

Four Communities Take Steps Toward Better Broadband

Cities pursue different paths to the same end: better connectivity for residents.

By Masha Zager / *Broadband Communities*

Tullahoma, Tennessee: Civic Pride, Gigabit and Smart Grid

Tullahoma, with a population of about 19,000, has one of the older, established municipal fiber systems, already in its eighth year of delivering FTTH services. But the city isn't resting on its laurels; in 2012, it became the smallest U.S. gigabit city (since that time, even smaller cities have gone gigabit), and it continues to earn high marks for service quality, reliability and customer support.

Tullahoma Utilities Board (TUB) general manager Brian Skelton explains that when he took the helm of the agency a decade ago, board members asked him to consider adding a telecom division to the existing water, wastewater and electricity divisions. It was actually the agency's second look at telecom; the idea of building a cable network had been raised – and rejected – in 2000. In 2006, Skelton hired Uptown Services to do a feasibility study, and Uptown recommended building an FTTH network.

The project moved forward at a speed that most other cities would envy. The board endorsed the fiber plan in 2007, and because community response was enthusiastic, the city council quickly signed on. In September 2007, the city released a bond offering. By the end of the year, bonds were issued and crews had begun installing the outside plant. "Friendly" customers started testing the new LightTUBE network in July 2008, and the first paying customers signed on in September 2008. After ironing out a few bugs, the utility started collecting revenue in January 2009.

Chattanooga, a much larger city about 75 miles from Tullahoma, was trying to build an FTTH network at about the same time and faced fierce opposition and lawsuits that delayed its project. Tullahoma had no such problems: "We were so small, we flew under the radar," Skelton says.

However, Tennessee law precludes TUB from serving communities outside its electric utility footprint – which Skelton says is frustrating to people who live nearby and would love to have FTTH service. Attempts to overturn the state law, with the support of state Sen. Janice Bowling, R-Tullahoma, a former TUB board member, have been unsuccessful to date, and the FCC's 2015 preemption of the law was recently overturned in court.

LIGHTTUBE SERVICES

Of the roughly 9,000 premises now eligible to receive LightTUBE services, more than 3,500 are subscribers, including an estimated 50 percent of local businesses. Customers can subscribe to internet, telephone and video services. Residential internet offerings range from 30 Mbps/5 Mbps to 1 Gbps symmetrical, and Skelton says the video service is "super high quality, with no compression off the satellite."

To differentiate its service even further, TUB created two local TV channels, which broadcast local news, high school sports, school plays and community events. "The addition of local TV

programming makes us ingrained in the community,” says Chelsea Adams, communications specialist at TUB. “People stop me in the store to give me ideas for the show. . . . We have a regular talk show, called ‘Talk in Tullahoma,’ and a not-for-profit may contact me when it’s getting ready to do a fundraiser and come in and talk about it. Recently, we did a cooking show with an army recruiter and an army chef that promoted recruiting.”

To support the community, TUB creates and runs ads for local nonprofit organizations as a form of sponsorship. “We can’t write a lot of checks, but we can promote people’s events and fundraisers,” Skelton says. The ads run not only on the TUB channels but also on the 24 most popular commercial channels.

AT&T and Charter both improved their services in Tullahoma in response to the municipal fiber, and LightTUBE customers sometimes take advantage of their special offers (like most municipal systems, LightTUBE doesn’t compete on “enticement pricing”). Skelton says customers who are enticed by special offers tend to “leave and come back to LightTUBE very quickly because of the quality of the TV and the speed and reliability of internet service.”

SMART GRID AND ECONOMIC DEVELOPMENT

In addition to selling triple-play services to residents and businesses, TUB is its own best customer: It uses the fiber network for several smart-grid applications. Its automated metering infrastructure (AMI) system reads electric and water meters and uses the fiber backbone to backhaul information from the wireless collectors. TUB now bills all its electric customers on a time-of-use rate, which it “couldn’t do without AMI,” according to Skelton.

