

Summit Perspectives On Community Fiber

At the 2012 Broadband Communities Summit in April, participants reported on how communities are ensuring the connectivity they need. In urban and rural areas alike, public and private organizations are collaborating in new ways to finance, build and use fiber networks. Following are a few of the many stories shared at the conference.

A BBC Staff Report

How a Smart Grid Improves The Business Case for FTTH

“The smart grid is a holistic approach to energy management,” said Dean Mischke, vice president of Finley Engineering Company, introducing the Summit session on smart grids and fiber. “It’s the application of technology across the entire industry, including generation, distribution and the consumer, to manage transport and conserve energy.”

Energy generation is at a standstill today, Mischke explained. No new nuclear plants are being built, and fossil-fuel plants face increasing pressure to reduce harmful emissions. Green energy has its own set of problems – solar power diminishes in late afternoon just as the air-conditioning load peaks, wind power varies unpredictably, and both are generated so far from population centers that the cost of delivering watts to consumers is high.

Energy companies are caught between a rock and a hard place – they must provide energy in real time to meet demand. Smart grids can help reduce the demand load. Today, electric utilities can curtail the usage of their large industrial customers when demand is high. With smart grids, utilities and interested consumers can begin to manage demand at the household level.

Chattanooga’s network reduces power distribution costs, enables a profitable telecom service and attracts businesses to the city.

CHATTANOOGA EPB: REPLICABLE ON ANY SCALE

Chattanooga’s municipal electric utility, EPB, built a smart grid using a fiber optic network, said Katie Espeseth, vice president of EPB Fiber Optics. That network also gave EPB the ability to provide 1 Gbps Internet services to every home and business in its territory.

About 15 years ago, EPB began planning a smart grid to provide more reliable electricity. It connected substations with fiber and then looked for any additional opportunities a robust communications network might provide. “An automated metering infrastructure offers great benefits to us as a utility,” Espeseth said, “but we never would have deployed the smart grid if that were the

only benefit.”

The smart grid – or “smarter grid,” as EPB calls it – exceeds the utility’s original estimates for cost savings by avoiding power outages and electricity theft. It also allows the utility to operate more efficiently and manage voltage better.

With all the benefits from the smart grid, EPB’s revenues from voice, video and data seem almost like icing on the cake. Today EPB Fiber Optics has 38,000 residential and 4,000 business customers. The telecom service became net income positive in 18 months and achieved its target take rate.

EPB is dedicated to using its fiber optic network to improve the city’s quality of life and economic development. Several large companies recently located

About the Authors

Marianne Cotter and Masha Zager contributed to this report.



Katie Espeseth, vice president, EPB Fiber Optics

to Chattanooga, largely for access to ultra-broadband communications and reliable electricity, and several call cen-

ters are moving to the city so they can hire home-based customer service reps. About a third of new jobs in the city are attributable to the fiber optic network .

For the electric utility, “We haven’t even scratched the surface,” Espeseth said. “We haven’t even begun to understand what we can do.”

Though population density affects the cost of building out fiber to the home, Espeseth said Chattanooga’s financial model would work for any electric utility. “It’s one of the best investments you can make,” she said. “The rate of return far exceeds what we could achieve in any other way. The ability to finance the build and realize results is available to any electric system, small or large.”

OPELIKA FOLLOWS IN CHATTANOOGA’S FOOTSTEPS

Opelika Light and Power in Opelika, Ala., is much smaller than Chattanooga EPB – it serves fewer than 13,000 premises with electricity – but it follows a similar business model. Accord-

ing to Beth Ringley of Motive Group, a consultant for Opelika, “If you add the broadband services on top of the smart-grid infrastructure, you get added revenue to help pay for electric improvements. The telecom pays back the electric utility to ride on its infrastructure. You’re not subsidizing telecom with electric dollars; you’re using one system to enhance the community.”

Ringley warned that launching telecom services involves some risk (or at least perceived risk) to an electric system for the first few years. “It takes a couple of years for the telecom take rate to get to where it should be,” she said. In addition, marketing telecom services requires a different and more entrepreneurial skill set for employees.

However, in Opelika, benefits from the smart grid also began accruing immediately in the form of reduced power outages. In addition, the telecom system was able to share some overhead expenses with the electric department.

Innovative Financing for FTTH Networks

“We are on the cusp of the biggest infrastructure build ever,” said Graham Richard, broadband champion and former mayor of Fort Wayne, Ind. Federal mandates require communities to spend \$150 billion on sewer projects in the near future – a potential leverage point for municipalities to build high-speed networks.

