



Lessons from Rural Minnesota Broadband Feasibility Studies

What can rural communities learn about
broadband expansion, based on feasibility
studies completed to date?

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A report commissioned by the Blandin Foundation
to support the work of rural communities across
Minnesota and beyond.



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Aggregate Lessons from Past Feasibility Studies

Since 2007, the Blandin Foundation has provided matching grants totaling \$372,786 with an average award of \$34,000 to 11 communities to support the cost of research of the feasibility of geographically based Robust Broadband Networks. For the purposes of this grant program, “community” was self-defined by applicants and included various combinations of cities and counties.

The phrase “feasibility study” means different things to different people and can refer to technical, financial, organizational or political components of a proposed development. It is not unusual to employ feasibility studies at different stages of a project – preliminary, intermediate or final business plan stages – and accordingly each involves different degrees of research and detail. Blandin Foundation’s Robust Broadband Networks Feasibility Fund has funded a wide range of studies. Each study has helped the awarded community make better informed decisions about its future.

The Blandin Foundation grants up to \$25,000 for a feasibility study for a single community or up to \$40,000 for a study that serves multiple communities or a countywide approach. The grant requires a 1:1 cash match to offset the cost and to demonstrate community interest and investment. Communities get match from a variety of sources, including incumbent broadband providers, local economic authorities and other foundations. Support from local providers can be a mixed blessing. It may indicate interest in improving the local infrastructure, but it may also impact the results of the study. For example, the **Lac qui Parle County** Board specifically requested that a local provider be involved in their feasibility study in part because they knew they did not want to become the provider. That decision worked out for them; they have a successfully deployed FTTP (Fiber to the Premise) network.

Communities that have completed feasibility studies

1. City of Staples/Todd County
2. City of Winthrop (Renville County)
3. Cloquet Valley
4. Cook County
5. Kanabec County
6. Lac qui Parle Economic Development Authority
7. Lakefield
8. Northfield
9. Red Wing
10. Redwood Falls/Redwood County
11. SouthWest Central Service Cooperative

This report looks at these eleven investments in aggregate through the lens of, “What can we learn and how should we apply that learning?” Specifically we look at:

- Business Basics: Cost versus Revenue
- Keys to Success (ARRA)
- Public Private Partnerships
- Technology Scenarios
- Local Champions

Business Basics: Costs versus Revenue

Feasibility studies look at the business basics of providing broadband access: cost and revenue. The goal is to create an equation where revenue is larger than cost and to secure financing until those numbers fall in line and to provide guidance for next steps in the project.

Costs generally include:

- Planning and Engineering
- Construction
- Equipment
- Backbone Access
- Operations (Marketing, customer support, technology management)

Key Question: Can you create a business plan where the projected revenue stream exceeds combined capital and operating costs?

Saying no doesn't necessarily relegate your community to modems and satellite, but it means you will need to get creative. **Scott County**, for example, created a fiber network with the primary goal of serving government needs and a secondary goal of serving residents. <http://wp.me/p3if7-4L> Cost saving was enough to drive their business case.

Some costs are set, such as subscriber equipment; others are variable, such as construction, which is dependent on soils, ground cover, topography, availability of utility poles or existing conduit and population density. For example, the **Kanabec County** study outlines per subscriber costs based on three scenarios:

Per Subscriber Category	Wireless	FTTP Rural	FTTP Urban
Central Office or CSA Electronics	N/A	\$91	\$91
Fiber Drop Residential-based on 500' drop for rural and 150' drop for urban	N/A	\$675	\$487
Fiber Drop Business-based on 500' for rural and 150' drop for urban	N/A	\$675	\$555
Home Electronics	\$170	\$372	\$372
Business Electronics	\$170	\$372	\$1003

The differences in cost of Fiber-to-the-Premise (FTTP) in one community (as seen above), based on technology and rural-versus-urban location, are indicative of the options and variances in most communities. The central office costs for FTTP are the same in an urban or rural setting. The fiber drop costs are significantly different based on estimated distance required to reach each premise. The expectation in Kanabec County is 150 feet (\$487) per drop in urban areas and 500 feet (\$675) in rural locations.

