



FTTH: Small Cities Are Not Waiting

by Jeff Griffin, Senior Editor

The telecommunications giants are spending millions of dollars touting bundled service packages, with heavy emphasis on “high-speed” broadband internet connections that includes video programming along with local and long-distance telephone services.

The capabilities of their fiber-optic networks are prominently featured in these advertising promotions, but the fact is Verizon is the only major company actually bringing fiber connections to end users in significant numbers – most of AT&T’s fiber system stops at the node with the majority of customers subscribing to its highly-hyped U-Verse connected by twisted copper cable. Customers of cable companies receive links to fiber via coaxial cables.

However, much of the U.S. remains without access to fiber networks with little prospect of service coming to many areas in the immediate future. That’s because the big-player broadband deployments are concentrated in metropolitan centers where there is a plentiful supply of customers and new-customer prospects.

An increasing number of communities, government agencies and business complexes aren’t willing to wait years for one of the major telecoms to finally pay attention to their needs. Instead, they are constructing their own fiber systems that bring true high-speed internet connections that

their residential customers want and businesses need to compete in the 21st century marketplace.

Clarksville, TN, is building its own fiber network that ultimately will offer broadband access to all of its electrical customers – about 54,000 at the beginning of the year. In addition to improving management of the power system, the Lightband broadband service offers high-speed internet service, digital television and telephone services through the fiber network directly to customers. Fiber optic cable terminates inside a gray plastic box mounted adjacent to each customer’s electric meter. There is no charge to the customer for bringing fiber to the home, whether the property owner subscribes to the new services or chooses not to.

Fast growth

Located in far, north-central Tennessee, Clarksville is one of the state’s fastest-growing cities, is home to Austin Peay State University, and is the closest major town to the Army’s Fort Campbell, KY.

The Lightband system is being built and operated by the Clarksville Department of Electricity (CDE), and the fiber network actually evolved from department efforts to implement technology to manage the city-operated network.

“The vision of our president, Ken Spradlin, was to look for efficient methods for managing our electric power customers,” said Stephen Hopkins, CDE vice president of telecommunications. “The university and Army base provide us with a very transient customer base. Our power system has over 130,000 truck rolls annually to connect or disconnect our 54,000 meters. The vision of Mr. Spradlin was to find a method that could allow for remote meter management thus working to better manage the costs associated with the 130,000 truck rolls.”

Research ultimately led to the conclusion that a FTTH network would improve management of the system by allowing remote meter readying and making connections and disconnects. And, if a fiber network was to be constructed, it made sense to consider adding services such as digital video, internet and phone services that would maximize the benefits of the broadband system, and the decision ultimately was made to construct such a network.

Implementing the plan required several steps over a period of several months. CDE developed a business plan for the fiber system, submitted it to the state controller’s office for approval and presented the plan to the Clarksville City Council. CDE and city council agreed the decision of whether to build the system should be made by the customers who would benefit from it, and



a referendum vote was held in November 2006.

“The initial public reaction was an overwhelming ground swell of support,” said Hopkins. “Incumbent providers presented some obstacles and objections prior to the vote. We handled these objections and questions through public forums to educate the voters.”

The referendum passed with 72 percent of the voters approving it, confirming community support.

System installation

Requests for proposals were issued in December. Atlantic Engineering Group (AEG) was awarded the contract to build the fiber network in February 2007, making AEG responsible for engineering, project management, materials management and construction of both aerial and underground segments of the network. The company’s

technical services division is providing all splicing, testing and network turn up to the building. This network incorporates the previous fiber-to-the-business (FTTB), traffic control projects and the core fiber ring is already complete.

Other providers of services are: Ciena (World Wide Packets), portals to the homes; Telco TV, programming content; Cornerstone Information Systems, internet system; and Kasenna, middleware. CDE operates the system.

Construction began in May 2007 and by April 2008 is approximately 13 percent complete, said Hopkins. CDE is monitoring and managing 7,200 of the 54,000 meters. In January 2008, the first customers began receiving the city’s Lightband service.

When complete, plans call for the fiber network to be approximately 70 percent aerial, 30 percent underground.

“It is an ‘as-built’ system following our electrical system, so where it is overhead, we place fiber cables on our own utility poles,” said Hopkins. “In areas where power is underground, the fiber goes underground, too.”

All construction is in the city limits of Clarksville in a primarily urban areas, but surface conditions were not a factor in determining whether fiber goes up or down, said Hopkins.

“The location of power cable is the primary criteria,” he said. “However, as we extend service to new developments, both power and fiber go underground in com-

mon trench with each in conduit. Buyers of homes in new additions demand underground utilities. When we take services underground in developed areas, the service will not be placed in conduit, and we will use directional drilling in those situations. Compact horizontal directional drilling machines are used for those installations.”

As Clarksville continues to grow, Hopkins said the percentage of underground cable of both power and fiber networks is expected to increase because cable in new developments is placed underground.

Hopkins said construction is proceeding smoothly.

“Customer response has been tremendous,” he added. “Since we are building the system out and providing service as we grow, our marketing to date has been very segmented and has allowed us to control demand and response to ensure that we can provide the services as promised.

“Our business plan anticipates 25 percent penetration within five years, and we fully expect to exceed that projection.”

The Clarksville Department of Electricity began operations in December 1938 when city of Clarksville purchased the distribution facility from the Kentucky-Tennessee Light & Power Company. Power consumed by CDE and its customers is supplied by the Tennessee Valley Authority. The department’s service area includes all of the 96 square miles located within the boundaries of the city of Clarksville.

