

# ***Telecommunications as Essential Public Infrastructure***

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In the 20th century, economic development and community development reflected the nature of of manufactured goods--all were rooted in physical places. Manufactured goods, compared to the weightlessness of information, are difficult and expensive to move. Collaboration and cooperation across regions and across political boundaries was, like moving manufactured goods, hard to do and hardly seemed necessary.

The Internet has created a new and different economy, in which goods and services have no weight, and are not tied to place. Political boundaries are invisible to the Internet. Does this mean that political entities no longer have relevance? Just the opposite is true, but in a way that most of us do not yet understand fully.

Thomas Jefferson's original vision for democracy in the United States was that most power and influence would be concentrated at the local level, with limited roles for state government, and an even smaller role for the federal government. In fact, Jefferson would be depressed and dismayed at the growth in state and federal governments; it is neither what he envisioned nor what he planned.

Both in the United States and in other countries, telecommunications and related information services are provided and regulated by a confusing array of public and private entities, with pricing structures that are more reflective of the cost of government regulation than the actual cost of delivering a particular service like voice telephony or Internet access.

As deregulation of telecommunications becomes more common, the potential exists for local and regional collaborative ventures in telecommunications that return much control to local communities, and out of the hands of national regulators and large telecommunications conglomerates. The current situation in most countries, in which these providers offer services countywide or across multiple regions, leave local communities with little control or influence over the kind of services they receive or the cost they pay. If communities wish to participate in the Information Economy, modest investments in telecommunications infrastructure will create great benefits. I am not advocating a great new public enterprise, but rather, a public/private partnership where the modest public investments attract much larger private investments. In Blacksburg, virtually all of the high speed access in the community has been built by the private sector. The publicly supported community network created demand for high speed access, which in turn brought private sector companies into the community.

We make investments in telecommunications not for what we can do today, but what we want to do in the future. I believe many telecommunications providers in the United States have underestimated future bandwidth needs by at least an order of magnitude. When large telecommunications providers talk about broadband and what they think that means to them, they talk about one to two megabits to the home and small business. I believe the proper target is 25 megabits, or about ten times more. If we talk about that in today's network protocols, it means every home and small business has to have a minimum of Gigabit Ethernet connectivity. We need to build a robust telecommunications infrastructure in our communities so that when voice, television, radio, and all other information mediums move to the Internet-based transport system our residents and businesses have what they need to compete in the global economy.

## ***Telecommunications and Economic Development***

Mark Peterson at the University of Arkansas and David L. Darling [1] of Kansas State University both are experts on economic development, and both agree that telecommunications is part of the public

infrastructure and that economic developers need to be paying attention to technology issues.

- Human Capital -- This is a set of learned skills that contribute to a person's ability to lead teams of people, manage systems and produce goods and services. The sum of all these skills among all residents and in-commuters equals the human capital stock available to a community.
- Infrastructure Capital -- These are the public and private investments that are permanently affixed to the land in the community.
- Financial Capital -- These are the money resources available to finance community, economic and business development projects.
- Innovation/Technology Capital -- These resources are devoted to supporting the creation, transfer and commercialization of new technologies.
- Commitment/Capacity Capital -- This capital is defined as the financial, human and other types of resources devoted to organizations that plan and implement community and economic development programs. An example is a community foundation.
- Business Environment -- This is the general support or lack of support given to local firms by local government, local labor markets, foundations and other players who impact business.
- Quality of Life -- This includes the recreational, cultural and amenity factors local people can enjoy.
- Environmental and Natural Resources

In the book *Grassroots Leaders for a New Economy* by Douglas Henton, John Melville, Kimberly Walesh[2], the authors note that ***how you use what you have is more important than what***

*you have*. The report identified seven key community processes to facilitate the new economy. They call these “connected community competencies.”

- Workforce education: basic education competencies, advanced preparation, renewal and retraining.
- Technology innovation: research, information flows and technology dissemination.
- Business creation: early-stage financing, entrepreneur support, and critically important culture and attitudes.
- Global trade: specialized facilities and organizations, international networks, and diversity.
- Physical infrastructure and planning: transportation infrastructure, advanced communications, facilities development, housing.
- Regulation and taxation: time-sensitive regulation, balance between taxation costs and value delivered.
- Quality of life: recreation, culture, downtowns, neighborhoods.

