

# More Speed, More Power

*Bringing fiber-optic cable all the way to the user provides new, enhanced services — smart grid, video, voice, data and more.*



## Introduction

The future is coming into focus. We'll need smart grids for electricity and broadband for communications. We'll need powerful networks that combine smart grid and broadband, giving citizens lower electric rates, quality TV and phone service via Internet protocol (IP) and the ability to upload and download data faster than ever before.

Government is expected to lead the way, using state-of-the-art technologies to improve our quality of life. To truly prepare for this future, government organizations need to deploy fiber-optic cable. The speed and power of fiber makes it the obvious choice for keeping citizens connected to the world around them — for improved education, economic development and communication.

Fiber-to-the-user (FTTU) networks take fiber-optic cable all the way to homes and businesses, rather than using it most of the way before switching to copper wire for the last mile. Because fiber's immense capacity is extended all the way to users, numerous rich, powerful applications can be run over the FTTU network.

A utility company can build one fiber infrastructure for its smart grid and use that same network for other services, such as phone, Internet and even television. TV services can include high-end items such as HD, DVR and video on demand. Fiber's high capacity can handle both the constant and fluctuating demands of the smart grid while also providing the other high-speed services consumers want.

### Smart Grid Plus

The FTTU smart grid allows the utility to collect and manage real-time data from homes and businesses. Smart meters at each location communicate over the FTTU network directly with the utility, so information and instructions can be sent back and forth. For example, the utility can tell the smart meters when to turn certain appliances on and off, or it can inform customers of when peak rates are in effect.

There are many advantages for both the utility and customers. Power can be delivered more efficiently and securely, and it can be automatically rerouted when problems arise to



## Case Study

### Smart Grid and More

*Chattanooga, Tenn.'s power utility switches to fiber optics for better electric service, and to provide broadband.*

**THE ELECTRIC POWER BOARD (EPB)** of Chattanooga, Tenn., is one of the largest publicly owned electric power companies in the U.S. The utility provides electricity to more than 170,000 customers.

EPB is also a leader in exploring new technologies for the benefit of citizens. EPB is currently building a smart grid system over fiber-optic infrastructure.

While a traditional electrical grid carries power in one direction — outward to customers — a smart grid sends power but also lets information flow back and forth between customers and the utility. The tremendous capabilities of fiber will allow EPB to gather detailed power-usage data directly from homes. For customers with smart appliances, those appliances will be able to communicate back and forth with EPB.

Using smart meters and a smart meter management system, EPB will be able to receive, process and store information from homes and businesses. All of this equates to more efficient power usage, so EPB can help mitigate the rising cost of power.

A big priority for EPB with the smart grid is to give customers more control. Customers can see how much they're spending on power at any moment and change their consumption habits accordingly. If customers choose, EPB can turn off power to certain devices when not in use, or turn on appliances when power is less expensive.

It's a leading-edge system. EPB's network will be the first smart utility system in North America built on a fiber-optic network that's capable of collecting and processing electrical usage information in real time.

avoid outages. By coupling the smart grid with video, voice and data, the utility gives customers better, faster communications than they've ever had before — while the utility gains revenue by selling these services.

Alcatel-Lucent enables triple play (voice, video and data) services over one fiber network. By using these services on a single platform, organizations will have a simpler system requiring less maintenance. Operating expenses will be lower. Meanwhile, speeds will be faster and performance will be better. Fiber's massive bandwidth allows extremely fast transmission of very large files, so upload and download times are greatly reduced.

With an integrated FTTH network and software, utilities can provide the best possible smart grid with greatly enhanced services — for the benefit of the utilities and their customers.

Fiber-optic cable is generally considered "future-proof," because its speed and capacity can likely handle workloads for many years to come. So no matter what services citizens want in the future — smart grid, broadband or those not yet conceived — FTTH networks will be up to the task.

With increased automation and intelligent monitoring, smart grids can even be "self-healing," fixing problems within the system before customers are affected. For example, power can be automatically rerouted during an outage, so customers lose power for a few seconds instead of a few hours.

