tier	\$3,324,546,423	\$202,020,390	6.08%	\$750,904,826
North Central	\$4,381,161,048	\$268,220,700	6.12%	\$988,562,169
SEDA COG	\$11,923,571,385	\$726,196,928	6.09%	\$2,692,316,704
Northwest	\$13,390,978,887	\$819,883,598	6.12%	\$3,021,496,541
SAPDC	\$8,765,533,260	\$535,001,198	6.10%	\$1,978,667,299
SPC	\$125,424,618,561	\$7,409,509,718	5.91%	\$28,435,303,648
Totals	\$185,457,848,994	\$11,075,320,577	5.97%	\$41,985,913,518

The very conservative estimates of expenditures included in this report indicate that there are substantial funds available for community owned and managed broadband systems in Pennsylvania: It would take just 6% of those expenditures to build integrated, future-proof fiber and wireless broadband systems to every home and business in all seven LDD regions.

By adopting an open service provider broadband system model, these new digital road systems will create unparalleled opportunities for existing incumbent telecommunications companies to reduce costs and to reach more customers. Local governments will not and should not sell services. Instead, regional consortiums of local governments will build high performance, future proof digital road systems and make those digital roads available to the private sector, just as governments today build roads and let the private sector use those roads to sell goods and services. There will be NO competition between government and the private sector, because *local governments will not sell any services to the public.*

### **The current broadband business model is broken**

The current business model for selling broadband is an anachronism that evolved in the early nineties with the introduction of dial up Internet access. At that time, there was little more than email and a few text-based Web pages available on the Internet, and selling bandwidth “by the bucket” worked fine. For something like \$20/month, subscribers got a “bucket of bandwidth” that was defined by some upper limit on that bandwidth, like 14,4000 bits/second or 56,000 bits/second.

As the Web evolved to include video and audio, and as new services like telephone over the Internet (Voice over IP, or VoIP) became available, more bandwidth was needed to support these uses. Broadband was and still is sold by the “bucket,” but the bucket is now larger, with the DSL bucket typically advertised as something like 1/2 megabit/second, and cable modem service typically promoted as 1-3 megabits/second. We are still buying bandwidth by the bucket.

This business model is fundamentally broken. There is no way to fix it. The broadband business model of selling bandwidth by the bucket is the only business in the 400 year history of modern mercantilism where *a company makes the most money if their customers do not use the service at all.* They make the least amount of money if customers like the service and use a lot of it. This approach is upside down from every other business in the world. It leads to odd behavior by the service providers that causes them to punish or even disconnect customers that use too much of the service.

From an economic development perspective, this is disastrous. Pennsylvania businesses should not be punished for using too much of an essential business service. An apt analogy would be if the Department of Transportation told a businesses that the tractor trailers they were using were “too big” and henceforth all deliveries had to be made by pick up truck. We know intuitively that this would make the business un-competitive with businesses in other regions that had roads that supported tractor trailers.

The least desirable course of action is to make direct or indirect investments in privately owned copper-based or low performance wireless infrastructure. As one example of what not to do, in other states, regional authorities and state governments have made direct cash payments to incumbent telecom providers to extend copper-based and wireless broadband services. This has two negative effects:

1. By doing this, elected officials are picking winners and losers in the marketplace. The private firm that gets the cash payment “wins,” and all other companies “lose.” It is poor policy for government officials to make such selections, and presumes that a handful of government officials can accurately predict that a single firm is likely to be able to provide all the business and residential telecom needs over a period of several years. The past twenty years of telecom deregulation and divestiture provide numerous examples of how difficult this is to do.
2. Investing in the continued use of copper-based broadband infrastructure or only low performance wireless puts Pennsylvania businesses at a competitive disadvantage in the world economy. Copper infrastructure is slow, and many low cost wireless systems lack appropriate security and bandwidth for business use. Competitors in many other countries already have low cost access to high capacity fiber systems (\$40-\$50/month for 100 megabit fiber is common). Pennsylvania businesses forced to use expensive and slow copper broadband systems because of government subsidies pay twice--once because their taxes are used to make payments to an incumbent firm, and a second time when they have to pay for a non-competitive service.

### **What is broadband?**

There is much confusion about the “true” definition of broadband. From the perspective of economic development, there can be no upper limit on the definition of broadband. Saying that broadband (as an example) is 5 megabits/second of bandwidth or 10 megabits/second is to immediately tell businesses in the LDD regions that there will be structural limits on their ability to do business in the future—it is dictating the size of truck that can be used to deliver goods and services. Here is the only appropriate definition of broadband:

***Broadband is whatever amount of bandwidth is needed to support a business’ ability to compete in the global economy.***

Broadband is a community and economic development issue, not a technology issue. The essential question is not, “What system should we buy?” or “Is wireless better or cheaper than fiber?” Instead, the question is, “What do our businesses and communities need to be able to compete globally over the next thirty years?”

