

The Fundamental Foundation of the Smart Grid is a Smart Network

WISELY IMPLEMENTED, THE \$4.5 BILLION ALLOCATED for the smart grid in the American Recovery and Reinvestment Act will accelerate the rollout of a new, intelligent power system. This transformation of an analog grid into a modern two-way communication network will empower utilities and consumers to revolutionize how we create and consume energy.

Today, the North American electricity grid successfully delivers uninterrupted power—over 4 billion megawatt-

hours of energy a day—to more than 100 million customers. According to the U.S. Department of Energy, the demand for electricity is expected to grow by more than 40 percent by the year 2030. Utilities are challenged to provide reliable, cost-effective power while minimizing their environmental impact. A smart, efficient grid will play an essential role in delivering affordable, ubiquitous and sustainable electricity to power our society and economy. The foundation of a smart grid is a smart network.

What exactly is the smart grid? Ask a dozen people and you'll get a dozen different answers. Many define it through the prism of smart applications, like advanced metering and demand response, distribution automation and plug-in hybrid electric vehicles. Today, there are hundreds of companies, investing billions of dollars developing an impressive variety of new products and technologies



CONNECTING OVER 25 MILLION CONSUMERS. AND GROWING.

With multiple, fully operational smart grids, our customers are transforming the grid to improve reliability, provide new services and empower consumers to track and manage their energy consumption.



to make the grid more efficient. These include everything from distributed generation and energy storage technologies, to more efficient appliances, to in-home technologies that allow users to better understand and control their energy use.

But the smart grid is bigger than that. Stakeholders must recognize that what these applications have in common is a reliance on a secure, unified network. A common platform is necessary to connect these devices and get them communicating with each other, utilities and consumers.

To ensure that the billions of dollars our nation invests in the smart grid delivers fully on its important potential, we must look to key lessons learned from networking the Internet. The right network for the smart grid, like the Internet, must be interoperable, scalable, reliable and secure. We believe that the only way to achieve this is by building the smart grid network infrastructure around the uncontested universal networking standard, Internet Protocol.

The Internet succeeded because of its unprecedented interoperability. This ability to run unlimited applications over a common networking platform is the reason that the same network that supported primarily e-mail back in the late 1980s can be used today to buy birthday presents, balance checkbooks, watch videos online and keep in touch via instant message and video chat. The smart grid requires comparable plug-and-play functionality for not only smart meters, but also plug-in electric vehicles, energy storage devices, rooftop solar panels and more.

Scalability also played an essential role in the flourishing of the Internet. What began under the auspices of the Department of Defense as a network connecting a handful of research institutions has grown exponentially into a global web supporting billions of Web sites, e-mail addresses, servers, gaming avatars, instant messaging, social networking identities and more. Although we could not have foreseen the proliferation of these applications and services, we were fortunate to have built the Internet upon a networking foundation that could accommodate this explosive growth in demand for connectivity. The smart grid similarly goes well beyond smart meters to include devices such as household appliances, personal automobiles and utility switches on our nation's most valuable and ever-present infrastructure – the power grid.

Security is paramount for the Internet. Fortunately, the open-IP platform on which the Internet is built leverages trillions of dollars in collective research and development. Against common intuition, the most robust security standards are the ones that are developed in the light of day upon open platforms, contradicting the notion that obscurity delivers security. It's difficult to find anyone who thinks that the smart grid should be anything less than the most secure network ever built, and there is no better-understood

source of field-hardened security experience than the IP standards and protocols that power the Internet.

In the end, the smart grid and the Internet are both network infrastructures upon which applications and services operate. IP is a public standard to which anyone can build, not a proprietary system controlled by private interests. The open evolution of IP has given birth to features built on decades of collective experience, which makes more sense than starting from scratch and hoping for the best with unproven, closed networking protocols. The least common denominator solutions will fail to deliver the smart grid solutions that will help us face the monumental challenges of climate change and economic recovery. Indeed, the recent political momentum toward smart grid standards has raised many questions about how best to harmonize smart grid applications. We can cut that debate short by adopting IP as the accepted networking standard.

The smart grid will help us reduce our dependence on fossil fuel with better use of renewable energy sources, even allowing consumers to incorporate their own rooftop solar panels and backyard wind turbines to provide some of their own energy and sell some of it into the grid. It will build U.S. leadership in the clean-tech industry by reducing greenhouse gas emissions, enabling continual innovation and development of new "smart" products, and providing an estimated 40,000 skilled jobs annually under a nationwide smart grid rollout. Building an open, IP-based networking infrastructure for this power system will level the playing field to ensure that the best technologies for the task at hand emerge. Without an interoperable, scalable, secure and future-proof smart grid, America's energy future will be locked in a quagmire of proprietary, closed and, ultimately, dead-end solutions.



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