**Before the**
**U.S. DEPARTMENT OF ENERGY**
**Washington, D.C. 20585**

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| In the Matter of | ) | |
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| Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities To Inform Federal Smart Grid Policy | ) | NBP RFI: Communications Requirements |

**REPLY COMMENTS OF**
**ENTERGY SERVICES, INC.**

Entergy Services, Inc. ("Entergy"), on behalf of itself and its operating affiliates, hereby submits reply comments in response to the Department of Energy's ("DOE") Request for Information ("RFI"), released May 5, 2010, regarding the current and projected communications requirements of electric utilities.[1] Entergy commented on similar issues in proceedings before the Federal Communications Commission ("FCC") during the FCC's development of the National Broadband Plan.[2]

As Entergy indicated in the FCC proceeding, while commercially available communications services will be an important component of Smart Grid deployment, utilities cannot and should not be expected to rely on commercial providers as their sole source of communications for all Smart Grid applications. As discussed below in these reply comments, private networks owned and operated by utilities provide the reliability, security and survivability necessary to support critical electric infrastructure.

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[1] / Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities To Inform Federal Smart Grid Policy, 75 Fed. Reg. 26206 (May 11, 2010) ("RFI").

[2] / In the Matter of A National Broadband Plan for Our Future, GN Docket No. 09-51, Entergy Services, Inc. Reply Comments (July 21, 2009) ("*Entergy NBP Comments*").

## I. INTRODUCTION

Entergy Services, Inc. is a wholly-owned subsidiary service company of Entergy Corporation, an integrated energy company engaged primarily in electric power production and retail distribution operations. Through its subsidiaries, Entergy Corporation owns and operates power plants with approximately 30,000 megawatts of electric generating capacity, is the second-largest nuclear generator in the United States, and delivers electricity to 2.7 million utility customers in Arkansas, Louisiana, Mississippi and Texas.[3]

Entergy has a variety of communications needs with widely varying requirements. In order to address these needs, Entergy currently utilizes commercially-provided communications services (in areas where the company does not have private communications infrastructure or for communications needs that do not have stringent reliability and availability requirements), as well as Entergy-owned and -operated fiber optic and private wireless networks (for communications needs with more stringent reliability and availability requirements). Entergy is also implementing innovative Smart Grid and advanced energy solutions. For example, Entergy received a DOE award to fund a pilot program to place Advanced Meter Infrastructure ( *i.e.*, "smart meters") in low-income residences in New Orleans, Louisiana. These meters, expected to be installed by the end of 2010, will provide customers with the ability to personally manage their energy consumption.

## II. THERE IS NO "ONE-SIZE-FITS-ALL" SOLUTION TO UTILITY COMMUNICATIONS NEEDS

At the outset, it is essential to recognize that the "Smart Grid" is not a single, unitary system, but rather an overarching concept encompassing a wide variety of functions,

[3] / Entergy Arkansas, Inc., Entergy Gulf States Louisiana, L.L.C., Entergy Louisiana, LLC, Entergy Mississippi, Inc., Entergy New Orleans, Inc. and Entergy Texas, Inc. comprise the six electric public utility Operating Company members of the Entergy System.

applications, systems, infrastructures, and technologies that are (or are intended to be) utilized for the safe, reliable, efficient, and economic delivery of essential electric power to the public. Each of these various components of the overall Smart Grid "ecosystem" – from two-way customer metering to load management to fault prevention to emergency restoration – involves distinct operational goals and requirements with unique demands on the type of communications systems that will be needed. Therefore, as DOE clearly indicated in its RFI,[4] any inquiry must take into account the fact that Smart Grid will require the implementation by each utility of multiple communications solutions likely involving a mix of utility-owned and operated private communications services together with services provided by commercial service providers.

DOE also recognizes that both current and future utility communications needs are not limited to systems and solutions specifically designed to support "Smart Grid" applications. Accordingly, the RFI explicitly requested information regarding utility communications needs other than for Smart Grid.[5] Utilities will continue to require reliable and dependable communications for all aspects of their operations – including communications with field crews carrying out construction, maintenance, or repair work on the grid infrastructure; communications with remote substations; communications with generating plants; and communications with neighboring utilities and transmission operators, etc. – not only on a "routine" operational basis, but especially in times of crisis or emergency, such as storms or other natural or man-made disasters. Core functions such as these are at the very heart of a utility's operations and are fundamental to the safe and reliable provision of electric utility service to the public. Moreover, these core functions form a bedrock that must be solidly in place in order for any Smart Grid application or deployment to be successful.