Other smart-grid applications include automatic reconfiguration of circuits to minimize the effects of outages and supervisory control and data acquisition (SCADA) to monitor and control the water and wastewater infrastructure. “The reliability and speed [of fiber-based SCADA] is so



LightTUBE Installer Robert Overman assists in a residential installation.

much better than radios,” Skelton says. “We offer our services cheaper to ourselves than we could buy it from our competitors.”

Like many municipal broadband networks, LightTUBE contributes to the city’s economic vitality. Tullahoma is trying to attract technology, health and retail businesses, and Skelton notes that the fiber network helped attract a new call center and enabled existing businesses to expand. It also attracted new residents who need to be able to work from home.

“From an infrastructure perspective, we can be a one-stop shop for companies looking to move here,” Skelton notes. “We can customize speeds based on their needs. They won’t get 100 Mbps symmetrical service from twisted-pair or coax. Businesses need to send information out, not just receive information.”

GOING FOR THE GOLD

TUB always intended to offer gigabit service – the network had that capacity from the outset – but it had to wait for internet backhaul costs to drop. Over the years, as backhaul became less expensive, LightTUBE continued

to upgrade its top speed, and by 2012, it was able to offer residential gigabit service at a gulp-inducing price of \$300 per month. Only one customer took advantage of that offer.

Skelton says, “Once we could afford to buy enough backhaul, we made the circuits redundant” – there are now one looped and two single-ended transport routes – “and then we could reduce the price to \$99.95 and, on January 1 of this year, to \$89.95. We do have customers asking, ‘Why not sell it for \$70, like Google?’ Well, we don’t have the buying volume. We tell them, ‘You’ll get a response from us in less than an hour, and you won’t get that from anyone else.’” Although \$89.95 is still pricey for Tullahoma, where median household income is about \$35,000, about 100 residential customers have now subscribed to the gigabit service tier.

Enabling gigabit service didn’t require any network upgrades, but provisioning service to a particular customer may require work. If the customer has a pre-2010 optical network terminal, that equipment may have to be replaced. TUB also verifies

that the customer's in-home network and Wi-Fi router are robust enough to support gigabit service. (TUB doesn't replace Wi-Fi routers but offers to lease a suitable router to the customer for \$9.95 per month.)

Like other gigabit providers, TUB finds that 1 Gbps users don't generate noticeably more traffic than, say, 90 Mbps users. "The faster speeds, unless you're doing something illegal, just allow you to get somewhere

faster," Skelton says. "It's harder on the network overall, but it doesn't affect traffic that much."

Even if the market for gigabit service is small, the fact that TUB can offer the service is a matter of civic pride, and TUB has generated excitement about it through ads, billboards and community sponsorships. "Most people think of LightTUBe as their utility," Skelton says. "The fact that we're owned by the

community means that we think about customer service differently from our competitors. I'm in the grocery store with our customers!"

As a veteran of municipal fiber, what advice does Skelton have for communities that want to build gigabit networks? "If your community would support it, and if you have a municipal utility that has the wherewithal to get it approved and build it, it's a great thing."

Hudson, Ohio: Changing Business Perceptions

Hudson, though only a little larger than Tullahoma, is located in a metropolitan area and has an affluent, highly educated population. It's not the kind of town that private service providers usually overlook. However, a quirk of geography limited the broadband available to residents.

"We're almost an island, halfway between Cleveland and Akron," explains Will Ersing, network systems administrator at Hudson's Information Services Department. "In the early 1990s, Hudson was still a small, rural community of 5,000, and after that, it grew very fast. But the incumbents had already built their infrastructure there. They did what they were going to do to provide TV, but they weren't interested in expanding it."

As the town grew and bandwidth demand skyrocketed, city government began to hear complaints from the general public and the business community. The economic development director heard more and more frequently, from both existing businesses and those he was trying to attract, that internet service in Hudson was poor. Businesspeople told him they held

conference calls from restaurants outside town because the internet service in their offices was so unreliable.

