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U.S. Department of Energy
Office of the General Counsel
Attn: Maureen McLaughlin
1000 Independence Avenue, SW
Room 6A245
Washington, DC 20585

Re: <u>NBP RFI: Communications Requirements</u>

Ms. McLaughlin:

The National Cable & Telecommunications Association ("NCTA")[1] submits this response to the Department of Energy ("DOE")'s Request for Information on Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities to Inform Federal Smart Grid Policy (the "RFI").[2] NCTA supports DOE investigation into the communications requirements for the Smart Grid. This RFI will create a dialogue that will enable not only DOE, but also other policymakers, utilities, Smart Grid vendors, consumers and other industry participants, better understand how Smart Grid technologies will affect consumers and the grid, and better inform Federal and state Smart Grid, environmental, energy and other important policy objectives.

As noted by DOE, a "Smart Grid uses information and communications technologies to improve the reliability, availability, and efficiency of the electrical system."[3] The promises of the Smart Grid include "improved reliability and power quality, reduction in peak demand, reduction in transmission congestion costs, the potential for increased energy efficiency, environmental benefits gained by increased asset utilization, increased security, ability to accommodate more renewable energy and increased durability and ease of repair in response to attacks and natural disasters."[4]

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[1] NCTA is the principal trade association for the U.S. cable industry, representing cable operators serving more than 90 percent of the nation's cable television households and more than 200 cable program networks.
[2] Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities to Inform Federal Smart Grid Policy, *Request for Information*, FR Doc. 2010-11129, 75 Fed. Reg. 26206 (May 11, 2010).
[3] *Id.* at 26207.
[4] *Id.*

According to the Electric Power Research Institute ("EPRI"), Smart Grid enhancements could cost up to $165 billion over the next twenty years.[5] Given the steep price tag, policymakers will need to ensure that Smart Grid investment decisions are prudent and rely on cost effective solutions. Most Smart Grid expenditures will be made by electrical distribution utilities as they upgrade their systems to enable new applications and to manage the increasingly complex network. These costs (plus a fixed return for most investor-owned-utilities ("IOUs")) will be recoverable from ratepayers through rate increases or special rate-riders.[6] Consequently, the onus of ensuring that the majority of Smart Grid investment decisions are prudent and cost effective will lie with state utility commissions.

We expect that this RFI will demonstrate that there is not a "one-size-fits-all" communications solution for the Smart Grid and that investment decisions should consider all available communications options, including cable broadband networks. Cable broadband networks are capable of supporting a wide range of utility-facing and consumer-facing Smart Grid applications. Cable broadband networks are robust, ubiquitous, reliable and secure. Furthermore, cable broadband presents consumers and utilities with an efficient, low-cost option for enhancing communications within the grid, and making energy use "smarter."

I. Utility Communications Requirements

When evaluating grid communications requirements, it is helpful to consider each segment of the electrical distribution system separately because each segment has unique functionalities and communications requirements. Conceptually, the grid can be divided into at least five segments: generation, transmission, "middle-mile" distribution (from the substation to the transformer), "last mile" distribution to the premises (transformer to the meter), and in home "behind the meter" applications. The vast majority of Smart Grid applications currently being discussed relate to the latter three downstream components of the electrical grid: distribution, last mile to the premises, and in-home connectivity. NCTA's comments focus on these aspects of the grid.[7]

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[5] *Sticker Shock: EPRI Says Smart Grid Will Cost $165 Billion Over 20 Years*, SMARTGRIDNEWS.COM (Feb 15, 2010), *at* http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation _News/Sticker-Shock-EPRI-Says-Smart-Grid-Will-Cost-165-Billion-Over-20-Years-1882.html. Other entities have estimated the cost to upgrade the grid to be anywhere between $45 billion and $1.5 trillion over the next several decades. *Compare* Candace Lombardi, *Report: By 2015, $45 billion spent on smart grids*, GREEN TECH (July 8, 2010), *at* http://news.cnet.com/8301-11128_3-20009962-54.html?part=rss&subj=news&tag=2547-1_3-0-20 *with* U.S. DEPT. OF ENERGY, SMART GRID SYSTEM REPORT viii (July 2009) (citing the Brattle Group's estimate that it could take up to $1.5 trillion to update the grid by 2030).

