FTTH Lights the Economy

The theme of the 2011 FTTH Conference, held in Orlando in September, was economic development, a subject central to many of the conference sessions.

'The Most Significant Decision We Ever Made'

Chattanooga has attracted 2,400 new jobs with a combination of fiber to the premises and reliable, smart-grid-based electric power.

"Deploying fiber to the home was the most significant decision we ever made," said Ritchie Sorrells, president and CEO of Texas cooperative GVTC, in a presentation at the FTTH Conference. "It enabled us to ensure the long-term viability of our company. It enabled us to compete with Fortune 500 companies."

GVTC's fiber network – along with its superior customer service and history of community involvement – has helped attract many new subscribers. More important, it has helped GVTC's service territory, which is on the fringes of the San Antonio metropolitan area, capture much of the growth spilling over from San Antonio.

GVTC markets its fiber services proactively to both residents and businesses, always offering the highest Internet access speeds in the region. (Currently it offers 80 Mbps/10 Mbps.) To attract residential customers, the company launched a new builder program that helps builders differentiate their homes; to attract business customers, the company works closely with local economic development agencies to meet the communications needs of businesses that are looking to locate or grow in the region.

GVTC's competitive fiber overbuild of the underserved town of Boerne gained it a 79 percent market share and allowed it to recover its costs within 21 months. The company is now replicating its Boerne experience in the nearby town of Bulverde.

Revenues from competitive commercial areas allow GVTC – a cooperative operated for its members' benefit – to extend broadband to its sparsely populated rural areas. Many of these areas now have FTTH. For the last, unserved 2 percent, Sorrells said, "We're pursuing all alternatives."

Sorrells anticipates that GVTC will continue to grow, reaching $100 million in 2014 from its 2011 revenue of $80 million. "Fiber to the home allows us to deliver value," he said. "But you've got to devote the resources and effort to tell the story – that's incredibly important."

CHATTANOOGA EPB

EPB, the municipal power utility in Chattanooga, Tenn., built a fiber-to-the-home network to install smart meters. It now also offers triple-play services throughout its territory. With 170,000 homes passed, it is the largest municipal fiber provider in the U.S., and with 1 Gbps available everywhere, it is also the fastest. (About 30 customers, including a few residential customers, subscribe to the 1 Gbps services.)

"We asked the community, 'What can you do with a gig?'" said Katie Espeseth, vice president of EPB Fiber Optics. "We meet with EPB customers every week to discuss this, including many who aren't broadband customers. We're trying to find out what we should be doing in the community. The campaign has sparked pride in our community – it takes us a long way." Customers are doing everything from playing games to creating high-resolution carpet samples, and fiber is critical to business success for many of them.

The electric utility itself has achieved $40 million in productivity gains from reducing outages and theft of services. When a series of tornados hit Chattanooga in April 2011, two-thirds of the premises served by the utility lost power, but the fiber-enabled grid identified the outages immediately and rerouted power wherever possible. Soon, the utility will launch an IPTV channel on which customers can view their energy usage and costs.

Espeseth said that companies have brought 2,400 jobs – including at a new Volkswagen Passat factory and an Amazon distribution center – to Chattanooga, drawn by the combination of reliable power and fiber-based broadband. In addition, the city is attracting a new generation of entrepreneurs and gaining a reputation as a place to start and grow businesses.

Education and health care have benefited, too. For example, access to self-paced learning on the Web allows public school teachers to spend an average of two extra hours per day helping individual students. Because Chattanooga's major hospitals are linked with rural hospitals, stroke patients get faster care and

radiology readings can be completed within 15 minutes rather than 24 hours.

EPB determined that all premises in its electricity service area should have access to fiber to the home and built out some of the lower-income neighborhoods first. In areas where not everyone could afford fiber-based services at home, LUS connected city recreation centers and libraries early on. Today, take rates in lower-income neighborhoods are comparable with citywide averages.

Panelist Sonja Murray, senior vice president of One Economy, added that adoption in low-income neighborhoods could increase further if Title 1 education funds are used for broadband – which is allowable if school superintendents agree.

