BEFORE THE
DEPARTMENT OF ENERGY

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

REPLY COMMENTS OF AT&T INC.

AT&T Inc., on behalf of itself and its affiliates ("AT&T"), respectfully submits these reply comments in response to the Department Of Energy's Request for Information ("RFI") on the communications requirements of electric utilities in Smart Grid deployments.[1] In its initial comments, AT&T highlighted the expanding demand for network connectivity and how utilities can benefit from leveraging new network technologies deployed by commercial communications operators to optimize the performance, scalability, security, reliability and cost effectiveness of their Smart Grid applications deployments. Commercial communications providers possess the technological and human resources to help utilities meet these complex and critical needs. Moreover, by employing commercial service for many of the Smart Grid applications, utilities can concentrate on assuring the reliable delivery of electricity to consumers, optimizing energy utilization within the existing electrical grid, and implementing new information technologies that will allow utilities to enhance billing, customer relationships, demand response and energy management systems. At the same time, the utilities will be reducing their exposure to technological obsolescence in an environment of rapidly changing technology and yet-to-be-

[1] Request for Public Comment on the Department of Energy's Implementation of the National Broad Plan by Studying the Communications Requirements of Electric Utilities to Inform Federal Smart Grid Policy, 75 Fed. Reg. 26206, 26208 (2010) ("Request for Information").

defined applications requirements. AT&T recommended that policy makers, including the DOE, encourage the serious consideration of commercial services for Smart Grid applications.

As AT&T had anticipated in its initial comments, several commenters question the ability of communications providers to supply the security, reliability and coverage the Smart Grid will require. These commenters ignore the fact that commercial communications providers today have deployed tested and secure networks that currently meet the expanding and dynamic needs of similarly demanding applications in the finance, government and health care industries. Proceeding from the flawed premise that commercial networks cannot meet the needs of the Smart Grid, these commentators seek DOE support for a program that effectively subsidizes utilities building their own private, and completely untested, communications networks.

As discussed more thoroughly herein, these comments, when examined in light of the facts, amount to mere generalizations that lack substance. The implications of the Smart Grid are that exponentially growing amounts of information will need to be exchanged between utilities and their customers and this collaboration will need to occur with high levels of security, reliability, availability and efficiency. Security, ubiquity and network survivability are second nature to commercial communications providers' deployments. When you peel away the rhetoric, therefore, there is no question that existing commercial communications networks are uniquely positioned to serve these new needs of the Smart Grid.

I. <u>Comments Filed in Response to the RFI Lead to a Number of Critical Points</u>

Commenters expressing concern related to the sufficiency of commercial services tend to focus upon critical infrastructure. The critical infrastructure needs of electric utilities are unquestionably important, however, they are just one important component of the Smart Grid. The Smart Grid is unique in that it will ultimately need to simultaneously support a combination of critical infrastructure, traditional consumer and business applications, and unprecedented levels of customer collaboration. Some of these aspects are well understood and supported today while others are just emerging. The Smart Grid is not, and will not be, a one-time implementation of information technology into the electric grid, but rather it will involve the continuing application of advanced information and telecommunications technologies (both wireline and wireless). While some Smart Grid applications will develop rapidly over the next few years, others will evolve over the coming decades. During this evolution, new applications will be developed and new devices and locations will need to interact with the grid which are not envisioned today. Without a doubt, the Smart Grid will place a premium on flexibility, scalability, interoperability and security of communications capabilities. Simultaneously, delivering these capabilities and continuing to deliver these capabilities over time will be difficult for privately deployed networks, but is second nature to commercial service providers.

The primary factors governing communications requirements for particular applications are coverage, availability, reliability, bandwidth, latency, emergency power, and security. Wireline and wireless commercial services, individually and in combination, exist that can meet these requirements, particularly when customer needs are clearly specified and addressed through rigorous configuration planning. In order for the full potential of the Smart Grid to be realized, the communications capabilities need to support not only a limited aspect of the operational needs of the utility – such as Supervisory Control and Data Acquisition (SCADA) systems - but equally important the newly emerging need to regularly interact with consumers must be supported. Commercial service providers have extensive experience with supporting collaborative interactions amongst and between millions of customers every day. Utilities prior to the vision of the Smart Grid, have not needed to deal with this prospect.