### **Investment Characteristics**

Just as communities had to take on the task of building and maintaining roads in the early twentieth century, communities must now provide digital road systems as a matter of community and business survival. These digital road systems must be designed with certain characteristics:

### ***Future oriented***

Current usage patterns are not a good predictor of future broadband needs. Communitywide digital transport systems must be designed to scale gracefully to support future uses over the next thirty years.

***Invest in systems that will meet future needs, not current demand.***

### ***Fiscally conservative***

Vendor and system selection should be deferred until a community or region has conducted a thorough financial engineering exercise that predicts as accurately as possible system design and construction costs, sources and cost of funding, operational expenses, prices of services, and income and cash flow.

***Identify a financially sustainable business model and an appropriate legal entity before picking systems or selecting vendors.***

### ***Integrated fiber and wireless system***

Both fiber and wireless infrastructure are needed to meet all business and residential needs. Wireless alone is an incomplete solution that will leave communities and their businesses at a competitive disadvantage. Wireless can be an appropriate early step as part of a well-designed, comprehensive integrated fiber and wireless system.

***Plan for integrated fiber and wireless solutions.***

### ***Open service provider model***

Community digital road systems should be managed in the same way physical road systems are managed. Use highly automated Layer 3 network systems and software so that qualified private sector service provider, including incumbent providers, can use the community system to deliver goods and services to customers. Companies that use the community system will pay a portion of gross revenue to the network owner/operator (the community) in return for access to a high performance system connected to every household and business.

***Invest in open services-oriented networks to keep operational costs low and to maximize competition and choice.***

### ***Regional design and management***

These community digital road systems are best initiated and managed over the long term as regional efforts. Networks do not “see” political boundaries. The communities of Pennsylvania will spend less and gain more by collaborating regionally to build these systems.

***Spend less and get more encouraging regional collaboration among municipalities and other public and private partners.***

## ***Economic development focus***

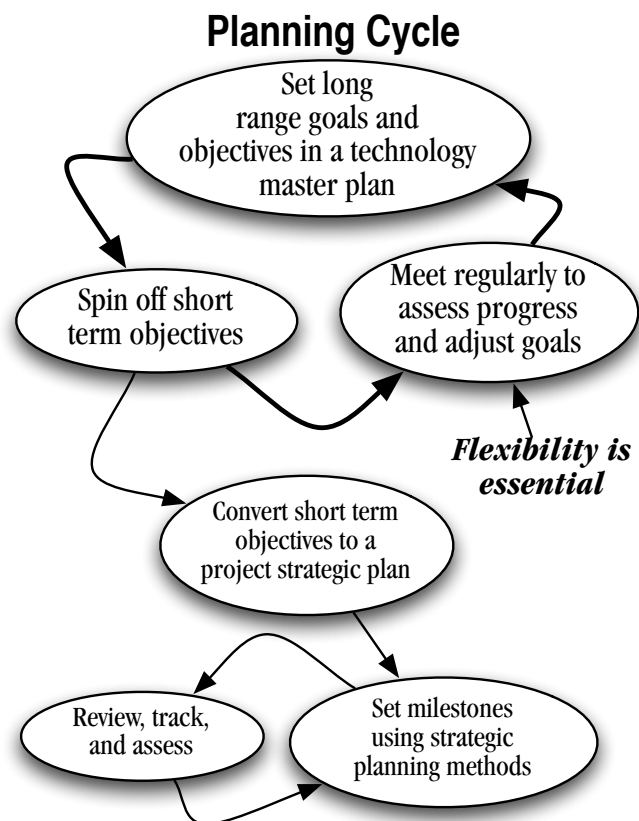
While technology design issues obviously have to be addressed appropriately, it is business needs that have to drive the design of these systems. Both the needs of businesses that will offer services and the businesses that will use those services to sell into the global market place have to be calculated carefully.

*Investments should support long term economic development goals and objectives.*

## **Planning for Success**

The recommendations in this report provide a broad framework of goals, objectives, and basic concepts that provide direction to the LDD regions over a period of years. Central to the success of these recommendations is regular review and updates of the plan itself, which must be regarded as a living document owned by the region. As technology and telecommunications systems change, so too the plan must change and adapt to fit those changes. And as local and regional opportunities (and sometimes setbacks) occur, the plan must again be updated to reflect the changing state of reality in the LDD regions.

While many of the objectives and action steps in this document are quite specific, the document itself is not intended as an implementation plan. Rather, as funding opportunities and projects develop, the master plan provides guidance to ensure that specific community and regional investments fit into the master plan framework and that the goals and objectives are being met over time. Figure One illustrates the planning process over time.



*Figure One: The planning process*

## Vision for the Future

The communities and businesses of the LDD regions need direction from the LDD planning staffs that will help them prosper in an increasingly competitive world economy. The competition no longer comes from the next county or the next state, but often from countries many thousands of miles away. The powdered metal and die and tool industries of the North Central LDD are losing jobs to increasingly sophisticated businesses located in Asia.