[6] IOUs are generally subject to rate of return regulation which enables them to recover a fixed rate of return on capital investments deemed prudent by utility commissions. As the DOE, accurately notes, IOUs are just one among many of the types of utilities. There are also municipally-owned utilities, rural electric cooperatives and generation and transmission cooperatives but IOUs serve approximately 73% of the U.S. customers and generate 74% of the kWh sales in the United States. *See* National Rural Electric Cooperative Association, Co-ops by the Numbers, http://www.nreca.org/AboutUs/Co-op101/CooperativeFacts.htm (last visited July 1, 2010). For municipally owned utilities and rural electric cooperatives, prudency reviews will be made by local city councils or county boards and cooperative members, respectively.

[7] The generation and transmission segments of the grid already have advanced communications paths for utilities to control generation dispatch and other supervisory control and data acquisition ("SCADA") systems.

The Distribution System. The utility distribution system is a robust network, capable of delivering a one-way stream of electrons reliably to consumers. The grid is now being asked to do more than was contemplated when it was originally designed. The new grid must support more functionalities, including delivery of accurate price signaling; management of renewable resources and consumer self-generation; support for distributed generation; ability to track and support demand response; meeting energy efficiency and carbon reduction mandates; connecting smart homes and appliances; and powering plug-in electric vehicles. These new advanced technologies and capabilities require a corresponding investment in advanced communications and more intelligence connecting the core to the edges of the electric distribution system. For example, distributed generation places a new strain on the grid as consumers become producers of electricity and electrons begin to flow both into the home and back into the grid. Utilities will need to implement advanced voltage regulation and system efficiency mechanisms to manage this two-way energy flow and to maintain appropriate voltage levels. Advanced Volt-VAR (volt-ampere-reactive) control systems require the installation of sensors throughout the distribution network and require real-time monitoring of the entire feeder network from the substation down to the end of the feeder lines.[8] Other distribution automation and grid management applications such as Centralized Remedial Action Schemes, Transmission and Substation SCADA, Phasor Measurement and Large Load Control Signaling have similar communications requirements.[9] These applications require dedicated, high-speed, low latency, reliable and secure networks to interconnect the substations, feeders and other control devices within the distribution grid to support these capabilities. As described below, cable operators can offer utilities dedicated broadband access with service level and quality of service guarantees to support these applications.

Last Mile Connectivity to the Home. Most of the recent Smart Grid-related deployment activities, and related policy debates, focus on Advanced Metering Infrastructure ("AMI") deployments and enabling two-way communications connectivity to the premises. AMI generally refers to the installation of a meter enabled with a communications module that allows the meter to transmit and receive communications, including energy consumption data, with the distribution utility via a wireless mesh, broadband over powerline, traditional broadband or other communications network. AMI deployments create immediate efficiency gains for the utility, including reduced truck rolls, eliminating the need for manual meter readers, enabling remote connect/disconnects and on-demand meter reading.

Unlike distribution automation and grid management applications, AMI deployments do not require high bandwidth, low latency, dedicated networks. Instead, smart meters generally only communicate kilobits of data every few minutes. Most AMI deployments rely upon privately built and managed communications networks including unlicensed mesh wireless or broadband over powerline networks. Last mile connectivity to the premises and enabling the corresponding capabilities, however, does not require privately built and managed networks. Existing broadband connections to the home are equally capable of handling the two-way

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[8] *See* KELLY BLOCH ET AL., ABSTRACT: THE FUNCTIONALITY AND BENEFITS OF A TWO-WAY CENTRALIZED VOLT/VAR CONTROL AND DYNAMIC VOLTAGE OPTIMIZATION, *available at* http://www.currentgroup.com/uploads/library/Abstract_Functionalities_Benefits_of_a_Two_Way_Centralized_VoltVAR_Control_DVO.pdf.

[9] *See* Comments of S. Cal. Edison, FCC NBP Notice No. 2: Comments Sought on Implementation of Smart Grid Technology, FCC DA Docket No. 09-2017 (Oct. 2, 2009) ("*FCC Public Notice No. 2*").

communications path from the meter to the utility. As an example, a meter enabled with home area network ("HAN") technology could interface with the consumer's cable broadband network and communicate two-way usage and pricing information to the utility.

Home Area Networks. Connectivity to the premises enables a host of smart applications and technologies including home energy management, distributed generation, demand response and smart appliances. AMI meters are just one type of gateway that can be used to support these applications. This connectivity to the premises can be accomplished in at least three ways: (1) the AMI meter is also enabled with a HAN communications interface, (2) the utility makes available the data that it receives from the AMI meter to consumers over another communications medium, such as the public Internet, or (3) non-AMI meters are retrofitted with HAN communications capabilities. Smart homes and appliances thus can be supported by consumers' existing broadband connection without the deployment of a redundant network to communicate with the AMI meter. Given cable networks' penetration rates, its network in many cases could be leveraged to provide utility connectivity to the meter and HANs in a cost effective manner.