Chad Moutray, who is Chief Economist, Office of Advocacy of the U.S. Small Business Administration, has data [3] that shows that small business creates between two-thirds to three-quarters of the net new jobs in the U.S. economy. Small business employs half the workers in the country. Even more startling, 99.7 percent of the businesses in the United States are small businesses. If your only economic development strategy is to compete with every other community in the country for the three-tenths of one percent of the “big company” jobs out there, you are headed down the wrong path. What are you doing in your community to support the growth of existing small businesses in your community, and what are you doing to create new, local entrepreneurs?

Jim Salmons and Timlynn Babitsky of the SohoDojo [4] describe what they call the dejobbed small business. According to Salmons and Babitsky, the traditional small business person has a single job that they do; this business person gets up every morning and does the same set of tasks every day and has a single revenue stream. The dejobbed small businessperson has no regular job--hence the notion of dejobbed. Instead, the small businessperson of the future has multiple revenue streams, and there is a set of tasks or work associated with the maintenance of each of those revenue streams. One of the other characteristics of this dejobbed small businessperson is that they work out of their home.

What does this notion of the dejobbed small business have to do with broadband? In the United States, depending on whom you ask, between 65% and 90% of new jobs are created by small businesses. If you embrace that statistic and the notion that we are going to have many more dejobbed small business people working out of their homes, full time, always on, reliable broadband services to residential neighborhoods becomes a critical goal for economic developers.

### ***Rights of way***

NTIA administrator Nancy J. Victory told the FCC's public forum on rights-of-way issues that no issue is more fundamentally important to the deployment of broadband service than rights-of-way. "We have a long way to go before achieving broadband's potential," and rights-of-way plays an important role in our progress, Ms. Victory said. Commissioner Michael J. Copps stated that because broadband deployment is integral to the rebound of the telecom industry, "any impediments to this must be addressed and solved." "The availability of advanced telecommunications is critical to the economy," said Commissioner Kevin J. Martin. "All governments should do what they can to not impede the deployment of broadband,"

Victory went on to say that Michigan is a good example of a state that has begun to make rights-of-way fees uniform and speeded up the permit process. Laura Chappelle, chairwoman of the Michigan Public Service Commission, has said that communities need to recognize the benefits of charging all telecommunications providers the same rights-of-way fees, even if the fees were lower. Chappelle indicated that the combination of low fees and a simplified permit-application process will attract

would-be broadband providers and the businesses that need them to Michigan towns.

Too many communities believe that rights of way fees are a new revenue opportunity. They believe they can help balance their budgets on the backs of telecommunications service providers; unfortunately, those fees are passed directly through to businesses and consumers in the form of higher fees. High rights of way fees actually retard a community's economic development work.

Over the next twenty to thirty years, rights of way will be the single most important issue most communities will deal with. It is an area that also has the most potential to transform the community's telecommunications infrastructure inexpensively. As an example, the cheapest and best thing a community could do to speed the development of an advanced telecommunications infrastructure is to simply rewrite building codes to require structured wiring in every commercial and residential building. Next, require developers of new subdivisions to install telecommunications duct and set aside very small plots in these new neighborhoods for service providers. When the subdevelopment is complete, the builders would turn over the duct and land to the community, just as they turn over water and sewer systems. Some community-based strategies for accelerating broadband deployment for little or no construction costs include:

- Require all new sub divisions to set aside proper telecom right of way, including NSAPs (Neighborhood Service Access Points--see the illustration on the following page).
- Require developers to install telecom duct and turn it over to the community in the same way that they install water, sewer, and roads
- Require all new buildings to have structured wiring meeting Cat5e/Cat 6 standards
- Just before repaving streets, using one of the new "microduct" systems (by Corning or Emtelle) to deploy duct and/or fiber. Make this part of the street maintenance budget.
- When installing or replacing street lights, use light poles with built in mounting brackets for wireless access points. The poles can be leased out to private sector companies which wish to deploy wireless services.

# First mile investment in telecommunications infrastructure

A brief overview

## Key goals

- Create a competitive marketplace
- Encourage private investment
- Reduce data and telecom costs for all
- Reduce overbuilding and redundant facilities
- Create local markets for new services

*Roads, water systems, and sewer systems were usually privately maintained before communities began management of them for the common good.*

Community investment in duct allows small and regional entrepreneurial telecom companies to compete with "old" monopoly service providers. It also reduces costly overbuilding.