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[4] / *See* RFI, 75 Fed. Reg. at 26207.

[5] / RFI, 75 Fed. Reg. at 26208.

As DOE observed in the RFI, it is unrealistic to "expect any 'one-size-fits-all' communications solution to accommodate all reasonable Smart Grid implementations and applications,"[6] nor would it be realistic to expect that any "one-size-fits-all" communications solution would be able to accommodate all other utility communications needs. Nevertheless, several participants in this proceeding are in essence arguing for a "one-size-fits-all" solution – reliance by utilities on commercial communications networks and service providers. [7]

However, based on its experience as a major producer and supplier of electric service to millions of business and residential consumers, Entergy submits that utilities cannot and should not be expected to rely on commercial providers as their sole source of communications for all Smart Grid applications, let alone for other critical utility communications needs. While commercial networks and services may be well-suited for certain non-mission critical applications, utility-owned and operated private communications systems will continue to be necessary for command and control and other mission-critical operations.

Overall, Entergy believes that the most effective and efficient approach to addressing the current and future communications needs of utilities, including for the deployment of new Smart Grid applications, is to ensure that utilities have the ability and flexibility to deploy a mix of private and commercial services consistent with specific operational needs and factors, including, but not limited to, relevant reliability, coverage, security, survivability, engineering, and performance requirements.

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[6] / RFI, 75 Fed. Reg. at 26207.

[7] / *See, e.g.,* AT&T Inc. Comments at 4; Verizon and Verizon Wireless Comments at 1.

## III. UTILITIES WILL CONTINUE TO REQUIRE PRIVATE NETWORKS TO MEET CERTAIN ESSENTIAL COMMUNICATIONS NEEDS

In their responses to the RFI, many utilities explained that private communications networks are critical components of their electric power delivery systems and evolving Smart Grid applications.[8] Entergy agrees with these utilities that reliability is perhaps the most important consideration for communications systems that support electric supply operations.[9] As Southern stated, "[I]f the grid control systems do not work, it is irrelevant what they could potentially do or how secure they are."[10]

Like other utilities, Entergy has designed and built its key communications systems to perform at an exceptionally high level of reliability.[11] Entergy's communications systems – like the communications systems operated by other utilities – must work twenty-four hours a day, seven days a week, 365 days a year and are designed to achieve a reliability standard of 99.999 percent to meet the public's "everyday" needs. Moreover, Entergy's communications systems must work in all conditions – including through hurricanes, ice storms, and other natural or man-made disasters – and must be instantaneously available to handle large amounts of traffic during or following major emergencies.

### A. Network Reliability and Survivability are Critical During Disasters and Other Emergencies

In response to the RFI, utilities provided numerous examples of failures of commercial communications networks during disasters and other emergencies, including Hurricane Katrina,

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[8] / *See, e.g.*, Baltimore Gas & Electric Company Comments at 2, Florida Power & Light Company Comments at 3, and Southern Company Services, Inc. Comments at 23-25.

[9] / *See, e.g.*, Southern Company Services, Inc. Comments at 8, Baltimore Gas & Electric Comments at ¶ II.7, Pepco Holdings Inc. Comments at 3-4.

[10] / Southern Company Comments at 8.

[11] / *See, e.g.*, Southern Company Comments at 7-8.

the 2004/2005 Florida hurricanes, and the 2001 Nisqually earthquake, as well as descriptions of the unavailability and service failures of commercial networks during and immediately after other events such as tornados, floods, local storms, and wildfires.[12] In these cases, utility-owned and operated private networks provided the sole source of critical communications service necessary to maintain and restore electric power to the public during and immediately after these emergency situations.

As a major supplier of electric power to over 2.7 million utility customers in the hurricane-prone Gulf Coast region, Entergy has extensive, first-hand experience with the need for reliable and survivable communications infrastructure and service to support electric operations during and immediately after natural disasters and other emergencies. For example:

- After Hurricane Katrina struck, public cellphone service in the affected region was extremely unreliable for approximately eight weeks due to a combination of infrastructure loss, lack of backup power, and large traffic volumes. In contrast, Entergy's two-way radio sites serving the New Orleans area were available in wide area mode within 24 hours after the initial event and remained operational throughout restoration.

