

# Five Questions to Ask Before You Spend a Cent on New Technology

Building the modern electric grid begins with a foundation of smart communications planning.

by Jake Rasweiler, Arcadian Networks

As smart grid moves from buzzword to reality, U.S. utilities examine how best to invest and manage their resources.

Many factors influence the shapes their plans may take, including economic pressures, regulatory demands, increasing complexities in security, reliability, efficiency and consumer empowerment. Yet for most, success or failure will depend on how well and how early they incorporate communications in their smart grid planning.

Comprehensive communications strategy, integrated into planning from the beginning, forms the best and most cost-effective foundation for smart grid applications. The business process for building a smart communications road map comes down to asking five essential questions about your enterprise:

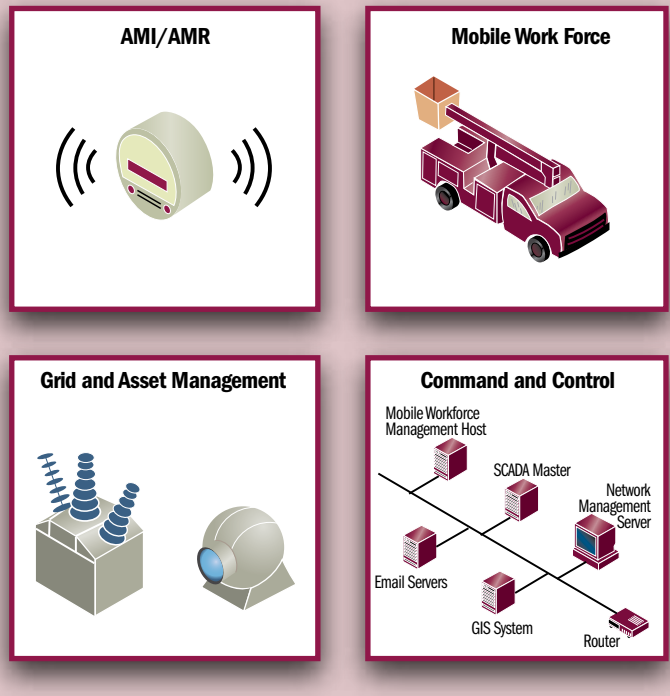
1. What do we want to do?
2. What is the big picture?
3. Who will we need to do it?
4. What do we have?
5. What matters to us most?

## What Do We Want to Do?

Focus on function and value (see Figure 1), rather than equipment or technologies. Like other aspects of the U.S. power grid, most utility communication networks have been assembled over decades using various technologies and applications. Often the applications and software are proprietary, requiring separate networks that can't communicate with one other. Before investing in communications or integration technologies, look at functionality.

Gather user feedback regarding how, where and when the communications technology will be used. Look beyond the capabilities of the current technology and beyond current needs. Too often, utilities spend on technologies that provide less-than-vital capabilities. The smart grid team needs to ask: What applications and use cases do we need now? Which are most urgent? Which can be added later? When you place functionality and communications on a project timeline, you begin to build a solid business case for your road map to the smart grid.

Figure 1: Common Functional Areas Within a Utility



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## What's the Big Picture?

Careful communications planning can form the backbone of the smart grid. It reduces redundant or piecemeal purchases of minutes, products and disparate technologies. To develop a comprehensive view of your operation, however, you must look at your entire enterprise—existing resources and the required applications and their security requirements.

Because of the way communications developed over decades, many utilities still use a silo approach. They think of communications as individual assets, requiring:

- A different network for each application,
- Stranded excess bandwidth,
- Costly diversity and redundancy, and
- Duplicative security.

This approach is nearing obsolescence as utilities seek to cut redundancy, control spending and gain multiple benefits and uses from every investment while applying a consistent

and enterprise approach to critical security program management. Smart grid strategy considers the entire utility enterprise. It is characterized by:

- An integrated network,
- Centralized management and security,
- Common equipment and interfaces, and
- Redundancy at critical sites.

### **Who Will We Need to Do It?**

A decade ago, few utilities had a smart grid integration team. Today, few can afford not to. Make sure your team includes representatives from all divisions of your organization responsible for the communication initiatives. C-level executives, information technology, engineers and communications technicians each can bring new perspectives and analyses.

Building a smart grid worthy of the name demands a comprehensive approach and will require consensus decision-making. Consider function and purpose—what you need the technology to do—rather than simply examining the current technology you’re using to achieve it.

First, establish your goals, then work back from those goals. Your aim is to eliminate or avoid patchwork solutions that provide incremental improvements but can add up to a large, enterprisewide telecom expense.

Assemble a team that is committed to an enterprise solution and willing to take a corporate view over a program-oriented approach.

The same applies to outside consultants. They can provide vital expertise, but look for one who delivers comprehensive, end-to-end planning based on the functionality you will use, rather than simply selling a particular product. Utilities have extensive internal assets and knowledge, and a good consultant will leverage that expertise. (There are many options today rather than just buying bandwidth or minutes from the big telecom that serves your region. They may sell you connectivity where they have it and charge you to extend to where you need it.)

The ideal road map team will build on current utility assets, leveraging and increasing their value, and help you avoid unnecessary operating costs.

By including all key stakeholders in your smart grid integration team, you ensure receiving input about the applications’ capabilities and intended uses. Within a chronological planning framework, your team gathers comprehensive data to accurately define the cost and benefits and, ultimately, to make better spending decisions. You can avoid mistakes such as over-deployment of excessively high levels of bandwidth with high up-front costs and short duration of use. With prudent smart grid communications planning and spectrum management, enterprise needs can more efficiently be met with less bandwidth.

