

Broadband and the Smart Grid

Modernizing the electric grid is a critical national goal to save energy, add reliability and cut peak demand. Broadband is key to achieving it.

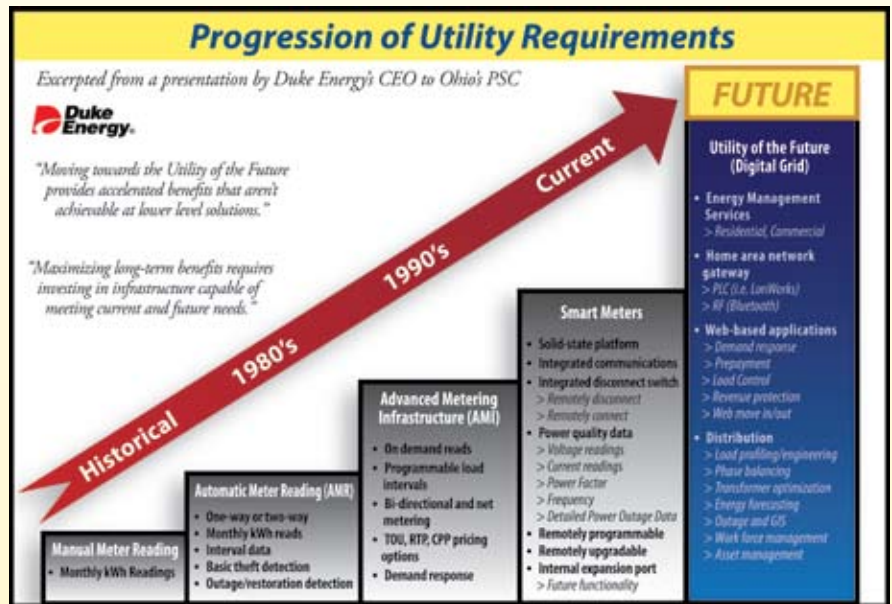
By Mike Smalley ■ Carina Technology Inc.

Rising oil prices have made all of us keenly aware of the need for alternative sources of energy. Today, the cheapest alternative energy source available is the “negawatt” – saving power by reducing consumption or increasing efficiency. But energy conservation depends on more than just consumers turning down their thermostats. The key to energy conservation is utilities’ development of the “Smart Grid.” And broadband technology is enabling the “smart” in Smart Grid.

As a vendor of broadband-based solutions for energy providers, Carina Technology is asked many questions by utilities about this approach to energy conservation. It’s not surprising that confusion and uncertainty exist about what broadband can do for utilities – the Smart Grid idea is a developing one and utilities are still experimenting with it. Following are some of the questions we hear most often, and the answers that we give.

Q. What makes the “Smart Grid” smart?

A. Smart Grid is a term used to describe the goal of electric grid modernization. In this vision, energy providers proactively monitor and manage systems and automate many processes that continue to run manually even in many of the most progressive utilities today. Forward-thinking energy decision makers



The never-ending list of utility requirements.

can make the “Smart Grid” smart by choosing open solutions today that are capable of meeting and exceeding future demand by managing energy smarter and quicker.

Q. We're already using Advanced Metering Infrastructure (AMI). Isn't that the same thing?

A. No, it's not the same. AMI is an interim step towards achieving a true Smart Grid. AMI includes most basic metering functions – such as automatic meter reading and remote disconnect – but it does not include more advanced features

such as energy forecasting, prepaid energy and distribution automation.

Q. But our current AMI (or AMR – automatic meter reading) system has worked fine for the last 10 years. Why should we change it?

A. Because it's outdated technology. Many current AMR/AMI systems were sufficient in the 1980s and 1990s, but as we enter the 21st century, advances in technology and consumer demand are both increasing exponentially. Additionally, the Energy Policy Act (EPAAct) of 2005 mandates that utilities make more real-time energy information directly available to consumers – and consumers themselves are demanding more insight into their usage and bills. To meet this need, utilities must prepare with open, intelligent solutions that are capable of delivering on the promise of a smart grid today.