Smaller Towns Increasingly Building Fiber Networks

Many small towns are building and successfully operating their own fiber networks. The Fiber to-the-Home Council provides these examples:

liNKCity

In North Kansas City, MO, liNKCity promises “much faster internet services at much lower prices.”

The city decided to investigate building its own fiber optic network after major carriers showed no interest in providing broadband service, said Paul Rader, communications facilities director. The city-owned-and-operated fiber optic network – liNKCity – was constructed between December 2005 and August 2006 and services both business and residential customers. Rader said liNKCity has proved to be very popular and is steadily adding new customers.

The system includes a 24-mile fiber distribution network with 330 distribution points. Most cable is underground.

“During planning, engineers studied both aerial and underground costs,” said Rader. “Just before the city council was ready to vote on the project, we had a big ice storm that brought down many overhead lines. The storm damage and service interruptions influenced the decision to go underground.”

Even though routes of underground cable were through residential and business areas, there was minimal surface damage and interference with normal activities, said Rader.

“Ninety-nine percent of the cable was placed in the ground by directional boring,” he explained. “We used compact drilling machines and could work with very small bore launch and receiving pits. We have heavy truck traffic through the city and could not afford to have traffic blocked by construction. At no time was it necessary to close a street or reroute traffic.”

Even though the drilling equipment was compact, they could make runs as long as 600 and 700 feet, said Rader. By having the large number of distribution points, lengths of services were kept to a minimum.

“Most are very short and the longest is 220 feet,” said Rader. “We bore services also, and when possible made installations with compact vibratory plows which is faster and still minimizes surface damage.”

The completed network brings individuals internet service that is much faster than cable or DSL and provides businesses, schools and government offices the capability of almost instant file transfer, video conferencing and the other benefits that only fiber can provide. It also has proved to be a valuable incentive for the city’s economic development programs. *(continued on page 18)*

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Scio Mutual Telephone Association

In Oregon, Scio Mutual Telephone Association has offered fiber-to-the-home telephone, cable television and broadband internet services for three and a half years.

Located 25 miles southeast of Salem in the foothills of the Cascade Mountains, the Scio network has just over 1,800 lines connected, said Duane Toews, service supervisor.

Toews said the roots of today's fiber system go back to Scio Mutual's decision to bring cable television services to the area in a timely manner.

"We started with a hybrid fiber-coax system, that we ultimately realized wasn't cost effective," he continued. "Two-thirds of our access lines are very rural – we have about 600 lines within a one-mile radius of the central office. The others are spread throughout our service area of about 100 square miles, some as much as 13 miles out. Since the early 1990s, we had placed a space conduit in all buried construction routes, and that helped make FTTH a good options. We have conduit available to pull fiber cable in to serve all but a few customers and plan to do so in the next few years and to finish placing conduit and fiber to the whole exchange."

Ninety-eight percent of the in-place fiber network is underground.

"Cable was installed by a mix of excavation and directional drilling, using directional drilling wherever possible," said Toews. "It has been running about 50 percent for each method. The areas that were excavated were in rocky conditions that could not be drilled cost effectively."

In areas where HDD was possible, surface damage was greatly reduced, keeping clean up to a minimum and allowing work to be completed with smaller crews. In addition to that, directional drilling offered another advantage.

"It is very wet here in the winter, and HDD allowed us to work during the wet months when it is not feasible to excavate," said Toews.

At the beginning, the Scio Mutual Telephone Association made the commitment to bring fiber to every home in its exchange and has completed about one third of its mainline fiber infrastructure.

"We see FTTH as a future proofing of our network," Toews concluded. "We have plenty of bandwidth for future growth."

Columbus Telephone

In Kansas, Columbus Telephone is one of the nation's smaller telephone cooperatives serving a population of about 3,300 in a two-square-mile area, but those customers enjoy a state-of-the-art fiber network providing voice, video and data.

"The town of Columbus is a true FTTH community," said Jim Dahmen, general manager.

Committed to a goal of providing the latest technology for its customers, Dahmen said the system's old aerial copper plant had passed its useful life expectancy and then some. It needed attention or, better yet, replacement.

"We recognized that copper would be sufficient in the short range, but the pure physics of copper has limitations that will be exceeded," Dahmen explained. "We wanted the most secure, flexible platform possible, and that is fiber."

The solution was a complete rebuild that brings fiber to every home and business.

"We determined that would provide the services needed and, in the long run, was most cost effective," Dahmen said. "And from a security standpoint, fiber is the most secure."



The next question was whether the new system should be aerial or underground.

"We're about 120 miles south of Kansas City in what we affectionately call the state's in 'Banana Belt' because of our mild winters," he continued. "But we do get some sleet and ice, and for security issues it's also better to be underground."

The decision was made to place cable underground, and most of the construction used HDD.

"Excavation required was minimal," said Dahmen. "One contractor did all the work. Most days there were from two to six compact drilling units working. Lengths of bores ranged from two blocks to short service drops to connect properties. To reduce the risk of damaging existing utilities, we potholed to verify their locations. The work did not disrupt traffic or normal activities, and by eliminating extensive excavating, the need for surface repairs is minimized, saving time and money."

Established in 1903, Columbus Telephone's new underground fiber system is an example of the independent telephone industry's commitment to bring broadband services to rural America, said Dahmen.

"We believe broadband connectivity will be the salvation of rural communities," Dahmen concluded. "We definitely see that our system is expanding our economic possibilities." ■