Though the largest businesses in town paid for dedicated fiber circuits, Hudson's business community is made up mostly of small and mid-sized retail and professional services firms that cannot afford dedicated circuits. These companies need reliable connections more than they need very high speeds, says Ersing.

City leaders and the economic development director approached the incumbents to request upgrades. "They were responsive at the upper levels, but nothing came through at the lower levels," Ersing says. "When we talked about expanding infrastructure into the business parks, they said, 'Sure, once there's a need.' But businesses aren't going to build there because there's no infrastructure!"

Once it appeared that the city would have to pay incumbents to upgrade their networks, city leaders began to examine other options. The city already owned fiber connections between its offices and school buildings and was planning to extend the fiber

to its electric substations. When the information services department proposed creating a fiber ring around the city to provide redundancy for these connections, officials wondered whether the fiber ring could be used to serve businesses as well.

The city council asked staff how best to use the city's fiber assets to address business complaints about poor internet service. For example, could the city sell or lease fiber strands to businesses? Should it operate a network itself? Should the network be open-access or closed? Ersing credits the council with "getting us to start investigating in this direction."

DEVELOPING A PLAN

With help from Magellan Advisors, the staff surveyed the community in January 2015 to confirm that a need for fiber existed. When nearly 1,000 residents and 133 businesses responded, saying their internet services lacked coverage, speed, performance and reliability, the team began to develop a plan and options for a business model. During the needs assessment, some members of the public expressed doubts about the city's undertaking such a project, but Ersing says there was less pushback than he expected. In the end, the clear need for services, together with a well-thought-out plan, generated overwhelming community support for a city-owned fiber network.

The staff presented two options to the city council: a full retail service model and an open-access model. The city council favored open access,

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but Ersing says, “There weren’t enough players.” After outreach to potential service providers yielded little response, the city decided to provide services itself. Ersing adds that, with an open-access network, “we would be fronting the cost of the network and have limited control. If a provider was bad, we would have limited recourse.”

With city manager Jane Howington championing the project, the city council agreed to make an internal loan from cash reserves to finance a network – now called Velocity Broadband – that could serve businesses throughout the city. “From the moment we were able to start writing checks to lighting up the first pilot customer [in September 2015] was 90 days,” Ersing says. It helped that the pilot area was close to the municipal office building, which was already fiber-connected; that the area was served by the municipal electric utility, Hudson Public Power; and that several “friendly” businesses in the pilot area were willing to test the system.

It also helped that the team had done its homework in advance, field-tested a variety of products and selected vendors – Cisco for core switches, Calix for FTTP electronics, and Clearfield and Preformed Line Products for connectivity solutions.

AN AGILE BUILD

Another decision that allowed Velocity Broadband to get up and running quickly was the use of an “agile build” philosophy. “We design and build at the same time with an eye to the whole design,” Ersing explains. “We start off doing a quick, high-level design with indicators such as ‘We know there are 32 customers here,’ then lay down a core design for the area, and the crews start building.

“Then we start investigating – is there available conduit, is there an aerial path, what’s the best way to route? We bring the answers back to engineering, which relies heavily on its GIS database. All the electrical plant is on the map, so we can follow that, including where there is duct that can be shared. We don’t always have to hire a boring contractor because we own the ducts and poles in the two-thirds of the



Installing aerial fiber in Hudson, Ohio

city that the electric utility covers, and we are able to utilize those resources. So that allows us to design the details, and then we can make adjustments as needed. If a new, large customer were to come on board in a part of town where we’re not working, we could reprioritize that area and get there quickly.”

When Velocity begins building in areas that Hudson Public Power doesn’t serve, the process won’t be quite as agile. In that portion of the city, Velocity has access only to rights-of-way and easements, not to ducts and poles. It will have to hire a contractor to do boring and trenching, and construction will be somewhat slower and more expensive.