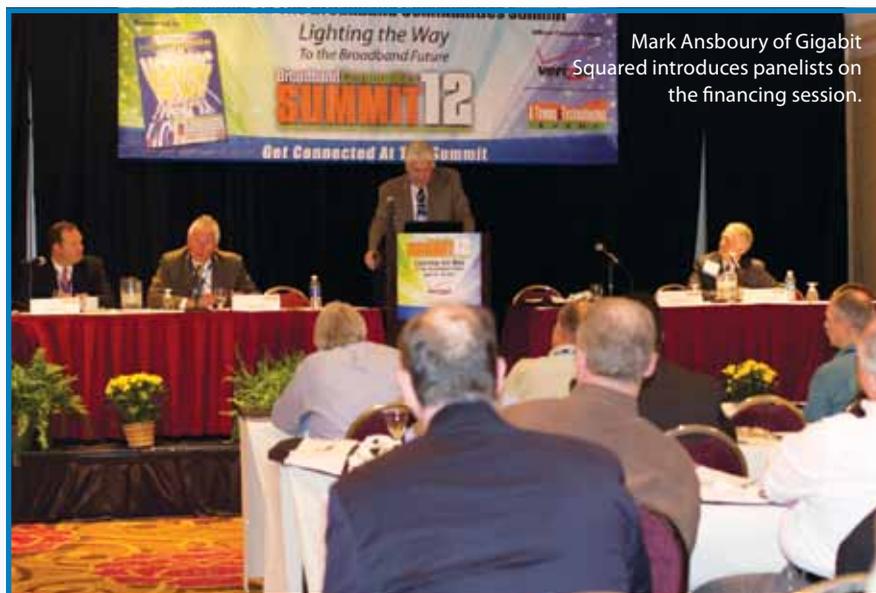
“Think strategically about reopening those projects to put fiber optics into sewers and other infrastructure,” Richard said. “Take advantage of 20-year bond financing to generate revenues that will offset the sewer rate increases.”

Richard added that because public entities often have more borrowing power than their private-sector partners, communities that want fiber-to-the-home networks should investigate a variety of financing methods, including “smart-city bonds,” revenue bonds and tax-increment financing.

For example, Renville-Sibley Fiber in Minnesota, a public FTTH proj-

ect in its formative stage, plans to use revenue-bond financing guaranteed by its network assets along with a debt service reserve fund. Cinergy Metronet, an FTTH overbuilder in Indiana, successfully uses tax-increment financing.

Cities issue bonds that they can repay based on anticipated tax revenues from new businesses attracted by new FTTH infrastructure. Cinergy Metronet then buys the bonds that cities issue and builds the infrastructures. Cinergy



Mark Ansboury of Gigabit Squared introduces panelists on the financing session.

Metronet gets a lower cost of capital, and “the risk to the community is close to zero,” Richard explained.

He added, “You’ve got to pull together a team in the community that really wants this so they can learn each other’s languages. The basic building block is community collaboration. To begin the process, assemble everyone and ask, ‘What if we became the best city for broadband – what would that look like?’”

ANCHOR CORPORATIONS STEP UP

Joe Starks, president of ECC Technologies, said private investors – especially foreign investors – were pulling money out of stocks and looking for investments in technology and telecommunications. “I’m seeing anchor corporations stepping up to put money into projects,” he said. “Tens of millions of dollars are coming in from private corporations. If a private or public FTTH project writes a solid business plan” – which includes what-if scenarios, worst-case scenarios, risk analysis, competitive analysis and more – “and shows cooperation with carriers, cell tower operators and other partners, then private investors

... will invest.” However, investors are also looking for deployers or potential network customers to put “skin in the game” – they don’t want to be on the hook for the entire project.

Aggregation of demand is a key factor that private investors seek, according to Starks. In addition to connecting homes with fiber, deployers should consider connecting cell sites, health care providers, public-safety agencies, municipal facilities, schools and large enterprises. To attract investors, they should roll small projects into major, long-term projects worth \$50 million to \$75 million.

Aggregating demand can also identify new sources of investment. Communities may find their potential large users willing to invest in the networks they need. “You may not need as much startup cash or sustainability cash as you thought,” Starks said. “There’s a lot of money out there.”