For community leaders it can be difficult to make decisions when there are rarely apple-to-apple comparisons. Financially an urban-only solution may be most viable, but community goals usually go beyond basic business goals. In fact, the trend since 2011 has been to consider larger networks,

such as county or regional geographic focus, as a way to offset that cost. <http://wp.me/p3if7-1b0> It allows the project to take advantage of greater revenue potential in areas with higher population density and balance that against the higher cost of building the network to the areas with lower population density.

Taking a broader geographic perspective on network planning also prevents the broadband donut or Swiss cheese effect, which refers to coverage maps that show cities and towns have much better broadband coverage than areas between towns. <http://wp.me/p3if7-10n> The towns are covered because a business case could be made to provide broadband; the outlying areas are not. The added difficulty for those unserved outlying areas is that their local incumbent providers have not shown interest in expansion and new providers are often hesitant to enter a market where the more profitable nearby areas are already served.

FINANCING

Broadband deployment projections require financing. Costs related to repaying financing also are variable based on financing options, which in turn is influenced by the ownership model in question.

Potential financing or funding sources include:

- State Grants and Loans (such as from DEED, Department of Employment and Economic Development)
- Federal Grants and Loans (such as from the USDA Rural Utility Service)
- Municipal General Obligation Bonding
- Revenue Bonds

One goal of the feasibility study is to flush out the factors that allow for a financing plan to be put in place. What cannot be monetized is the quality of life and tax base implications of the network (what new businesses might move to town and add to the tax base and how these new services might keep current residents or attract new ones). When a community is educating its constituents on the viability of the network, it is important to not only focus on the financial numbers but also the intangible benefits of the network.

The financial components of the feasibility study require:

- Business Case Projections of Costs and Revenues
- Balance Sheets
- Income Statements
- Cash Flow Statements
- Capital and Operational Breakeven Analysis
- Sensitivity Analysis for Competitive Responses

In a retail model, ongoing revenues come from subscriber fees, but there are some variables here too, in terms of different classes of subscribers, such as residential, business and “anchor institutions” like schools, libraries and government facilities. Business customers (large and small) may be willing to pay more for connectivity and may be interested in potential added services. Anchor institutions can become big customers and/or potential partners in a community wide upgrade.

There is another option to consider. Rather than provide retail services to end customers themselves, a community might opt to go with an “open access” model – akin to a wholesale approach where the community builds a network and works with one or more third party providers to provide “retail” broadband services. In this model the revenue source is strictly a “wholesale lease rate” from the retail providers.

Importance of Take Rate

Some people ask, “What percentage of the potential market must a provider acquire to be profitable?” This is a misleading statistic because the business case is built a real number -not a percentage. The higher the population density, the cheaper it is to serve a community. The higher the population, the greater the potential for customers. Conversely, the lower the population density, the greater the cost. The lower the population, the less potential for customers.

Reaching 20 percent of an urban market share may be enough to cover costs; while reaching 80 percent of a rural market may still not be enough to cover costs.

Take rate does uncover potential issues of competition and digital inclusion opportunities. But in terms of a business case, real numbers of subscribers paints a clearer picture of revenue potential.

EACH COMMUNITY IS DIFFERENT

Each community is different; part of value of the feasibility study is fleshing out the variables based on unique community factors and determining the best alternative for broadband infrastructure development. But throughout the planning the question remains the same: How to create an equation where revenue exceeds cost? And how long does it take to get there?

KEY TO SUCCESS: (SURPRISE!) ACCESS TO CAPITAL (SUCH AS ARRA)

Five of the communities that completed feasibility studies have gone on to deploy ultra-fast broadband networks; six have not. Four of the five communities that are implementing their study recommendations received ARRA (American Recovery and Reinvestment Act) funding. (Actually four networks were deployed as two communities with feasibility studies really became one ARRA project.)

