BROADBAND INTERNET ACCESS FOR ALL RESIDENTS OF TOMPKINS COUNTY

"Keeping Our Community Connected"

Recommendation
To The Tompkins County Legislature

Prepared by

The Tompkins County Broadband Committee

Pat L. Pryor, Chair
David M. McKenna, Vice Chair

January 17, 2012

Broadband Internet Access for All Residents of Tompkins County

"Keeping Our Community Connected"

Table of Contents

ACKNOWLEDGMENTS

To: The Tompkins County Legislature

From: Pat Pryor, Chair and Dave McKenna, Vice-Chair
               Tompkins County Broadband Committee

Re: Comments from the Chair and Vice-Chair

Date: January 17, 2012

It is not often that one has the opportunity to work on a project with the extensive scope of the charge to the Broadband Committee (the Committee). We feel privileged to have led the committee to this point of presenting our findings and recommendation to the Legislature. Yet, we also know that the needed work will not be complete until every home in Tompkins County has access to broadband Internet service. We both wish to indicate that, as the County and its municipalities move into the implementation phase, we are willing to continue in our role(s), if it is the desire of the Legislature for us to do so. We wish to thank the Legislature for its foresight in establishing the committee and for the opportunity that has been provided to lead its deliberations.

Access to broadband Internet service rapidly has come to be regarded as a basic necessity of 21st century culture in much the same way that phones, radio, and television were regarded in previous generations. Yet, it is very much a fact of life that in our rural communities a significant number of homes lack such access. During the time that this committee has been working, community members regularly have contacted us, wanting to know when they will be able to get access and how they can help move our work forward. Interest in our findings and our recommendations is keen, as currently unserved residents look forward eagerly to the benefits of having broadband Internet service available at home.

Our county library and many of our local libraries have seen the need and have taken many steps to implement as much free public access as they are able to provide. However, the need is so great that there are frequent lines waiting to use the available public terminals. We anticipate that our libraries will continue to be an important part of the network of access that will be necessary to reach all county residents. Even when every home has broadband Internet available, there will be some who cannot afford the price, and increased library access will continue to be needed to fill the gap.

We cannot close without thankful acknowledgement of the highly dedicated and professional contribution of a terrific group of community volunteers who stepped forward to assure that this committee had access to the best thinking available in its deliberations. Without them, we could not have done what has been done. And most have indicated a willingness to continue to make their expertise and commitment available in moving this project forward to its next steps.

And lastly, we wish to thank County staff for their invaluable contributions to the effort, particularly our regular staff at meetings—Paula Younger, Deputy County Administrator, and Andrea Gibbs, Administration Specialist. Public Information Officer Marcia Lynch, also, was especially helpful in bringing the final document to publication standards and assisting with preparation for public distribution.

Sincerely,

Pat Pryor   Dave McKenna

EXECUTIVE SUMMARY

The importance of high speed (broadband) access to Internet services has catapulted to prominence at all levels of government in recent years, as broadband becomes a more integral part of everyday life for both households and businesses. No longer is broadband service just a "gadget" for the entertainment of those with financial means, or for business operations alone. Quality Internet access is a necessity for the day-to-day transactions and communications of every citizen. The 21st century equivalent to rural electrification or the interstate highway system, the provision of universal access to a broadband connection is now recognized as an appropriate role for government at the local, state and federal level.

In August 2010, the Tompkins County Legislature noted that certain county residents were unable to participate in the rapidly growing number of services available only to those with broadband access, either because they lived in rural areas where broadband was not available, or because they could not afford it.

The Tompkins County Broadband Committee (the Committee), made up of eighteen community volunteers and two members of the County Legislature with the support of County staff, was formed to address issues surrounding broadband access. (See *Appendix A* for a list of members.) The Committee was charged to "…advise the Tompkins County Legislature on how to best promote broadband technology countywide, to address the needs of unserved and underserved residents, foster public-private innovation, enhance existing capabilities, and support good governance."

> **The digital divide is an "opportunity divide." . . . Being connected is no longer a convenience; it is a necessity.**
>
> **FCC Broadband Adoption Task Force**
> **November 30, 2011**

With valued voluntary input from several outside consultants and the expertise of its own highly competent members, the Committee began its task. Three subcommittees were created to examine aspects of the issue: Level and Quality of Access; Education and Awareness; and Funding. By the spring of 2011, the nucleus of recommendations began to emerge and on June 21, 2011 the Committee presented its Interim Report to the County Legislature.

Based on analysis of all the information on various options available, the Committee recommends that the County, in collaboration with other stakeholders, proceed to implement universal broadband Internet access in Tompkins County via a *Fixed Wireless* option, as described in detail in this report.

The Committee considers the *Fixed Wireless* recommendation to be superior to all other technological possibilities in a number of ways:

Cost. A preliminary estimate, provided as part of the State presentation to our group in April, and confirmed by our investigations, suggests that *Fixed Wireless* would be the most cost-effective option for meeting current requirements. A good working number for capital cost is from $300 to $800 per household.

Deployability. We have local experts who know all aspects of the technology. There will be no guesses or unforeseen issues in deploying it.

Support of the local economy. Four local companies, employing local residents, offer Internet access using this technology.

Evolutionary upgrades. While the *Fixed Wireless* approach meets current FCC standards, it does not have the high-speed capabilities of a few other alternatives. The Committee, however, proposes to start with a modest, lower cost system, with independent options for incremental and modular upgrades in the future.

Our recommendation, therefore, allows for future deployment of an enhanced system with future flexibility. Communications technology will almost certainly change dramatically in coming years. Committing to a very high-end solution now may leave the County mired in outdated technology because of new technologies that come on line during development.

Implementation of a *Fixed Wireless* option now will allow us to accomplish the goal of universal broadband Internet access at a moderate cost, while preserving options for future upgrades. We are confident that this approach will serve the citizens of Tompkins County well, enabling the County to address both current and future needs.

There is still much work to do going forward.

A business plan should be put in place, at least in a draft form, so that, should an opportunity for funding present itself, the County is ready to move forward rapidly with an application. The County should identify a mechanism to keep the expertise represented on this committee, as it moves forward into a business plan phase. Additionally, no matter which technology, governance, and funding mechanisms are finally decided upon, the County must have substantial funding available and the readiness to commit matching funds, should grant opportunities become available—or, failing that, to directly fund the project.

INTRODUCTION

Understanding the Need

The Internet plays a vital role in contemporary life globally and is the technical foundation for a vibrant and competitive future in Tompkins County. An international information economy requires access to broadband Internet for commerce, education, political participation and cultural development of the community. Unfortunately, the current state of the County's infrastructure for broadband access to the Internet serves the community unevenly and insufficiently to meet these needs. The technology exists, but the cost for commercial providers and the price for individual subscribers are too great to extend the infrastructure into the less densely populated or more rural areas of our community.

The cost/price factor is in conflict with the obvious need that the community has for broadband access to the Internet. It is clear that the Internet plays a critical role in supporting businesses, educating students, encouraging citizen involvement, and connecting our population to the world. The reverse is also important: the absence of broadband Internet retards economic progress, inhibits political engagement, reduces attractiveness to potential residents, and isolates both individuals and the community from participation in the global culture.

Broadband Deployment as Social Policy

The very formation of a Broadband Committee of Tompkins County, which presents this report to the Legislature, further reflects concern about equitable access to the Internet for all the members of our community.

The Tompkins County Legislature has a choice. It can assume that Internet access is a personal matter, and solutions to it are up to the individual. Or the Legislature can treat broadband access to the Internet as infrastructure that is as necessary to the health of the community as roads and highways, and recognize the relationships that it navigates between commerce and the people for the benefit of the entire county.

If a global information economy requires equitable, robust broadband access to the Internet, then the Legislature should find a reasonable way to make sure service is available for all residents of Tompkins County. This document, which outlines a financial and technological analysis of options for deployment of that infrastructure to the residents and businesses of Tompkins County, is offered in the hope that the Legislature will find workable solutions to realize this goal.