II. Cable Broadband Networks are a Viable, Low Cost Option for Smart Grid Communications Networks

Cable broadband networks are capable of supporting Smart Grid applications, including distribution-specific applications, as well as last mile and in-home connectivity. The cable industry has decades of experience in building, developing and deploying low-cost communications paths relying on existing standards and protocols. Additionally, cable operators regularly manage and provide dedicated broadband services to businesses, consumers and governmental agencies with quality of service and service level guaranties, including to businesses with highly sensitive data such as medical centers and military bases. Cable's, or for that matter wireless and telecommunications providers', networks can be leveraged to support Smart Grid applications within the distribution system, for AMI deployments and within the home cost effectively and without the need of deploying or overlaying an alternate, expensive, dedicated single-purpose communications network.

A. Cable Networks are Ubiquitous

Cable network operators have expended over $160 billion since 1996 to deploy and manage a nationwide communications network that provides video, broadband and voice communications to consumers nationwide. As of March 2010, high-speed cable broadband Internet service was available to 92%, or 122.1 million, U.S. households[10] and 42.8 million customers received their broadband Internet service from cable operators.[11] These networks are already built, rely upon industry accepted communications protocols and standards and incorporate industry standard cybersecurity principles. These networks are not dedicated to any

[10] *See* NCTA, Industry Data Availability, http://www.ncta.com/StatsGroup/Availability.aspx (last visited June 30, 2010) (NCTA's analysis of national data prepared by SNL Kagan and the Census Bureau for March 2010).
[11] NCTA, Operating Metrics, http://www.ncta.com/StatsGroup/OperatingMetric.aspx (last visited June 30, 2010) (reporting national data prepared by SNL Kagan for March 2010).

single application and are able to support AMI solutions and advanced communications within the distribution utility systems.[12]

B. Cable Networks are Robust, Resilient and Secure

The cable broadband network physical infrastructure is highly robust and resilient and has been architected to overcome significant damage and threats to the physical infrastructure and to withstand severe conditions.[13] The cable network was designed with redundant communications paths to avoid sudden disruptions of data traffic flows as a result of disasters, pandemics or other crisis situations. Cable broadband networks also rely upon secure, hardened facilities; alternative routing capabilities combined with key network management techniques; emergency planning and disaster preparedness; and organization structures to address disruptions to service, network overloads and other emergency situations. These structural features reflect years of risk assessment and analysis, and deployment of best practices by cable network engineers, who constantly improve and upgrade their systems to be responsive to new and emerging threats. Consequently, cable network operators have designed the network and instituted disaster recovery plans to avoid communications failures during emergencies and to quickly bring back connectivity online following an emergency.

Cable operators understand that the utility's mission of delivering reliable electricity is essential to the national economy. Cable operators have worked with other mission critical institutions such as hospitals, military installations and government agencies. As well, cable networks are used for millions of secure e-commerce transactions with financial institutions daily. Cable operators regularly enter into agreements with businesses and governmental agencies that provide dedicated communications with correspondingly high service level and quality of service metrics, and are willing to explore utilities' service level and quality of service requirements in supporting Smart Grid applications.

C. Smart Grid Applications Do Not Require Single-Purpose Networks

Some have argued that the mission-critical nature of delivering safe, reliable and efficient electricity to consumers requires corresponding communications networks to be designed, managed and operated as a single-purpose dedicated, utility-managed communications network.[14] These characteristics are not limited to utility-managed networks. On the contrary, commercial network operators, whose business objective is to deliver ubiquitous, reliable and secure communications networks for millions of people, are well-positioned to support advanced communications requirements of the Smart Grid. Cable broadband operators are financially incented to design and deploy robust and resilient networks, and to take steps to ensure that their network architecture has sufficient redundancy, capacity and security to withstand physical

[12] The mere fact that cable broadband networks may not serve 100% of the premises in a distribution utilities service territory does not support the need for a utility to start from scratch with a separate network. Like the Internet, Smart Grid can and should function even though the underlying communications architecture may include a mix of cable, wireline, licensed wireless, mesh, broadband over powerline and satellite networks.

[13] For more information, see Comments of NCTA, In the Matter of Effects on Broadband Communications Networks Of Damage to or Failure of Network Equipment Or Secure Overload, FCC PS Docket No. 10-92 (June 25, 2010) ("*FCC Survivability Proceeding*").