The cheapest alternative energy source available is the “negawatt” – saving power by reducing consumption or increasing efficiency. The key to energy conservation is the “Smart Grid.”

Q. What exactly does broadband have to do with the Smart Grid?

A. Broadband infrastructures such as FTTH are the only communications networks that can transport real-time information dynamically and reliably. Because fiber networks are future-proof, you can be sure they will handle increasing bandwidth demands and layered applications without costly network upgrades. Also, once an FTTH network has been deployed, there are no recurring communication costs.

Q. They say fiber is faster, but will we really get information from the system any sooner?

A. True two-way communication to and from endpoints on a fiber network happens in real time at light speed. You will see responses from commands and receive system event alarms instantaneously. Other backhaul networks may have delays of 20 to 60 seconds while others may not communicate for hours or days.

Q. What if we can't get fiber to every home? Can we still get data from all of the meters?

A. Even when an optical network terminal (ONT) is not available at every home, there are several options for achieving 100 percent grid visibility. Short- to medium-range communication over a block or neighborhood can be achieved by using standardized communications protocols such as Zigbee from one ONT-connected home in the area. Information from each endpoint is collected in real time and sent back to the utility central office over the FTTH system.

Q. We're considering a 900 MHz RF network for metering communications. Why not just use that?

A. 900 MHz RF networks have the advantage of being private, proprietary communications infrastructures. They also have the disadvantage of being private, proprietary communications infrastructures! These systems are inherently closed, not scalable and limited in bandwidth and applications capability. They limit the choices a utility or city has in deploying applications from other ven-

dors that use open standards.

CAN WE REALLY MANAGE A FIBER NETWORK?**Q. Would we have to operate the FTTH network ourselves?**

A. Some utilities choose to hire an IT staff and other support personnel to manage their networks in-house, while others seek out third-party partners to handle this. Similarly, for utility management applications, utilities can choose to manage their applications in-house or simply collocate management with the solutions provider.

Q. Let's say we manage it in-house. How many people will we need?

A. That depends on the size of your network and the services offered to your customers. For instance, one utility-owned FTTH deployment manages 30,000 meter points and a base of triple-play customers with an in-house staff of five.

Q. Won't we have to power the customer premises equipment?

A. Yes, you'll have to provide power from either inside or outside the home

Automatic Metering Infrastructure includes most basic metering functions – such as automatic meter reading and remote disconnect – but it does not include energy forecasting, prepaid energy, distribution automation and other functions.

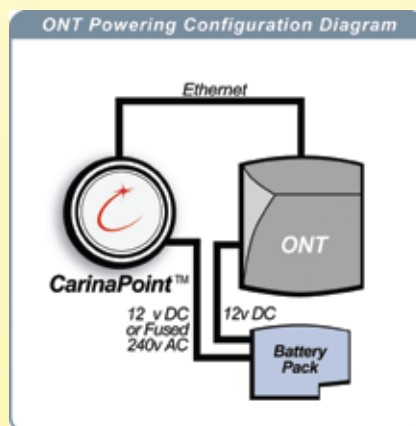
for the ONT. Inside powering for the ONT presents many challenges – you'll need the services of a certified electrician, you'll have to schedule the installation with the customer, you'll have to drill through the wall, and at the end you will still have only limited access to the power source. But there are external ONT powering solutions that allow for easy access to the site; safe, low-voltage powering; reliability; backup power; notification in the event of an outage; and quicker deployment at the home.

Q. Will we face regulatory issues and challenges?

A. That's a possibility. Many utilities across the nation are already deploying or actively pursuing FTTH as their preferred communications infrastructure, and their work in paving the way is invaluable. However, resistance from incumbent providers, lack of definitive regulatory rulings and backing, and lack of widespread consumer knowledge of FTTH remain as challenges. Legal precedents are generally favorable for municipal utilities, which helps strengthen the case for muni/utility FTTH. Lobbyist and advocacy groups such as the Fiber-to-the-Home Council (www.ftthcouncil.org) are also driving and speeding deployment.