Having feasibility study results in hand may have played a key role in positioning the awarded communities to be competitive for federal funding. It certainly provided the communities with the data required in the application process and demonstrated that they were shovel-ready projects, which was a major requirement of projects seeking ARRA funding.

Updates on those networks, the build-out of which has been facilitated through ARRA funding, follow.

Cook County – Arrowhead Electric Cooperative, Inc received \$16,137,484 in federal funds, plus an additional \$4 million grant from Cook County. Construction began August 2011. To date, 620 miles of fiber optic cable have been constructed. They are embarking on final stages of construction and will be scheduling home installation in early 2014. <http://wp.me/3if7>

Services are being tested with a goal of serving customers in 2014. Arrowhead Cooperative has set-up a free public computing area for users to access high-speed internet or use the Cooperative's high-speed guest Wi-Fi.

<http://wp.me/p3if7-2sW> (Cook County also benefits from the Northeast Service Cooperative \$43 million middle mile ARRA-funded network.)

Lac qui Parle Economic Development Authority (LqP EDA) - Using a BIP (Broadband Initiatives Program) award through ARRA of \$9,652,956, Farmers Mutual deployed fiber to the premise to Dawson, Boyd and rural Madison. The project was completed in November 2013.

Farmers Mutual is currently signing customers up for service. <http://wp.me/p3if7-288> LqP EDA has been supporting broadband adoption with business training <http://wp.me/p3if7-2eU>, the Computer Commuter (a mobile computer lab) <http://wp.me/p3if7-1j6> and more efforts. <http://wp.me/p3if7-2j7>

Lakefield/ SMBS (formerly the SouthWest Central Service Cooperative and including Lakefield) has successfully completed their ARRA fiber network build. A 120 mile fiber ring now connects eight towns and the rural residents along the route to Windomnet, their partner and wholesale provider of telephone, cable TV and broadband services.

Sales out-paced the original projection in the ARRA application. A final penetration rate of over 75% is anticipated as obtainable in the near future. SMBS's ARRA award was for \$12,700,250. SMBS is cash flow positive and the project sustainable.

SMBS is working on broadband adoptions efforts through the Blandin Broadband Communities initiative. <http://wp.me/p3if7-24h>

IMPACT OF FEDERAL FUNDING

Federal investment allowed these projects to move forward with their broadband improvement plans. At this point it appears unlikely that similar federal funding will be available in the future, but as noted earlier, the communities in Minnesota that had feasibility studies prepared or in progress when the ARRA funding was announced were better poised to complete the proposals and demonstrate preparedness than communities that hadn't researched fiber options. Luck favors the prepared.

Key Question: Is there government (or philanthropic) funding available to help you deploy broadband and/or promote broadband adoption?

Be sure to check out the Blandin Foundation Broadband Initiative <http://broadband.blandinfoundation.org> or Blandin on Broadband blog for some ideas. <http://blandinonbroadband.org/category/funding/>

Note for Policymakers: Broadband is an Investment

Strategic Networks Group, an economic consultant, has compiled evidence from studies they have conducted in North Carolina, Virginia, Kentucky, Illinois, and Nebraska that demonstrates a \$5 million economic development impact for every 1,000 broadband passes installed. They also found that 23.4 percent of all new jobs created in the economies they have studied are directly attributable to broadband. <http://sngroup.com/tag/broadband-economic-impacts/>

In the meantime, communities looking at local broadband improvements may want to look to these projects for ideas worth replicating. For example, are there engineering approaches that worked well or a partnership model worth modeling?

Communities in proximity to these projects may consider approaching the project leaders and/or broadband providers to see if there is interest by the providers in extending their network.