### Smart Meters for All

EPB's investment in smart grid infrastructure will enable it to adjust rates and usage to changing conditions. And it will provide tools to help customers better manage their energy use. Many people will benefit from these tools, since EPB's grid will be one of the largest municipal smart grids in the country.

"As an electric company, our first and foremost goal has always been to do whatever we can to give the best service possible to our electric customers," said Danna Bailey, vice president of corporate communications for EPB. "That's really why we started looking at fiber and at the smart grid."

EPB began building the fiber infrastructure in early 2008. The goal is to complete the smart grid — and have smart meters in all homes and businesses throughout EPB's service area — within three years. EPB ultimately plans to leverage and analyze meter data to enable load sharing and load management, furthering the grid's efficiency.



## Broadband Services Too

EPB is also giving customers the option of receiving broadband triple-play services — phone, Internet and TV — using Alcatel-Lucent solutions. Customers who want the service pay a subscription fee to EPB. Since the smart grid brings fiber to the home, it makes sense for EPB to offer broadband communications over that same fiber network — for better services and performance for consumers.

By taking fiber all the way to the home, EPB is providing a 100 percent fiber-optic network. The result is Internet service that's much faster than cable and DSL. Speeds are up to 100 Mbps — both uploading and downloading. EPB's system gives consumers the option of receiving advanced communication services that are typically available in much larger cities.

Following a competitive bidding process, EPB selected Alcatel-Lucent to provide the end-to-end broadband solution for voice, video and data. In addition to phone and Internet service, Alcatel-Lucent's expertise will enable EPB to offer high-definition TV and a full suite of advanced TV services including video on demand.

"Customers are particularly attracted to some of the features that aren't available with the standard cable offer," said Bailey. "For example, quad DVR, where you can record up to four programs at one time, and you can watch them in different rooms. There are lots of times when people — families especially — want to record four programs at once."

The contract for Alcatel-Lucent's services was signed in September 2008 and is valued at \$67 million. Under the contract, Alcatel-Lucent is responsible for architecture design, testing, integration, deployment, operations and maintenance.

Bailey said EPB's customers are enthusiastic about the new services. "They feel like the services we're offering are more sophisticated and better, and a better value," she said. "But they also like that we're here. They like that they can call us and know that they're talking to somebody who lives in the same town as they do."

## Future-Ready

For both the broadband services and the smart grid, the power of fiber makes a big impact for EPB. "Having a lot of bandwidth is very important to being able to not only collect data, but also to be able to access that data in near real time," Bailey said. "So we chose fiber optics because of the incredible bandwidth capacity that fiber optics allows."

EPB also chose fiber because its huge capacity lets it handle the utility's needs well into the future. "The incredible bandwidth that we have with fiber all the way to the home allows us to do a lot of things," Bailey said. "We're just getting started. There's no telling what we'll be able to add in the future."

The fiber-optic network also aids economic development in the region. Companies choosing a location are always interested in strong telecommunications infrastructure. EPB's fiber-optic network has been a factor in the area's efforts to recruit businesses. It's also helped keep some businesses from leaving. "We know of some companies that were able to stay here because of our fiber-optic network," said Bailey.

## ARRA Stimulus Funds

In October 2009, EPB was awarded a \$111.5 million Smart Grid Investment Grant by the U.S. Department of Energy, through the American Recovery and Reinvestment Act. The funds will allow EPB to expedite the smart grid build out.

It's a big leap forward in the ongoing journey. "The way we see the smart grid, it's never going to be completely done because we will always be working to improve it," Bailey said. "We intend to develop new applications to add to it. Or someone else will develop new applications that we can add."

The phone, Internet and TV services also will have big possibilities for the future. It's all thanks to the capabilities of fiber. "It's great to have one technology be the foundation for providing better electric service and better communication service at the same time," said Bailey.



Alcatel-Lucent delivers complete, best-in-class communications solutions aligned with the most challenging mission imperatives of government, and tailored to business needs. Alcatel-Lucent: serving those who serve the public in an always-on world.

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