The Local Development Districts can play a critical role in four ways:

- **Leadership Role** - Identify and support those strategies that will, over the next five to seven years, get Pennsylvania communities the broadband infrastructure they need to retain and expand existing businesses and to attract new businesses.
- **Advisory Role** - Provide planning and project management services to local and regional broadband infrastructure projects, with special attention to identifying best practice, key infrastructure investments, and avoidance of “re-inventing the wheel” by communities.
- **Education Role** - Commit to a long term education effort for planners, elected officials, business leaders, and local government staff. This project will provide regular opportunities to learn about broadband infrastructure, appropriate community and regional investments, benefits and impacts, and appropriate financial and management models.
- **Define and plan for “Intelligent Communities”** - Around the world, other regions and countries already have “Intelligent City” and “Intelligent Community” projects well underway. Pennsylvania needs similar efforts throughout the state to remain competitive. The LDDs can accelerate this work by promoting the concept, by defining the characteristics of a Pennsylvania “Intelligent Community,” and by providing project roadmaps for communities and regions that want to achieve this goal.

Affordable broadband is by no means a panacea for a region’s competitive threats, but without affordable, high capacity broadband services, a region’s businesses will find it more and more difficult to remain viable.

Some see broadband investments as risky.

***The greatest risk is leaving a region’s broadband infrastructure to third parties not vested in the future prosperity of a community or region.***

Community leaders are often concerned about whether or not their citizens and businesses would actually use a community broadband system. The concern is that too few citizens use the Internet to make the investment worthwhile.

However, an open access digital road system offers much more than Internet access. An open services network typically offers a wide variety of services, including telephony, TV program-

ming, computer backups, home and business security monitoring, telemedicine, telehealth, on-line gaming, desktop computer management, and much more. The success of a digital road system does NOT depend on broadband at all. It is not necessary to "sell" people on the Internet at all. Even if you have a resident who loudly proclaims that they do not have a computer and have never been on the Internet, they are still likely to be a customer if you have an open services network in the community.

Why?

As just one example, VoIP telephone provider Skype plans to offer unlimited calling to any telephone in the U.S. for \$30/year. That is not a typo. If you bring Skype in as a provider on your open services network, you are not selling broadband at all. You are giving residents and businesses an opportunity to cut their phone bills by as much as 90%!

Given that service option, how many people would say, as you hook up the community fiber to their home, "I'm very happy paying ten times more for phone service, and am not interested in saving money?" If your community has high unemployment and/or a large elderly population on fixed incomes, saving several hundred dollars per year on their phone bills can be very significant. It frees up that money for other needs, and some of that money will be spent at businesses in the community, rather than typically being mailed out of state to a large telecom firm.

Selling only "broadband," or just Internet access, is not only old fashioned, it is not financially viable over the long term. We know better now, and the future for communities is to build digital roadways that offer citizens and businesses not just Internet access but a whole array of IP-enabled services that save them time, money, or both.

# The Intelligent Community

The residents of “intelligent” communities will have, literally, a world of information at their fingertips. Already, new services like blogging and YouTube are providing hundreds of thousands to new, media-rich sources of information (some valuable, some primarily entertainment). Residents of media-rich communities will be able to access virtually any movie ever made with a few mouse clicks. They will be able to choose from a rich variety of music, search the Web, and access massive archives of multimedia video and audio programming. The characteristics of media-rich communities of the future includes:

- *Abundant, inexpensive bandwidth locally available from an integrated fiber and wireless open service provider system.*
- *Massive and redundant fiber and wireless connections to the rest of the world.*
- *An effective and well-designed cluster of Web sites that market the community to the world, including a community Web portal, economic development sites, excellent local government sites, and many local community and civic sites.*
- *A knowledgeable and engaged citizenry that is comfortable using technology for business and personal use.*
- *Businesses that are expert in using broadband-enabled services to manage current customers and to market goods and services to markets throughout the world.*
- *Rich local content generated by citizens, organizations, government, and local organizations.*

A wide variety of information devices, including video monitors, distributed audio systems, converged media centers (computers), PDAs, wireless handheld phones, and tablet computing devices. Both fiber and wireless systems will be needed to support business and personal use of broadband-enabled services.

These media-rich communities will be attractive to an emerging new group of businesspeople that typically are well-educated, own their own businesses, and are making choices about where they lived based on family needs and interests, rather than business interests. This new breed of entrepreneurs place a high value on the kinds of amenities that contribute to a good quality of life—traditional neighborhoods, ecologically rich greenspaces, walkable destinations for personal and business needs, excellent schools, and a sense of place.