CHANCE OF STATE FUNDING

While Federal funding similar to the ARRA funds is unlikely, there is a chance that Minnesota may make funds available for broadband deployment and/or adoption through the Office of Broadband Development. In January, 2014, the Minnesota Governor's Broadband Task Force recommended the Legislature consider a number of funding options for broadband mapping, deployment and adoption, including \$100 million for a broadband infrastructure grant fund. <http://wp.me/p3if7-2xS>

NON-ARRA FUNDED PROJECTS AND OTHER PROGRESS

Red Wing – Red Wing is the only Minnesota community to receive a Robust Fiber Network Feasibility Fund grant that has successfully deployed a fiber optic network without ARRA funding. Hiawatha Broadband Communications (HBC) applied for ARRA funding, but was not awarded funds. <http://wp.me/p3if7-Le> Despite this setback, HBC moved ahead with the project using their own source of funds.

Red Wing is currently working with US Ignite <http://us-ignite.org/> to promote broadband adoption of their Gigabit network.

Public Private Partnerships

Most of the feasibility studies consider partnership with a commercial broadband provider. Generally there are three factors that determine the viability of a public-private partnership:

1. Ability to create a level of trust amongst the community and the provider
2. Number of current broadband providers
3. Level of interest or support from at least one current provider

Having a private sector provider, either an incumbent or new competitive provider, willing to step up into partnership with the community can make moving forward easier, as was the case in Lac qui Parle County and Southwest Minnesota.

Not having a clear partner introduces some potential challenges and barriers.

TOO MANY PARTNERS?

While competition has been cited as a positive trend in lucrative markets <http://wp.me/p3if7-RS>, in small communities it can cause problems in the form of market fragmentation. In general, hard-to-serve sparsely populated rural communities are well served by approaching and/or encouraging local providers to participate in any community technology planning conversations at early stages of planning.

FiberNet Monticello is an example of a community that has competed with two local providers, the existing telecommunications and cable television companies. <http://blandinonbroadband.org/?s=monticello&x=0&y=0> On the one hand, the community now has three choices for ultra-fast broadband; on the other hand, FiberNet has run into financial problems spurred (at least in part) from ultra-competitive pricing and barriers raised by commercial competition in the wake of a new public option.

Another solution is to collaborate with willing local providers. **Cook County** has partnered with all local providers in the broadband adoption and digital inclusion programming <http://wp.me/p3if7-29r> funded through ARRA via the Blandin Foundation's Minnesota Intelligent Rural Communities (MIRC) initiative.

A more direct approach to promoting broadband deployment is to build an Open Access Network where the community builds the network and invites commercial providers to offer services over that network to local residents, businesses and (sometimes) anchor tenants. It is akin to a wholesale approach where commercial providers offer retail access to end customers. This option has been suggested in several feasibility studies.

Key Question: Is there (at least) one commercial provider that is a likely and willing partner?

- An internet service provider partner is very beneficial.
- If you have multiple potential partners, creating collaboration through open access may be an option.
- If no local/current provider is available you may want to seek partners elsewhere. Or consider a cooperative approach.

INCUMBENT PROVIDERS NOT INTERESTED?

Finding out that the incumbent providers serving your community do not see a compelling business case for improving infrastructure and services in all or part of your community, on their own or in partnership, is a challenge. But it is not uncommon. This dynamic is common across all of the communities that have completed feasibility studies through this Blandin Foundation RFP program, but have to date not been able to act on the studies' recommendations for infrastructure build.

At the 2013 Connect Minnesota Broadband Summit, industry representatives noted that a successful public private partnership recognizes that the role of government is to govern and the role of the provider is to provide service. <http://wp.me/p3if7-2u0> What does a community do when there is a gap between the services offered and the community's demand for service?

NEGOTIATING WITH INCUMBENTS

Kanabec County is served by a couple of providers, but none have yet shown interest in improving service throughout Kanabec County. The Kanabec feasibility study suggests further conversations with local providers, but also suggests considering other partnerships (such as with East Central Energy), and a drive to increase demand through broadband adoption programs and concerted efforts to identify additional anchor tenants to pitch to the providers.

In February 2013, Kanabec County began a conversation with the local providers (CenturyLink and Midcontinent). The conversation started publicly at the East Central Minnesota Broadband Summit. <http://wp.me/p3if7-29B> It has continued, but only once non-disclosure agreements were signed. Due the non-disclosure it's difficult to know how those talks are progressing, but it has been 10 months and so far nothing has been reported.

