Value Engineering Adds Efficiencies For Huntsville Utilities

As electric utilities consider fiber network plays, well-thought-out designs will be key to their success. Here's how Huntsville Utilities used value engineering to control fiber network construction costs and hone its plan.

By Sean Buckley / *Broadband Communities*

As Huntsville Utilities advanced its wholesale dark fiber network – one that attracted Google Fiber as an anchor tenant – the utility found that it could achieve its buildout goals on budget with value engineering help from Foresite Group.

Value engineering is a method of increasing the value of products or services through an examination of their functions. Value, which can be manipulated by either improving function or reducing cost, is defined as the ratio of function to cost.

Stacy Cantrell, vice president of engineering for Huntsville Utilities, says Foresite Group helped the utility rein in costs and tighten the network design. "Before Foresite was brought in to take over project engineering, we were in a rough spot – there was no value engineering to the project, so there was a lot of less-efficient design and unnecessary construction cost," Cantrell says. "We also had low-quality construction prints that caused additional inefficiency during construction."

Huntsville Utilities initially used an auto-generated design and then used value engineering to refine the design. By adopting value engineering, Huntsville Utilities secured three benefits: It was able to review the auto-design, adjust the design to be more realistic for construction and remove some auto-design inefficiencies.

"Auto-design is a great way to get a design quickly and get an up-front estimate and bill of materials for a large project, but it doesn't always result in a practical design," Cantrell says.

Lee Comer, network design division director for Foresite, says that by implementing value engineering, it was able to not only remove mileage from Huntsville Utilities' projected auto-design network and shorten the buildout schedule but also satisfy Google Fiber's goals.

Comer compares network design to a chef's challenge of getting all the dishes in a meal ready at the same time. "The designer has to manage getting all the design phases completed in a logical time frame so there is an adequate funnel of work to both attract and retain construction resources through the life of the project build," he explains. Foresite's adjustments to the design pushed Huntsville Utilities to add more crews and compress the overall project timeline. The result, according to Comer: "We were able to aid Huntsville Utilities in making deliveries to their anchor tenant on time."

Cantrell agrees, adding that Foresite's value engineering process eliminated simple design redundancies.

"We were finding things like the design going down both sides of the street or down the street and back up the other side," Cantrell says.

REDUCING CONSTRUCTION EXPENSES

Reducing buildout and operational costs was a key priority for Huntsville Utilities in mapping out its fiber network. Upon completion, the network will serve 108,000 residential sites via Google Fiber.

Foresite was able to evaluate the original design and re-engineer it to eliminate erroneous paths and then build in design efficiencies.

Before the utility began working with Foresite, its fiber network construction expenses exceeded expectations.

"We were in a position where construction costs were higher than desired, and construction mistakes were being made," Cantrell says. "By value engineering the design, we cut out significant construction footage, lowering our costs."

Cantrell adds that Foresite also made it simpler for construction partners to follow its plans. "The construction prints that Foresite Group prepared were clear and easier for our contractor to follow, so there was less time in the field interpreting the prints and more time working – and fewer construction mistakes," she says.

Ben Lewis-Ramirez, director of business development for Foresite Group, agrees that value engineering helped Huntsville better use its resources by giving it more accurate cost figures.

"What we found when we came in is that the initial high-level estimates [made by] the group consulting with the utility were off by a lot of money," Lewis-Ramirez says. "We were able to give them some forward-looking approaches to allocating resources and construction sequencing to help rein the costs back in."

APPLYING TELCO PROCESSES

Foresite traditionally targeted large telcos and has only recently begun to address the utility and municipal broadband segments.

Foresite created a market assessment process to guide utilities and municipalities in making a business case for building a fiber broadband network. The process includes strategy sessions, upfront planning and automated fiber network designs with multiple architectures.

Lewis-Ramirez says the company applied what it learned from its work with larger providers to its growing base of electric utility and municipal provider customers.

"We took the lessons learned in working on the big carrier projects and applied them to the municipal space," Lewis-Ramirez says. "What we found out pretty quickly was that … [municipalities] have a prescribed process they have to follow by law to select the right contractors."

Unlike large telcos, which have in-house resources to develop network deployment plans, utilities and municipalities typically hire consultants. Foresite had established relationships with large telcos, providing fiber network design, wireless services and outside-plant engineering services under its telecommunications practice area. It can help new players map the network routes and estimate construction costs and potential take rates.

"Telcos have their own process for determining what markets make sense to enter," Lewis-Ramirez says. "We applied that telco mindset of looking at a city in terms of how much it's going to cost to build. In other scenarios, we would also look at projected take rates, but in Huntsville that was not an issue, as there was an anchor tenant involved."

FOCUS ON PARTNERSHIPS

Seeing an opportunity to enable smaller cities to get broadband as larger carriers target Tier-1 cities, Foresite devised a "Gig-City" program as a strategic partnership with mayors, chief sustainability officers and economic developers to evaluate the needs of their communities and provide guidance about solutions.

For municipalities and utilities that decide to build a fiber network to serve residential and business customers, Foresite Group becomes a single point of contact to manage the project. To coordinate the fiber network build process, Foresite develops relationships, negotiations, schedules, deliverables and expectations with the other partners.

A key element of the program is outside-plant capabilities. Having developed the requisite outside-plant skills by working with its large telco clients, Foresite could bring those experts to assist Huntsville Utilities.

"We relied a lot on our expertise as outside-plant engineers that work with big telcos in estimating costs and in overseeing these incredibly complicated network builds," says Lewis-Ramirez. "When you're deploying a network across an entire city, there are a lot of moving parts, and having everything properly coordinated is important."