It is unlikely that many utilities can afford (either financially or from a cost of time to build perspective) to construct the communications networks that will be required to meet the needs of the Smart Grid. Certain legacy applications, such as SCADA and emergency dispatch/field communications services may have worked well and continue to work well on private networks. However, these networks cannot readily be bootstrapped to meet the broad communications needs of the emerging Smart Grid; nor can a broad program of building new private networks be justified in light of the costs involved. The true costs of the communications infrastructure needed for the Smart Grid may not be readily or fully apparent to a utility. Rate payers and investors of the utility could be needlessly burdened with additional costs if the Smart Grid communications platform is not designed, configured and maintained from the start to deliver flexibility, scalability, interoperability and security far into the future. Commercial service providers have extensive experience with building and evolving communications platforms that readily accommodate rapidly changing uses and exponential growth.

Although the emerging needs of the Smart Grid are important, the operational needs of today cannot be overlooked. Operational needs of the utilities fall into two broad categories with very differing requirements. The first category is critical infrastructure and the second broad category is routine business operations. As stated earlier, some utilities previously built their own communications capabilities in order to support availability, reliability and performance for critical infrastructure. Such networks often employed wireless technology because the remoteness of the endpoints, which needed to communicate, were too costly to serve with wireline facilities. In other instances, the mobility of the endpoints, such as for field staff dispatch, did not lend itself to use of wireline facilities. At the time many of these networks were built, commercial wireless services were only beginning to develop which left the utility to face the Hobson's choice of either building its own radio network or doing without essential communications. As we discuss below, today's electric utilities now have opportunities to partner with service providers to meet their needs for demanding applications with the appropriate mix of communications technology.

Unlike critical infrastructure applications, many of the traditional routine business applications employed commercial services and these services have fulfilled the expectations of the using companies. Of course, there may have been instances where the incremental cost of placing one or more of these applications on the private network was small and justified. Nevertheless, both wireless and wireline commercial services have been used extensively to meet business needs of utilities in the past. Undoubtedly this can, should and will remain the case in the future.

The Smart Grid vision though presents an entirely new set of requirements for communications networks - the need for utilities to collaborate with their customers and support a diverse range of energy consumption related applications. None of the purpose built networks discussed above were designed with this requirement in mind and would be costly to upgrade. This is not to mean that existing private networks were not built to meet challenging design parameters. On the contrary, where highly reliable coverage was needed to reach remote locations - such as for monitoring substations or for sustaining continuous communications with field crews who were traveling or working in fairly unpopulated areas – historical investment in private networks could be justified. But the challenge with the transition to the Smart Grid is to establish robust and interactive coverage with millions of customers, do so where those customers live, and connect the multitude of devices that they do and will use to manage their energy needs.

So the fundamental question to be addressed in this proceeding is whether it is more effective to supplement the commercial service provider infrastructure (which is already providing service to the almost all consumers) or is it more cost effective subsidize the utilities' deployment of their own private (and redundant) network - either by trying to bootstrap existing private networks to meet these needs or by engaging in a massive new build for the Smart Grid which effectively replicates a commercial service network. As a general proposition, and as discussed in the remainder of our comments, the most productive and cost efficient path is for utilities to rely on commercial service providers as a first choice for their communications needs.

II. Partnering With Commercial Services Providers Is A Win-Win Proposition For Utilities

Utilities are already faced with substantial prospective capital needs to upgrade generation and transmission capacity as consumer demand for electricity continues to grow. Adding competing demands for building private communications infrastructure will tend to drive up capital costs. This will needlessly raise the cost for the ratepayers. Utilization of commercial services, whether wireline or wireless, helps reduce the utilities' need for capital because the service provider will be making much of the network related investment. There is little dispute that the scope of coverage and capabilities of commercial networks is rapidly expanding and commercial carriers will continue investing in their networks to reach even more consumers with growing communications needs. While serving the needs of the Smart Grid may require even further investment, such incremental investment would be dwarfed by building a parallel private network. The more prudent course is for a utility to strive to leverage the on-going capital investments of commercial services providers made for these very same purposes - a win for the utility, a win for the utilities' rate payers and a win for commercial service providers and society in general.