CO-OPERATIVE APPROACH

Renville and Sibley Counties have gone a different route. They have been searching for a way to deploy a fiber to the farm network for several years. The focus has been on creating a network that includes farms and others outside city limits, despite the higher cost of "to-the-farm" deployments. Initiative sponsors have worked to get local governments on board, including cities and counties. They formed a Joint Powers Board, however the project took a dramatic turn when Sibley County decided not to continue with the project.

The night that Sibley County dropped out, local residents discussed forming a cooperative. <http://wp.me/p3if7-1Vt> The project has gained momentum and local community leaders are moving forward with a cooperative approach. <http://wp.me/p3if7-2xp>



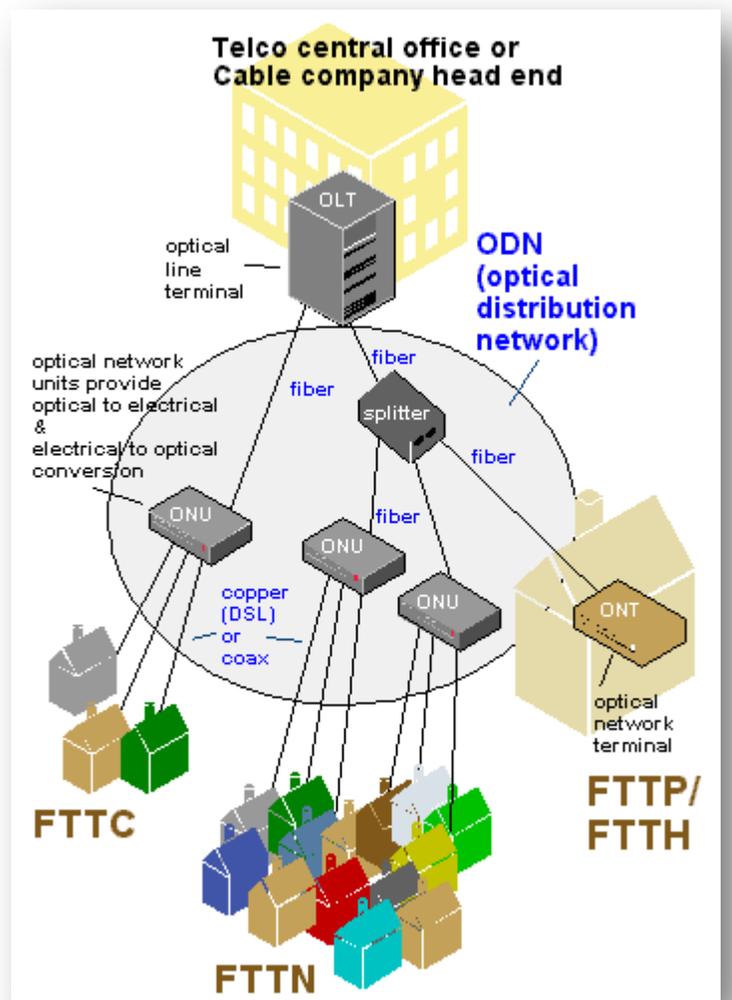
The co-operative approach was used in 1935, when America was deploying electricity. Learn more from vintage video, Power and the Land on the Rural Electrification Administration (REA). <http://tinyurl.com/reabroadband>

A cooperative approach was also mentioned at a recent public meeting in **Todd County**. <http://wp.me/p3if7-2wQ> It is worth noting that the Livestock Advisory Commission was involved in early broadband discussions in Todd County. In the US, the cooperative model has historically been an approach that has helped farmers keep costs low and been used as a tool to provide consumers with leverage with which to work with private companies. <http://www.cdf.coop/history-of-cooperatives/> The cooperative model for broadband access is gaining popularity in the US. <http://wp.me/p3if7-258>

Technology Scenarios

Having an obvious partner may dictate many of the technology choices you make. For example, Lac qui Parle EDA worked with Farmer's Mutual, a local telecommunications company. Farmer's had worked with fiber in the past. They had a "regular way" for building a fiber network and it became the *de facto* solution. The advantage is that the provider has experience and expertise in a certain technology and they probably have investments that can be leveraged to reduce costs and streamline the process for the new community build.