THE MIDDLE MILE FINANCES THE LAST MILE

Tad Deriso, president and CEO of the Mid-Atlantic Broadband Cooperative, operates a 1,500-mile wholesale middle-

mile network. Private companies, ranging from Verizon Business and Level 3 Communications to mom-and-pop Internet service providers, use its assets to reach business customers. The network became financially sustainable in 2007 and now has nearly \$6 million in annual revenues. However, the network depended on grants to get started.

The Mid-Atlantic Broadband Cooperative now gives matching grants to last-mile providers that connect to its network and deliver broadband to areas that would otherwise be unserved. For example, CenturyLink will connect 2,600 homes with help from MABC. One condition is that it maintain open access to competitive providers. “Mission accomplished,” Deriso said.

Deriso noted that some middle-mile networks funded by the broadband stimulus program have turned to private markets for additional funding. “BTOP projects aren’t allowed to sell or depreciate their assets,” he said, adding that banks are uninterested in these assets because they are so restricted. However, network owners can lease these assets to private-sector partners. “We’ll see a lot of that in the next year or so,” Deriso said.

Open-Access Success Stories

Open-access fiber networks, still rare in the United States, are common in Sweden, said Ron Corriveau, VP of COS Systems, a Swedish open-access software company. Municipalities, regional authorities, utilities, and operators of public housing and student housing have all experimented successfully with open access.

Marketing is the key to success, according to Corriveau: Let potential customers know they have options, and target locations where network service is available. “Make it easy to find service providers,” Corriveau said. “Make it simple to compare their prices and terms. And make it easy for service providers to contact and acquire customers and integrate them into the network operating system.” In a recent survey, 90 percent of Swedish customers said they preferred self-service provisioning options.

THE UTOPIA STORY

One of the first U.S. open-access networks was UTOPIA, built by a consortium of 16 cities that represent one-quarter of Utah’s population. (See the Municipal FTTH Deployment Snapshot in this issue for more information about UTOPIA.) Todd Marriott, CEO of UTOPIA, said the network’s vision of open access was a “layered ecosystem” or marketplace for service providers.

“Why would a conservative state do such a thing?” Marriott asked. “The government shouldn’t do what the private sector can do.” His answer: The private sector can’t and won’t provide a comparable service, and the UTOPIA ecosystem allows the free market to operate.

UTOPIA service providers range from national companies to small local ISPs, making it “one of the most free-

market systems out there,” according to Marriott. Any provider can use the zero-client gateway, whose source code is open. Services are local as well as Internet-based – for example, cities use the network for automated meter reading. “You could put sensors in the grass for irrigation, you could have home automation, LTE [backhaul] ... there are slices of connectivity for data centers, utilities, sensors, medical applications, government. It’s all about the ability to innovate.”

Relations with service providers were not always easy. One service provider abandoned 4,000 customers and left owing UTOPIA \$3 million. “Now we don’t let them do that,” Marriott said.

Marriott concluded by calling for the open-access networks of the country to unite and form an even bigger

Open-access networks may offer unlit fiber, lit fiber or wholesale bandwidth to third-party service providers.

addressable market. “That would really provide innovators with the ability to make money,” he said. “In addition, we could cooperate to bring costs down. If you’re out there doing this alone – well, we already made every mistake in the book. We can tell you about them.”

POTATOES AND CHIPS IN GRANT COUNTY

Grant County, Wash., is even more rural than UTOPIA’s territory (“Desolate is more like it,” said Russ Brethower, fiber optic outside plant manager for the Grant County Public Utility District), and its open-access network is even older than UTOPIA’s. The local economy features “lots of potatoes and potato processing” as well as a silicon refining plant.

The fiber network began serendipitously in 2000, when the public utility district board was looking for something useful to do with its surplus revenues and an engineer suggested building an FTTH network. (Washington state had recently given its public utility districts the authority to provide wholesale bandwidth services.) The district started a pilot FTTH project in 2000, using electric line crews to build the plant. The pilot project was not without problems (“Pioneers catch arrows and bleed,” as Brethower put it) but nevertheless, the agency moved on to a countywide network in 2001 and “spent a lot of money learning about FTTH and letting vendors learn about FTTH.”

After the project’s original champion left the agency, Grant County paused to reconsider and do some business modeling. The community was in favor of proceeding with the project, and every county commissioner elected since then has supported it, so the network continued to grow. At present, because money is tight, the build focuses on relatively

high-density areas, which can more easily support the operations and maintenance costs. The network now passes 23,000 premises and has 6,500 customers, including all the local schools and hospitals.