Even though it might be feasible to economically build a private network to meet the specific needs of a particular or narrow set of applications, it is quite a different matter to build a scalable and adaptable network needed to remain relevant and cost effective for the Smart Grid of the future. From a pragmatic standpoint, the technological obsolescence and scaling risks are hard to quantify when assessing the economics of a purpose built network. This is particularly true when the applications that will be riding the network are not fully understood, the locations which must be served are disbursed and many of the devices which must be connected are not yet designed. As a result, such costs are prone to underestimation when evaluating the economics of constructing a private network.

Nevertheless, once a decision is made to build a private network, then the die is cast. Any wrong assumptions with respect to where service will be required, what coverage will be delivered or what capabilities will need to be supported, will need to be "fixed" by the utility to assure support for the Smart Grid applications. With the benefit of hindsight had such issues been accurately understood during initial planning, the economic justification for building a private network may not have been compelling or may not have been the low cost option. Nevertheless, rectifying the situation will result in real costs that are ultimately born by the utility rate payer and investors.

Commercial service providers have extensive experience in meeting the service needs of rapidly growing markets and their networks are built specifically to both anticipate and accommodate new applications as they are introduced into the market. Accordingly, it makes good business sense for electric utilities to leverage this ability of commercial service providers. It may not be the case that every application should be placed on a commercial service network – some may work fine on the existing private networks. Nevertheless, utilities should work with commercial carriers as the first choice to address specific Smart Grid needs. Such partnerships will help the utility to reduce costs and risk while speeding the delivery of new capabilities, all of which will benefit ratepayers of the electric utility. Although investment in a utility built network with accurate foresight would arguably also benefit ratepayers, investments made in existing commercial carrier networks yields an undeniable overall economic benefit to society in addition to the users of the Smart Grid and does so while lowering risk to ratepayers and utility investors.

Commenters tend to agree that flexibility, scalability, reliability, interoperability, and security are critical to efficiently accommodating emerging Smart Grid applications. At the same time, no commenter would likely claim an infallible ability to accurately predict either the complete needs of the emerging Smart Grid applications or the technology that will become available to support these applications. Because of this, Smart Grid communications capabilities must first and foremost be flexible and adaptable. This is a fundamental attribute of the commercial networks.[2] Current users of commercial services have rapidly changing needs for services and commercial service providers have learned how to balance nimbleness with cost effectiveness while not sacrificing security and interoperability.

Furthermore, it is unlikely that there is dispute that it is difficult to accurately project what devices will need to intercommunicate, where they will be deployed or when they will first be introduced. This imposes a requirement that the communications platform be readily scalable. Commercial communications service providers have a proven track record in this area. For example, commercial wireless customers grew from less than 100 million subscribers in

[2] Commercial service providers have often demonstrated the ability to implement new technology in a non-disruptive manner in order to assure a modern and robust communications infrastructure. For example, the wireline network evolved from analog to digital technology and transitioned from circuit switched to packet platforms. These massive transitions were accomplished while continuing to deliver service to existing customers and expanding the options for new services. The same is true for wireless networks, where the transition has been from 2G to 3G and soon to 4G platforms, all while improving service and capabilities for customers. These changes were necessary to meet the rapidly changing and more demanding needs of communications users.

2000[3] to over 270 million as of December 2008.[4] During that period, commercial wireless service providers added over 240,000 cell sites across the country[5] with the result that at least three commercial communications operators provide wireless service in census blocks that cover more than 95 percent of the U.S. population.[6]

While commercial networks have proven scalable, it is extremely difficult to efficiently build this attribute into a private communications infrastructure, particularly without an initial massive over-building that would impose carrying costs on rate payers. Based on recent analysis of building public safety networks, the Federal Communications Commission (FCC) has estimated that the total cost to build a new national overlay wireless network, covering 99% of the population, would likely be in the range of $15.7 billion for capital, and the 10 year present value of capital and operating costs would be in the range of $34.4B to $47.5B.[7] In addition, the underlying assumption is that an estimated 44,800 cell sites would need to be installed,[8] which would be a lengthy undertaking.[9] Although the cost would be smaller for the operating territory of a single utility, they would still be substantial in terms of investment and time to deploy, particularly in view of the fact that substantial wireless and wireline coverage is delivered by

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3 *History of Wireless Communications, From Building the Wireless Future to Expanding the Wireless Frontier,* CTIA Website, *available at* http://www.ctia.org/media/industry_info/index.cfm/AID/10392.

4 Press Release, *CTIA – The Wireless Association Announces Semi-annual Wireless Industry Survey Results* CTIA website (April 1, 2009), *available at* http://ctia.org/media/press/body.cfm/prid/1811.