LUS FIBER

Lafayette, La., is also making good use of its communitywide FTTH network, according to Mona Simon, communications engineering and operations supervisor for LUS Fiber. Public high schools now have 1 Gbps connections, lower schools and libraries all have 100 Mbps connections, and even private schools and home-schooled students can get high-speed connections. Students access educational videos from Louisiana Public Broadcasting, participate in real-time video visits with children in other states and peer directly with the University of Louisiana.

"There's excitement and new ideas," Simon said. The city is becoming a hub for movie and video game production, with the LITE Center, Pixel Magic and the Academy of Interactive Entertainment all thriving. A local arts center has begun broadcasting live performances, and the city's many music festivals are now held online as well as in the streets.

LUS is also planning a smart electric grid; it expects to see results similar to those Chattanooga has documented.

Measuring the Economic Benefits Of Communitywide FTTH

In the spirited discussion that followed a presentation by David Russell, solutions marketing director for Calix, a roomful of FTTH Conference attendees grappled with measuring the impact of communitywide fiber-to-the-home deployments.

Russell examined five fiber communities – Bristol, Va., and Bristol, Tenn. (a single community that spans two states); Dalton, Ga.; Jackson, Tenn.; Reedsburg, Wisc.; and Windom, Minn. – before and after they deployed fiber infrastructure. These were the only five U.S. communities that were commercial hubs for their surrounding areas and completed communitywide fiber builds prior to 2004. Russell compared growth rates in jobs and number of businesses in the four years prior to the fiber builds and the four years following the fiber builds. (Metro-area or county-level economic data was used as a proxy for city-level data, which was not available.)

Russell's results were inconclusive. In absolute terms, all the cities added more businesses during the post-fiber period than the pre-fiber period, but only Bristol had faster job growth. However, comparisons of absolute growth rates are not particularly meaningful because the economic environment changed between the first and second period. To discount the effects of changes in the overall environment, Russell compared each community with its state.

Relative to their states, he found that Bristol, Jackson and Windom all had higher business growth in the post-fiber build period, but Dalton and Reedsburg lagged far behind. Bristol and Dalton improved their relative rates of job growth in the post-fiber build period, but the other three cities lagged behind their states.

Overall, only Bristol – which is often held up as a model of an economically successful community fiber build – seemed to have unequivocally positive results.

INTERPRETING THE RESULTS

Russell presented his findings – which contradict anecdotal evidence and early studies of fiber deployments – not as evidence of fiber's role in economic development but as a challenge for further research and analysis.

One possibility, of course, is that building out fiber to entire communities does not offer any particular economic advantage.

Another possibility is that these fiber networks offered advantages that only Bristol fully exploited. (The Bristol municipal utilities have been proactive in using their fiber networks for business services and the smart grid.)

Some additional possibilities raised by Russell and by members of the audience

ECONOMIC GROWTH IN FIVE EARLY FIBER COMMUNITIES

	1998–2002 (Pre-fiber build)				2004–2008 (Post-fiber build)			
Community	Job Growth	Job Growth Relative to State	Business Growth	Business Growth Relative to State	Job Growth	Job Growth Relative to State	Business Growth	Business Growth Relative to State
Bristol, Va., and Bristol, Tenn.	1%	-8%	14%	-12%	2%	-3%	34%	-5%
Dalton, Ga.	7%	-9%	33%	-10%	-1%	-9%	36%	-17%
Jackson, Tenn.	19%	13%	9%	-10%	-4%	-8%	35%	-5%
Reedsburg, Wisc.	13%	4%	17%	5%	-2%	-2%	25%	-7%
Windom, Minn.	8%	-4%	0%	-29%	-5%	-6%	19%	-6%

Source: Calix

included the following:

- The sample size was too small for meaningful analysis.
- The post-fiber build period was too short to demonstrate results.
- Metro-area and county-level business data are not granular enough to show effects in small communities.
- Statewide data may not be the appropriate yardstick for comparison.
- Different measures of economic development – such as growth in percentage of high-tech jobs, increased retention of young people or increases in property values – might have been more appropriate.
- FTTH stimulated some economic sectors and not others.
- FTTH stimulated growth in home-based businesses that was not reflected in job and business data.