DARK FIBER INTEREST IS GROWING

Huntsville Utilities' dark fiber network garnered immediate attention in 2016 when Google Fiber announced it was going to leverage the fiber network to establish an instant presence in the city.

In February 2016, Google Fiber signed a 20-year lease on Huntsville's dark fiber network and committed to offer triple-play services to all Huntsville residents and small businesses. The news gained immediate attention, not because Huntsville was the first city to use a wholesale model – at least 100 other municipal networks do – but because Google Fiber was the first well-known provider to sign on with a municipal network.

Google Fiber's agreement with Huntsville Utilities was part of a broader initiative to consider various methods in each city where it plans to deliver service, including the use of existing network infrastructure. Huntsville Utilities leases access on the network to Google Fiber, which in turn will connect customers to an FTTH internet service.

Huntsville Utilities has set a goal to fund the fiber project's cost through lease agreements with private providers. Google Fiber pays Huntsville Utilities $5 per household passed and $100 per available non-split fiber for up to 105,000 addresses. HU's rate schedule offers several types of leases: network leases with a 32:1 split in which the tenant pays on a per-port basis, dark

fiber point-to-point leases with no split, a backbone ring lease and a colocation space lease. It also provides a series of lit fiber services to Huntsville's city buildings, the city's school district, and traffic signal infrastructure.

In a high density/high volume distribution network fiber lease scenario, Huntsville Utilities charges $3,500 a month for a backbone ring fiber lease. A low density/low volume distribution network lease offers two options: backbone ring fiber minimum at $3,500 per fiber and a backbone ring fiber maximum for $16,000 per fiber.

To work with partners such as Google Fiber, the utility builds fiber to the curb, installs a multiport service terminal (MST) that can serve several customers, and lets service providers build and own the final drops to the customer premises.

This approach allows Huntsville to control the buildout schedule to the various neighborhoods, but it does not have to get involved in customer connections. Google Fiber – or another provider partner – markets services to customers, secures permission for drops and installations, plugs its cables into the MSTs and gets customers connected.

"It's presented a huge opportunity for Huntsville Utilities and the city of Huntsville as far as connecting our facilities – we are just now starting to get a handle on how to take advantage of it," Cantrell says. "We have built over 50 percent of the city of Huntsville now, so there's enough to start making a difference."

Foresite Group is also consulting with Huntsville Utilities and other stakeholders on the implementation of smart-city applications and other innovative use cases.

In addition to Google Fiber, AT&T, Comcast and Uniti Fiber (via the former Southern Light) are making large fiber builds in the city. AT&T launched FTTH services in Huntsville in 2016, and Comcast Business is building out a fiber network to deliver up to 10 Gbps speeds to local businesses. Meanwhile, Uniti Fiber is building fiber to serve businesses in Cummings Research Park and provide 5G services throughout the city.

Although Huntsville Utilities has not named any new customers, Cantrell says it is seeing growing interest from others to lease fiber on the network.

"We have not made any other agreements near the same magnitude as the Google agreement, but there has been other interest from different types of tenants," Cantrell says. "We do have some other dark fiber leases in place."

UTILITIES SPREAD BROADBAND, FIBER WINGS

Huntsville Utilities' move into the wholesale fiber space represents a growing trend: Electric cooperatives and municipal electric utilities are taking on broadband service to drum up new broadband competition and upgrade internal infrastructure. Utility companies can use the fiber to perform command-and-control and smart-grid applications.

As the home to a vibrant community of engineers and scientists, Huntsville began looking for ways to entice broadband providers such as Google Fiber by issuing a request for information in 2015.

Huntsville Utilities hopes to achieve two main goals: monitoring its power system and enabling 1 Gbps FTTH services for all Huntsville residents via Google Fiber. From a utility point of view, Huntsville Utilities hopes to improve the communication capabilities of the water, electric, and natural gas systems to improve operational efficiency and provide better service.

Utilities getting into fiber broadband have several advantages, including an established customer base, existing rights-of-way, pole access and connections to homes. Although Huntsville Utilities did have to add additional resources to maintain the fiber, the utility has existing infrastructure to support the fiber network: a 24/7 dispatch center open 365 days a year, with shift work and call-out policies in place and used.

A key issue with any new fiber player is getting access to existing utility poles. Because Huntsville Utilities *is* a utility, Cantrell says, the make-ready process is much easier than what a newcomer such as Google Fiber faces when it enters a new city or town to install fiber.

"The process can take a lot of effort, but it's a process that electric utilities deal with every day," Cantrell says. "It is new to be on the applications end, but we are one big step in the process that we have some control over. We also can coordinate the make-ready with other pole line maintenance or necessary replacements, making the process more efficient."

Lewis-Ramirez agrees. "When we look at the list of potential cities where it makes sense to deploy fiber and broadband networks, the ones that have their own electric utilities are the places where it is a little easier to do so," Lewis-Ramirez says. "They have ... workforces that have experience working on pole lines, and in many cases, they own their own utility lines."

Having a well-established set of pole arrangements was a key element in what made an agreement with Huntsville Utilities an attractive destination for Google Fiber, whose make-ready and pole access issues with incumbent providers and utilities are well documented.

Utilities have taken part in the second installment of the FCC's 2018 Connect America Fund (CAF II) reverse auction. In all, 35 electric cooperatives will collectively receive $225 million over 10 years to help defray the costs of deploying broadband in unserved areas.

Lewis-Ramirez expects more rural electrical cooperatives will launch similar initiatives.

"The fact that this year electric cooperatives were invited to participate in the CAF II program is pretty telling," Lewis-Ramirez says. "I think you're going to see more and more electric co-ops, especially in rural and smaller communities, build networks." ❖

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