> **Economic and Societal Benefits of Universal Broadband Access**
>
> *Geographically approximately 25% of Tompkins County does not have access to reliable and affordable broadband.*
>
> *How might our county benefit from broadband expansion?*
>
> Health care options are increased, as rural practitioners have access to broadband Internet programs geared to health care-related professions.
>
> Rural residents will be able to participate from home in the cultural, informational, educational, and business applications that are available to those with broadband Internet access.
>
> Business development is encouraged when telecommuting is a possibility. Small and medium-sized businesses, the most effective job creators, will especially benefit from broadband Internet access.
>
> Real estate markets will see a boost in areas that currently lack broadband Internet access.
>
> The availability of jobs in the area as a result of business growth will provide options for our young people to remain and find meaningful local careers and professions.

TOMPKINS COUNTY BROADBAND COMMITTEE—THE CHARGE, THE WORK, AND THE ACCOMPLISHMENTS

In August of 2010 the Tompkins County Legislature voted to establish a broadband committee. The essence of the committee's charge is to *"…advise the Tompkins County Legislature on how to best promote broadband technology countywide, to address the needs of unserved and underserved residents, foster public-private innovation, enhance existing capabilities, and support good governance."* County Legislator Pat Pryor serves as Chair of the committee, and County Legislator David McKenna is Vice-Chair. Please see Appendix A for a complete list of committee members.

Over the past ten months, this committee has sought and received valuable input from public and private sources. Beginning with its first meeting in November of 2010, the Broadband Committee focused on the following elements of its charge:

- Economic Development
- Government Performance
- Public Safety/Emergency Medical Services
- Tele-Health (in-home heath care)
- Education – changing needs and equity
- Energy and Environment
- Rural Broadband Access
- Civic Engagement.

A consensus quickly formed that a subcommittee structure would best address the following key subject areas:

- Level and Quality of Access
- Marketing, Education and Awareness
- Funding, Partnerships and Collaborations

Results of subcommittee work so far include the following achievements:

*Subcommittee on **Level and Quality of Access***

- Prepared a "gap map" of the County, showing where broadband access is not available. Much more accurate than New York State's, the map enables the identification of appropriate technologies. (This "gap map" is included as part of this report. See *Exhibit I* on the next page.)
- Determined cost estimates for required technologies.

*Subcommittee on **Marketing, Awareness and Education***

- Developed information to counteract a general misunderstanding and lack of awareness of the need for broadband access.
- Planned initiatives to increase awareness of the value of broadband in our county.
- Recognized the impact of broadband access on the quality of life for county residents.

*Subcommittee on **Funding, Partnerships and Collaborations***

- Identified options for generating revenue for a broadband initiative.
- Concluded that the most appropriate technology is a "moving target" and that, therefore, costs of a broadband initiative will vary, depending on which technology is adopted.

- Determined that the lack of a clearly defined business plan of action will inhibit the County's ability to compete successfully for future Federal/State funding opportunities.
- Concluded that substantial funding will be necessary.

Exhibit I. "Gap Map" of Current Unserved Areas of Tompkins County

As of September 1, 2011, there were 4,714 households and businesses in the rural areas of Tompkins County that were without reliable broadband access. This graphic provides the geographic location of these areas, with the purple shading identifying the unserved area, and the heavy yellow lines denoting the municipal borders.
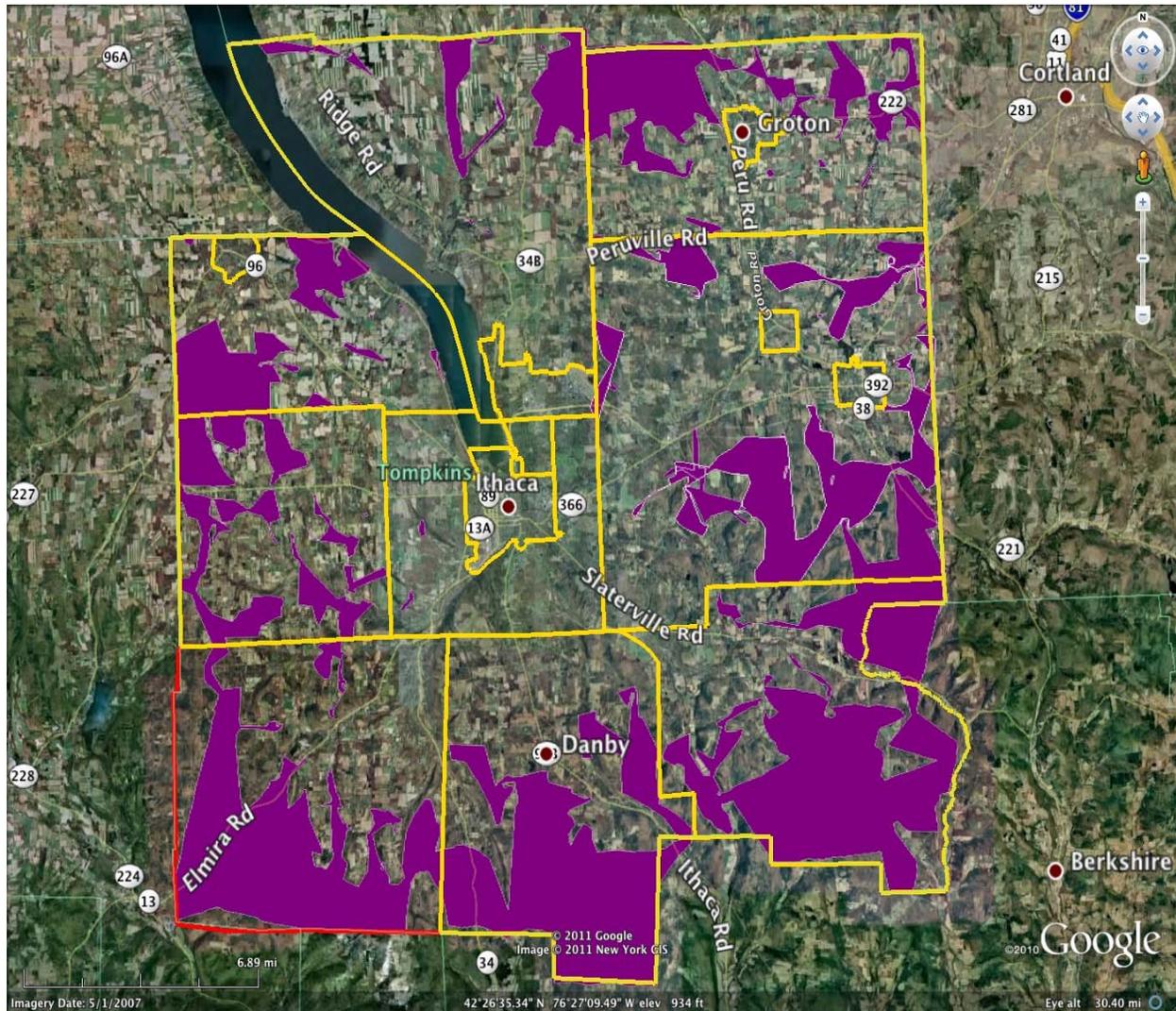
The Broadband Committee invited several information technology experts to bring their perspectives to the group. Presentations to the Committee included

- Thomas D. Ball (Cornell University) – presented *Cellular Evolution and the Road to 4G.*

- David Salway (NY State Enterprise Program & Performance Management Office & Broadband Program Management Office) – summarized state and federal broadband initiatives with local impact.

- William Johnson (NYS Office of Cyber Security) – demonstrated the Web-based mapping program showing gaps in broadband availability, types of broadband technology deployed, levels of competition, and maximum speeds. *(Upon examination committee agreed that this map does not reveal the true scope of areas that are underserved.)*

- Joe Starks (ECC Technologies) – provided an overview of broadband expansion in the Finger Lakes and Southern Tier Regions, including a high-speed broadband connectivity project in Chemung, Schuyler and Steuben Counties.

- Paul H. Griswold & Jim Baase (Finger Lakes Technologies Group, Inc.) – Q & A on broadband fiber network construction in the state with a focus on central New York State.

- Dr. Luvelle Brown (Superintendent of Schools, Ithaca City School District) – presented the importance of information technology in K-12 instruction, what this means for children and families residing in his district, and the potential impact for students in households without high-speed Internet access outside the classroom. Also reported on district plans for expanded use of technology in the classroom.