5 Ex Parte Letter from Christopher Guttman-McCabe to Chairman Julius Genachowski (July 9, 2009/, *available at* http://files.ctia.org/pdf/filings/2009_Wireless__Economic_Contributions.Letter.Final.pdf.

6 *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Radio Services*, WT Docket No. 08-27, Thirteenth Report, DA 09-65, p. (rel. Jan. 16, 2009).

7 *A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders*, OBI Technical Paper No. 2, at 5. Significantly, even a hybrid deployment, one occurring in partnership with commercial providers but still involving substantial independent ownership and operating responsibility, is estimated to require an investment of $6.3B with a 10 year present value of operating costs and capital in the range of $12.5B. *Id*. at 6 (Exhibits 6 & 7).

8 *Id. at 5.*

9 In the context of a public safety broadband network, the FCC's cell site and cost estimates are significantly higher than what would be needed with a regional network of networks build plan.

commercial service providers. Equally important, the base of customers who would be carrying the cost of the private network in investment would be significantly smaller.

Indeed, the Smart Grid already is dealing with significant issues of scalability. Currently, the Advanced Metering Infrastructure (aka: Smart Meters) requires that new two-way communications be established with millions if not hundreds of millions of locations. For example, one estimate is that 8.3 million Smart Meters with 2-way communications capability were installed by the end of May 2009 and that figure was projected to grow to 33 million deployed by the end of 2011.[10] Beyond this early need of the Smart Grid for "Smart Meters," at least some consumers will transition to become producers of electricity in the future as renewable energy generation becomes more cost competitive and practical for consumers to deploy. This will require a new form of communications permitting consumers to effectively sell surplus energy back to their utility. And because the technology to store energy for future use is just in its infancy, the transactions will need to be both secure and occur in real time.

Similarly, some major sources of electric consumption will no longer be stationary. Air conditioners, freezers and pool pumps may soon be displaced by electric vehicles as the largest household source of electricity consumption. However, this "household" device will not be limited to consuming energy at the consumer's home. Electric vehicle recharging will require a high degree of interoperability and sophisticated communications between consumers and utilities to support charging at home and on the road, while at the same time permitting load management by utilities. Unfortunately, private networks tend to create technological islands which are more difficult to interoperate and scale compared to commercial service networks.

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[10] *See* http://www.greentechmedia.com/articles/read/8.3m-smart-meters-and-counting-in-united-states/

Security is another significant Smart Grid consideration that justifies reliance on commercial service providers. Commercial service providers have extensive experience collaborating with their customers to assure the security and integrity of critical applications in the financial, health care, and government segments to name but a few. There is little doubt that new and more sophisticated threats will develop to the safety and security of personal information and critical infrastructure at the same time progress is made towards the Smart Grid vision. Defenses against such threats will be complicated by the need to maintain two-way communications between a host of mobile and stationary endpoints with each employing continually changing devices and applications. In such an environment, diverse and complementary layers of security prove effective.

Commercial service providers offer a wide variety of security and business continuity services that work in conjunction with security measures a utility can implement within its own services and infrastructure. Commercial service providers also bring the unique advantage of addressing security threats both from a broad perspective of what is occurring in the local, regional and global networks and with knowledge of what issues may be surfacing with other customers. Commercial service providers employ sophisticated real-time analytical capability not achievable with individual private networks. Such capabilities are crucial in detecting emerging issues and permitting remedial steps to be taken before the attack is at the doorstep of the utility.

III. Wireless Solutions Are a Critical Aspect of Smart Grid Network

As stated earlier, a number of commenters advocate building duplicate private networks with almost no realistic consideration of the potential of existing commercial wireline and wireless networks to deliver services. In some cases, these 'new' networks would include some terrestrial facilities (e.g., fiber rings), but the primary focus is upon building new *wireless* networks. There is no question that private wireless networks played an important role in historically meeting the needs of electric utilities, and wireless technology will continue to be critical to supporting the evolution of the Smart Grid. However, some commenting parties seem to equate the industry's historical reliance on private wireless networks as justification for federal policy for a massive overbuild of a heavily subsidized wireless infrastructure for the Smart Grid. A part of the justification for this unprecedented request is a need to support emergency communications for field crews.