One of the advantages of not having an obvious partner, or having an obvious partner that is flexible, is the opportunity to investigate a wide range of technology scenarios. The following are high level descriptions of options that have been suggested in past feasibility studies.



<http://www.pcmag.com/encyclopedia/term/43551/fttp>

	Definition	Advantages	Disadvantages
FTTP (Fiber to the Premise)	Optical fiber from the carrier directly into the home or business.	It provides highest quality service to the end customer.	It is more costly than FTTN or other hybrid technology solutions.
FTTN (Fiber to the Node/Neighborhood)	Optical fiber to a junction box (node) in an area that serves a few hundred customers within a radius of about a mile. Connections from the node to the customer premises often use DSL or coaxial cable (DOCSIS).	It is faster than not using fiber to the node. It is less expensive than FTTP. It is an infrastructure that can be upgraded to FTTP as a phased approach.	It is not as fast as FTTP.
Open Access Fiber Network	A network that separates the physical access to the network from the delivery of services – akin to wholesale model. The owner or manager of the network does not supply services for the network; these services are supplied by separate retail service providers.	It allows for greater variance in management and investment. For example, a community can invest and own the network while supporting local business growth that provides service to end customers.	It is a unique model that has been more popular outside the US.
Open Access Network with wireless overlay	Builds upon the wholesale approach that separates the network from wired services but includes a layer of wireless to reach end customers.	Provides end customers with service more cheaply and quickly than wired services. It is an infrastructure that can be upgraded to FTTP as a phased approach. It can provide a quicker revenue stream for the project.	Depending on who provides the wireless service, it can pit government services against commercial-provided services. While usually considered a temporary fix, customer may decide that wireless is sufficient and not upgrade to FTTP once available.
Open Access Network that serves community anchor institutions	Builds upon the wholesale approach that separates the network from providing services but includes network access to key anchor institutions, often government, school and/or healthcare facilities.	It helps the community network provider offset some costs by moving away from an existing provider, yet still allows government to support local provider and stay out of the business of providing and managing broadband service.	Local commercial providers will not have the opportunity to serve community institutions, which often can be big customers for a commercial provider.

Within each scenario is another range of scenarios based on what equipment and standards are selected, community profile details and existing infrastructure. For example, looking at Open Access Network a community will have to decide who will manage the network, the city or a third party? Then who will own the equipment used to manage the network, the city, the management company or the companies providing retail service. Each community will have a unique set of

opportunities based on their situation and the intricacies of each option and part of the reason a feasibility study is valuable.

CHOOSING AN APPROACH

Most communities would like to have FTTP but the potential for revenue may not meet the costs. For communities with multiple providers, the issue may not be actual number of customers in the area but market fragmentation. In such cases the Open Access Network model may be worth considering.

For other communities a phased approach may be more practical. This may mean an iterative process where they might deploy FTTN, sell services to recoup costs and being a phase II deployment of FTTP. Or it may mean building wired services (FTTP or perhaps FTTN as an iterative step) in areas where revenue can surpass cost more quickly (higher population density for example) and building out wireless services as an iterative step in other areas.

The key to an iterative approach is to minimize investment that does not lead to the ultimate goal of FTTP. So if construction is required to complete the FTTN connection to end customers, it is worth the immediate upgrade to FTTP rather than building with copper or cable.

Many communities consider a couple of the options as a phased approach to getting FTTP. SMBS, for example, decided to extend their network to more communities by offering wireless services to areas where it was not feasible to offer FTTP. <http://wp.me/p3if7-1bW>. The advantage to the community is greater broadband expansion; the advantage to the provider is building a customer base. In the future, it will be easier to make a business case to upgrade to FTTP with an existing customer base.