A community colocation facility allows a vendor to enter a community and provide competitive services affordably. An MSAP data exchange point in the colo facility enables high bandwidth services.

**DUCT/FIBER**

**NEIGHBORHOOD EQUIPMENT SITES (NSAPs)**

**COLOCATION FACILITIES, MSAPs**

**WIRELESS SITES, TOWERS**

NSAPs, or Neighborhood Service Access Points, provide equipment location points in neighborhoods for vendors who wish to offer services

*Wired and wireless services may both be used in communities. Geography, service needs, and costs will determine which is appropriate.*

Neighborhood sites for wireless towers should be managed by the community to reduce visual clutter and to provide optimum service

### Joining the Knowledge Economy: Six key challenges

*Vision: Where does the community want to go?*  
*21st century telecom infrastructure*  
*Savvy entrepreneurs*

*Continuous innovation*  
*Skilled workforce*  
*Quality of life*

## *Communitywide Network Parallel Processes*

### *Infrastructure development*

- Design of the network
- Construction of the network
- Network operations
- Community-centered rights of way management
- Building code and zoning code changes

### *Organizational development*

- Organization type determination
- Governance structure and leadership
- Legal and administrative

### *Content and services development*

- Services to citizens and civic groups
- Technology demonstration projects
- Administration and operations
- Bandwidth aggregation

### *Education and training*

- Build demand for services
- Partnerships with local educational institutions
- Short courses and seminars
- Education of local leaders

### *Entrepreneurship development*

- Support for local small businesses
- Planning to attract entrepreneurs from outside the area
- Business infrastructure development
- Neighborhood as business district efforts



Why is broadband so important in neighborhoods? Recall the SohoDojo concept of the dejobbed small businessperson. In the Knowledge Economy, the business district where much growth will occur is the residential neighborhood, as more and more small businesses begin in and stay in homes. Are your building codes and zoning up to it? If you believe you can rely on your town Planning and Engineering department for leadership, you may need to think again. In my experience, town planners are good, competent people who do not receive adequate direction from elected leaders.

In the absence of visionary leadership, town planners simply become enforcers of existing codes, meaning most communities are still using land based on a nineteen-sixties manufacturing economy that is long gone. Communities that embrace traditional neighborhood design (TND) for new developments and require telecommunications infrastructure in new neighborhoods will be creating the best places in America to live and to work. And you don't have to raise taxes or seek grants to get the job done. You do have to have elected leaders who want to make a difference.

### ***The Seven Deadly Sins of Community Technology Projects***

1. Lack of involvement by public officials -- There are at least two reasons why this happens. The first is that elected officials do not feel knowledgeable about technology issues, and adopt a strategy of simply ignoring them to avoid feelings of inadequacy. The community must support its local leaders by providing them with opportunities to learn enough to lead. Second, business leaders whisper in the ears of our leaders that the the government should do nothing, because the private sector will take care of everything. This has not worked in the past decade, and will not work in the next decade. In fact, modest public investments will create much create business and jobs opportunities.
2. Believing it is a make-work project for local businesses -- I see too many communities get started and then immediately doom the project by hiring underqualified local business and advisors on the theory that grant money should be spent locally. If you want to be successful, you must acquire the very best advice and management you can afford. The opportunities for local businesses will be much greater later.

3. Lack of a sustainable business plan -- This is called the “Field of Dreams” strategy. If you build it, they will not come. Investment in telecommunications infrastructure must be sustainable, with a hard-nosed business plan that lays out income and expenses in detail, and looks at least twenty years into the future.
4. Too much emphasis on infrastructure, too little on content -- Often, communities successfully invest in infrastructure but then find no one uses it. Incorrectly, the community then decides that it was a waste of money. Successful community network strategies include not only infrastructure but have multiple parallel tracks that include education and training efforts, serious local content development and management efforts, entrepreneurship development, services development, and bandwidth aggregation.
5. Too much reliance on grants -- Applying for a grant and hoping money will magically appear in two years when the grant runs out is neither prudent nor sustainable, but too many communities rely on this approach anyway. Grants can help a project get started, but they will not sustain it.
6. Doing what you want to do, instead of what you can do -- Communities often get sidetracked by focusing too much on what they want to do, rather than what they can do. Very few communities have the resources to pursue the end goal immediately, but too many act as if that is the only alternative. Every community has the capacity to do something, even if it is a small thing, today. Do that thing first, build on your successes, and keep moving forward with small things executed well.
7. Spending without a vision -- In my experience, money has little to do with success. As far as I can tell, there is only one key factor that determines success in these endeavors, and that is a simple and clearly articulated community vision statement, not just about technology, but describes clearly what you want your community to be like in twenty years. This vision statement need only be three or four pages long, but should address things like quality of life, the environment, entrepreneurship, leadership, and education.