These businesspeople and their families make relocation decisions based on quality of life only where there is abundant and affordable broadband, because broadband is the enabler of these new Knowledge Economy businesses. Many of these microenterprises are located in homes, and so neighborhoods are now business districts. According to The CIT Group ([www.cit.com](http://www.cit.com)), 19% of all businesses are now located in homes. Some economists expect this to increase to over thirty percent in the next twenty years. Broadband is reshaping our communities in positive

ways—less commuting, less need for high capacity transportation systems, more focus on community and civic life, and more emphasis on personal relationships.

These new communities will have neighborhoods, a downtown, beautiful public spaces, walking and biking trails, and a focus on those amenities and infrastructure improvements that create a real sense of community. And throughout the community, a mesh of glass fiber and wireless systems will weave a web of information, data, entertainment, music, and news that will keep the community prosperous and vital.

# Last Mile Connectivity Recommendations

## Goal One

### *Encourage the deployment of community-owned telecom infrastructure.*

- ❑ All community investments in telecom infrastructure should be directed to support an open, services-oriented Layer 3 digital road system.

#### **Action Steps**

- The LDDs should provide local government leaders and planners with a series of seminars and meetings that provide information about the benefits and advantages of an open services broadband architecture, especially the potential to provide new sources of funding to communities.
- ❑ Create a model “open ditch” policy that encourages the of laying fiber lines alongside road, water, and sewer projects.

#### **Action Steps**

- Provide training for public works employees to install and maintain telecommunications duct of various kinds. Look for a pilot project in each LDD region to use as a hands-on training opportunity.
- ❑ Encourage developers and builders to bury community-owned conduit and fiber in new developments and to wire new houses as “smart homes”. As new homes and businesses are built in the LDD regions, these structure should be “Internet ready” and “future proof” with appropriate cabling systems throughout. Local government can accelerate this process by requiring all new constructions to meet appropriate standards.

#### **Action Steps**

- Develop an appropriate model ordinance that can be used as model for communities interested in developing community-owned telecom infrastructure
- Meet with local builders and developers to talk about how fiber, duct, and structured cabling increases the value of new homes and business structures.
- Identify at least one community in each LDD region that is interested and coordinate ordinance and standards development.
- All new neighborhoods and residential developments should have land set aside for an NSAP (Neighborhood Service Access Point). Convene a meeting of developers, builders and local government planners to discuss changes to comprehensive plans that are required. Write a sample specification for an NSAP set aside that can be provided to builders and developers.
- ❑ Have community–managed colocation facilities available to public and private telecommunications providers and users.

### **Action Steps**

- Survey current telecom service providers to gauge interest in using community-owned colocation facilities in LDD communities. Use feedback from providers to help identify those locations, with an initial goal of identifying a minimum of one site per county by the end of 2007.
- Develop cost estimates and a “standard” design for colo facility that can be replicated by all the LDDs (note that vendors will often assist with this at no charge).

## **Goal Two**

***LDD communities and regions should have a robust intracommunity and intercommunity digital transport system that is the equal of any other region in the world.***

☐ Over the next three to five years, Pennsylvania local governments should make investments in telecom facilities that will support the bandwidth required by the quadruple play of services (voice, video, data, advanced and advanced services) a minimum of twenty years in the future.

### **Action Steps**

- Adopt a goal that every home and business has the ability to obtain a high performance broadband connection via fiber and/or high performance wireless by 2012. A broadband connection is defined as a minimum bandwidth 100 megabits/second of sustained (not shared) throughput, and some homes and businesses may want or need Gigabit connections. No maximum level of bandwidth should be defined.
- ☐ Investments in network equipment and systems should include support for IPv6 protocols (next generation Internet) to ensure wide interoperability among users, institutions, and businesses.

### **Action Steps**

- Convene a meeting of IT managers from public and private institutions in the county to discuss the IPv4 to IPv6 transition. Identify a set of volunteers who will develop a one page information handout on IPv6 interoperability issues and circulate it widely among network administrators in each LDD region.
- Encourage the purchase of IPv6 ready network electronics for all future public and private purchases.

### **Goal Three**

*Drive down costs for high capacity bandwidth users throughout the LDD regions.*

- Assemble a list of institutional and business bandwidth users in each LDD region (T1 connections and above) and where possible, identify costs associated with the connections.

#### **Action Steps**

- Identify a group who will collect and maintain the data.
- Canvass institutional and business users to determine current bandwidth use in the region. Ensure that purchasers of bulk bandwidth understand bandwidth aggregation and how it can reduce costs.
- Develop and maintain a mailing list of network administrators in each LDD region. Encourage frequent and regular communication among network administrators, including regular lunch or breakfast meetings.

### **Goal Four**

*Residents, visitors, businesspeople, and other travelers should have convenient wireless access throughout the LDD regions.*

- Visitor centers and other tourism destinations should offer free WiFi access, with appropriate signage advertising the availability of access.

#### **Action Steps**

- Invite the organizations that manage visitor centers and tourism destinations to attend a meeting on the issue of WiFi access at those locations.
- Create a plan and project template for providing WiFi access at a visitor center.
- Use the established network of inns, B&Bs, restaurants, and other visitor attractions to publicize the availability of public WiFi.
- Design an appropriate sign that indicates graphically the availability of WiFi access.
- Ask the Pennsylvania Department of Transportation to adopt the sign as a standard throughout the state.