The fact that utilities need reliable communications, particularly in times of emergency, is not disputed. However, what needs careful examination is whether such an over-build is either a cost effective solution and whether this is a new requirement originating with implementation of the Smart Grid. The answer in both instances is "no." Many utilities currently have communications systems in place for use with their field personnel, including emergency response crews. Whether or not these existing systems adequately meet the needs in natural or man-made disasters should not be confused with the new needs implicit with Smart Grid expansion. Clearly, a historical reliance on private radio systems does not demonstrate a prospective need to build private radio networks, particularly to address the expanding need to support consumer collaboration applications which were never supported on private networks. Moreover, a heavily subsidized allocation of spectrum is particularly unjustified in light of the recent research conducted by the Utilities Telecom Council ("UTC").[11]

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[11] http://www.utc.org/utc/utility-telecom-services-comprehensive-analysis-communications-services-offered-utilities-july-2 summarizing UTC's latest research report, Utility Telecom Services: *A Comprehensive Analysis of Communications Services Offered by Utilities*, July 2010.

According to the UTC website, utilities generate up to an estimated $12.4 billion in the sale of wholesale and retail communications services according to UTC's latest research report.[12] And based on a survey of its utility members, the UTC analysis shows that over two-thirds, or around 2,226 utilities sell some form of communication services to homes and businesses in their service areas.[13] It is hard to justify a massively subsidized allocation of scarce spectrum resources to Smart Grid purposes that could then be used to provide a competitive alternative to commercial service providers who, in the first place, could have met the needs of the Smart Grid in a more cost-effective and timely manner. It is even harder to justify if the subsidized infrastructure is used to provide services that then complete with offerings of commercial service providers.

With that said, there is nothing preventing individual utilities or utility associations from participating in the bidding process for licensed spectrum. But obtaining the spectrum is only the first step in a costly and lengthy process of deploying a wireless network. As stated earlier, building a private radio network to meet the combined needs of emergency response and Smart Grid applications could well have a 10-year present value cost as high as $45B. Beyond this, the engineering and deployment of new radio infrastructure, particularly of the scale and scope envisioned by some parties, is a lengthy undertaking, potentially requiring the establishment of tens of thousands of cell sites. Relying on a national private wireless network for the Smart Grid would undoubtedly delay the transition to the Smart Grid by years, if not decades. The same holds true for regional private wireless networks.

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[12] *Id.*

[13] *Id.*

Equally misplaced are the claimed deficiencies in commercial providers' networks allegedly necessitating the building of private networks – e.g., some commenters argue that gaps in coverage, network congestion and inadequate emergency power systems make commercial providers networks unreliable for Smart Grid deployment applications. These claims do not withstand examination.

a. Coverage

Prior to the new millennia, when many of the utility private radio networks were installed, the commercial wireless networks had neither the coverage nor the reliability that exist today. As a result, there was a time when building private wireless networks may have been a necessity. But the capabilities and coverage of wireless commercial networks today is vastly different than that which existed only ten years ago[14] and the capabilities and coverage only continue to expand as next generation technology is introduced into these networks.[15]

Some commenters have argued that Smart Grid applications require ubiquitous coverage and that commercial providers cannot provide it. On this point, they are mistaken. Commercial service providers can unquestionably help utilities achieve the coverage they need in a cost effective and timely manner.

At the outset, it is important to note that no provider has 100% wireless coverage of geography and population, nor is that a realistic goal given the massive build-out cost it would entail. But 100% wireless coverage is not necessary to effectively deploy Smart Grid. Rather,

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[14] In 1997, there were only about 50 thousand cell sites existing in the United States. *See* http://www.ctia.org/media/industry_info/index.cfm/AID/10391. In the five year period from 2004 to 2008, more than 79 thousand cell sites were added (*see Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 09-66 (Terminated), Release May 20, 2010, at 16 (sum of incremental adds 2004-2008)); from 2000-2008, commercial wireless service providers added over 240,000 cell sites across the country. *See* Footnote 5. Similarly, from 2000 to the end of 2008, wireless service subscribership increased from 109.5 million to 270 million subscribers. *See* Footnotes 3 and 4.