- Chuck Bartosch (Clarity Connect, Inc.) – presented an analysis of the "gap map" identifying locations without broadband service in Tompkins County, showing real gaps in locations where the New York State Office of Cyber Security and area cable/TV companies show that broadband service exists.

The Committee also reviewed the vision statement of the Regional Economic Development Council of the Southern Tier, and heard a report from Ric Dietrich (Supervisor, Town of Danby) on the strategy for cable franchise negotiations in Tompkins County.

Additionally, the Committee submitted a proposal to the Community Foundation of Tompkins County (CFTC) requesting funds to administer a survey on broadband access availability and needs in underserved communities. (The proposal was not approved for funding by the CFTC, but the committee is continuing to explore funding options to administer the survey.)

Exhibit II, which follows, provides more detail of the activities of the Committee at its monthly meetings.

DATE		EXHIBIT II: MEETING SUMMARY
2010	**November:**	**Pat L. Pryor (D-District 6), Chair of the Committee:** Introduced **Martha Robertson, Chair of the Tompkins County Legislature,** who welcomed and thanked the committee members for accepting the assignment.
		Discussion: Brainstorming session: how to accomplish the expansion of broadband internet access to all parts of the County.
	December:	**Presentations:** Committee members with expertise in broadband technology shared their experience to create a baseline for committee work.
		Discussion: Formation of working groups around access, affordability, and public awareness**.**
		Discussion: Developing a problem statement on issues and goals within the Committee's Charge.
2011	**January:**	**Report:** Meeting of the Tompkins County Council of Governments (TCCOG) on cell towers and cell tower placement. Committees coordinate for information sharing and avoid duplication of work.
		Sub-committees Formed: 1. Level/quality of access 2. Marketing/Education/Outreach 3. Funding
		Goal of Committee: Affordable service for 100% of the county
	February: First Sub-committee reports	**Marketing, Education and Awareness:** Identify short-term, mid-term, and long range plans. Education via public forums. Investigate perceived household needs for technology and develop community education component.
		Level and Quality of Access: Evaluate technologies and estimate cost for providing. Develop "gap map." Priority to areas with no access. Define broadband in reference to FCC - 5 Mbps aggregate. Expandable to levels high enough to support small business, etc. Users pay operating expenses. Primary cost capital expense. Estimate 2-3 years to 100% coverage.
		Funding and Collaboration: Public utility; tax-free municipal bonds; federal grants; Cell tower issues TCCOG; transmitters on existing/proposed towers; tax incentives for service to low density areas; commitments to provide services to cell towers in exchange for reduced rent for wireless carriers; existing networks (TST BOCES); partner with other counties to achieve population targets for grants.

DATE		MEETING SUMMARY
2011	**March:**	**Presentation:** **Thomas D. Ball, Manager of Voice Engineering for Cornell:** *Cellular Evolution and the Road to 4G.* Explanation of industry terms related to service expansion, pricing, and projecting revenue; regional availability of "4G" technology.
	April:	**Presentations:** **David Salway, Director of the Enterprise Program & Performance Management Office and the state's Broadband Program Management Office:** State and federal broadband initiatives; Assessment of local broadband needs. **William Johnson, Deputy Director, NYS Office of Cyber Security: Geographic Information Systems:** Broadband mapping program; Web-based mapping program. *(*Agreement in Committee that the NYS map does not reveal the true extent of underserved areas)*
	May:	**Presentation:** **Joe Starks, President and founder of ECC technologies:** Broadband and telecommunications issues in underserved areas; role of local municipalities in closing gaps; Overview of broadband expansion in the Finger Lakes and Southern Tier Region.
	June:	**Presentation:** **Paul Griswold, President/CEO and Jim Baase, Vice President-Network Services, Finger Lakes Technologies Group, Inc. (FLTG):** Presentation on services provided by the company and broadband fiber network in New York State.
	July:	**Presentation:** **Dr. Luvelle Brown, Ithaca City Schools Superintendent:** Importance of Internet k-12; Impact for students w/o high-speed Internet access at home; Preparing teachers for technology in the classroom.
		Paula Younger, Deputy County Administrator: Vision of Broadband Committee; Attendees invited to join in a discussion with Subcommittees; Discussions yield insights and ideas.
	August:	**Presentation:** **Chuck Bartosch of Clarity Connect:** Presents "gap map" identifying locations without broadband service; map reveals gaps that New York State maps do not show (see April).

DATE		MEETING SUMMARY
2011	**September:**	**No formal Committee meeting:** Individuals and Subcommittees continue work.
		Southern Tier Regional Council Public Forum: Community provides input on priorities for economic development including upstate broadband service delivery.
		Committee sub-group proposal to TC Community Foundation: Seeks support for a survey on broadband access in underserved communities.
	October:	**Committee member, Ric Dietrich:** Report on strategy for Cable Franchise Negotiations: **Tompkins County Council of Governments (TCCOG)** create a common agenda to encourage competition among providers to promote broadband access build-out in the towns. **Suggestion:** Create TCCOG/ Broadband Committee collaboration to share information and expertise.
		Marketing, Awareness, and Education Subcommittee: Interim report presents separate plans for going forward both with and without TC Foundation funds for proposed survey.
	November:	**Discussion:** Regional Economic Development Council of the Southern Tier—Interface between the Council's Goals for Broadband and Committee Recommendations to the Co. Legislature.
		Status of Cable Franchise Negotiation Strategy (Ric Dietrich)
		Discussion: Preparing Formal Recommendation; Document production steps, time line, and Committee member assignments.
	December:	The Committee met twice in December to review and make revisions to the formal Recommendation Document that will be given to the County Legislature in January 2012. The Committee also began discussion about the design/delivery of a presentation to the Legislature, which is intended to provide a brief overview of the Committee's work during the past 12 months and to introduce to the Legislature the Committee's key recommendation for improving broadband access in the County.

PROMOTING BROADBAND TECHNOLOGY IN TOMPKINS COUNTY: WEIGHING THE OPTIONS FOR RELIABLE, COST-EFFECTIVE CONNECTIVITY

Technology Options

Prior to making its recommendation, the Broadband Committee considered several technology options for expanding connectivity in Tompkins County. The following options were investigated and determined to be technically insufficient:

Broadband over power lines. In this scenario, Internet access is provided over power lines. However, it is technically incompatible with the power system (and with most of North America's power systems) and hence is not an option here.

DSL. DSL ("digital subscriber loop") is a technology for carrying Internet traffic over copper phone wire. However, it cannot meet the Federal minimum standards for broadband without extensive costly local infrastructure development. DSL is being phased out across the nation and such upgrades are very unlikely.

Cellular. Cellular ("4G") can meet Federal standards if the infrastructure is intensively deployed, but at this time there is no deployment at all in rural Tompkins County, and deployment by the cellular operators in the near future seems unlikely in areas without coverage from the prior standard.

The following options were also considered and determined to be technically sufficient. This determination changed the selection criteria from a technological consideration to a cost/benefit evaluation for each technology.

Fiber to the Home. Fiber to the home would provide reliable high-speed connectivity to every home and would easily support foreseeable future needs. For pure performance, it would be the ideal solution. However, it would be prohibitively expensive to deploy. Deploying fiber to underserved homes throughout the County is estimated to cost about $25,000–$60,000 per mile of fiber. A local exchange carrier in southern Minnesota provides fiber to the home in an area similar to ours and found it costs an average of $2.2K per household to $5.3K per household depending on population density.

Hybrid Fiber/Coax. This term refers to running fiber from central facilities to distribution points ("hubs") in various localities, and coaxial cable from those distribution points to the users near them. Most cable operators, including those in Tompkins County, operate their systems this way. There are two issues. First, reaching new unserved areas requires laying new fiber to new distribution points, and the costs are the same as for fiber to the home. Second, current central equipment provides relatively slow, shared upload speeds, and upgrading the system to support higher speeds would be expensive. It would require upgrading both the endpoint connections and the central equipment. Slow upload speed limits newer applications—for example, where video is sent. This is of particular concern to businesses, medical facilities, and institutional users such as libraries and municipalities.