- Community and regional Web sites should provide “free WiFi” maps and directions so that travelers can easily identify public WiFi hotspots.

#### **Action Steps**

- Write a one page “talking points” handout for Web site managers that discusses the benefits of providing easy to find WiFi information on local and regional Web sites with travel and tourism information.

- ❑ Lower the barriers to market entry for wireless providers in the LDD regions and ensure the county has appropriate wireless and radio services.

**Action Steps**

- Encourage localities to conduct a wireless site survey to identify appropriate locations of antennas and towers in within their community. The site survey should consider population densities, private wireless use (e.g. WiFi, WiMax, etc.), and the potential for a uniform, countywide public safety radio network.
- Publicize the wireless survey results to wireless providers.
- Local governments should consider purchasing and/or setting aside public property for wireless towers, based on the results of the wireless survey. Space on the towers would be leased on a first come-first serve basis to private wireless providers.
- Local governments should adopt an ordinance that simplifies procedures for obtaining antenna space on public structures.
- Local governments should adopt a common fee structure for mounting antennas on public structures so that the costs for mounting antennas and the lease costs are uniform throughout each LDD region.

**Goal Five**

***Communities in each LDD region have a world class, high performance broadband network that is attractive to relocating companies and entrepreneurial startups.***

- ❑ LDD communities and regions should develop a Fiber and Wireless Overlay Plan that defines where key backbone fiber routes and wireless tower sites (existing and future tower and antenna sites) should be located in communities.

**Action Steps**

- Identify communities and localities interested in community broadband.
  - Hold a two hour broadband workshop with interested localities in each LDD to discuss the potential to begin installing duct.
  - Assist interested communities with the development of a fiber overlay plan that identifies near term (next twelve months) and far term (next three years) opportunities to install telecom duct and/or fiber.
  - Work with town Public Works departments to acquaint them with the new policy.
  - Hold a regional (one per LDD) one day vendor demonstration for public works staff. Invite vendors from several different duct and fiber cable system companies
- ❑ Ensure that all users of public right of way have provided appropriate GIS data for their cable routes.

### **Action Steps**

- Begin an LDD-wide list of telecom service providers and contact each one to determine if they use public right of way. If they do, ask for all public right of way route maps.
- Coordinate development of community and LDD-wide GIS maps of cable routes.

## **Goal Six**

***Community rights of way are managed to ensure that future right of way needs are not compromised.***

- LDD communities have clear and concise public right of way policy that is managed fairly and strictly.

### **Action Steps**

- Survey existing right of way policies.
- Develop a standard right of way policy that will be used for all future easements in a locality or region. Require all future easement applications to include appropriate GIS data so that cable location can be managed appropriately.
- Hold a workshop for planners and elected leaders to educate them on right of way issues and the role of the county government in managing right of way.
- Survey existing GIS data on right of way cable use. Work with existing right of way users to obtain any missing data and/or to obtain cable location data.

## **Goal Seven**

***Use fiber cable systems to connect local government facilities to improve local safety and communications.***

The critical nature of public safety communications requires robust, high capacity fiber cable between government fire, rescue, police, first responder sites, and other critical public infrastructure. Towns located on or near rivers should consider incorporating a system of high water monitors and sensors. Local government investments in public safety fiber networks offer an opportunity to overbuild (install additional fiber count over and above public safety needs) fiber cable. The extra capacity can serve as the backbone of a community-managed open services network.

- Local governments should develop an Emergency Communications Plan that provides interoperable communications between various first responder, fire, rescue, and public safety organizations.

### ***Action Steps***

- Review critical facilities and locations with public safety, public works, and emergency response officials.
- Invite representatives from county agencies, private enterprise, telecommunications service providers, public safety and first responders, utilities, and medical institutions to a meeting to discuss the need for a plan. Invite all interested parties to help develop the plan.
- Work with all representatives that agreed to participate to develop a draft plan before the end of 2007, with special attention to the current operational status of public and private critical infrastructure.
- The draft plan should pay particular attention to the restoration of emergency communications systems (especially radio systems), cellular telephone systems, and landline telephone and broadband systems after a natural or manmade catastrophe.
- Once funds are allocated, train local public works crews to install duct and fiber cable systems.
- Interested communities should purchase enough duct to begin connecting local facilities in 2008.

# Content and Services

## Goal One

*Help the communities of the LDD regions understand the value of a community Web portal, with the dual goals of promoting Pennsylvania communities as a great place to live and to work and to help residents and community groups promote civic, social, and youth activities locally.*

- Educate community leaders on the value of well-supported, “modern” community Web portals and the linkages to economic development and business recruitment.