[15] The first commercial wireless service in the United States was introduced in 1983. See http://www.ctia.org/media/industry_info/index.cfm/AID/10390. In 1997, 2G-based service was introduced in the United States. See http://www.ctia.org/media/industry_info/index.cfm/AID/10391. In 2003, 3G-based service was introduced. See http://www.networktelephones.com/. Then 4G-based deployment is now underway. Thus, the technology existing today is far superior to that which existed when many private radio networks were installed.

utilities need an economically viable mix of integrated technologies that can securely and reliably connect utility assets and support interactions with customers. In order to achieve this, the most cost-effective strategy – and the only one that many public utility commissions will likely approve – is to start with the 90+% coverage of commercial wireless providers and integrate other technologies to achieve the coverage that the Smart Grid requires. Indeed, that is how AT&T serves its numerous, existing Smart Grid utility customers around the country. It builds on its extensive, nationwide network and integrates other robust, secure communications technologies to connect every location the utility needs to reach.

AT&T already provides reliable wireless coverage to the vast majority of the sites that its utility customers serve.[16] Our current coverage typically exceeds 90% of a utility's customer locations. Within this area, AT&T offers point-to-point solutions through our partner Smart Synch, as well as mesh network solutions through partners like Itron and Silver Spring Networks. Since mesh networks typically rely on unlicensed spectrum to carry data to a collection point (from where it is backhauled on licensed spectrum) they allow AT&T to support Smart Meters that would otherwise fall outside of the company's network coverage. This effectively extends the company's network for supporting Smart Grid operations beyond the current network's reach.

When collaborating with a utility to provide service, AT&T first examines its deployment plans to determine new areas into which its network will extend over the course of the time the utility will be deploying Smart Grid capabilities. Indeed, knowledge of a utility's coverage

[16] Periodically, parties will raise the topic of dropped cell phone calls as an argument against the reliability of commercial wireless networks for Smart Grid purposes. In doing so, they compare apples to oranges. Several characteristics of Smart Grid communications distinguish them from wireless voice service, and they combine to ensure near-perfect reliability for Smart Grid communications. First, all Smart Grid transmitters are stationary when communications occur and therefore do not require the signal handoffs between towers that cause dropped mobile voice calls. Second, most Smart Grid communications are more delay tolerant than is wireless voice service. If a transmission fails to go through the first time and is re-sent a few milliseconds later, it does not create the jitter or fade that can reduce the coverage area for voice calls. Lastly, the transmitters on virtually all Smart Grid devices are significantly stronger than on cell phones, so the communications are correspondingly more robust and reliable.

requirements may cause AT&T to alter its existing network expansion plans because of synergies achieved with the newly defined needs of the utility. Because AT&T is constantly expanding and improving its network coverage, this tends to drive up the baseline coverage figure for a utility deployment even further compared to that which exists today. In one recent example, looking out to 2013, which was the utility's deployment horizon, AT&T's network coverage was projected to be 98% of the utility's service area, rather than the 96% which existed at the time of the request.

There are instances where coverage requirements will not likely be fully met for a utility in a timely manner, given the current network expansion plans. In such cases, AT&T examines the possibilities for partnerships that would allow it to further expand its network. For example, the company has had, or is currently having, conversations with three different utilities about the possibility of placing network equipment on the utilities' infrastructure and sharing utility rights of way. Such agreements can dramatically speed AT&T's installation of additional network assets. This type of collaborative deployment has the additional benefit of extending wireless coverage further afield for AT&T subscribers generally, in addition to increasing the network reach for Smart Grid applications. Other possibilities for expanding coverage include leasing capacity on municipally or state-owned wireless and fiber networks as a way to further broaden its coverage. Finally, AT&T provides consulting services to assist its utility customers with plan development, strategy and deployment of other technology solutions to reach the near ubiquitous coverage and other capabilities the utility may seek.

As noted earlier, achieving near ubiquitous coverage will likely require integration of multiple technologies. For example, one strategy may be to use commercial cellular capabilities for the bulk of the coverage and then position a mesh collector near the edge of the network to communicate with meters that fall outside commercial service coverage areas. Another option, available to AT&T, is to use satellite technology to address "holes" in commercial cellular coverage. The satellite option is significantly more expensive than the terrestrial wireless solutions that support the bulk of AT&T's Smart Grid offerings. However, the incremental cost of extending satellite coverage to a small subset of a utility's operating territory can be much lower than the cost of extending the existing wireless or wireline infrastructure to such locations. Accordingly, the cost of such a hybrid solution (i.e., wireless + satellite) is much lower than building a single use/single technology network from the ground up.

