



# A SMARTER GRID IN A SENSIBLE WAY



## **A SMARTER GRID IN A SENSIBLE WAY**

A smarter, more efficient Grid is upon us. Promised efficiency gains will come from solutions that enable distributed field sensors and controls and improve centralized operations systems. And the central nervous system that connects thousands of distributed locations within a coverage area to the operations center, is communications infrastructure.

### **A SMARTER GRID IN A SENSIBLE WAY**

A smarter, more efficient Grid is upon us. Promised efficiency gains will come from solutions that enable distributed field sensors and controls and improve centralized operations systems. And the central nervous system that connects thousands of distributed locations within a coverage area to the operations center, is communications infrastructure.

At Motorola, we have proven experience building mission critical communications. Our heritage in public safety and utilities voice communications is well established. In the last decade, we have established our leadership position in wireless broadband. We are committed to working with utilities to provide real, near-term benefits for utilities by providing data, voice and video connectivity to Grid operations and developing solutions that can be leveraged to add new capabilities as they are deployed.

Improving grid communications infrastructure requires a cost effective, secure and reliable way to improve service, reduce costs and ready the grid for additional upgrades as they make the best business sense to deploy. Today, utilities are increasingly deploying licensed and unlicensed wireless broadband solutions in a number of key areas:

- Create backhaul links for Automated Metering Infrastructure (AMI)
- Reduce leased line costs
- Increase connectivity to distributed SCADA sensors and control points
- Create backhaul links for distribution automation (DA)
- Deliver real-time information to mobile work crews for better decision making and quicker problem resolution

In addition to common uses, wireless broadband solutions can also provide the necessary bandwidth to support new capabilities such as advanced monitoring and control

applications, VoIP phones and wireless video surveillance of critical, widely distributed assets. While the technology to do all the great things that the Smart Grid promises evolves, communications infrastructure solutions provide a logical, financially attractive place to start, delivering measurable efficiencies and savings that can reduce the risk of longer-term, higher-investment capabilities.

Current technology allows these Smart Grid solutions to be deployed rapidly with a proven return on investment. Leased line replacement, as an example, typically has an ROI of about six months. [Kansas City Power and Light](#) implemented our Point-to-Point technology to reduce its reliance on T1 leased lines and increase network reliability.

### **THE NEED FOR SMART GRID SOLUTIONS**

The drive behind Smart Grid investments lies in available supply being outstripped by increasing demand and the real threat of what a loss of power could mean in our society. Instead of building more costly power plants, the general industry consensus is that if we manage demand for energy and the distribution of energy better, we can cost-effectively close the gap between supply and demand. By deploying a near, real-time monitoring and control solution and enabling consumers with detailed consumption information, the utility industry can move towards real-time pricing models.

Some key drivers to Smart Grid include:

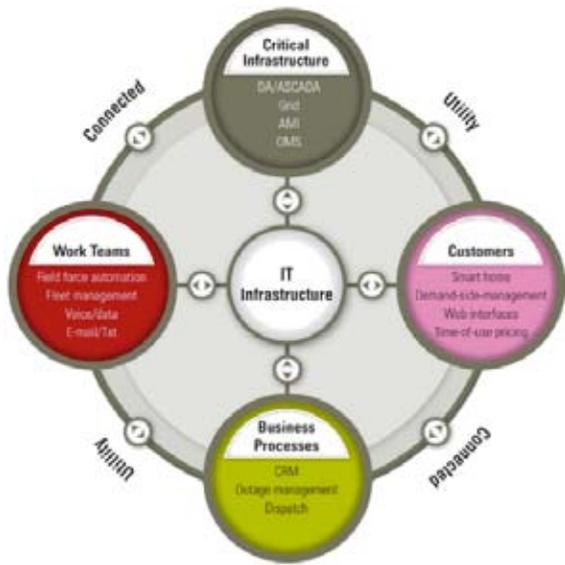
- Cost of new power plants exceeds the cost for managing demand & distribution
- Going green and energy management is a global initiative - requiring distributed control
- Aging equipment being replaced
- Changes in regulations, laws and standards
- Retiring workforce being supplemented with technology

Electricity is as fundamental to our lives as oxygen. It is of vital importance to the U.S. economy, national security and the daily lives of more than 300 million Americans. Utility IT leaders carry the full weight of this knowledge and unique responsibility squarely on their shoulders and continue to evaluate new technologies to enhance operations and system reliability – as stakeholders and consumers remain intolerant of shortfalls on either measure. An intelligent grid is no longer just a future state. It is evolving now with real-world implementations and real savings and efficiency benefits.