Audience members agreed that additional work was needed to identify and measure the results of fiber builds.

THE NEXT FRONTIER: INTEGRATION OF FIBER WITH WIRELESS

Verizon's next frontier is the seamless integration of its FiOS network with its new LTE network, said Virginia Ruesterholz, president of Verizon Services Operations, in a keynote address at the FTTH Conference.

Connecting cell towers to Verizon's FTTH network will allow millions of devices to be integrated into the network and will make possible the "Internet of things," or widespread machine-to-machine communications, Ruesterholz said. She added that integrated solutions enabled by this wireline/wireless network have the potential to address many of society's problems. Smart home security, smart grid management, online education, traffic management, medical monitoring and emergency services are just a few of the applications that will use the new converged network.

Follow the iPhone Model to FTTH Success

Video subscribers are "cord shaving" (giving up premium TV services in favor of Internet video), and telephone subscribers are opting for cellular service. How can fiber-to-the-home deployers grow revenue?

Bryan Rader, CEO of Bandwidth Consulting, pointed to the iPhone and its App Store as a model for FTTH operators. With plenty of bandwidth, FTTH operators have "a great opportunity to add applications." Operators can open the doors to application developers, allowing them to offer applications on their networks at little or no cost and sharing revenues with those who achieve success.

True, the marketplace is segmented – everyone doesn't want everything – but operators can offer many applications, promote them based on customer demographics, and expect to see each customer subscribe to one or two.

New consumer applications, many of them still unknown today, can "make the difference for the FTTH business case," Rader said.

Chris Carabello, director of marketing for Metaswitch, countered that the secret of FTTH success lies in business services, especially business VoIP. "Many businesses will change providers to get VoIP," he said. Though VoIP began as an over-the-top offering marketed to cost-cutters, telecom providers now sell it directly.

Businesses consider VoIP a strategic service because it supports their remote workers. Nearly two-thirds of businesses have remote workers who average 40 percent of their time on the road or working from home (or from the benches at their children's soccer games); with VoIP, these workers can continue receiving calls at their office phone numbers.

From a telecom provider's point of view, hosted VoIP is the "gateway to the cloud." Once businesses accept the idea of buying a hosted service, they are also open to buying cloud-based storage, security, LAN support and hosted applications. Providers can easily layer on these additional services.

According to Carabello, a successful business bundle must be simple to sell and simple to buy. "You have to know how to communicate your value proposition," he said.

Ron Holcomb, the VP of business development for Tantalus Systems, proposed smart-grid applications as important sources of additional revenue for FTTH operators – though, perhaps, not just yet. "We're still somewhere between Pong and PacMan" in the development of the smart grid, he said, and requirements for the smart grid are far more complex than requirements for media or retail applications.

Electric utilities must add intelligence to the grid for many reasons, including fuel cost volatility and environmental regulations. The Electric Power Research Institute estimates that the benefits of smart grids exceed the costs by four to one. One problem is that not all the benefits accrue to electric utilities.

Another problem is that smart-grid applications haven't been completely defined. Though some – advanced metering systems, demand response, distribution automation – are well understood, the grid communications infrastructure must be flexible and scalable enough to continue adding new applications as they are developed.

The infrastructure also needs to be completely reliable. All these requirements spell fiber – but most electric utilities don't have the capital they need to invest in fiber. Fortunately, they can collaborate with telecom providers.

"There's a huge opportunity for telcos and electric utilities to work together," Holcomb said.

What's Driving Fiber Network Builds?

Google's Kansas City fiber project is designed to prove the business case for fiber to the home in a typical American city, said Rick Whitt, director of telecom and media policy for Google.

Whitt was one of three speakers in the keynote discussion that wrapped up the 2011 FTTH Conference, along with Blair Levin, Aspen Institute Fellow and director of the Gig.U project, and Michael Romano, senior vice president of policy for the National Telecommunications Cooperative Association (NTCA). Tom Cohen, FTTH legal counsel at the law firm of Kelley, Drye & Warren, moderated the discussion.