Engage the team in discussion to accurately represent and aggregate costs, benefits and the long-range deployment cycle, and you’ll establish reliable budget projections. For many utilities, advanced metering infrastructure (AMI) is an early top priority.

Yet, leaders need to invest for future capabilities. Consider wireless licensed spectrum solutions, which anticipate and integrate present and planned technologies, including: supervisory control and data acquisition remote terminal units (SCADA RTUs), AMI, VoIP phone calls, Wi-Fi access to network applications, downloading engineering drawings and video and security surveillance.

### **What Do We Have?**

Audit your existing assets. When you build your communications strategy first, you can effectively integrate existing assets and technologies. You might be surprised at the potential to re-deploy or build out existing assets.

Your embedded assets are a toolbox for creating your solution. Combine existing tools with new technology to help mitigate costs. It is like the old axiom of a stick: Some see a club, some see a lever and others see only a stick. The audit helps refine your knowledge management process and educate your team to the potential of your sticks.

Existing assets may include towers, backhaul, communication systems, spectrum and more. Which can be repurposed for best functionality and value? One Minnesota cooperative, Connexus Energy, leveraged its assets cost-effectively. While deploying new 700-MHz radios to improve rural substation communications as part of an AMI effort, Connexus was able to reuse 900-MHz units elsewhere in the system. It also assigned existing trucks from other tasks to help with the install. Explore the latent capacity of your assets in light of your long-term goal: a cost-effective, standards-based, converged network.

### **What Matters Most to Us?**

Realistically define the benefits based on your priorities. Which assets are most mission-critical? Which smart grid initiatives are most relevant to that mission, given the realities of your organization’s demands? Are costs the key factor? Are you considering short-term deployment costs or life cycle costs? What is the balance between costs and service? Will anyone thank you for saving a dime on a system during a major blackout?

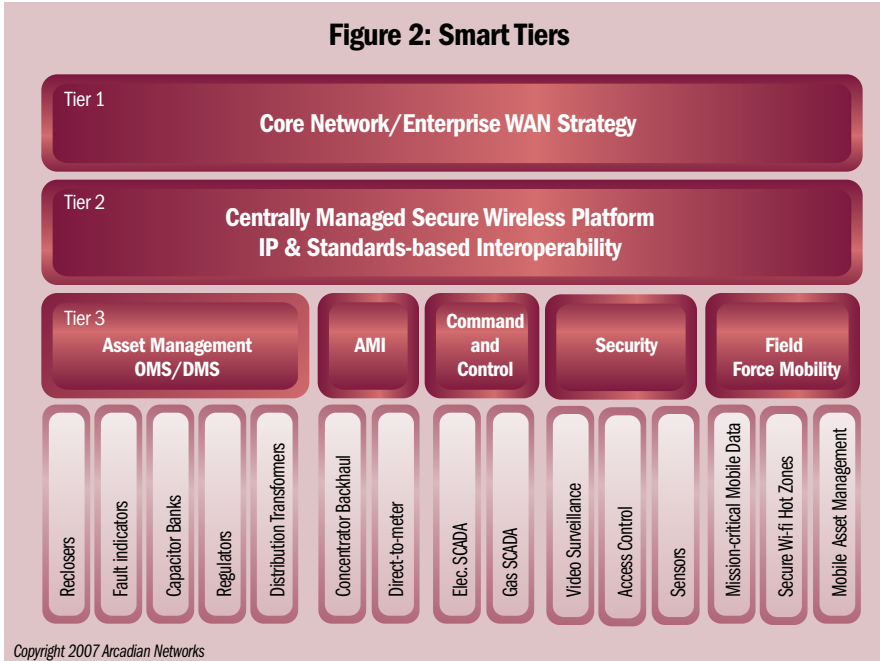
Consider interoperability carefully, too. Standards-driven interoperability is a key characteristic of smart grid strategy because it allows you to invest wisely in technology that is highly adaptable and flexible to future uses. Interoperability must be inherent in the new technologies deployed.

Moreover, new technologies often are capable of interfacing with legacy systems. For example, a licensed IP radio technology with Ethernet and serial remote interfaces could connect to an aging RTU (delivering interoperability without having to upgrade the legacy serial interface).

With careful planning, you can build a smart grid structure to support today’s operations as well as tomorrow’s requirements. Key characteristics of a solid reference network design will be:

- Standards-based,
- Inherent network management and security,

**Figure 2: Smart Tiers**



Consider the design and scalability of your communications network (including functionality and cost). Remember that costs are not always linear as geographical, and numerical changes can create more stress on designs that are not apparent in a limited deployment.

Your reference design can be flexible (see Figure 2 for example), but it should anticipate growth scenarios and be planned with an eye to economies of scale, not only for those using the connectivity, but also for managing the network itself. Scalability must encompass current capabilities and a management approach that will work on a large scale.

A good smart grid road map adapts to each utility's needs and resources, building an optimal communication solution based on a structured framework of customized, effective decision-making. The smart grid, communications costs and enterprise approach

- Future-looking, and
- Scalable.

Do your homework to ensure your plans are standards-based.

are inextricably linked. Only a comprehensive combination of smart grid strategy and network methodology can support current needs and build wisely to reap economies of scale for the future. **ZIP**



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