SPLIT RESPONSIBILITIES

Hudson Public Power plays a key role in building out Velocity Broadband. “We couldn’t do it without the municipal power department,” Ersing says. “They’re the guys stringing fiber. They’re part of the core that’s making the system happen.”

However, in Hudson, unlike most cities with municipal power utilities, the information services division, rather than the power utility, is in charge of the project. Hudson Public Power is essentially the outside-plant contractor, and the information services department is responsible for installing network equipment, programming the system and negotiating contracts with customers and internet suppliers.

For now, the sales team consists of local IT businesses, a strategy that has proven very successful.

“We’re not the best at selling,” Ersing says. “We don’t market routinely, not in a competitive market.” As time goes on, however, the city may beef up its in-house sales and marketing competencies, ending up with a hybrid salesforce.

CHANGING BUSINESSES’ PERSPECTIVE

Velocity Broadband now has about 50 business customers, and the buildout of the business network will continue

through 2017. The baseline service is 25 Mbps symmetrical for \$120 per month – a price that customers describe as “right on” or even “really good” – and services up to a gigabit are available.

Most customers are small businesses, if only because the larger businesses tend to be tied to preexisting long-term contracts. However, both small and large business customers say they love the service, and at least one company moved into Hudson’s office park because of the fiber connection.

“One engineering firm went from a

four-hour to a four-minute upload,” says Ersing. “It changed their perspective of what the internet could do for them.”

In future marketing efforts, Ersing wants to focus on educating businesses about how reliable, ultra-high-speed broadband can open new opportunities for their companies.

Though the city currently focuses on serving business customers, it is exploring the possibility of a residential fiber network. “We’re building the [business] network to support residential service should we need to

support it,” Ersing explains. “We don’t want to have to overbuild it.”

In August, Hudson issued an RFP for an FTTH feasibility study, including a residential needs assessment, deployment strategy options and construction cost estimates. This planning effort should provide a tool to gauge residential demand for fiber services and develop a business case for a residential network. If the numbers prove out, Hudson will be well positioned to move forward to becoming an all-fiber city.

Owensboro, Kentucky: Lessons From a Pilot Project

Owensboro, a town of about 60,000 on the Kentucky-Indiana border, along the Ohio River (and the self-proclaimed BBQ capital of the world), has provided internet services to commercial and industrial customers since 1997 through its municipal utility. By 2015, the utility was ready to extend service to residential areas, but despite its long experience in telecom, it decided not to commit to the full buildout. Instead, it launched a small pilot project, which is about to enter its second phase.

Why do a pilot project? “We wanted to get it right,” says Sonya Dixon, communications and public relations manager for Owensboro Municipal Utilities (OMU). “FTTH is a capital-intensive project. At OMU, we pride ourselves on quality services. We wanted to, therefore, work out all the kinks and make the service as seamless as possible, while carefully monitoring costs.”

TESTING THE BUSINESS MODEL

Christopher Poynter, OMU’s superintendent of telecommunications, explains that the utility wanted to test its financial assumptions, including the take rates it had projected and the amount of support that customers would need, as well as further develop its engineering prowess and get back-room operations running smoothly.

The utility selected the location for the first phase of the pilot project, which

passed 558 homes, because it was close to OMU headquarters, its demography was typical of Owensboro and it had a mix of aerial and underground facilities. Because of the area’s demographic and geographic characteristics, any lessons learned from the first phase will likely apply to the city as a whole.

The take rate projection of 20 percent – which is ambitious, considering that internet access is the only service offered – appears to be validated. OMU connected its 100th customer in August, having done very little marketing, and a survey shows that customers are extremely pleased with the service even after suffering through some initial problems. (The biggest issue was an unreliable transport link to the internet, which caused several outages until OMU upgraded a secondary circuit.) Most customers said they would recommend the service to others, and residents outside the pilot area are now beginning to ask when the network will reach their neighborhoods.