**THE CONNECTED UTILITY**

Operationally, Smart Grid technologies need to help utilities contain costs and deliver a reasonable, achievable return on investment. By having the ability to leverage solutions across multiple applications, they can positively impact OPEX and CAPEX spending, effectively lowering a utility’s Total Cost of Ownership (TCO).

In a “Connected Utility,” business critical information flows seamlessly across the wired and wireless IT networks to connect grid infrastructure, work teams, business processes and customers together in a private, utility specific intranet.



A “connected utility” reliably and securely moves data from one location to another: to and from field deployed workers and remote meters; to distribution controls; and, to customers to manage the network more effectively. This ability is critical to a community’s economic and social success. Technology investments must ensure continuous operations and maximize power availability. New capabilities should assist with the rapid diagnosis and resolution of issues when they occur, minimizing down time and associated energy costs.



With an 80-year track record on providing reliable outdoor wireless communications, we have excelled in reliably and securely transporting information in harsh and demanding outdoor environments. Our wireless systems are deployed in thousands of networks around the world providing data, voice and video connectivity. For example, the [Sylacauga Utilities Board](#) is currently using our technology to enhance their SCADA, non-emergency 911 connectivity and AMI backhaul.

**RELIABLE COVERAGE & CAPACITY**

Providing complete communications coverage is a key factor impacting your success. Any gaps or holes in a coverage area can create inefficiencies. Utilities need to have backhaul solutions to deliver high capacity to a service area, distribution solutions to serve neighborhoods, and access solutions to connect individual users and equipment. While some suppliers provide one piece of this solution, we offer all of them with the planning tools to design, deploy, manage and optimize them to ensure they work together as one integrated network solution.

For example, a backhaul link can provide connectivity to reach a location more than 100 miles away. A distribution network can spread this signal to locations within an area of more than 200 square miles, feeding access networks to provide continuous coverage in city blocks, neighborhoods and communities. These networks can scale from small areas serving dozens of remote users to hundreds of thousands of users in dense urban environments. As new capabilities are required, or as new communities are added to the coverage area, the network scales without affecting the existing network.

## **COST CONTAINMENT**

As with any infrastructure investment, the better you can plan for and stay ahead of projected needs, the more efficient and cost-effective your operation will be. This is particularly important in the utility arena, where funding is limited and investments are highly scrutinized by stakeholders.

When deployed for data transfer, our solutions have a proven ROI of a matter of months when compared with leased lines. When leveraged for video surveillance, our wireless solutions provide connectivity at one fifth the cost of wired video surveillance cameras.

Smart Grid technologies, particularly wireless communications infrastructure, help take costs out of the investment equation over the long-term. One U.S. Department of Energy study calculated internal modernization of U.S. grids with Smart Grid technologies would save between \$46 and \$117 billion over the next 20 years just due to reduced transmission losses – key, as estimated demand is projected to increase by double over that same time frame.

## **CONTROL**

Having more control of and visibility to key components of operations – from transmission and distribution to communications – means you will have access to better information, can make better decisions and achieve better results. Solutions that leverage private wireless networks offer that control, as well as greater security, improved QoS, information assurance, and greater bandwidth for applications to run on one common network backbone. Ease of integration into existing infrastructure also impacts overall system management.

[Wisconsin Public Service Corporation](#) and [MapleNet](#) in Indiana designed and deployed their own networks and leverage our wireless broadband links for AMI and SCADA applications. These networks can be leveraged to support additional applications as they are deployed in the future.

## **PERFORMANCE MEASUREMENT AND THE NEED FOR COMMUNICATIONS**

As utilities move to meet a number of reliability measurements, their communications infrastructure plays a vital role in the ability to collect information for compliance reports. In addition to traditional benchmarks, more accurate measurement also gives you insight into how equipment is performing and potential failure risks – thus enabling a proactive interaction between the utility, its maintenance crews and the customer.

With more detailed information on usage and availability, the relationship between the utility and the consumer can become more collaborative. As Smart Grid capabilities expand to include new applications, utilities can understand, segment, and educate their retail electric customers based on individual interest and needs. In the near-term, utilities should create programs that offer energy efficiency audits, home area network management, and other value added services to help consumers to take advantage of benefits from your Smart Grid investments.