- Although Entergy's fiber optic lines sustained some damage from Hurricane Katrina, Entergy's transport backbone was never lost due to its ring architecture and the robustness of the design.

- The commercial carrier central office serving Entergy's Waterford nuclear power plant near New Orleans was flooded by Hurricane Katrina, and the carrier's estimate for restoring service was "months." Entergy immediately deployed T1 circuits on its own internal communications network to provide the Waterford nuclear plant with access to the public switched network via Entergy's offices in Little Rock, Arkansas, thus reestablishing vital communications links to the Waterford plant.

- After Hurricane Katrina struck, Entergy was able to quickly deploy wireless "Canopy" communications systems to a number of critical electric substations

[12] / *See* Southern Company Comments, Attachment B; Florida Power & Light Comments at 3; Tacoma Public Utilities Comments at 5; DTE Energy Comments at 7; San Diego Gas & Electric Comments at 21; East Central Energy-Minnesota Comments at 5; Great River Energy Comments at 9; National Rural Electric Cooperative Comments at 12.

in the New Orleans area that had been served through carrier leased lines until they were knocked out by the storm. The carrier was unable to restore these leased line services for many months, and in many cases Entergy subsequently opted to discontinue the use of leased lines to these sites altogether.

- When Hurricane Ike struck the area around Winnie and High Island, Texas, in 2008, commercial carrier facilities in the area were rendered unavailable with no reasonable timeline for restoration proposed. Within two days, Entergy was able to deploy a private microwave system that restored communications to the Entergy facilities in Winnie as well as Entergy's wide area land mobile network serving the High Island area.

Hurricanes are not the only emergency situation with which Entergy must contend. For example, during a major ice storm in Arkansas in January 2009, a number of Entergy land mobile radio sites that rely on commercial carrier leased circuits for wide area connectivity were made unavailable for as long as two weeks due to carrier circuit outages.

These examples graphically illustrate the difference between utility-owned and operated private communications systems and commercial networks with respect to reliability and survivability and the need for utilities to maintain private networks for their mission-critical communications needs. In Entergy's case, all critical communications sites have permanent generator backup with sufficient fuel for at least four days of operation without refueling. In addition, battery plants are also in place at each site as an additional backup to the generators. Typically, these sites also have redundant battery chargers and redundant HVAC equipment.

While some commercial operators imply that they have sufficient back-up power for their communications sites, it is far from clear from the information provided whether commercial operators have actually taken adequate measures. For example, the statement by one commercial carrier that its wireless sites "are *engineered with* reserve batteries *and/or* permanent generators"[13] does not provide any clear information regarding the extent to which its sites are

[13] / AT&T Comments at 11 (emphasis added).

actually equipped with operational back-up or what proportion of these sites rely on battery back-up alone. Other commercial operators are similarly vague regarding the extent to which their communications sites are equipped with back-up power.[14] Given the commercial operators' vigorous opposition to efforts by the Federal Communications Commission to require back-up power capabilities, Entergy remains skeptical of their claims that the measures they have taken are sufficient to meet utilities' needs and requirements. [15]

### B. Utilities Require Reliable, Available Communications to Support the Routine Operation and Management of the Electric Grid

Natural disasters and other emergencies do not present the only situations in which reliable and available communications are paramount. Entergy engineers it communications system with a goal of 99.999 percent reliability to ensure the safe, reliable, and efficient delivery of electric power to the public on a routine, "everyday" basis. Monitoring, command and control, load management, and other functions critical to maintaining a safe and balanced flow of electricity at all times throughout the entire grid require communications capabilities with tolerances that often must be measured in milliseconds.[16] Even many non-mission critical applications with less stringent reliability and availability requirements nevertheless require a level of reliability, availability, and functionality that cannot always be found through a commercial communications operator.

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[14] / *See* Verizon and Verizon Wireless Comments at 11; T-Mobile Reply Comments at 5.