## *The rise of the Knowledge Democracy*

The rise of the Information Economy has created simultaneously two kinds of organizations that have had enormous impact on communities and individuals--the global enterprise and the microbusiness.

The free flow of information has enabled global enterprise on a scale that was scarcely imagined twenty years ago. Even companies that sell real goods (of any kind) are manageable as global enterprises only because the global telecommunications network makes it possible to aggregate in real time the massive amounts of data needed to keep the parts flowing to factories, to keep finished products moving onto trucks and planes, to keep the trucks and planes carrying those goods to their destination, and to keep the stores in individual communities stocked with the right level of goods.

The dilemma for communities is that it is often very difficult to have a conversation with or maintain a relationship with a global enterprise whose headquarters may be many states or many countries away. And if conversations occur, they are often extremely complex because of the many layers of company managers and company lawyers that may be required just to talk, let alone reach consensus on an issue.

Conversely, the fluidity of information and ease of communications has led to many more individual and small enterprises that often have tremendous impact on the community. Increased ease of information distribution has led to an increase in nonprofit and community groups that use highly-organized and sophisticated technology to argue single issues before local government.

Local government leaders, exhausted by the barrage of conflicting information, the intense demands for individual consideration at the expense of the common good, and the threat of costly litigation from both business and community groups, often end up doing nothing or simply taking the path of least resistance (that course least likely to provoke a lawsuit). In the end, the community disintegrates because relationships have become formalized in lawsuits or do not exist at all. Community becomes an exercise in shouting, rather than speaking, listening, and understanding.

The concept of the Knowledge Democracy involves three key points:

- First, the acknowledgment that telecommunications and the rise of the Internet have permanently altered the way people acquire and use information. In the past, distribution of information about community issues and affairs was expensive and tedious. Information was often passed informally through the maintenance of human relationships in the community. Today, information is widely available from many sources, and human relationships are no longer needed to obtain information.
- Second, a civil society trying to make decisions will be most effective when the process of finding the common good is regarded as a mutually interdependent effort in which the goal is to help all parties to the process succeed. This approach requires constant maintenance of relationships through mutual respect of the opinions of others, gained by speaking, listening, and understanding.
- Third, that the American model of democracy works best when approached as an ongoing set of conversations about issues, leading to a consensus within the community about the best course of action. These conversations are purposeful, parallel processes designed not just to talk about the issues but also to reach consensus on how the community should proceed. These processes are aimed at rebuilding trust by letting citizens participate fully in all aspects of deciding what to do about a key issue.

Representative democracies are intentionally designed to avoid the tyranny of the majority by using elected representatives to mediate these conversations and make decisions based on understanding the content of those conversations. Representative democracy permits lawmakers to make decisions that may be at odds with a majority of individuals, but that may best represent the common good. Note that a key feature of representative democracy, as compared to other forms of government, is that it permits such an outcome, even though making decisions for the common good is not an automatic outcome of the process.

A community operating on the principles of the Knowledge Democracy will:

- Make equitable use of information technology to encourage broad participation in conversations by as many individuals and organizations as possible. Information technology will also be used to gather, interpret, and disseminate widely all opinions and information about an issue, to those interested individuals and organizations.
- Make a commitment to place the highest priority on human relationships, which are the basis of a healthy community. Participants in community discussions will agree to speak with care, to listen with respect, and to make every effort to understand the needs and wants of others (even if they disagree).
- Make a commitment to seek consensus on issues and to respect the basic principles of representative democracy, rather than automatically resorting to litigation when outcomes reflect a consensus for the common good rather than self-serving wants.

Finally, in the Knowledge Democracy, we must learn to distinguish between information and knowledge. While we talk about the Information Age, information is not the problem. We have plenty of information; what we usually lack is knowledge. And what is knowledge? Knowledge is on the path to wisdom. In fact, I think we can talk about the mathematics of wisdom.