Nearly all customers subscribe to the 50 Mbps tier for \$49.99 per month, and a few are taking the gigabit tier for \$99.99. Surprisingly, the middle tier of 100 Mbps for \$69.99 has almost no takers. “Customers go for either price or speed,” Poynter says. “There’s not a whole lot in between.”

Another unknown was the amount of support that customers would need. Despite receiving formal training,

customer service representatives, who had not dealt with residential internet service before, were understandably anxious. “It was a little nerve-racking,” Poynter says, “but starting with a small pilot area helped us know whether customers would contact us five times a day or once a month.” So far, customers have required little help; future support needs should be even lower because once an issue occurs more than a few times, the technical staff begins to address it during installation.

GAINING EXPERTISE

Before the pilot began, management had made basic decisions about outside plant based on visits to the well-established municipal fiber systems in Chattanooga, Tennessee, and Russellville, Kentucky. For the most part, the pilot project confirmed the workability of those plans and the cost estimates for both aerial and underground installations. However, the team made minor tweaks – for example, increasing the vault size for fiber distribution hubs and deciding not to preload the hubs with splitters, which strands capital until the splitters are needed.

In addition, preparing the utility poles for aerial deployment turned out to be somewhat more difficult and expensive than anticipated (though aerial deployment is still considerably less expensive than underground deployment). Although OMU owns the poles, the telecom division pays

the same pole attachment fee that any other user would pay. “We have to be able to cover the costs of capital on our side of the balance sheets,” Poynter says. Many fiber deployers assume that steep make-ready costs and delays for pole attachments reflect a lack of cooperation by pole owners (some of whom are their competitors); the fact that pole attachments can be problematic even with full cooperation, as in OMU’s case, suggests that at least some difficulties are inherent in the process.

Poynter says the pilot project taught OMU a great deal about detailed design, such as where to place fiber hubs and what fiber counts to use. Working through these decisions on a small scale gave staffers the confidence to tackle the citywide build, and discussions with the splicing contractors also suggested alternative designs that they could use.

Another lesson learned was the importance of communication. At weekly meetings, all groups involved talked about the challenges they encountered during the pilot project. Dixon says, “It may seem laborious, but I can’t tell you how valuable it was. Sometimes just hearing how things worked was important.” For example, the meetings were instrumental in getting the customer service group to the point of feeling comfortable about answering first-tier customer calls.

ON TO PHASE 2

Based on the success of the first pilot project, the utility commission approved a second phase, which will start construction in October. To



OMU’s 100th customer is happy to be connected.

help contain costs, the second area is contiguous with the first. “Engineering and economics should drive the decision,” Poynter says, explaining why OMU is not using the “fiberhood” approach currently popular with many fiber deployers. Because the decision is easily defensible on the basis of cost, it seemed the most logical and fair way to expand, he adds.

Phase 2 will reinforce the first phase, but on a larger scale. At 926 homes passed, the new project is almost double the size of the first project but still represents only a small fraction of the city. If costs and take rates continue to meet expectations,

management will seek approval from the utility commission to take the project citywide, making fiber services available to every residence in the city.

Dixon praises the teamwork and trust that is critical for making such a complex project successful. “We’re grateful for the support of the utility commission,” she says, “and for the flexibility of our staff across all departments for taking on new challenges, being adaptable and open and providing information. The project involves input from everyone.”

And the residents of Owensboro? “By subscribing, the community is telling us they approve,” Dixon says.

Centennial, Colorado: City With a Fiber Future

Centennial is a new city, incorporated in 2001 in the exurbs of Denver. Its 107,000 residents enjoy high incomes, good schools, safe streets, award-winning parks and even free rides to the light rail station. The city consistently appears on lists of the best places to live and, with a 96 percent broadband penetration rate, is ranked

the most connected city in the United States in the 100,000-plus population category. Furthermore, Centennial has no municipal utilities and provides most services through contractors.