### **Action Steps**

- Survey some out of the area community Web portals that have been identified as using best practice in design and execution.
- Prepare a handout for community leaders that describes the reasons why a community Web portal is important to the community, emphasizing linkages to economic development and company and entrepreneur recruitment strategies.
- LDDs should identify commercial hosting options and/or mature, well-supported open source Web content management systems (free of fees and license restrictions) that are appropriate for community Web portals.

## Goal Two

*Improve the local community use of technology to deliver and access services so that a wide variety of rich, timely, and local information is available on the Web for residents, businesses, travelers, and tourists.*

- Encourage the development of local government Web sites that are easy to update and that provides RSS news feed with local government information. Local government Web sites should be separate from the community Web site.

### **Action Steps**

- LDDs should identify mature, well-supported open source Web content management systems (free of fees and license restrictions) that are appropriate for the support of local government information and services.
  - Provide seminars and short courses to staff responsible for maintaining local government Web sites. The training should demonstrate the ease of use, features, and advantages of open source Web content management systems.
- 
- Promote the use of broadband by increasing the local capacity of residents and businesses to design and develop on the Web.

### **Action Steps**

- Help the youth and under-employed/unemployed of the LDD regions acquire more experience with blogging, Web design, and Web site management by developing a work force training program focused on Web skills valuable to businesses.
- ❑ Get every community and civic group that wants a Web presence on the Web.
  - Work with the community portal project to ensure that the community portals are using modern “no HTML” content management tools that support blogging and RSS news feeds.
  - Develop a workshop to provide training on blogging and RSS to community and civic groups.

### **Goal Three**

***Ensure that the businesses of the LDD regions have the knowledge and training to make the best use of business content to offer their products and services to a global marketplace***

- ❑ Business owners and entrepreneurs should have the knowledge and skills to make appropriate choices in designing attractive and responsive online content that promotes their businesses successfully.

### **Action Steps**

- Hold regular seminars for businesspeople that showcase well-designed, affordable, and successful business Web sites. Look for education partners (e.g. public schools, community college) in each LDD region to help with this effort.
- ❑ Ensure that local businesses have access to local Web content and Web site design firms that can provide affordable and reliable advice on developing successful business Web sites.

### **Action Steps**

- Inventory existing local firms that provide services, and identify gaps, especially for specialty services (e.g. multimedia design).

## Organizational and Network Operations Options

Local government should not sell telecom services for a variety of legal and practical reasons. Given the many small local government units in Pennsylvania, regional broadband ventures are a more efficient approach. Broadband coops offer many advantages.

Cooperative business enterprises as formal entities date from the mid-1800s. The first cooperative was set up in England to serve customers unhappy with local merchants. In the United States, the Grange movement began setting up cooperatives in rural areas to sell needed items to members and to help sell produce and other agricultural products that were produced by members. Today, credit unions are the most common form of coop business in the United States, with more than 65 million people obtaining services from over 12,000 credit unions.

Telephone and electric coops continue to be very common in rural parts of the US, and in fact, the majority of telephone companies in the United States are coops, but most have very small numbers of customers--often less than a thousand subscribers. Telephone coops serve more than a million subscribers in thirty-one states. The True Value and Ace Hardware chains are actually buying coops that help keep independent hardware stores competitive with the large chain stores.

The U.S. Department of Agriculture (USDA) provides extensive support for existing coops, and also helps communities start coops. One of their publications lists the principles of the coop:

- User-Benefits Principle -- Some purpose of a coop are to help members get services that might otherwise not be available, to get access to markets, or for other “mutually beneficial” reasons.
- User-Owner Principle -- The users of the cooperative own it.
- User-Control Principle -- The owners of the co-op (i.e. members) control the co-op through voting (annual meetings, etc), and indirectly by electing a board of directors to manage the enterprise. Large users who make high volume purchases of goods or services may receive additional votes.

Because cooperatives are user-managed, control of the enterprise is vested in the community or region where the users reside. Cooperatives also return excess earnings to its members; these refunds are called patronage refunds, and are typically computed at the end of the fiscal year. The expenses and income of the coop are calculated for the year, and any excess is returned to members, based on the percentage paid in by each member (e.g. a member that paid in 1% of total earnings would get a refund of 1% of any excess earnings). If a local government was a member of a coop (as a buyer of services), it would also get refunds.

Most cooperatives do not pay dividends on capital. This helps keep outsiders from taking control of the company, which would result in the community losing control over the quality of services and direction of the enterprise.

Coops are organized in part based on the territory they serve, and there are several classifications that may be relevant for Pennsylvania broadband ventures. A local coop serves a relatively small area that may be a single county and/or a radius of ten to thirty miles. A regional coop may have a service area of several counties up to an entire state (or multiple states).

Most local use a centralized governance structure, which means that individuals and businesses represent the bulk of members.

Cooperatives offer one or more of three kinds of services:

1. Marketing coops help sell products or services produced by members.
2. Purchasing coops buy products and services on behalf of members.
3. Service cooperatives provide services to members, and service coops include the credit unions, the electric coops, and the telephone coops.