- Data + Structure + **Cognition** = Information
- Information + Context + **Cognition** = Knowledge
- Knowledge + Experience + **Intuition** + **Cognition** = Wisdom

The common element in these equations is cognition and intuition--what happens inside our heads. This cannot be duplicated by a computer, no matter what people selling this stuff tell you. A handheld GPS is not much good in helping you get home if you forgot to put fresh batteries in it.

## *A vision for the future*

I mentioned earlier the importance of a shared vision for the future. This is independent of the size of the community, independent of the local economy, independent of the wealth (or poverty) of the community. If the community can come together and reach consensus on a futures-oriented vision of what the community ought to be, that community will be successful. Once a community shares that common vision, the goals, objectives, and outcomes flow naturally from the shared vision. In everything I do, I have one, simple vision for technology.

*The purpose of technology is to support and enhance human relationships.*

Put another way, the purpose of technology is not to encourage people to have a close, personal relationship with their computer. Nor is it to encourage people to use software that requires them to constantly ship a significant fraction of the wealth and prosperity of their community to a few companies that are using their size and power abusively. The purpose of technology is not to encourage people to spend hours installing overly complicated and complex software that crashes frequently just so they can write a one page letter to someone on the town council. The purpose of technology is not to create "walled gardens" that encourage people to buy more stuff while locking them out of the opportunity to publish and read whatever they like.

Communities must ask themselves some questions.

- Are you firmly committed to a forty year old economic development strategy that ceased being appropriate about twenty years ago?
- Are you simply reforming that strategy by emphasizing projects like call centers, which are simply Information Age equivalents of the factory floor?
- Are your elected leaders treading water and simply trying to maintain the status quo, which no longer works in a global, networked economy?

What does a vision for the future look like? Each community must come together to create a vision that uniquely reflects the strengths and capacities of the region, but I can give you some guiding principles.

- The Information Economy is over--we are already entering the Knowledge Economy, which will transition within twenty years to the Web Economy. If you are planning to take part in the Information Economy, you are too late.
- In the wake the government and business scandals of the past decade (e.g. Enron, Global Crossing, vote fraud, White House interns), the community must dedicate itself to 21st century core values (ethical, moral, spiritual values that define the community)
- We must nurture and develop transformational leaders--leaders who understand their role has changed, from one of deals made behind closed doors to one of facilitation. The leaders of the future must be comfortable encouraging authentic dialogue about community issues and be able to bring those discussions to a true consensus that leads to action.
- We have to reprogram the DNA of the community--recognizing that we are all part of interdependent, nonlinear systems that provide us with opportunities for personal, business, and community transformation.

Every community that wants broadband must first articulate a vision of what they want their community to be like--not next week, or when the fiber is installed, but what the community will be like in ten or twenty years--this vision must describe, simply and clearly, what people will be doing with technology, how they will be using for business, personal, and civic use, and how the technology will make that community a better place to live and to work. If communities take the time to develop this vision, if they take the time to develop a consensus in the community that makes it a shared vision, that community cannot fail in whatever it tries to do.

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## About the author

Dr. Andrew Michael Cohill is an information architect with more than thirty years experience in technology and telecommunications. His educational degrees include a B.S. in Computer Science, a Master's degree in Information Systems (specializing in ergonomics), and a doctoral degree in architecture. He has worked in large and small businesses, in state government, and in academia. He worked for AT&T before, during, and after the breakup in the mid-eighties, and worked at AT&T Bell Labs as well as the manufacturing arm of the company. He has extensive experience in software and data base systems development. His software R&D group at Virginia Tech was designing and deploying Internet-based software in the early nineties, before the Internet became a household word.

In 1993, Virginia Tech selected him to lead the Blacksburg Electronic Village project. Over the next decade, Cohill made Blacksburg a worldwide phenomenon; throughout the late nineties, Blacksburg was widely hailed as the most wired community in the world. More recently, Cohill was selected by the Governor of Virginia to lead the Virginia eCommunities Task Force; in 2000, Cohill advised Hewlett-Packard on the design and management of HP's Digital Villages initiative.

He has consulted with more than 100 communities worldwide on telecommunications planning and long term strategy development. He is in wide demand as a speaker and advisor on technology issues because of his nontraditional approach to community development and his dedication to approaching technology issues as part of a larger view of the community. Passionately committed to ensuring that communities get the right technology to prosper in the future, Cohill began working full time as a consultant in the spring of 2002. He is also Executive Director of the Knowledge Democracy Center, and works closely with Communities of the Future on a variety of joint projects.

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