Currently, 23 providers offer retail services on the system. Only one offers the triple play, and only a few are really market players – the others offer niche services, such as super-high-speed connectivity for gamers, to a few dozen customers. The economics for service providers aren’t quite as impossible as they seem; the district charges only \$500 to join the system, and many service providers operate on other county networks as well (many Washington public utility districts operate fiber networks). Regional and national carriers are now looking to join the Grant County network to serve the new data centers springing up in the area, drawn by cheap hydropower and seismic stability.

Flying in the face of all advice, Grant County abandoned its branding and marketing activities, and today it does no marketing at all. “We list the providers on our website and give them a list of customers so they can market to them,” Brethower said. The lack of marketing doesn’t seem to hurt. “The school traffic is incredible,” Brethower said, “and the regional hospitals have remote clinics so they can VLAN back to the hospital and read X-rays on the spot.”

METRONET HAS ZING

South Bend, Ind., was “stifled for economic development,” according to Mary Jan Hedman, executive director of St. Joe Valley Metronet. To transition to the new economy, the community knew it needed affordable high-speed bandwidth; to get affordable high-speed bandwidth, it needed more competition. Public and private organizations part-

nered to set up St. Joe Valley Metronet, which now operates a network with about 60 miles of fiber.

The network was built using existing conduit owned by two cities and a county, which received free use of some of the fiber strands in exchange. The other fiber strands are leased, unlit, to about 30 local service providers that light the fiber at anywhere from 1 Gbps to 40 Gbps and provide services – Internet access, VoIP, videoconferencing, backup services, cloud services and many others – that are marketed generally under Metronet’s Zing brand name.

To support the service providers, Metronet displays a matrix on its website that shows the services available from all providers. It also educates end users about how they can use the fiber. Service providers do not pay for their use of the network. “We want them to grow and offer more services to the end users,” Hedman said.

South Bend is fortunate to have one of Indiana’s two carrier hotels; because of its manufacturing heritage, the city has a high convergence of long-haul fiber. “The problem was that there were no exit ramps,” Hedman said. Now Metronet has a presence at the carrier hotel, so carriers can provide services to the area “instead of zooming on by.” The long-haul carriers sell bandwidth wholesale to the local companies that actually retail services on Metronet.

Affordable high-bandwidth connectivity has given the South Bend area more opportunity to attract and grow businesses. Users of the network today include about 100 businesses, government agencies, medical facilities, educational institutions and nonprofits.

DANVILLE MAKES A COMEBACK

Like many municipalities, Danville, Va., started building a fiber network to serve its city facilities, schools and municipal electric substations. The network, called nDanville, borrowed a small amount of money from the electric utility to get started and paid it off with interest. In 2004, when the institutional network was established, the city began to extend fiber to businesses; currently 93 businesses and small apartment com-

plexes are connected to the network. Now nDanville is building out fiber to the home. The first phase of the FTTH project will pass 344 homes, and funds have been budgeted to make fiber available to all homes in the electric utility's 500-square-mile service territory.

The network is now financially self-sufficient and generates enough revenue from market and E-Rate subscribers to plow back into the system. The regional middle-mile provider Mid-Atlantic Broadband Cooperative gives nDanville access to the rest of the world.

"We toyed with the notion of being a full-service provider," said city manager Joe King, "but we backed off and adopted open access because of the conservative nature of the community." Currently, nDanville sells wholesale connectivity – lit fiber, rather than dark fiber – to a single service provider, which in turn sells retail services to homes and smaller businesses. (The city acts as its own ISP, and large businesses also have direct connections.)

nDanville considered retailing services but decided on an open-access approach "because of the conservative nature of the community."

Though nDanville would prefer to have multiple service providers on the network, "in an isolated community, we're not seeing service providers coming in," King said.

The city began selling connectivity to businesses for purposes of economic development. Danville was historically a textile and tobacco processing center and lost many jobs as those industries declined. The city was not well positioned to attract newer industries, and its telecom service was particularly poor. (Though middle-mile networks benefited from tobacco settlement money, last-mile networks such as nDanville did not.)

Now, with a comprehensive economic development program and a robust fiber network, the city can compete for business. "The network is helping to put us on the map and making us more attractive," King said, citing a Cray supercomputer site as well as a dental practice that has now expanded to five locations.

When a customer signs up for service, the utility bears the connection cost. The customer pays a premises charge to the network and a service charge to the service provider. The service provider pays a fee to nDanville – but not until it actually sees revenue from the customer. "We're trying for low cost of entry," King explained.