All in all, this doesn’t sound like the type of city that would mount a major broadband initiative. But the business community in Centennial is unhappy

with its broadband options because of what city council member C.J. Whelan calls “low satisfaction with the price-performance ratio,” and neighboring cities in the booming Denver area are very competitive. Centennial has greenfield space that may not be able to attract new development unless the city can assure businesses and developers



Centennial is aiming for broadband as spectacular as its vistas.

that fast, reliable, affordable broadband will be available.

Ken Lucas, a city council member, says simply, “The city wants a fiber future and wants to have control.”

Tim Scott, the city’s director of fiber infrastructure, adds, “For economic development, you have to stay at the forefront.”

THE FIBER MASTER PLAN

The city began building fiber for an intelligent transportation system in 2008, and council members thought the excess capacity on fiber strands might be used to improve business connectivity and deliver “smart city” services. In 2013, the city held a successful referendum to exempt Centennial from the state law that prevents local governments from establishing telecommunications utilities and embarked on a planning

process with help from Magellan Advisors. The planning process solicited input not only from city government but also from the county, the sheriff’s office, libraries, school districts, the fire authority and local businesses.

In March 2016, this process came to fruition with the adoption of a fiber master plan that called for extending the 40 miles of existing city-owned conduit and fiber with new construction, resulting in approximately 60 miles of backbone fiber network provisioned with high-count fiber optic cables. The backbone will connect city facilities and be designed to support community anchor institutions, businesses and residential areas in the future. The city council voted unanimously to allocate \$5.7 million from the city general fund for capital investment into the fiber backbone.

Centennial does not plan to

become a service provider; it will lease dark fiber to institutions and service providers at what Scott calls “compelling rates.” It will connect the fiber backbone to one or more carrier-neutral data centers, which will provide gateways to a number of broadband providers. This will allow it to market areas close to the backbone as “fiber ready.” The city also plans to partner with providers to market the network to businesses.

MOVING FORWARD

In July, Centennial hired a design and engineering firm to act as the owner’s project manager for the network build: Manweiler Telecom Consulting, a locally based firm with experience in both the public and private sectors. The project manager will help finalize the backbone design and select a construction contractor, then ride herd

on the contractor for the next two years and sign off on each segment of the network as it is delivered.

The first step is to verify assumptions made in the master plan. For example, Scott says, “We’re probably using 65 percent existing city conduit, so we’re assuming it’s there as per the records and also usable. It may not be there, it may be collapsed, it may be full of water or smaller than it’s supposed to be.”

Manweiler also suggested design changes to bring fiber closer to potential customers, such as shifting a route from the main street to another nearby street where many tech businesses are located, and proposed accelerating the network build to take advantage of economies of scale.

At the same time, the city is conducting discussions with community anchor institutions to determine whether they will want to use the network. Anchor

institutions will have to build their own connections to the fiber backbone, but their decisions may influence the final route the network takes. Anchor institutions could become either investors in or customers of the city’s network, according to Stephanie Piko, a city council member.

Discussions with potential private service providers are also underway. The city hopes that by the time construction of the backbone begins, there will be at least one private sector partner willing to lease strands on the backbone and drive fiber to the premises.

Governance is the final piece of the puzzle that needs to be solved, and legal research is in progress to set up a stand-alone authority or utility. Scott says the goal is to allow the network authority to make day-to-day decisions on its own but give the city council ultimate oversight. The Centennial storm water authority operates in

a similar way, so the city has some experience with this model.

Although the business community was the instigator of this project and most residents are not yet demanding better broadband, the city is concerned about residents’ future broadband needs. With that in mind, the city is seeking private partners who can eventually build to residential neighborhoods as well as to businesses. Scott says that to make the backbone network partner friendly, potential partners will be invited to discuss such issues as placements of community cabinets.

“Our ultimate goal is to have universal fiber to the home,” Lucas says, and Centennial’s project seems designed to lead to that end. ❖

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