Q: *Your FTTH projects have all made news this year. Can you give us a status report?*

Whitt: So far, so good. Milo Medin, the Google Fiber project manager, is trying to figure out how to make the cost structure for FTTH good enough that the business model creates itself. We chose a location – Kansas City – where the demographics are mixed and the land areas are mixed so we could test the value propositions and validate our model. There have been some challenges, such as pole attachments, but we have a great relationship with the mayor, and we hope to have the fiber network up and running next year.

Romano: NTCA's 580 members are small, family-owned or cooperative businesses, and they're at the other end of the spectrum from Google. They're filling gaps in places that no one wanted to serve in the first place. Their average distance to a primary Internet connection is 125 miles. Many have only one choice for a middle-mile provider, and they're excited about the stimulus-funded projects that will offer them more middle-mile capabilities.

Sixty-eight percent of our members have either all FTTH plant or a mix of FTTH and copper, and many more are trying to build FTTH using stimulus grants or traditional Rural Utilities Service (RUS) loans. The RUS is required to plan for the long term, and [even though the agency is technology agnostic] that leads it to support fiber.

The last-mile stimulus-funded projects are going a little slower than we would like; the environmental impact statements and other pieces of the puzzle continue to be a bit of a holdback. In the northern part of the country, they're racing to get started building ahead of the cold weather.

Levin: In the rest of the world, FTTH networks are built either when a government orders a monopoly telecom provider to build fiber or when the economics are so strong they can choose to do it. In this country, Google came up with the idea of building fiber networks as application test beds, and we [at the FCC] agreed with that. But how do you create test beds? You can't just go to Bell Labs anymore – you need a different kind of logic to drive the U.S. to continue its leadership in this area.

It was astonishing that 1,100 communities responded to Google's Fiber for Communities RFI. It's a measure of the communities' desire to be on the cutting edge. Now, how do we take that energy and that work and say, "We'll see you and raise you 30 cents"?

University communities tend to have all the factors that are needed for test beds: density, preexisting network assets, high demand for bandwidth – along with some of the most innovative people in the culture. So we talked to a number of universities and launched the Gig.U project with 29 of them. We were flooded with requests to join the project but wanted to cut it off before it got too large. Now we have 37 communities – some cities, some rural – most of them the homes of flagship state university campuses.

We're flipping the Google equation. Instead of competition among communities, we want to foster competition among providers. These 37 communities are offering to work with providers on improving the economics for investment in next-generation networks. It won't be a free lunch, but it might be a better lunch for a cheaper price. Google said to communities, "Here's what you can do that doesn't cost you much, if anything, but lowers the cost of FTTH." We're similarly situated – we can do that with our cities and utilities, with the university assets and with owners of multifamily buildings in communities where the single greatest criterion for choosing an apartment is the level of broadband connectivity.

The providers can be Google, cable companies, telcos or anyone else. The more responses to our RFI that we receive, the better answers we'll have and the better able our communities will be to hold a competitive process next year and drive a huge amount of activity.

Blair Levin, director of the Gig.U project: "Here's my prediction: Two to four years after a million American college kids get gigabit connections, the audience in this room is going to be five times bigger."

"When the FCC adopted revised pole attachment rules, we were told they would address companies like ours (pure ISPs). We didn't care what the rate was; we just wanted certainty. Well, the order didn't provide that. It left us hanging."

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Q: *Google eliminated consideration of every city in California because the permitting and processing barriers raised by local governments made building FTTH too costly. How can we drive those costs down?*

Whitt: At Google, we pride ourselves on being a green company. It's demonstrated in how we site our facilities and use energy. Yet California has a statute that requires a multiagency review of environmental impacts but doesn't even define the basic terms. The process takes months and sometimes years.

Milo Medin said that even if there are suitable properties in California, we can't justify this. We're not building this network out of the goodness of our hearts. We're trying to make a business and prove that the model works – and, given the state of affairs in California, that's not the case. His statement sparked some fruitful conversations with policymakers in California.

We're not trying to avoid meeting environmental standards. We just want to have more certainty. We need to have a process that a company can navigate successfully.

Romano: NTCA members face similar challenges. Even when they've been in a community for 50 or 80 years, new challenges pop up. The stimulus award process added many additional layers of complications and reviews to the point where meeting the statutory deadlines is a challenge.