The service coop would seem to be a good fit for a regional broadband venture.

Equity is typically raised for coops by direct investment from members. In return for an investment, members receive a membership certificate. The member may also receive shares of stock if the cooperative issues stock (some do, and some do not). Once a member has invested, they gain the right to vote in elections. In the LDD regions, if a local government made a large initial investment in the cooperative (e.g. by transferring ownership of locally installed telecom infrastructure), it could gain substantial influence in the affairs of the organization by gaining multiple shares and increased voting rights.

Although cooperatives are typically constrained by both Federal and state laws to do a majority of business with members, in most cases, cooperatives are able to do business with nonmembers up to some percentage of business income that can be as high as 49 percent. Note that this may be affected by the underlying legal incorporation of the cooperative--if incorporated as a 501(c)(12), the IRS requires that 85% of income must come from members for the purpose of meeting ordinary expenses.

Virtually all maintenance, repairs, and operations of a regional network can be outsourced to qualified private sector firms, and this is the general approach that should guide any community investments. Public works crews can, however, easily handle the installation and maintenance of certain kinds of passive infrastructure (e.g. telecom duct).

## **Goal One**

***Ensure that there is an appropriate regional entity that can help aggregate broadband bandwidth, software and hardware purchases, and coordinate training and education needs.***

- Help all technology and telecom users, especially institutional users, save money by pooling demand for services and technology.

### **Action Steps**

- Each LDD should form a working group to collect a list of large broadband users in the region (typically institutional users like medium and large businesses, schools, hospitals, colleges, and local government that use T1/DS1 services and above).
  - Once an initial list of institutional users has been created, convene a lunch meeting at an appropriate location to discuss the potential of pooling demand and reducing the cost of broadband.
- Manage community investments in telecommunications infrastructure on a regional basis to reduce the cost and effort to individual governments and to accelerate availability of broadband service options in each LDD region.

### **Action Steps**

- Hold discussions with local governments in the LDD region about forming a regional broadband coop that would manage telecommunications investments on a regional basis.
  - Retain the services of legal firm with extensive coop experience to develop a model legal plan for creating LDD regional broadband coops.
- Provide a statewide super coop that would act as a broker for services needed by the local (LDD region) broadband coops.

### **Action Steps**

- Determine how many LDDs are interested in pursuing the development of a local broadband coop. If there are at least three, retain the services of a legal firm with extensive coop experience to develop a legal plan for incorporation.

## **Goal Two**

***Ensure that ongoing management and operations of community telecom investments have professional oversight and high quality maintenance and operations that meet business user needs.***

- Outsource ongoing infrastructure maintenance and repairs to private sector firms whenever highly specialized skills are required (e.g. fiber splicing).

**Action Steps**

- Develop a general set of guidelines to help communities that want to make investments in telecom infrastructure that indicates what maintenance tasks can generally be allocated to public works crews and what tasks may be candidates for private sector outsourcing.
  - The LDDs should develop a model RFP for soliciting qualified private sector firms to perform maintenance and repairs.
- Outsource network operations to qualified private sector firms that provide this service as a primary line of business.

**Action Steps**

- The LDDs should develop a model RFP for soliciting qualified private sector firms to provide network operations and management.

## Funding Strategies

There are no significant funding or technology challenges related to community investments in broadband infrastructure. Communities routinely invest in, build, and manage water and sewer projects that are many times more expensive than community broadband systems. Subsequent chapters in this report provide extensive estimates of the many billions of dollars currently being spent on telecom services by local government, schools, health care facilities, businesses, and residents. A small fraction (less than 7%, typically) of those funds—being paid out of existing government, business, and home budgets—is all that is needed to provide world class broadband infrastructure to every home and business that requests it.

***The critical funding challenge is not to find new sources of funding, but rather to choose to spend existing funds differently.***

The bulk of community investment in broadband infrastructure will be in systems (fiber, duct, right of way, towers) that have a conservative life span of thirty years or more. This is ample time for regional network entities and local governments to repay any loans needed to build the initial system. Any community infrastructure operated as an open service broadband system can easily be financed by a revenue sharing arrangement with those firms that use the system to sell goods and services.

Any company that chooses to use community infrastructure for commerce would pay the network owner (typically a regional entity vested in the region) a share of revenue that reflects a fair value for the portion of network capacity used by that service. High demand, heavy bandwidth use (e.g. video programming) would pay a larger share of revenue than a low demand, low bandwidth use (e.g. home and business security systems).

All existing telecom providers, including incumbents, would be invited to use the system to sell services both to existing customers and also to reach new customers with new services that were not possible to deliver using older, copper-based technology. Incumbents indicate that they cannot offer broadband in some rural areas because of the high cost of infrastructure. This is true, because the current telecom business model of each company building, maintaining, and managing its own infrastructure (called overbuilding) is expensive--much more expensive than building a single common digital road system that is shared by many companies.