Rural Communities Act Regionally

Two stories of resourceful New England towns pooling their resources and aggregating their demands were presented in the Summit's economic development program. (A third such project, ECFiber, is described later in this article.)

CONNECTING THE CAPE

What appears to visitors to be a wealthy enclave dotted with estate-like summer cottages is different for Cape Cod's permanent population. The Cape, along with the islands of Nantucket and Martha's Vineyard, lacks a competitive telecommunications infrastructure, and this creates a dearth of year-round business opportunities for full-time residents, who struggle and often move away. Several years ago, community leaders realized the situation was unsustainable.

In 2006, the OpenCape Corporation was formed to bring broadband into the area. With no large cities to propel the project forward, community involvement from the string of towns that

define the Cape was critical. "Cape Cod residents see themselves not so much as individual towns but as a region," said OpenCape CEO Dan Gallagher, "yet it is very much a town-hall environment. We had a lot of community meetings." Support for the project was strengthened by the enthusiasm of local libraries, schools and other anchor institutions. "Libraries are an important part of the project," said Gallagher, who added that OpenCape enjoyed broad support throughout the region and the state.

In 2010, OpenCape was awarded a \$32 million BTOP grant. This was combined with \$8 million in matching funds from the Commonwealth of Massachusetts, Barnstable County and a private construction and operating partner. OpenCape's mandate was to construct a comprehensive middle-mile communications network to support the economic, educational, public safety and governmental needs of the south-east Massachusetts region.

Today, construction of the core fiber optic backbone on Cape Cod, with extensions to regional network connection centers in Providence and Brockton, is well under way. The project includes a microwave radio overlay that will encompass Martha's Vineyard and a regional colocation center in Barnstable Village. With 55 of the 350 miles completed, the project is on schedule to meet its January 2013 completion date.

Gallagher stressed three essentials:

- The vision of community leaders to bring the region together
- Persistence over time as the project's complexity develops
- Positive energy to overcome the nay-sayers.

WIRING WESTERN MASSACHUSETTS

WiredWest began as a grassroots effort by citizens of small towns in western Massachusetts that had either no broadband service or completely inadequate service. "Incumbent providers weren't

So far, 29 towns in western Massachusetts have joined WiredWest and are contributing time and money to get the last-mile project under way.

going to do it,” said Monica Webb, executive committee chair of WiredWest.

The MassBroadband 123 middle-mile network, currently under construction, will provide a fiber optic backbone with connection points for last-mile networks, but local communities must build the last mile that will finally bring fiber to homes and businesses. In August 2011, the WiredWest Communications Cooperative Corporation was formed for that purpose.

According to Webb, achieving the

economies of scale needed to build the last mile required aggregating the needs of more than 40 communities. “As each community had to vote to join the cooperative,” said Webb, “we had to organize and attend a great many educational meetings.”

Though the cooperative is still in the planning stages, its goals are clear: to plan, build and operate a community-owned, fiber optic network that provides comprehensive, affordable, reliable and high-quality Internet, phone, television

and ancillary services to all residents, businesses and institutions in participating towns. So far, 29 towns have voted to join WiredWest and have ponied up the \$1,000 one-time membership fee to join the cooperative.

Webb said that finding a workable financing strategy is the biggest challenge to date. “The cooperative is the bonding agency,” she said, noting that some towns are too small to have their own credit ratings. Eventually, each town had to provide services in addition to a fee to join the group. The cooperative relies on pro bono work and volunteers, amounting to 30 hours per town. The cooperative also secured \$130,000 in pro bono services for mapping.

Webb is optimistic about take rates for the completed network. “We have the demographics in the area to support a high level of adoption,” she said.

Three Open-Access Fiber Projects Tackle the Middle Mile

ACCESS ONTARIO BRINGS TECH JOBS TO THE FINGER LAKES

Though the technology infrastructure that a major university enjoys doesn't often extend to the community around it, Ontario County, N.Y., home to Cornell University, prided itself on being one of the most highly advanced technology centers in the country. Yet it was suffering serious technology job losses. “They were experiencing two-to-three day outages due to lack of diversity, redundancy and competition,” said Joe Starks, president of ECC Technologies.

“We had a fragmented telecom infrastructure,” explained Michael Manikowski, executive director, Ontario County Office of Economic Development. “We wanted to build a fiber ring around the Finger Lakes area to open it up to service providers.”