[15] / *See also* Southern Company Comments at 28, citing the Telecommunications and Electric Power Interdependency Task Force ("TEPITF") of the National Security Telecommunications Advisory Committee ("TEPITF further noted that many private communications systems operated by electric utilities are protected with back-up power: 'These backup capabilities, which are not economical or feasible for commercial networks, are required by utilities to ensure reliable communications in emergencies.'").

[16] / *See, e.g.,* Southern Company Comments at 11 and 20-22.

For example, Entergy recently deployed approximately 400 irrigation load control "smart meters" in Arkansas. As recently as July 2010, over 60 of these devices, which are served by a commercial wireless network, were unavailable for approximately 24 hours. The commercial network operator has not been able to provide Entergy a reason for the outage, nor has it been effective in demonstrating the ability to coordinate diagnostic and repair capabilities within its own organization. While these problems may not be especially serious in the context of meter communications, they demonstrate that this type of network would never be acceptable in support of infrastructure-critical or grid management applications.

As another example, in early August 2010, one of Entergy's two-way radio sites in Arkansas that relies on a commercially-provided leased circuit for host connectivity was down for approximately 67 hours in good weather conditions. As far as Entergy has been able to ascertain, the outage of this site was due to an intentional circuit disconnect by the commercial carrier as a result of the carrier's mismanagement of circuit records. Although Entergy promptly notified the carrier of the outage and sought to have service to the site restored as quickly as possible, restoration nevertheless took nearly three full days, largely because this single circuit does not represent the same priority for the carrier as it does for the utility that relies on this service to manage and restore electric power. In Entergy's experience, this type of event is not uncommon, and illustrates the reason why Entergy prefers to have control over its own communications service whenever possible.

An additional example can be found in Entergy's recently completed project to route its own fiber optic line to Entergy's Saint Rosalie service center in Louisiana. Previously, WAN service connectivity to the Saint Rosalie service center had been provided by leased line service through a commercial provider. However, the commercial provider's service was repeatedly up

and down and extremely unreliable. Because WAN service to this service center is very important to Entergy, especially during storm restoration operations, Entergy made the decision to install its own private line after the commercial provider was unable to improve performance over an extended period of time.

Various parties in this proceeding have boasted extensively (albeit generally) of the reliability of commercial networks and the ability of commercial operators to address utilities' communications needs.[17] However, the examples above – in which commercial operators were repeatedly unable to provide satisfactory communications service under various operating conditions – clearly demonstrate that commercial networks and commercial service options do not necessarily provide adequate reliability, availability, and performance for many important utility communications needs.

### C. Other Alternatives Proposed by Commercial Operators Do Not Satisfy Utility Requirements for Reliability and Availability

Although Entergy appreciates that network reliability is an important issue for commercial communications providers as well, Entergy is concerned over the lack of specific information or examples presented in this proceeding to support commercial operators' claims that they could satisfy utilities' reliability needs.[18] In general, while the reliability of commercial networks may be high, they are neither designed nor constructed to meet the "five nines" level of reliability demanded of utility networks, primarily because it would make little economic or business sense to do so. Instead, commercial networks operate at a "best effort" standard where service interruptions and outages are often tolerated and accepted – a standard that is far from

[17] / *See generally* AT&T Comments; Verizon and Verizon Wireless Comments; CTIA Comments.

[18] / *Id.*

sufficient to meet utilities' reliability needs, especially with respect to command and control and other mission-critical communications applications. [19]

While commercial operators often contend that a utility can always negotiate a service level agreement ("SLA") with a commercial carrier "guaranteeing" the necessary level of reliability, as a practical matter such SLAs guarantee little more than the right to request a partial refund or credit following an outage or other degradation in service. Carrier SLAs generally do not guarantee prompt service restoration nor even that the utility will actually receive the necessary level of service quality and reliability at all times, let alone at the "five nines" level required for utility operations. Carrier SLAs are therefore inadequate for critical utility communications needs. As Southern pointed out, "[a]fter-the-fact rebates or credits for prolonged outages pursuant to [an SLA] will not compensate the utility – or its electric customers – for the utility's inability to communicate and/or control its grid."[20]

Moreover, commercial operators also generally include a *force majeure* clause in their service agreements to excuse any service outages or interruptions as a result of storms or other unforeseen emergencies – precisely when electric utilities must rely most on their communications services. Commercial operators' desire to excuse the non-performance of their networks during the very conditions when their services are most needed further demonstrates the need for utilities to maintain a private network option for mission-critical communications needs.