Somewhat paradoxically, the cost of such a community digital road system is lower when there is a day one commitment to build to any residence or business that requests service. This maximizes the potential marketplace of buyers and attracts more sellers to offer services because of the larger potential market.

## **Goal One**

### ***Develop sound financial plans before making any vendor or system selection.***

- ❑ Use a qualified broadband consulting firm to develop detailed financial models of regional or community broadband efforts before talking to vendors about equipment purchases or construction designs.

#### **Action Steps**

- Defer often controversial discussions about vendors and systems until an appropriate financial analysis has been conducted. The financial analysis should provide extensive detail on hardware and software system costs, cost of fiber and wireless facilities construction, staffing, legal, consulting and other expenses, cost of borrowing, anticipated kinds and types of services, expected prices of services, and system income and revenue.
  - Get a financial analysis that includes a careful study of revenue potential. Community-managed open services networks have the potential to not only pay for themselves from use fees and lower the cost of telecom services, but can also provide funding to participating local governments that make appropriate investments in the enterprise.
- ❑ Adopt open service provider Layer 3 broadband systems as a general business model.

#### **Action Steps**

- Study the differences between the four most common business models: private sector triple play, municipal triple play, municipal wholesale (often called “open access or incorrectly “open service provider network”), and true open service provider broadband systems.
- Provide a Web site with properly vetted and reviewed information on the design, planning and financial benefits of open service provider broadband systems. Provide opportunities for local leaders to engage in discussion and receive informed answers on how to begin community broadband projects.

## **Goal Two**

### ***Develop community sources of funding to get local and regional projects started.***

- ❑ Use local government communications and emergency preparedness needs to provide partial funding of community broadband systems.

#### **Action Steps**

- Identify safety, communications, and security requirements for local governments interested in broadband infrastructure investments.
- Develop a fiber and wireless overlay plan for broadband connectivity to all government facilities.

- Develop pre-design cost estimates for the construction of the infrastructure.
- Use annual general fund allocations and/or pursue DHS (Dept. of Homeland Security) and other public safety grant opportunities to begin installation and operation.
- Consider leasing excess fiber capacity to the regional broadband coop.
- Operations and maintenance of the safety and security system may be outsourced to the regional coop.

### **Goal Three**

***Develop opportunities for broadband users to invest in and own a portion of the broadband service authority or coop.***

- Spread funding across as wide a segment of the community as possible.

#### **Action Steps**

- When creating a regional broadband authority or coop, create a distributed ownership and investment structures that allows broadband users to make early investments to accelerate build out to their location.
- Investigate the potential of using “pass by” or connection fees to help fund the development of the infrastructure.
- Provide tax incentives or other inducements to builders and developers who install appropriate telecom infrastructure (typically duct and rights of way) in new business parks and residential neighborhoods. The infrastructure would be turned over to the local community in the same way that streets, sidewalks, water, and sewer is handed over to the local community.
- Provide an easy and straightforward way for communities that own and invest in telecom infrastructure to lease or otherwise provide access to the regional broadband authority/coop.

- Ensure that citizens and businesses are well informed of the value and potential of community broadband investments.

#### **Action Steps**

- Design and deliver a public awareness campaign to acquaint citizens and businesses with this approach and why it is being considered.

## **Goal Four**

***Make efficient use of existing assets to lower the overall cost of a community or regional broadband system.***

- ❑ Encourage the development of local and regional fiber and wireless overlay plans to identify where fiber and wireless towers need to be located to provide comprehensive service to all residents and businesses.

### **Action Steps**

- Hold seminars and short courses for GIS staff at the LDD and local government level to begin familiarizing them with the need for tracking telecom infrastructure.
- Begin developing of an inventory of existing assets that may of value in the development of community broadband infrastructure, including bike paths, rights of way, rails to trails projects, greenways, and other public throughways that may be useful.
- Begin an inventory of local, regional, and national firms that already have fiber and wireless systems deployed in public right of way. Request route maps and begin tracking those routes as part of a regional fiber and wireless overlay plan.
- For firms that do have fiber deployed, make inquiries about the possibility of long term fiber leases and/or outright purchase of the infrastructure.

## **Goal Five**

***Use public and private sources of capital to finance construction and build out of community broadband systems.***

- ❑ Identify key sources of funds that have the potential of funding 20% to 40% of an entire regional or community build out.

### **Action Steps**

- Work with local USDA officials to identify what requirements would be imposed on a regional broadband coop to qualify for low cost loans from the Rural Utilities Service.
- Meet with private capital firms that specialize in municipal leasing to learn what restrictions and requirements they impose on local government borrowing for telecom projects.
- Explore grant opportunities at the state and Federal level to support broadband infrastructure for low income families and neighborhoods.
- Look for local investors who may want to help with the enterprise. In some areas, multi-county backbone networks have been funded entirely by local investors.