## **TECHNOLOGY IMPLICATIONS**

Despite the buzz, the entire industry is understandably approaching Smart Grid investments cautiously. Economic uncertainty and funding challenges make it even more important to create a logical and cost-effective migration strategy. Key initial priorities will focus on improving service reliability and operational efficiencies. While deployment models and Smart Grid solutions proliferate, the Smart Grid needs to be fused with IP, high-level security and interoperability standards. By integrating digital computing and communication technologies and services with the power-delivery infrastructure, the Smart Grid will enable bidirectional flows of energy and two-way communication and control capabilities. A range of new applications and capabilities will result. Anticipated benefits range from real-time consumer control over energy usage to significantly increased reliance on solar and other sources of clean renewable energy to greatly improve reliability, flexibility and efficiency of the entire grid.



### **Performance measurements include:**

- ASAI – average system availability
- SAIDI – system average interruption duration index
- SAIFI – system average interruption frequency index
- CAIDI – customer average interruption duration index
- CIII – customer interrupted per interruption index
- MAIFI – momentary average interruption frequency index

## **SECURITY**

As Smart Grid technologies get deployed, everyone has a vested interest in ensuring that security standards are developed and adopted with them to avoid unexpected opportunities for adversaries to penetrate these systems or conduct large scale attacks. The priority efforts to take advantage of stimulus money already has some security experts concerned that many utilities will cut corners to get Smart Grid solutions deployed, ignoring risks and vulnerabilities in the process.

To protect the grid and the greater connectivity required by new capabilities, reliable methods for confidentiality, integrity, authentication, authorization, access control, availability and non-repudiation must be incorporated into new Smart Grid devices and protocols. Federal Information Processing Standards (FIPS) approved Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) solutions are readily available to be deployed for Smart Grid solutions.

These solutions have already been proven in utilities, public safety deployments and healthcare deployments where sensitive and private data, video and voice signals are handled reliably in normal and emergency situations.

## **OUR STRONG UTILITY HERITAGE**

Motorola, has provided mission critical voice communications to utilities for years. These deployments can be complemented with secure, highly reliable and cost effective wireless broadband communications networks for Smart Grid backbone applications, including AMI backhaul, Distribution Automation, Supervisory Control and Data Acquisition (SCADA) and video surveillance.

Today, we are leveraging state-of-the-art communications and security capabilities into new Smart Grid technology, and are working with the National Institute of Standards and Technology (NIST) and others to lead the development of Smart Grid Security requirements and solutions. We are proud of the strong partnerships we've built with public utilities over the last three decades, along with the secure land mobile radio systems we've designed and implemented for public safety, Federal and DOD applications.

We can help you make Smart Grid a reality on your terms and within a timeframe that matches your business goals.

## **A BETTER OPERATING MODEL**

While the technology to do all the great things that the Smart Grid promises continues to evolve, communications infrastructure solutions provide a logical, financially attractive place to start investments. You benefit from immediate, measurable efficiencies and the savings achieved can reduce the risk of longer-term, higher-investment capabilities.

As a utility leader, we know you take the commitment to responsibly serve your community seriously. Delivered services must be robust, reliable and secure in a deregulated and highly competitive environment. Surprises must be avoided and proactive planning is critical. The Smart Grid will transform how utilities interact and connect with their employees, customers, other grid companies and technology partners. But there is much work to be done.

Overhauling the aging electric grid will be a slow, often challenging process. However, as the focus sharpens on efficiency, reliability and security, the utility industry will see sweeping, significant returns on their investments – and lower TCO over time – by aligning with the right partners to adopt new Smart Grid technologies and strategies.

## **ABOUT MOTOROLA WIRELESS NETWORK SOLUTIONS**

Motorola delivers seamless connectivity that puts real-time information in the hands of users, giving customers the agility they need to grow their business or better protect and serve the public. Working seamlessly together with its world-class devices, Motorola's unrivaled wireless network solutions include outdoor wireless Point-to-Multipoint, Point-to-Point, Mesh and two-way Wide Area Networks along with indoor solutions including Wireless LAN, outdoor wireless Mesh Wide Area Networks, Point-to-Multipoint, Point-to-Point networks and Voice over WLAN solutions. Combined with powerful software for wireless network design, security, management and troubleshooting, Motorola's solutions deliver trusted networking and anywhere access to organizations across the globe.

## **National Priorities**

The Smart Grid will require numerous standards, specifications and requirements to allow for its successful transition into the existing grid framework. To prioritize this important work, the National Institute of Standards and Technology (NIST) chose to focus on standards needed to address the priorities identified in the Federal Energy Regulatory Commission (FERC), as well additional areas. These include:

- Demand Response and Consumer Energy Efficiency
- Wide-Area Situational Awareness
- Energy Storage
- Electric Transportation
- Advanced Metering Infrastructure
- Distribution Grid Management
- Cyber Security
- Network Communications