The open-access fiber project attracted strong political and community commitment and eventually became Axxess Ontario. It follows these six principles:

- 1 The organization is set up as a non-profit local development corporation

Job loss is a powerful motivator for communities to build the fiber infrastructure that businesses need to survive.

and is managed by outside contractors rather than staff. ECC Technologies designed, implemented and now operates the network.

- 2 The network provides backbone fiber only, not services.
- 3 The fiber is open to everyone.
- 4 The fiber reaches every municipality.
- 5 No additional taxpayer support is required.
- 6 The network was designed as economic development infrastructure for the 21st century.

Today, the community has 200-plus miles of dark fiber available for lease, the project is fully funded and potential contracts are valued at more than \$12 million. Customers can choose from five service providers. More than 300 tech-

nology jobs were announced in 2011, and the fiber ring is globally competitive. “The fiber optic ring is now being actively marketed in Europe and Asia,” said Starks.

EASTERN ONTARIO REGIONAL NETWORK

Job loss is powerful motivator, as communities in eastern Ontario, Canada, found out. After losing 12,000 full-time jobs, the region was ripe for innovation; the result was Eastern Ontario Regional Network (EORN), a network designed to eventually touch all 1.1 million people in the region. “About 300,000 people had only dial-up,” said Jim Pine, colead of EORN and chief administrative officer of the County of Hastings.

“We’ll provide faster speeds to those who are connected and give access to those who never had it.”

Home to six First Nations, the 13 counties of eastern Ontario are largely rural, with rugged landscapes and dispersed populations. From the beginning, EORN established an open-access policy based on shared ownership with the private sector. Canada’s central government and the province of Ontario each contributed \$55 million to the network, the private sector contributed \$50 million and EORN came up with \$10 million for a total cost of \$170 million. As EORN’s role was to build but not run the network, 14-year commitments from private-sector participants, including ISPs, were secured up front. Eventually, EORN will surrender its 51 percent ownership to the private sector.

To date, the network, which is 90 percent built, has 55,000 kilometers of fiber with 160 points of presence connected to that fiber. One requirement for the ISPs was that all locations have equal access and pricing.

Pine cited the following lessons for the public sector:

- Rather than focusing on return on investment, look at the potential losses from *not* building the network.
- Partner with the private sector.
- Acquire the skills to negotiate with the private sector.

EORN will work with Queens University in Kingston to study the impact of the network on the community’s economic development.

INTER-COUNTY BROADBAND NETWORK, MARYLAND

Without adequate broadband coverage, central Maryland suffered hardships that hindered its chances of recovering from the recession. Echoing a point made by Pine, Ira Levy, chief performance officer and CIO, Howard County, said, “When justifying the cost of a project, the question to ask is not what is the cost of doing it, but what is the cost of not doing it. People move away, revenues decline.” Indeed, area realtors and developers were unable to lease their space, leaving many vacancies in office buildings. Levy noted, “Prior to leasing space, business

owners were asking, ‘What are the available broadband options?’”

The Inter-County Broadband Network was formed as a subrecipient of One Maryland Broadband Network BTOP grants. This consortium of nine central Maryland jurisdictions partnered with technology innovators and thought leaders, such as the Maryland Center for Entrepreneurship incubator, as well as private companies, such as Freedom Wireless, which leased space on towers and water tanks to reach rural areas.

Rather than starting from scratch, the group began by looking for existing fiber. “We consolidated tens of networks into one,” says Levy. The strategy called for changing from a dark-fiber leasing model to leasing lambdas, or wavelengths, which was more cost-efficient. For sustainability, the project called for creating an app store to encourage entrepreneurs to develop on the network.

The result: a 1,000-mile fiber ring that connects central Maryland with a single network and has become an attraction for business owners looking to lease space.

Do-It-Yourself Fiber in England and Vermont

In remote areas where traditional service providers have no business case for broadband, residents’ only option may be to “do it themselves.” Once they make that choice, they usually decide to go all-out and build fiber to the home so they won’t have to do it all over again in a few years.

Timothy Nulty, executive director of ECFiber, a 23-town community fiber project in Vermont, said residents of remote areas are “faced with a stark choice: marginalization, emigration or do-it-yourself.” He added that DIY has a long, honorable tradition in such areas. “We’re often told it’s too hard,” he said, “but the other two options are harder.”