Fixed Wireless. "Fixed Wireless" means the customer endpoint is at a fixed location, as opposed to a mobile endpoint (such as a cell phone). A dedicated fiber or wireless connection from a central office

is used to feed a wireless distribution point, where radio-based connections, instead of coaxial cable, reach end users. An increase in capacity typically requires the addition, not substitution, of equipment, and usually does not require a change at an end user location. It is, therefore, much less expensive than the other two main alternatives. However, there can be spectrum capacity issues, since there is only so much frequency space available for sending data over airwaves, but this tends to be less of an issue in rural areas and more of an issue in dense areas, such as towns or villages. A good working number for capital cost is from $300 to $800 per household.

RECOMMENDATION TO THE COUNTY LEGISLATURE

The committee recommends the *Fixed Wireless* option (described previously), whereby a signal is relayed from a central office to a distribution point, such as a cell tower or even a telephone pole. The distribution point sends the signal wirelessly to a fixed end-point (receiver) on the home.

This option avoids the expensive and cumbersome installation of "last mile" connection that is necessary with a fiber build-out. It does not provide as much bandwidth as fiber to the home (the ideal), but it can exceed the current federal definition of "broadband" and be upgraded in a modular fashion to meet future demand. It is preferable to other current technologies for the following reasons:

It is affordable. A preliminary estimate, communicated during the State presentation to our group in April and confirmed by our own investigations, predicts that *Fixed Wireless* would be the most affordable option for meeting current requirements.

It is low risk. We have local experts who know all aspects of the technology. There will be no guesses or unforeseen issues in deploying it.

It supports the local economy. Four local companies offer Internet access using this technology and employ local residents. Since the local consumer is the primary customer base for these companies, they may provide a solution preferable to other larger companies whose primary interests may lie elsewhere in both geography and mission.

It is upgradeable. While this model does not provide the peak speeds of some other approaches, its implementation cost is relatively modest. As consumer demand increases or technologies change, its speed and capacity can be upgraded, and those upgrades can be incremental and modular, meaning different parts of the system can be upgraded independently and in steps, as needed.

Communications technology can change dramatically in only a few years. In the future, if bandwidth demand becomes so high that a system such as this fundamentally cannot support it, the expense of deploying fiber to the locality or to the home would be justified. This recommendation does not preclude deploying an enhanced system in the future, and the initial low cost of the system may mitigate the objections to replacing it all or in part with higher-speed technology, which may very well become more readily and cheaply available in future years.

MANAGING THE VISION: GOVERNANCE MODELS, RESOURCES, AND FUNDING CONSIDERATIONS

At the outset, the committee's Funding, Partnerships and Collaborations Subcommittee identified several opportunities to generate necessary revenue for a broadband initiative, as well as collaborations that might reduce operating costs. As we investigated the options, we found there was more ambiguity than firm fact for many of them.

Some options, such as those revenue sources that require a political act, will require long-term positioning of broadband access as a social and economic necessity. Other funding options, such as State and Federal grants, subsidies, and incentive programs (for example, American Recovery and Reinvestment Act or "stimulus" funding), suffer from issues detailed below.

Much of the funding used by neighboring counties for similar initiatives is no longer available. Complicating the issue even further, the technical parameters, project scope, and most appropriate technology to employ are in a state of constant change. Specific funding methodologies will need to be determined at the time the County commits to implementation. In preparing for a "shovel ready" broadband project, assessing the most appropriate technology and funding mechanism will need to be revisited.

For now, the Broadband Committee's recommendation regarding funding would have to be a firm "it depends." Nonetheless, it is useful to discuss methods that have been used to fund completed projects in other localities. It is safe to assert that there will be no sole source of funding available that will be sufficient for a project of this scope.

Resources and Funding Considerations

Traditional local government revenue options. Tompkins County has available to it the traditional revenue methods that governmental units always have— bonding, property tax, and tax abatement or incentive for providers. In the current economic climate, a substantial amount of political will would be required to utilize these options. The case would have to be made that minimal broadband services are an economic and societal necessity.

State and federal sources. There are several programs and methods in this category that may be useful for funding an initiative to provide service where there is limited economic incentive for commercial providers to do so. Currently, each of them has substantial impediments that must be cleared before funding can be secured.

- The Rural Utilities Service (RUS) grant program, administered by the U.S. Department of Agriculture (USDA), may be an option. Currently, however, this program refers to areas not served as indicated by the National Broadband Map that has been issued by the National Telecommunications Infrastructure Agency. This map is based on census data, not on actual coverage performance, and therefore many of the areas in Tompkins County that are de facto underserved are listed as already having broadband available. It should be noted that the National

Broadband Map is widely recognized by industry experts as being incomplete, insufficient, and erroneous.

- Universal Service Fund (USF) initially was created to bring telephone service to rural households on the model of the Rural Electrification Act that brought electricity to the same households. (There is a charge for this on monthly telephone bills to underwrite the cost to the provider.) There have been several hearings and proposals regarding how to repurpose the ongoing revenue stream to support broadband. However, unfamiliarity with the technologies, too broad a range of options available, a lack of definable standards on what constitutes acceptable service, and the fact that many large and powerful players (telephone companies) derive substantial revenue from this Fund will probably prevent any resolution in the foreseeable future.

- Appalachian Regional Commission (ARC) is a regional economic development agency that represents a partnership of federal, state, and local government. Established by an act of Congress in 1965, ARC is composed of the governors of the 13 Appalachian states. Local participation is provided through multi-county local development districts, which for Tompkins County is represented by the Southern Tier Eastern Region Planning and Development Board (STERPDB). Each year at designated time frames ARC provides funding opportunities for a variety of projects in areas such as business development, education and job training, community development, and telecommunications infrastructure. Grant requests from our area are coordinated through and recommended to ARC by STERPDB. Tompkins County is not a member of STERPDB, and the committee recommends the County consider joining.

Utilizing pre-existing networks. For a combination of legal and technical reasons, it is not possible to use existing networks, such as the Cornell University network, the Tompkins-Seneca-Tioga Board of Cooperative Educational Services (BOCES) network, or the New York State Education and Resource Network (NYSERNet).

Grants from private foundations and individuals. The Gates Foundation, the Pew Charitable Trust, Annenberg Foundation, Google, and other private philanthropic entities have in the recent past made monies available at the magnitude required. While these exist conceptually, their actual usefulness will depend upon what is available at the time concrete steps are taken to initiate this project.

Governance Models

At the time this report is being written, there is no urgency to immediately choose the most appropriate governance model for a Tompkins County broadband initiative. It is a given that, no matter what the structure of governance, this project will emerge as a fee-for-service operation.

It is safe to assume that one option can be ruled out: current commercial providers reaching into those unserved areas without additional incentives. This technology is mature enough that if there were a viable business case for the commercial model to provide extended service, providers would have done so by now.

Discussed below are three broad categories of governance and oversight that would work. There are advantages and disadvantages of each based on consideration of what are primarily fiscal operating issues.

Category 1—*Incorporate the initiative into the current County departmental structure, either standalone or as a subdivision of information technology or communications.* This has the advantage of being able to secure almost any type of funding conceivably available, from government grants to private corporations, bond issues, and tax revenue. However, the initial capitalization of this project is fairly high. Under this model, the capital assets and the accompanying depreciation would impact the County budget.

There are logistical considerations since personnel would be County employees. The question would need to be addressed regarding whether personnel costs and potential collective bargaining issues under this scenario would exceed those under the alternative models below.

Additionally, general ledger adjustments would have to be made to collect and record the cash flow from the monthly provider fees, with the accompanying logistical issues of operating a service on the basis of monthly billing.

Category 2—*Create a public authority or a municipal utilities corporation.* Public authorities are corporate instruments of the State created by the Legislature to further public interests. Public authorities have various levels of autonomy from the State based on the powers, as well as the constraints, built into their legislative mandate. They require a State legislative act.

Some public authorities are completely self-supporting and operate entirely outside the budget process, while others rely on State appropriations to fund operations. In addition, most authorities are authorized to issue bonds, without voter approval, to develop and maintain infrastructure, as will clearly be necessary with this project. Project revenues usually support debt service for these bonds.

Unlike traditional State agencies, many authorities conduct business outside of the typical oversight and accountability requirements for operations including, but not limited to, employment practices, contracts and procurement procedures, and financial reporting. Each public authority is governed by a separate board of directors appointed by elected officials for varying terms of office.