Q. If we deploy a FTTH system, won't it be surpassed by a better technology in 5 or 10 years? How future-proof is it?

A. No, the bandwidth capability of fiber networks is nearly unlimited and will handle additional applications, in most cases, without the need for an upgrade. The fiber cable itself will never be outdated the way a cable wire may be. When upgrades do become necessary, only the electronics must be upgraded while the fiber cable remains intact.



How Carina's meter add-on gets its power.

UTILITY APPLICATIONS VS. THE TRIPLE PLAY

Q. What really pays for an FTTH network – consumer triple play (voice, video, data) or utility applications?

A. Both. An FTTH-enabled utility can reap savings and revenue gains in multiple areas, including demand response, decreased physical visits to the home, external powering savings, reduced bad-debt write off, prepaid electricity and leveled demand peaks. These applications provide continuous and supplementary revenue to supplement the triple play.

Q. If we offer triple play services, what penetration rate do we need?

A. That varies with each community. Generally, a penetration rate of 30 percent to 40 percent for triple play services will go a long way to paying back the investment on the system, but you can add additional savings and revenue streams by simultaneously modernizing electric systems.

Q. Our community is interested in fiber for Internet access, but so far no one has focused on the benefits to the electric utility. When should we get involved in the discussion?

A. You should get involved as early as possible, because you can help build the business case for fiber. In municipal FTTH deployments, the electric utility is often overlooked during the system design and implementation, on the assumption that the largest chunk of revenue and payback will come from triple play services. While this can be true, achieving the targeted take rate of 30 percent to 40 percent can take a long time. By taking into account the Day One benefits and cost reductions that Smart Grid can provide, as well as available revenue-generating utility-based services, service providers can take advantage of these interim revenue streams, thus speeding payback and justifying the case for fiber.

Q. Does the Smart Grid concept apply only to the electric grid? We also operate gas and water utilities, and we'd like to run those more efficiently, too.

A. Yes, Smart Grid has valuable applications for water and gas utilities, such as real-time leak detection. Leaks are responsible for about 20 percent of unaccounted water in most utilities, and most of them are not detected and managed in real time.

WHAT WILL WE DO WITH A SMART GRID?

Q. Why do we need real-time information – and what do we do with it all?

A. Simply put, the more data that's available more often, the more accurate and timely utility and customer reaction can be. Effective smart grid solutions should be specifically designed to use real-time data to help refine and pinpoint inefficiencies and seek patterns in behavior. Instead of searching for a needle in a haystack, you can automatically categorize each stalk of hay or needle and tell the difference between the two.

Q. Is the information valuable for consumers, too?

A. Always-on two-way communication and utility/customer cooperation are the keys to successfully implementing Smart Grid. End users can take an active part in demand-side management through easy and effective solutions and strong visual cues. By keeping lines of communication and information sharing open between the provider and user, both parties can take ownership of the system and of energy usage.

Q. What do we do with our current software solutions? Can they be interfaced?

A. True Smart Grids are based on open standards and interoperability. Existing utility software and other legacy sys-



Open systems allow easy workforce management – in this case, from a laptop in the field.

tems can be integrated by some vendors like Carina; however, many fixed AMI/AMR solutions are proprietary and may not be upgradable.

Q. Will we have to change our current business processes?

A. Probably not. We've built utility best practices into the system. Data is packaged so as to meet the information needs of various groups within the utility.

Q. Will this system help us implement real-time pricing or critical peak pricing?

A. An always-on, reliable broadband connection is the best backhaul solution to implement real-time and critical peak pricing programs. In terms of data throughput capability, reliability and future capacity, FTTH is superior.

Q. What other utility applications and needs do you see coming?

A. Utilities must find solutions that help manage resources more efficiently, reduce waste and better match generation to demand curves. Advanced services such as intelligent grid switching capability, energy forecasting, workforce management and sophisticated transmission and distribution automation are coming. ■

ABOUT THE AUTHOR

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