[14] *See*, Comments of the Utilities Telecom Council, *FCC Survivability Proceeding*, at 2 (June 25, 2010).

harm, severe loads and other stresses to the infrastructure. Conversely, communications network management is not core to utilities' mission of delivering electricity. Building, owning, operating and maintaining communications network infrastructure requires a high degree of telecommunications expertise and a large capital investment. Utilities may be better positioned to outsource these obligations to companies whose core business is deploying, managing and operating advanced communications networks. Even if there is some portion of the distribution grid that is so sensitive as to merit a private, dedicated network, commercial broadband network operators are well positioned to provide these dedicated services. NCTA's members provide all sorts of advanced point-to-point circuits that serve commercial customers, and are well positioned to do so for specific portions of the Smart Grid.

D. Use of Commercial Networks May Be More Cost Efficient than Dedicated Networks

State utility commissions are increasingly recognizing the potential cost savings presented by the use of commercial communications networks as opposed to dedicated Smart Grid communications networks. For example, the California Public Utilities Commission recently indicated that "before [it] approves a specific Smart Grid infrastructure investment, [it] will wish to ascertain whether investments in Smart Grid communications are cost-effective and whether a utility has adequately considered a range of alternatives, especially those concerning the use of existing and future communications infrastructure operated by third parties."[15] The New York Public Service Commission similarly encouraged utilities to consider commercial networks in Smart Grid deployments.[16] The fact is that reliance on existing networks can be a more cost effective use of resources because it avoids the up front capital costs of deploying a separate dedicated network and spreads the ongoing operations and maintenance costs across the network's users. It allows utilities to focus on their core business instead of developing the institutional expertise and resources necessary to manage these networks.

E. Rate-of-Return Incentive Structures Perversely Favor Utility-Owned Networks

NCTA recognizes that IOUs' rate-of-return incentive structure encourages these IOUs to expend funds on capital assets, in which they earn a fixed return. By contrast, utilities generally do not earn a return on ongoing operations and maintenance expenditures. This regulatory model perversely creates incentives for IOUs to favor utility-owned and utility-built dedicated

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[15] *See* Order Instituting Rulemaking to Consider Smart Grid Technologies Pursuant to Federal Legislation and on the Commission's own Motion to Actively Guide Policy in California's Development of a Smart Grid System, *Decision Adopting Requirements for Smart Grid Deployment Plans Pursuant to Senate Bill 17 (Padilla), Chapter 327, Statutes of 2009*, Cal. Pub. Utils. Comm'n Rulemaking No. 08-12-009, at 47 (June 24, 2010).

[16] *See* In the Matter of the American Recovery and Reinvestment Act of 2009- Util. Filings for N.Y. Economic Stimulus *et al.*, *Order Authorizing Recovery of Costs Associated with Stimulus Projects*, NY Pub. Serv. Comm'n, CASE 09-E-0310 *et al.* at 41 (July 27, 2009) (the New York Public Service Commission encouraged "utilities to work with established network providers to leverage their available infrastructure and operational expertise in deploying smart grid communications solutions.").

networks over commercial networks managed and operated by a third party, even if the commercial networks are a low-cost, equally feasible alternative.[17]

While NCTA recognizes that intrastate utility incentive structures are outside the jurisdiction of DOE's authority, we highlight this issue as a partial explanation for IOUs' preference for dedicated networks. Until state utility commissions reevaluate IOUs incentive structures, and consider alternative regimes such as price/revenue cap regulation,[18] we encourage them to follow California's and New York's lead in encouraging IOUs to fully evaluate all communications options, including commercial networks, when considering Smart Grid deployments. This will help ensure that IOU investments in communications architectures are prudent and leverage low cost network architectures.

III. Conclusion

We appreciate this opportunity to file comments in this important proceeding and applaud DOE's efforts to open up a dialogue on communication requirements of the Smart Grid. While many of the salient Smart Grid questions remain within the state jurisdiction, DOE can provide a valuable role in identifying best practices and convening stakeholders to assist in getting the regulatory structure more amenable to Smart Grid investment.

We believe that continued discussions regarding the nature of the Smart Grid and its advanced communications requirements will inform Federal and state Smart Grid policy debates, and will aid policymakers, utilities, Smart Grid vendors, consumers and other industry participants in making cost-effective Smart Grid investment decisions.

Respectfully submitted,

Neal M. Goldberg

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[17] This so-called "A-J-W effect" (so named after Averch, Johnson and Wellisz) has been long recognized as an inherent problem with cost-of-service regulation, where the regulatory structure induces utilities to adopt excessively capital-intensive technology. *See,* ALFRED E. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS VOL. II 49-59 (MIT 1995).

[18] Many distribution utilities in Canada and the United Kingdom, for instance, are regulated under price cap models, which reward utilities financially for reducing capital and operating costs.