The advantage of an authority is its separation from the County's budget, its ability to issue bonds, and looser requirements than a true governmental department. However, establishing an authority requires enabling legislation, which would require a fair amount of specificity about the role, objectives, and cash flow before such an authority could be established. This approach also, for better or worse, makes the State your partner. Additionally, since elected officials appoint oversight positions, the oversight board may become politically influenced, or in this particular case, staffed by those who are not familiar enough with the technologies involved to make informed decisions.

Category 3—*Incorporate a nonprofit entity to create and administer the proposed networks.* There are three forms that this might take: a standalone not-for-profit corporation; a not-for-profit entity in partnership with one or more governmental agencies; or a private/public partnership.

Standalone not-for-profit corporation, which would hold the assets and operate the company on an ongoing basis. There is nothing particularly exotic about this form; however, it does have its limitations. Capitalizing the initiative would be more difficult under this model, as some grants are only available to municipal or government agencies. Nor would it have the power of issuing bonds or raising a specific tax levy for that purpose. Capitalization would have to be accomplished through borrowing and incorporating debt service as an ongoing operating cost.

However, there are advantages to a self-sustaining, self-governing entity with the authority to choose its board of trustees. One of the disincentives for current commercial providers is that this small and expensive service population cannot sustain the kind of cash flow that will recover investment quickly enough to meet corporate targets. These imperatives will not be present in the not-for-profit governance model. The power to set its own policy and procedure regarding how quickly return on investment will need to be recovered removes the pressure that has disinclined commercial providers. This model has been used in successful projects in the adjacent counties to the north and south of us.

Constituting a not-for-profit entity in partnership with one or more governmental agencies to best utilize the strongest aspects of each. There is a very viable model for this, in the form of Tompkins Consolidated Area Transit (TCAT). TCAT is a nonprofit that operates the bus system, but has no access to federal grant money from the Department of Transportation (DOT). Those grants are awarded solely to governmental entities. Therefore, the County purchases the buses using its access to those DOT funds, and TCAT operates those assets.

Private/public partnership. In the most recent round of federal "stimulus" grants and their associated state grants, the specifications called for direct disbursement to for-profit companies. Sometimes the for-profit interests would then partner with governmental or other not-for-profit entities. While partnering is not mandated by legislation, it is a favored model for funding. Usually the private partner was a pre-existing provider, and the government provided revenue-sensitive contributions such as rights-of-way, takings, tax abatements, or subsidies. This would allow networks extended into unserved areas to run with sufficient return, therefore providing incentive for commercial vendors to go where typically they had not.

This committee takes no position regarding which governance model will be the most advantageous. The decision regarding the appropriate method of governance will have to be based on the composition of available funding sources and the County's tolerance of additional cost centers at the time the County is ready to move forward in a concrete way.

PREPARING FOR THE JOURNEY AHEAD

In the most recent federal distribution of funds designed to stimulate broadband programs, the lion's share of the money went to commercial corporations. According to the National Telecommunications and Information Administration (NTIA), the reason that few government broadband stimulus applications were awarded was a lack of preparedness and expertise on the part of the governmental applicants.

Certainly the technical expertise required to launch this initiative is present in Tompkins County, as evidenced by the work of this Broadband Committee. In the short run, this committee may continue to be useful to communicate the objectives to the community, define milestones, and follow up on and monitor progress. However, deployment will require a transition of oversight and execution from a volunteer basis to professional management.

Although no precise cost estimates have been drawn from research thus far, it is clear that this initiative will require substantial planning and support. The investigation into the *Google Fiber For Communities* project, which was undertaken in 2010, was valuable in illustrating vital components that Tompkins County did not have organized and available at that time: expertise and fiscal resources.

Tompkins County has done much to address the question of expertise by creating this committee to provide ready access to expertise focused conceptually on this issue. There is still much work to do going forward.

A business plan should be put in place, at least in a draft form, so that, should an opportunity for funding present itself, the County is ready to move forward rapidly with an application. The County should identify a mechanism to keep the expertise represented on this committee, as it moves forward into a business plan phase. Additionally, no matter which technology, governance, and funding mechanisms are finally decided upon, the County must have substantial funding available and the readiness to commit matching funds, should grant opportunities become available—or, failing that, to directly fund the project.

Finally, the people and Legislature of Tompkins County must recognize that broadband deployment is social policy. This social policy requires public engagement to think through the options and, ultimately, to commit to a plan to achieve the goal of enhancing Internet access to underserved areas of this community.

APPENDIX A—List of Tompkins County Broadband Committee Members

CHUCK BARTOSCH, Founder and CEO of Clarity Connect, Inc.—Ithaca, NY (Town of Dryden)

Chuck Bartosch, a long-time resident of Tompkins County, is founder and CEO of Clarity Connect, Inc., a local provider of wireless internet access and services for households and businesses in Ithaca, NY and surrounding areas. Much of Mr. Bartosch's work has been in collaboration with local municipalities in pursuit of the goal of the extension of high-speed access to rural areas that are currently unserved or underserved. Mr. Bartosch holds a Master's degree in Physics from Cornell University and a Bachelor's degree in Physics from Stanford University. His commitment to the community includes service as President of the Ithaca City School District Board of Education, Ithaca Rotary Club, Tompkins County Stop DWI Committee, Cayuga Coalition for Healthy Youth Board, and volunteer tutoring at the Caroline Elementary School.

LARRY BERGER, Commercial Agent, Lama Real Estate—Ithaca, NY (Town of Dryden/Ellis Hollow)

Lawrence (Larry) Berger is employed by Lama Real Estate in Ithaca, NY, working with a client base of commercial developers, investors, national firms and retail and office tenants. Previously, Mr. Berger specialized in Marketing and Operations at the Management level with various international firms in Ithaca, NY; New York City; Melbourne, Australia and Auckland, New Zealand. His family's experience in moving into a new home in the Ithaca area and discovering that it does not have any reliable access to broadband fuels his strong desire to find reliable, workable and affordable solutions to the goal of universal high-speed access for all county residents and businesses. Mr. Berger holds a Master's degree from Carleton University, Ottawa, Ontario in International Affairs with a focus on Development Studies and International Management. His Bachelor's degree from West Virginia University is in Liberal Arts with a focus on Political Science, Anthropology and Math.

JON BOSAK, Consultant—Ithaca, NY (Town of Ithaca/West Hill)

Mr. Bosak organized and led the committee that created the XML specification for computer data, and for many years he held the title of Distinguished Engineer at Sun Microsystems. He is now Director of Standards at Tradeshift, a company specializing in electronic invoicing. Mr. Bosak helped found OASIS (the Organization for the Advancement of Structured Information Standards) and currently chairs the OASIS UBL Technical Committee, which is responsible for the development of data standards for international electronic commerce.

SCOTT BRIM, Internet2—Ithaca, NY (Town of Ithaca/East Hill)

Scott Brim is Deputy Technology Officer for Internet2, a non-profit consortium led by the research and education community that provides advanced networking and network-related services, nationally and internationally. Mr. Brim has over 30 years of professional experience in all aspects of Internet technology and services. Scott has worked extensively in both the commercial and non-profit sectors with the primary goal of making the Internet better through innovation, deployment, usability and policy development. Mr. Brim holds a BA magna cum laude from Harvard University.

SUSAN CURRIE, Director, Tompkins County Public Library—Ithaca, NY (City of Ithaca)

Susan has 30 years of professional experience as a librarian at Cornell University, SUNY Binghamton and Tompkins County Public Library. Susan has extensive experience in library services, personnel management and working with systems automation and implementation as well as implementing services for access and navigation of internet resources. She holds a Masters of Library Science from the University of Buffalo and a B.A. in English.

RIC DIETRICH, Town Supervisor—Town of Danby, NY

For over twenty years, Ric has served in all aspects of town government and the local town fire department. For thirty years he worked in schools in every rural municipality of Tompkins county. He has been a member of the county Recreation Partnership and various youth services boards. He is Past President of what is now called the Tompkins County Council of Governments, founding member of the Human Services Coalition, President of Danby Community Council, and community liaison to the Tompkins County Emergency Management Committee. Ric has participated in every broadband proposal submitted on behalf of the Town of Danby, as well as those submitted in collaboration with Cornell University and the county Broadband Committee. He is committed to the goal of providing Broadband capabilities for all undeserved rural communities in Tompkins County. Ric holds a Masters of Fine Arts degree from the Southern Illinois University School of Communication.