In the mountainous region of Vermont where ECFiber operates, lack of broadband connectivity is a major reason residents are marginalized. Unable to secure funding for broadband from

the stimulus program or from traditional private funders, they decided to build their own network.

The challenges of a DIY network, Nulty said, are to build the network inexpensively, to organize the right institutions to create and run it, and – most important – to raise the money to build it.

THE B4RN PHENOMENON

Lindsey Annison, a founder of Broadband for the Rural North (B4RN), spoke about her campaign to bring fiber broadband to England’s rural North Country. The B4RN group of rural broadband activists struggled to counter persistent myths, such as “Broadband isn’t economically viable” (For whom?), “Demand is too low” (We need broadband even more than urbanites do!), “Communities lack telecommunications experience” (Wrong!) and “Rural residents don’t need more than 2 Mbps”

(Well, I do!). The group also worked to educate community members about what broadband could do for them.

Eventually, the B4RN organizers formed an “industrial society” – similar to a cooperative in the United States – and decided to build a network capable of gigabit symmetrical bandwidth to serve 1,500 premises over a 220-square-mile area. FTTH was the only good option, Annison said – cellular service doesn’t work well in the region, and street cabinets weren’t practical on farms. A wireless overlay will help farmers connect to the network from their fields.

The first phase of the project includes the network core and connections to the Telecity carrier hotel in Manchester, where B4RN will peer directly with other carriers. “We’ll just sell raw bandwidth,” Annison said, “and then expand from there.”

The group raised all the money it needed in the community and recruited labor from the community as well. Farmers who dug fiber trenches across their fields were paid in equity. Even in harsh economic times, the organizers found diverse skills within the community as well as an appetite for investment. Any future profits from the network will be plowed back into the community.

ECFIBER BREAKS THE RULES

“Real broadband for rural America is the goal,” said Ron Cassel, CEO of Matrix Design Group, a consulting firm that works closely with ECFiber. Like B4RN in England, the ECFiber towns in Vermont decided an all-wireless solution would be of little help to them. Only a gigabit-capable symmetrical network would give the region the economic boost it badly needed. Cassel’s challenge was to build it inexpensively.

One critical decision was to forgo video service and all the “hassle and expense” that entails, concentrating on the dumb pipe and on voice service. Rural residents are already well served by satellite TV; what they desperately needed was broadband.

Cassel made a number of design decisions to minimize cost. He was helped by the area’s pattern of settlement (houses are clustered along valley roads, at about 12 per mile, rather than scattered as they are in the flatter Midwest) and by the availability of utility poles – and good relationships with the other



Ron Cassel, CEO of Matrix Design Group, at podium, with DIY Fiber panelists

utilities – that enabled an almost entirely aerial build. Use of Google Earth and E911 data to identify premises made planning fairly simple.

The design calls for placing a small hubsite in each town center, every 20 miles or so. (Because the towns are participants in the network project, they have been cooperative about siting issues.) There are no active electronics in the field – Vermont’s cold, snowy winters make powered field cabinets impractical. Rather, 36-count home-run fibers are used to reach the premises within 2 miles of each hubsite. To reach premises farther from the town centers, GPON technology with a tapped architecture, similar to a traditional cable TV network design,

was used. Because this design conserves fiber, most of the cable used in these areas can be 12- and 24-count.

Close working relationships with vendors helped the project get favorable pricing and lead times for materials and equipment. And, like B4RN, ECFiber has been helped by enthusiastic communities. Neighbors turn out to lend a hand or bring lunch to construction crews.

The one downside to the network’s modified home-run design, Cassel said, is that all the electronics in each hubsite have to be lit on Day One. However, he noted, “the take rate is so high that it doesn’t matter.” Despite this drawback, and despite building extra capacity to allow for 20 percent growth, he was able to keep costs below \$14,000 per route mile, which permits the network to charge prices comparable to other broadband providers in Vermont.

Another cost challenge is the lack of peering, which makes wholesale bandwidth expensive. This is expected to change once ECFiber builds fiber to the colocation center in White River Junction, about 25 miles from the first ECFiber town. “The unavailability of long-haul fiber is not the killer issue that Washington thinks it is,” Tim Nulty said.

CROWD FUNDING A NETWORK

The legal and financial organization of ECFiber was as carefully thought out as the technical design. Leslie Nulty, the

The Leading Conference on Broadband Technologies and Services

Broadband Communities

SUMMIT 2013

APRIL 16 - 18 • INTERCONTINENTAL HOTEL - DALLAS

“Great education for municipal managers who are trying to become knowledgeable about broadband ... it is a way to gain valuable information and professional contacts.”