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[19] / *See, e.g.*, Alcatel-Lucent Comments at 3 ("As a matter of common business practice, current commercial wireless networks are built to "best effort" standards regarding availability and are sometimes not available when and where the utility needs them most during extended power outages.")

[20] / Southern Company Comments at 26-27.

At least one commercial carrier has suggested that utilities could utilize a managed virtual private network ("VPN") for their communications needs.[21] While a managed VPN would alleviate availability issues arising from congestion on the public network, ultimately it is only as reliable as the underlying circuit or connection on which it is carried. If the physical circuit carrying the VPN is down, the VPN is down as well. As discussed above in these reply comments, many of the issues Entergy has experienced with commercial carriers have involved the circuits themselves, not the traffic being carried on them.

Similarly, government programs intended to provide priority communications service – such as the Wireless Priority Service ("WPS"), the Telecommunications Service Priority System ("TSPS"), and the Government Emergency Telecommunications Service ("GETS") – are not an effective substitute for utility-owned and operated private communications systems.[22] First, it is not clear whether all of the communications services on which utilities rely – even those used to support critical functions – would even qualify for these programs. More significantly, however, it has been Entergy's experience that, even for those utility communications that do clearly qualify, these programs have not provided any practical benefit or improvement to Entergy's communications capabilities during storm response situations. In actual practice during such situations, Entergy has found that the availability of communications on a commercial carrier's network is limited by damaged infrastructure, a lack of field resources to dispatch for repair and restoration, or a lack of available channel resources. By the time these problems have been overcome by the commercial network operator, the need for priority access has generally passed.

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[21] / *See* AT&T Comments at 15.

[22] / AT&T Comments at 16; Verizon and Verizon Wireless Comments at 12.

For all of these reasons, Entergy will continue to require Entergy-owned and operated private communications facilities that are not dependent on commercial communications networks and services.

## IV. UTILITIES HAVE EXTENSIVE EXPERIENCE AND EXPERTISE OPERATING COMMUNICATIONS NETWORKS

Commercial operators participating in this proceeding assert that they are better suited to handling utility communications needs, including for Smart Grid, because the management of communications networks is supposedly outside the scope of utilities' expertise.[23] This assertion is flatly inaccurate.

Utilities have been designing, building, and operating private communications systems for decades, as evidenced in the comments filed by nearly every utility participating in this proceeding.[24] Moreover, utilities have firsthand understanding of how these communications systems support their electric power operations and are thus in the best position to determine not only their communications needs, but how those needs can support the further development of the efficiency, safety, and reliability of the electric grid.

Entergy operates a sophisticated internal communications network that supports electric grid control, power generation and distribution, and business operations. In addition, Entergy operates a "carriers' carrier" fiber transport business that is carried over Entergy's own network. Entergy's privately-owned and operated communications network is comprised of:

- A private fiber network;
- A private voice network;

[23] / *See, e.g.*, AT&T Comments at 7; Verizon and Verizon Wireless Comments at 2; National Cable Telecommunications Association Comments at 6.

[24] / *See, e.g.*, Baltimore Gas & Electric Comments, Florida Power & Light Company Comments, Northeast Utilities System Comments, Pepco Holdings Inc. Comments, and Southern Company Comments.

- A private microwave system;
- A private land mobile radio system;
- Local area networks;
- Wide area data networks;
- Remote access services; and
- A video conferencing platform.

These systems are designed for high reliability and availability and are aligned closely with Entergy's priorities as the primary supplier of electric power to over 2.7 million customers, as well as with Entergy's federally-mandated responsibilities under the FERC/NERC standards for electric grid reliability and critical infrastructure protection.

Because Entergy has direct control over the resources necessary to maintain and operate these systems, Entergy can focus the use of these systems on operational priorities for the safe, reliable, and efficient delivery of electric power to the public and on critical restoration activities in the event of widespread or localized emergencies. Evidence of the depth and extent of Entergy's experience and expertise can be seen in the survival and performance of its private communications network through some of the most devastating storms in recent history, including the "one-two" punches delivered to Entergy's Gulf Coast service area by Hurricanes Katrina and Rita in 2005 and Hurricanes Gustav and Ike in 2008.