JOHN LEVINE, Consultant—Trumansburg, NY

John runs Taughannock Networks, a professional consulting firm. He has written books ranging from the popular "Internet for Dummies," now in its 13th edition, to technical titles such as "Linkers and Loaders." He serves as president of CAUCE, the Coalition Against Unsolicited Commercial E-mail, a leading grass-roots organization working against abusive online activities. He is a Senior Technical Advisor to the Messaging Anti-Abuse Working Group, which coordinates activities among large network providers around the world. He holds a B.A. and Ph.D. in Computer Science from Yale.

DAVID M. MCKENNA, Tompkins County Legislator and Vice-Chair of the Broadband Committee—Newfield, NY

Legislator McKenna has lived and worked in Tompkins County for most of his life and has been part of the Newfield community for over 40 years. Representing District 8, he began his term on the Legislature in 2010 and currently serves on the Government Operations and Facilities and Infrastructure Standing Committees. Mr. McKenna holds an Associate degree in mechanical technology from Tompkins-Cortland Community College. His professional background includes employment with Transact Technology as Manager of the Mechanical Engineering Department for sixteen years, and then served as Manufacturing Engineer and Facilities Manager for five years. He uses the Internet "to do everything"; it is an extension of his lifelong work and he wants all community members to have access.

TRACY MITRANO, Director of Information Technology Policy, Cornell University—Ithaca, NY (Town of Ithaca/South Hill)

In addition to twenty-five years of experience in college classrooms, Ms. Mitrano has been in academic administration for ten years. She has been on the EDUCAUSE Board, Steering Committee of InCommon of Internet 2, and currently is on the board of the National Institute for Technology in Liberal Education. She holds a doctorate in American history from Binghamton University and a law degree from Cornell University Law School.

MIKE PLISS, Director of Technology, Ithaca and Lansing School Districts—Ithaca, NY (Town of Ithaca)

Mike has 30 years of professional experience helping organizations leverage and manage technology. Mike brings to the Broadband Committee 10 years experience in K12 education, and the recognition that it is essential to the continued success of Tompkins County that we find a way to assure that every child and every student in our community has robust Internet

connectivity at school, in their libraries and at home. "Leave No Child Offline!"

PAT L. PRYOR, Tompkins County Legislator and Chair of the Broadband Committee—Lansing, NY (Freeville)

Following Pat's retirement from 38 years of teaching in public schools in Tompkins County, Pat was elected to and served a 4-year term on the City of Ithaca's Common Council. Upon moving to the Town of Lansing, Pat was elected 2 years ago to the Tompkins County Legislature. During both her term on Common Council and her current term on the County Legislature, Pat's interests have included the promotion of sound economic development as a means of improving the quality of life for city and county residents. Her interest in the extension of Broadband to all parts of the county is directly related to both her interest in economic development and to her strong commitment to education equity for all young people in our school systems.

GARY REINBOLT, Principal, Quicksilver Services—Brooktondale, NY

Gary spent 42 years in public broadcasting as an engineer, producer director, development officer, and administrator. Accomplishments include responsibility for the design and execution of a complete upgrade of WSKG's radio and television production and transmission plants paid for by a capital campaign that exceeded its goal by over 100%. He currently consults to profit and not-for-profit organizations on management, fundraising, media, and technology issues.

VICTOR T. RENDANO JR., VMD, MSc, DACVR, DACVR-RO—Groton, NY

Dr. Rendano is a diplomate of the American College of Veterinary Radiology. He is board certified in veterinary radiology and radiation oncology, a distinction obtained by only sixteen veterinarians in the United States. He was a tenured associate professor at Cornell University, College of Veterinary Medicine for 20 years. After retiring from Cornell in 1996, he established a tele-imaging company known as eVetDiagnostics. He currently is CEO and president of that company. Additionally, Dr. Rendano is a partner in the Veterinary Medical Center of Central New York/Syracuse and Advanced Veterinary Cancer care/Newburgh, New York. Dr. Rendano has published over 100 papers and has lectured nationally and internationally.

HURF SHELDON, Director of Research Systems, The Program of Computer Graphics, Cornell University— North Lansing, NY

Mr. Sheldon has worked in academic research settings for over 30 years, the last 21years as Director of Research Systems at The Program of Computer Graphics at Cornell University. He has been involved in network research and security, operating systems development, and computer hardware development. He has studied Regional Planning at Bard College, Real Estate at Dutchess Community College, and various computer and scientific courses at Cornell University. From 1963 -1966 he was a helicopter crew chief in the US Army. He has an A.S. Degree from American University. Hurf is a member of The Town of Lansing Zoning Board of Appeals and was on a joint committee to review and make recommendations to revise the town Zoning Code and Master Plan.

EDWARD SWAYZE, CIRS, 2-1-1 Information and Referral Director, Human Services Coalition—Ithaca, NY (City of Ithaca)

Edward has 23 years of professional experience in Human services and Information management. Edward has worked extensively with human service programs and non-profit groups on service provision and information sharing using call center, database, and web technologies. Edward holds a Bachelor of Science in Policy Analysis and Planning from Cornell University and certification as Information and Referral Specialist (CIRS) by the Alliance of Information and Referral Systems (AIRS).

At-Large Members

SID BOSWELL, Broadband Planner, Design Nine, Inc.—Blacksburg, VA

Sid serves as a volunteer consultant to the Committee. Having recently relocated out of the Tompkins County area, Mr. Boswell was interested in serving on the Broadband Committee given his knowledge and experience in community telecommunications planning. Sid works with communities across the US assisting them with broadband planning, fiber design, project management and working with local Service Providers. Sid has 15 years of professional experience in telecommunications and has worked extensively with telecommunications providers, including several years at both AT&T and Comcast Cable. Since joining Design Nine, Sid has assisted many communities in building their own Open Access Fiber or Wireless Networks including *The Wired Road* in rural Southwest Virginia, *The Wired West* in Western Massachusetts, and *FastRoads* in New Hampshire. Sid holds a B.S. in Telecommunications Engineering Technology from Texas A&M University.

ED MARX, Commissioner of Planning and Community Sustainability, Tompkins County Planning Department—Ithaca, NY (City of Ithaca)

Mr. Marx leads efforts to achieve County organizational sustainability and directs strategic community initiatives in Housing, Energy and Greenhouse Gas Emissions, Natural Resource Conservation and Sustainable Development. He previously served as Public Works Commissioner and Deputy County Administrator for Tompkins County, and Director of Planning and Community Development for Oswego County, NY. Mr. Marx holds a Masters degree in Planning and Community Development from the University of Colorado and a B.S. in Natural Resource Economics from Cornell University.

LEE SHURTLEFF, Director, Tompkins County Department of Emergency Response—Village of Groton, NY
Lee coordinates fire, emergency medical and emergency management services within the County. He oversees the public safety communications systems, including the 911 Center/Public Safety Answering Point. He served as project manager for the $20 million upgrade to the County's voice and data radio systems and has been heavily involved in the development of the state's emergency communications initiatives. Lee has a B.A. in Political Science from the state university system and is a former County Elections Commissioner. He is a past Chief of the Groton Fire Department, chairs the Board of Directors of the Groton Community Health Care Center & Nursing Facility, and is also a member of the boards of various heath care, hospital, historical, and other local non-profit community organizations.

GREG POTTER, Director, Tompkins County Department of Information Technology Services—Ithaca, NY (City of Ithaca/Fall Creek)

For nearly 14 years Greg has directed IT operations for Tompkins County. His efforts have resulted in numerous technology

initiatives and telecommunications/data infrastructure projects crossing all categories of County departments and services. In addition, he currently manages the Geographic Information Systems (GIS) division, serves on the Board of Directors for NYS Local Government Information Technology Directors Association, and serves on the Local Government Records Advisory Council for NYS Archives. Greg has a background in Community Planning and Economic Development, and holds a Bachelors Degree in Environmental Design and a Master's Degree in Public Administration, both from the University of Colorado.