Cloquet Valley is also looking at a phased approach. Cloquet Valley is sandwiched between communities that are getting fiber connections. In fact, they have watched as fiber has been deployed down major highways, but bypassed their communities. While they continue to strive for a fiber network, Cooperative Light and Power (CLP), a local wireless provider, has begun offering wireless access. The cost is \$50-60 for 3-7 Mbps service with an installation fee of \$250. For many residents this service is an improvement on other local options. <http://wp.me/p3if7-2xx>

Within each technology scenario is also range of management and partnership options. The community might “go it alone” by owning and operating the network as an Internet Service Provider. The community might hire and/or partner with a private sector partner to manage the network and ISP services to the community. The community might work with a private sector partner via vendor-relationship, as in the case with Open Access models. Or they may try something innovative as RS Fiber is embarking on, a co-operative model.

| Local Champions |

As a rule, feasibility studies don't highlight the importance of local champions. But people close to the projects will attest that local leadership and passion make a difference. <http://wp.me/p3if7-13j> Behind each project moving forward is a champion who thinks about the work every day and helps others stay focused on the importance of the work for the common good.

Minnesota broadband champions have also been recognized by national publications:

- In an article featuring the RS Fiber project, *Governing* lists "recruiting a champion" as one of the keys to building a community broadband network. <http://wp.me/p3if7-224>
- SMBS champions get a nod in *Broadband Properties* (now *Broadband Communities*). The article notes the support of champions in several communities within the SMBS project. <http://wp.me/p3if7-1Ll>
- Robert Bell praised the work of many Minnesota broadband champions when talking about the Blandin Foundation's MIRC (Minnesota Intelligent Rural Communities) project. <http://wp.me/p3if7-19q> Bell said, "What is important is what they [champions] inspire in others: the burning desire to succeed, not to mention its darker cousin, envy."

Key Question: How to support local champions?

If you are reading this, you probably are a broadband champion for your community. How can you enthruse others to join the effort? Check out the TED Talk by Derek Sivers, How to Start a Movement for inspiration.

<http://tinyurl.com/yhff3kw>

Successful champions are evangelists. The Blandin Broadband Communities (BBCs) met in December 2013 to talk about how participating communities can most effectively support broadband adoption efforts. The important role of local champions was a theme that emerged. Participants recommended encouraging and resourcing partners and others to tell the story of the role of broadband as the indispensable infrastructure of our age to create a sense of urgency and to make sure that broadband is included in conversations about economic development, health care, education and increased standard of living. <http://wp.me/p3if7-2uq>

|| Conclusion ||

From the fertile farm lands in Sibley County to the lakes in Todd County to the forests of the Cloquet Valley, each rural community in Minnesota is different, and the differences go beyond topography. Population densities are different, existing telecommunication infrastructure and ownership are different, interest in broadband and broadband adoption rates are different, local tolerance of risk is different and local economies are different.

Cookie cutter approaches to rural broadband expansion planning do not work, which is why there's value in local feasibility studies to create or recommend custom solutions. That said, it is also true that we can learn from one another. The hope in sharing information gleaned from past feasibility studies is that it will inform and open dialogue with more communities.

LESSONS LEARNED

- Business Basics: Cost versus Revenue – Revenues must surpass costs for a sustainable model. That may mean creative financing or for a community it may mean factoring in costs saving to offset revenue deficits.
- Key to Success (ARRA) – Stimulus funding for broadband deployment was a game changer that is not likely to happen again soon. But community champions can learn from those who got funding. See what worked for those networks that were funded and keep an eye out for opportunity, which may emerge from State resources.
- Public Private Partnerships – Public Private Partnerships may take many forms, but for a community where a pure market case cannot be made, there may be a solution is drawing on private expertise and public funding options.
- Technology Scenarios – While FTTP is the ultimate goal for most areas, there are iterative designs and ownership plans that can improve financial viability.
- Local Champions – Especially when the business case is hard to make, communities need local leadership to increase interest in a broadband effort and spearhead efforts to make it happen.

Leadership: You Have to do it yourself but you can't do it alone.



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