In fact, on a number of occasions, it has been apparent that Entergy has unique communications systems capabilities that surpass those of the commercial carriers. For example, immediately after Hurricane Katrina, Entergy provided communications service over its private network to assist the Exxon Chalmette refinery return to operations. After Hurricane Ike, a major commercial carrier experienced a generator failure at one of its critical sites in Beaumont,

Texas. The carrier asked Entergy for assistance, and Entergy was able to determine the problem for the carrier and assist in bringing the site back on line. In addition, Entergy has already provided numerous examples in these reply comments where it was able to quickly and successfully restore communications service through its own private network operations in circumstances where commercial carriers could not.

As demonstrated above, Entergy's expertise and experience in managing a communications network is at least equal to – and in some cases exceeds – the capabilities of any of the commercial carriers. In addition, Entergy's decades of experience in providing communications services and support for utility operations puts Entergy in the best position to assess whether the use of commercial networks for any particular Smart Grid or other utility communication application is appropriate, cost-effective, and safe.

## V. SPECTRUM AVAILABILITY IS CRITICAL FOR UTILITY OPERATIONS

Entergy relies heavily on wireless communications to support essential functions of its electric utility operations, such as voice communications with line and field crews and remote monitoring and control of its electric grid. Entergy also relies heavily on wireless communications during large-scale emergencies and storm recovery efforts to enable critical electric power to be restored to the public as quickly and as safely as possible.

Given its reliance on wireless communications, Entergy is concerned about the limited amount of dedicated spectrum currently available to utilities and other critical infrastructure industries. In particular, Entergy disagrees with the arguments being made by commercial operators that spectrum needs should be based solely on market forces and economic supply and demand considerations.[25] In some cases, the use of spectrum by utilities and other critical

[25] / *See* CTIA Comments at 15.

infrastructure industries may in fact be more valuable to the public and to society than any commercial or market-driven application. As the Congressional Research Service observed in its June 29, 2009 report to Congress:

> Auctioning spectrum licenses may direct assets to end-use customers instead of providing wireless services where the consumer may be the beneficiary but not the customer. The role of wireless communications to support a smart grid has been briefly noted in this report. Spectrum resources are also needed for railroad safety, for water conservation, for the safe maintenance of critical infrastructure industries, and for many applications that may not have an immediate commercial value but can provide long-lasting value to society as a whole.[26]

Moreover, in practice, the commercial operators' proposal would not make more spectrum available to others; rather, the effect likely would be to force utilities to raise electricity prices in order to be able to retain the spectrum required to provide reliable electric service, including the spectrum necessary for storm restoration efforts.

For the reasons discussed above in these reply comments, Entergy believes that the limited amount of spectrum currently available will be inadequate to meet the demands of Smart Grid and other utility communications needs.[27] Entergy therefore urges DOE to coordinate with the FCC, the National Telecommunications and Information Administration ("NTIA"), and other federal agencies and regulators to ensure that existing spectrum allocations are protected and to identify additional dedicated spectrum that can be made available for utility and critical infrastructure use. For example, DOE and other agencies may consider allowing utilities to operate in spectrum bands already allocated for government or public safety – such as the 700 MHz "D Block," the 1800-1830 MHz band, or the 4.9 GHz band – on some form of shared use or partnering basis where the needs of both public safety and utilities can be reasonably

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[26] / Linda K. Moore, *Spectrum Policy in the Age of Broadband: Issues for Congress*, CRS Report for Congress at 13 (2009).

[27] / *See also* Alcatel-Lucent Comments at 16.

accommodated and without an automatic and absolute right to preempt utility communications. DOE could be very influential in helping to ensure that a meaningful dialogue is opened and maintained on these important issues.

## VI. CONCLUSION

Entergy submits that the most effective and efficient approach to addressing the current and future communications needs of utilities, including for the deployment of new Smart Grid applications, is to ensure that utilities have the ability and flexibility to deploy a mix of private and commercial services consistent with specific operational needs and factors, including, but not limited to, relevant reliability, coverage, security, survivability, engineering, and performance requirements. Entergy looks forward to working with DOE and others in addressing the issues presented by the deployment of Smart Grid technologies in the nation's electric infrastructure.

Respectfully submitted,

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