Whitt: Milo and I were asked how Kansas City induced Google to build its network there. They didn't offer us tax breaks. The demographics and topology were what we were looking for, and in addition they promised to improve the process. We asked to have a single contact on each side for permitting and processing issues, and they agreed to that.

We're hoping that a set of best practices comes out of this project – things that we've discovered are potential obstacles and pitfalls to swift deployments and what you can do to improve them, to bring the project in on time and avoid unnecessary costs. We're hoping that, over time, our partnerships with the two Kansas City governments lead to results we can show other communities.

Q: *On video franchising, the FCC and states made the process more uniform across the country. How do we accomplish the same for permitting? Even Google had pole attachment problems in Kansas City.*

Whitt: Pole attachments are one of the thorny issues for building out fiber and other infrastructure. The process was set up for people in traditional industry sectors – power companies, phone companies, cable companies are all in their own separate buckets – but Google is a pure ISP.

When the FCC adopted revised pole attachment rules, we were told they would address companies like ours. We didn't care what the rate was; we just wanted certainty. Well, the order didn't provide that. It left us hanging. In our initial conversations with Kansas City Power and Light, they said, "Which of these categories do you fit in? None? OK, thanks, see you later." Eventually, we found some accommodation – though not with the help of the FCC.

Google knew a lot about the infrastructure business already – but this has given us a whole new perspective and a lot of humility.

Q: *What do you see happening with retransmission consent? Prices keep going up. You're trying to make a business happen, but one of your big three services is getting squeezed.*

Romano: Many of our members are trying to enter the video business just to capture and keep customers. Video is a money loser for most companies, but they do it to make the customer sticky. Now a number of them are trying to enter the business with over-the-top video. Video is very tough for us. Our moneymakers are broadband and phone service.

Q: *What revenue streams do you see for the future? College kids have only wireless phones, and video is moving to the computer. Do you think there will be only one big stream, broadband?*

Levin: If we look back to the year 1600, the British and the French had the same gross domestic product, but by 1800, the British were way ahead. In France, the scientific academy was funded by the king, and the British had a patent system – a bottom-up approach to innovation.

According to Thomas Friedman's book "That Used to Be Us," innovation from above is orderly but not productive, and innovation from below is extremely chaotic but productive. Google and Skype weren't built in the Bell Labs of their time; they were made possible through access to abundant resources, both people and infrastructure. So we have faith that if we put unlimited bandwidth in the hands of a few million strategically located people, they're going to invent things we have no idea of.

The incremental cost of providing the resources is very low, and the

potential benefit is very high. With a massive increase of bandwidth to the smartest, most innovative populations, the problem can take care of itself.

Q: *What's the path to the fibering of the U.S.?*

Whitt: There will be lots of little projects pushing from the bottom up – Gig.U and other things inspired by the Google Fiber project. There's a lot of pent-up demand; folks want fiber in their communities. If we can reduce costs, smooth processes and prove that applications that require high capacity are out there, we can prove that the business model works. All these elements taken together will create the demand for fiber.

Romano: I hope that the test beds work, but I hope it doesn't end there. Verizon has driven fiber into a lot of its network, and other providers have, too.

The big shift is the mental shift. Once the mental shift happens, the fibering will happen. It took a generational shift to design factories for electric power instead of water power.

In a lot of rural areas, the copper is 30 or 35 years old. The last time it was replaced was when operators went to single-party lines. Operators should invest in the network for the life of the network, not for their near-term needs. I hope the fibering of rural America will happen as copper is replaced over time. Replacing copper with fiber used to be viewed as "gold plating." But when plant starts to deteriorate, it's time to replace it with something that will last.

Levin: The really big shift is the mental shift. That's more important than fiber. Once the mental shift happens, the fibering will happen. It took 40 years for 50 percent of the population to adopt electricity, and it took a generational shift to design factories for electric power instead of water power. Henry Ford started building horizontal plants in Detroit, and others said that was the way to do it.

Broadband allows the rethinking of education and of the way corporations work. Once that happens, all those questions become easy because *not* using fiber becomes unimaginable. That's what will happen in five to 10 years. ❖