— John A. Seymour
City Administrator, City of Opelika, AL

To Exhibit or Sponsor, contact:
Irene Prescott at irene@bbcmag.com, or call 505-867-2668
For other inquiries, call 877-588-1649, or visit www.bbcmag.com

A Towns Technologies
EVENT

SUMMIT COVERAGE

project's director of marketing, customer care, administration and investor relations, explained that ECFiber was set up as an interlocal contract of 22 towns and the city of Montpelier, each of which appoints a delegate and an alternate to the governing board. The organization has the legal status of a municipality, which exempts it from a number of regulations and enables it to issue promissory notes.

ECFiber contracted with ValleyNet, a community-based nonprofit, to design, build and operate its fiber network, and ValleyNet, in turn, entered into the contract with Matrix Design. To finance the project, ECFiber raised \$2.4 million in three rounds from local investors, selling 15-year notes in increments of \$2,500.

The plan succeeded, according to Leslie Nulty, only because "legal counsel was willing to defer payment, state law was favorable, the customer base was hungry for broadband and there was a strong community self-help tradition."

The project was able to move ahead after years of frustrating setbacks. The first phase is now live with 200 subscribers, the second phase is about to start construction and the third phase is beginning design.

At present, ECFiber is the service provider, offering residential and business Internet access and voice service. Though ECFiber was conceived as an open-access network, its first phase, with only 200 subscribers, has not aroused the attention of any third-party service providers. "Over time, I like to think service providers will come along," Tim Nulty said. "I view them as customers, not as competitors."

The disadvantage of crowd funding is that the project is proceeding more slowly than it would with traditional financing. "Our limited cash reserves make us vulnerable to predatory pricing," Leslie Nulty said, "and the unserved towns may lose hope." ECFiber hopes to return to the conventional capital markets soon, using the success of the initial phases as proof of concept.

CONNECT THE ANCHORS FIRST?

At the end of the DIY Fiber presentation, a lively discussion centered around

the question of network building strategy. Traditionally, municipal networks begin by connecting municipal facilities, then add community anchor institutions such as schools, colleges, libraries, hospitals and major businesses, and eventually work their way down to ordinary residents and small businesses. The NTIA broadband stimulus program also followed this strategy.

Conventional wisdom holds that connecting anchor institutions makes communities more viable, and, in many cases, revenues from anchor institutions finance subsequent phases of the build. Yet ECFiber is building out its network one town at a time, connecting residents' homes in every phase of the project.

"Is the anchor institution theory wrong?" asked a Summit participant who directs an organization that is devoted to connecting anchor institutions with broadband.

"It's rubbish!" Tim Nulty replied.

He explained that, in his view, building a network around anchor institutions is disadvantageous both technically and financially. Technically, he said, "When you build a universal distribution network, you get the middle-mile network for free. However, it doesn't work the other way around. You can't back-engineer, so you wind up having to build two networks." Policymakers aren't aware of this issue, he added.

Financially, he added, "because you cream off the anchor tenants, you actually make it harder from a cash point of view." (That is, if an anchor-institution network does *not* expand to residences and small businesses, other network builders cannot afford to do so because they won't have anchor tenants.)

Annison added that the British government built many duplicative networks to many different types of anchor institutions. "Then they had to ignore all that fiber," she said.

Leslie Nulty said, "In Barnard, the community anchor is the general store. The library is open only 10 hours a week. People use the Internet at the store. There's a real lack of information about how rural places function." ❖

Stimulus Projects Start with Charles

- Buy American Compliant
- More than 300 OSP Products Approved for ARRA Projects



NEW!

CFBT / CFIT Fiber Building Terminals
Indoor and outdoor fiber distribution at MDU with flexibility for all types of fiber networks



CFIT Fiber Interconnect Solutions
Rugged environmental pedestals and terminals provide fiber interconnect capabilities at cell sites, MDU and other remote locations



NEW!

CFBT / CFIT Fiber Hubs
Compact design, flexibility for multiple fiber types and adapters, and scalability (up to three 1x32 splitters) for up to 96 subscribers

Charles is proud to support Broadband Stimulus Award Recipients with the "Stimulus Starts Here" Program. For details, please visit www.charlesindustries.com/stimulus.html

Charles

www.charlesindustries.com

INNOVATIVE ENCLOSED SOLUTIONS™