JONATHAN WOOD, County Attorney, Tompkins County—Lansing, NY

Mr. Wood holds a B.S. in Business Administration from the University of North Carolina and a J.D. Cum Laude from the Cornell Law school. He clerked for a federal judge, and was an associate at an environmental law firm before joining the County Attorney's Office in 1993. He served as a member of the County's original electronic futures committee which worked on establishing Internet connections for local governments and school districts in the early 90s.

Understanding the Urgent Importance for Broadband

Broadband Consumer Education Resources
http://learnerwebspclc.pbworks.com/w/page/42288193/Broadband-Consumer-Education-Resources

- What is broadband?

- What are different broadband technologies?

- What is bundling?

- Do I need a contract to use broadband Internet?

- What are features?

- What can I learn from ads from Internet companies?

- How do I prepare to talk with an Internet salesperson?

- Internet Tour

How to test your Internet speed. www.nyspeedtest.org/testyourspeedstep1.php

Visser, M. and Ball, M. A., Information Technology and Libraries, (December 2010), "The Middle Mile: The Role of the Public Library in Ensuring Access to Broadband"

This paper discusses the role of the public library in ensuring access to the broadband communication that is so critical in today's knowledge-based society
http://www.ala.org/lita/ital/sites/ala.org.lita.ital/files/content/29/4/visser.pdf

Digital Age Is Slow to Arrive in Rural America
http://www.nytimes.com/2011/02/18/us/18broadband.html

Building a Better Broadband Map, Helping Businesses Make Better Broadband Choices. "That's where Bandwidth.com has stepped in, with its own broadband map - available at Broadband.com - that offers a lot more of those missing details, including some crucial ones: how much does broadband cost and what speeds do you actually get."
http://www.readwriteweb.com/biz/2011/03/building-a-better-broadband-ma.php

Understanding the state of broadband in the U.S. [VIDEO 1:22:19]
http://www.youtube.com/watch?v=RbfuIyNmYiM

If the broadband network is fully built out - not an inexpensive proposition - there will still be the challenge of helping those who cannot afford it and, along with that, there will be the challenge of convincing those who aren't as interested in life online that broadband is critical to their future - the key to that national transformation President Obama has outlined.
http://www.pbs.org/newshour/rundown/2011/03/broadband-access-exploring-us-connectivity-by-community-type.html

The Public Library Funding and Technology Access Study 2010-11
 http://www.ala.org/ala/research/initiatives/plftas/2010_2011/index.cfm#final%20report

5 Reasons Internet Access in America is a Disaster
http://www.cracked.com/blog/5-reasons-internet-access-in-america-disaster/

Doing the Work to Deliver Broadband

Obama touts plan to get wireless Internet to 98 percent of U.S.
http://www.washingtonpost.com/wp-dyn/content/article/2011/02/10/AR2011021005765.html

Southern Tier Central Regional Planning and Development Board (STC) announced today the launch of a $12.2 million project to deploy an optical fiber broadband network across Chemung, Schuyler and Steuben counties. STC_BBProject_Release_FINAL_2-11-11_1.pdf
http://tompkinscountybroadbandcommittee.wikispaces.com/file/view/STC_BBProject_Release_FINAL_2-11-11_1.pdf

Broadband Internet coming to rural parts of Southern Tier - YNN, Your News Now
http://ithaca-cortland.ynn.com/content/533530/broadband-internet-coming-to-rural-parts-of-southern-tier/

Kansas City Wins Google:
In Google's announcement, it states that "Google has signed a development agreement with the city, and we'll be working closely with local organizations, businesses and universities to bring a next-generation web experience to the community."
http://www.zdnet.com/blog/networking/no-broadband-for-you-you-or-you-kansas-city-wins-google-fibre/893

Lithuania's high-speed broadband
http://www.baltictimes.com/news/articles/28804/

10 Things You Should Know About the National Broadband Plan Posted on November 30, 2011 The following are ten things you should know about the FCC's National Broadband Plan.
 http://physicsinventions.com/index.php/10-things-you-should-know-about-the-national-broadband-plan/

Promoting Broadband – Options, Costs, Effectiveness

A Guide to Broadband Funding Opportunities How to Navigate the Grant Process Compliments of U.S. Senator Kirsten E. Gillibrand
http://gillibrand.senate.gov/imo/media/doc/BroadbandGuidebook2.pdf

Pew Internet and American Life Project
http://www.pewinternet.org/topics/Broadband.aspx

"Why would you want ultra-fast broadband at home?"
http://www.zdnet.com/blog/networking/why-would-you-want-ultra-fast-broadband-at-home/366

Universal Service Fund reform - battle lines being drawn
http://www.telecompetitor.com/usf-reform-battle-lines-being-drawn/

FCC Commissioner slams N. Carolina attack on city-owned broadband
http://arstechnica.com/tech-policy/news/2011/04/fcc-commish-slams-north-carolina-anti-muni-broadband-bill.ars

Seventh Broadband Progress Report
http://www.fcc.gov/reports/seventh-broadband-progress-report

Chattanooga is what the Internet will look like in 10 years. We're 10 times faster 10 years sooner than the goals established in the National Broadband Plan. Harold DePriest, President – EPB.
 http://gigaom.com/broadband/take-the-chattanooga-choo-choo-to-the-internets-future/

UN report shows broadband potential for economic and social development
http://www.un.org/apps/news/story.asp?NewsID=38623&Cr=&Cr1

Axcess Ontario Middle Mile Network Wins Award
http://www.muninetworks.org/content/axcess-ontario-middle-mile-network-wins-award

Verizon Wireless Claimed Coverage
http://www.verizonwireless.com/b2c/CoverageLocatorController?requesttype=NEWREQUEST

Managing the Vision

Interesting policy resource for rural broadband issues
http://www.ruralstrategies.org/rural-broadband-policy-group

Chattanooga, TN beats Google to 1Gbps—for $350 a month
http://arstechnica.com/tech-policy/news/2010/09/chattanooga-tn-beats-google-to-1gbps.ars

Axcess Ontario Officially Complete | community broadband networks
 http://www.muninetworks.org/content/axcess-ontario-officially-complete

Pew Internet & American Life Project report on how mobile devices are changing environment communications
http://www.pewinternet.org/Reports/2011/Local-mobile-news.aspx

Community Broadband Is On The Rise
http://www.pcmech.com/article/community-broadband-is-on-the-rise/

Schuyler county | community broadband networks
http://www.muninetworks.org/taxonomy/term/592

Good info on the broadband requirements for rural healthcare.
 http://www.nosorh.org/policy/files/041811fcc_comments_usf_rules.pdf

Idaho Town Builds Incremental, Open Access Network
http://www.muninetworks.org/content/idaho-town-builds-incremental-open-access-network

APPENDIX C—Glossary of Terms and Common Abbreviations

Glossary of Terms

4G. Abbreviation for fourth-generation wireless, the stage of broadband mobile communications that will supersede the third generation (3G). Specifies a mobile broadband standard offering both mobility and very high bandwidth. Usually refers to LTE and WiMax technology.

Actual Speed. Refers to the data throughput delivered between the network interface unit (NIU) located at the end-user's premises and the service provider Internet gateway that is the shortest administrative distance from that NIU. In the future, the technical definition of "actual speed" should be crafted by the FCC, with input from consumer groups, industry and other technical experts, as is proposed in Chapter 4 of the National Broadband Plan. The technical definition should include precisely defined metrics to promote clarity and shared understanding among stakeholders. For example, "actual download speeds of at least 4 Mbps" may require certain achievable download speeds over a given time period. Acceptable quality of service should be defined by the FCC.

Broadband. For the purposes of determining the Investment Gap, 4 Mbps actual download and 1 Mbps actual upload; see also the National Broadband Availability Target.

Burst Rate. The maximum rate or "speed" which a network is capable of delivering within a short timeframe, typically seconds or minutes. This is usually expressed as a rate in Mbps.

Carrier of Last Resort. The carrier that commits (or is required by law) to provide service to any customer in a service area that requests it, even if serving that customer would not be economically viable at prevailing rates.

Census Block. The smallest level of geography designated by the U.S. Census Bureau, which may approximate actual city street blocks in urban areas. In rural districts, census blocks may span larger geographical areas to cover a more dispersed population.

Census Tract. A small, relatively permanent statistical subdivision of a county, designed to contain roughly 1,000 to 8,000 people who are relatively homogeneous with respect to their demographics, economic status and living conditions.

Common Carrier. A telecommunications provider, such as a telephone company, that offers its services for a fee to the public indiscriminately.

Coverage. In wireless communications, refers to the geographic area in which one can obtain service.

Dark Fiber. A fiber optic cable that is laid and ready for use, but for which the service provider has not provided modulating electronics; usually contrasted to lit fiber, which is fiber optic cable in use to provide wired communications.

Digital Subscriber Line (DSL). A generic name for a group of enhanced speed digital services generally provided by telephone service providers. DSL services run on twisted-pair copper wires, which can carry both voice and data signals.

Fiber-to-the-Node (FTTN). A high-capacity bandwidth approach that uses both fiber and copper wires. Optical fiber is used from the core of the telco or CATV network to an intelligent node in the neighborhood where copper wire is used for the connection to the end-user, with one node serving perhaps many residences or small businesses. The few 100 meters or so of the local loop from the node to the premises generally is either unshielded twisted pair (UTP) in a telco application or coaxial cable (coax) in an HFC application, although some form of wireless technology is also possible. Known as Fiber to the Neighborhood, or Fiber to the Cabinet (FTTCab), as well.

Fiber-to-the-Premise (FTTP). A fiber-deployment architecture in which optical fiber extends all the way to the customer's premise. Also known as Fiber to the Home (FTTH) or Fiber to the Building (FTTB). Typically using PON for residential deployments.

Fixed Wireless (FW). Fixed wireless refers to the operation of wireless devices or systems in fixed locations such as homes and offices. Fixed wireless devices usually derive their electrical power from the utility mains, unlike mobile wireless or portable wireless which tend to be battery-powered. Fixed wireless also refers to the delivery of broadband Internet access to the home through a wireless signal.

Gateway Device. A network device that acts as an entrance to another network and often is used to connect two otherwise incompatible networks.

Gigabit Ethernet (Gig-E). A network transmission standard that provides a data rate of 1,000 megabits per second.

Greenfield. A network in which a carrier has no infrastructure currently (of that technology), and it needs to be built from scratch.

Hub & Spoke. A system of connections arranged like a chariot wheel, in which all traffic moves along *spokes* connected to the *hub* at the center.

Hybrid Fiber Coaxial (HFC). Another term for cable systems, which are a combination of fiber (Middle and Second Mile) and coaxial cable (Last Mile).

Incumbent Local Exchange Carrier (ILEC). The dominant local phone carrier within a geographical area. Section 252 of the Telecommunications Act of 1996 defines Incumbent Local Exchange Carrier as a carrier that, as of the date of enactment of the Act, provided local exchange service to a specific area; for example, Verizon, Windstream and Frontier. In contrast, Competitive Access Providers (CAPs) and competitive local exchange carriers (CLECs) are companies that compete against the ILECs in local service areas.

Independent System Operator (ISO). An organization that coordinates, controls, and monitors the operation of the electrical power system, either within a single state or across multiple states.

Internet Gateway. The closest peering point between a broadband provider and the public Internet for a given consumer connection.

Internet Service Provider (ISP). A company that provides a connection to the public Internet, often owning and operating the Last-Mile connection to end-user locations.

Last Mile. Refers generally to the transport and transmission of data communications from the demarcation point between the end user's internal network and the carrier's network at the customer premise to the first point of aggregation in the carrier's network (such as a remote terminal, wireless tower location, or HFC node).

Long-Term Evolution (LTE). A high performance air interface for cellular mobile communication systems. LTE technology increases the capacity and speed of wireless networks relative to current 3G deployments.

Loop. The connection from the network central office to the customers' premises.

Megabyte. A Megabyte is approximately 1,000 Kilobytes. 100 Megabytes might hold a couple volumes of Encyclopedias. 600 Megabytes is about the amount of data that will fit on a CD-ROM disk.

Microwave. Microwave transmission refers to the technique of transmitting information over microwave frequencies, using various integrated wireless technologies. Microwaves are short-wavelength, high-frequency signals that occupy the electromagnetic spectrum 1 GHz to roughly 300 GHz, (typically within ITU Radio Band Signal EHF) though definitions vary. This is above the radio frequency range and below the infrared range.

Microcell. Cell sites with extremely limited, but targeted, coverage. Microcells may provide indoor coverage in skyscrapers or may be placed in fire trucks, police cars and ambulances.

Middle Mile. Refers generally to the transport and transmission of data communications from the central office, cable headend or wireless switching station to an Internet point of presence.

National Broadband Availability Target. The level of service set in the National Broadband Plan that should be available to every household and business location in the U.S. The initial target is an actual download speed of at least 4 Mbps and an upload speed of at least 1 Mbps, with a proposed review and update every four years.

Next Generation 911 (NG911). An emergency response system that integrates the core functionalities of the E911 system and also supports multimedia communications (such as texting, e-mail, and video) to the PSAP and to emergency personnel on the ground.

Over-builder. A facilities-based provider of cable service, telecommunications, or broadband that builds in an area already served by another facilities-based provider.

Plain Old Telephone Service (POTS). The basic single line switched access service offered by local exchange carriers to residential and business end users, using loop-start signaling.

Point of Presence (POP). An access point to the Internet. A point of presence is a physical location that houses servers, routers, switches and aggregation equipment. A location where a communications carrier allows other carriers to access its network.

Public Switched Telephone Network (PSTN). The worldwide collection of interconnected public telephone networks that was designed primarily for voice traffic. The PSTN is a circuit switched network, in which a dedicated circuit (also referred to as a channel) is established for the duration of a

transmission, such as a telephone call. This contrasts with packet switching networks, in which messages are divided into small segments called packets and each packet is sent individually. Packet switching networks were initially designed primarily for data traffic.

Unserved. Those residences and businesses without access to a broadband network capable of offering service that meets the National Broadband Availability Target.

Voice Over Internet Protocol (VOIP). A family of transmission technologies for delivery of voice communications over IP networks such as the Internet or other packet-switched networks. Other terms frequently encountered and synonymous with VoIP are IP telephony, Internet telephony, voice over broadband (VoBB), broadband telephony and broadband phone.

Wireless ISP (WISP). An Internet service provider that provides fixed or mobile wireless services to its customers. Using Wi-Fi or proprietary wireless methods, WISPs provide last mile access, often in rural areas and areas in and around smaller cities and towns.

WiFi. A mechanism for wirelessly connecting electronic devices. "Wi-Fi" is a trademark of the Wi-Fi Alliance for devices such as PCs, smartphones, tablets, or game consoles that can connect to the Internet when within range of a WiFi hotspot. Hotspot coverage can comprise an area as small as a single room or as large as many square miles.

WiMax. Worldwide Interoperability for Microwave Access (WiMAX) is a telecommunications technology that uses radio spectrum to transmit bandwidth between digital devices. Similar to WiFi, WiMAX brings with it the ability to transmit over far greater distances and to handle much more data.

Common Abbreviations

3G - Third generation

4G - Fourth generation

CLEC - Competitive Local Exchange Carrier

CO - Central Office

FCC - Federal Communications Commission

Gbps - Gigabits per second

GHz - Gigahertz (1 billion Hertz)

GPS - Global Positioning System

IP - Internet Protocol

ISP - Internet service provider

IT - Information technology

kHz - Kilohertz (1 thousand Hertz)

LTE - Long-Term Evolution

Mbps - Megabits per second (1 million bits per second)

MHz - Megahertz (1 million Hertz)

PC - Personal computer

PDF - Portable Document Format

POP - Point of Presence

POTS - Plain Old Telephone Service

QOS - Quality of Service

R&D - Research and development

RSA - Rural service area

RUS - Rural Utilities Service

USF - Universal Service Fund

VOIP - Voice Over Internet Protocol

WCS - Wireless Communications Service

WiMAX - Worldwide Interoperability for Microwave Access

WISP - wireless Internet service provider

Glossary and Abbreviations Sources:

National Broadband Plan (Appendices)

Omnibus Broadband Initiative Technical Paper Series - No. 1 – List of Common Abbreviations and Glossary