In light of the preceding discussion, AT&T respectfully suggests that policy makers focus on increasing the spectrum available for commercial services, rather than dedicating this limited resource to purpose-built private networks.[17] The criticality of spectrum resources for the commercial market was highlighted in the recent National Broadband Plan released by the FCC:

> The growth of wireless broadband will be constrained if government does not make spectrum available to enable network expansion and technology upgrades. In the absence of sufficient spectrum, network providers must turn to costly alternatives, such as cell splitting, often with diminishing returns. If the U.S. does not address this situation promptly, scarcity of mobile broadband could mean higher prices, poor service quality, an inability for the U.S. to compete internationally, depressed demand and, ultimately, a drag on innovation.[18]

Increasing the spectrum resources available to commercial providers will permit upgrade and expansion of coverage generally – which will, in turn, speed and make less expensive Smart Grid deployment. As the Department of Justice recently noted, increasing available spectrum will

[17] AT&T does not oppose the use of the 700 MHz D block by utilities if it is reallocated to the public safety community and believes public safety entities and utilities partnering with commercial providers in the development of their wireless networks utilizing this spectrum would be the highest and best use of this precious spectrum resource and provide the services, redundancy, and coverage that public safety and utilities seek.

[18] FCC, *Connecting America: The National Broadband Plan*, at 77.

expand geographic coverage while also contributing to the broader goal of increasing broadband competition.[19]

b. Congestion

Differing Smart Grid applications will likely have different service requirements, i.e., the criticality of the application, whether it is real-time and inelastic traffic or 'bursty' and elastic traffic. All these considerations factor in to how congestion could affect the application and how the network needs to manage its traffic to minimize adverse impacts. Some parties speculate that congestion could be an issue for commercial service networks precisely when utilities would require assurances that their communications be handled. The assertion is made that commercial service providers cannot afford to build in the capacity or redundancy needed to reliably support critical utility traffic during emergencies. Concerns that Smart Grid applications will be adversely affected by congestion during emergencies are unfounded.

It must be noted at the outset that over-building capacity is an expensive strategy, particularly when applied to a purpose-built private network. The capacity built to guard against congestion impact remains unused for lengthy periods of time but must still be paid for, in this case by rate payers of the utility. Network management techniques, already in common use by many commercial carriers, represent a far more efficient approach to mitigating and responding to congestion – in conjunction with continuing capital investment in capacity expansion as and where needed. In the backhaul and core components of wireless networks, these network management techniques are generally the same as those used in wireline networks, as explained in our initial comments.[20] One particularly relevant tool for critical Smart Grid applications is

[19] Letter from Christine A. Varney, Assistant Attorney General, U.S. Department of Justice, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-51 at 21 (Jan. 4, 2010) ("Given the potential of wireless services to reach underserved areas and to provide an alternative to wireline broadband providers in other areas, the Commission's primary tool for promoting broadband competition should be freeing up spectrum.").

[20] AT&T Comments at 14-15.

the use of virtual private networks/managed data services that employ differentiated service handling and other Quality of Service (QoS) measures to assure that performance-sensitive traffic receives priority access to network resources.

In the Radio Access Network (RAN) connecting the wireless devices to the cell towers, the congestion issues and management techniques can be somewhat different where "call admission control" and scheduling algorithms are used to allocate the shared spectrum resources to the users within a cell. Currently, fielded networks allow for the assignment of different traffic handling priorities and allocation and retention priorities that can be combined to offer priority access to designated traffic in the face of RAN congestion.[21] These capabilities are being significantly enhanced to provide even greater QoS provisioning in the soon-to-be-deployed Long Term Evolution (LTE) networks. LTE will offer a much finer grained classification system for handling traffic in the RAN, through the backhaul links to the core network. The capabilities also will be far more spectrally efficient, increasing the data carrying capacity of the RAN, which itself is another means of mitigating any congestion concerns.

The engineering design of both wireline and wireless broadband networks is such that there are few single points of failure in the "core" and the aggregation (or "backhaul") sections of the networks. This helps prevent and mitigate any congestion arising from physical damage to network elements. Wireless networks are designed with redundancies between switching offices and the core of the network as well as coverage redundancies in certain critical or high traffic areas served by the RAN. Industry standards and best practices for engineering, installation and maintenance contribute to build in substantial resiliency for broadband network elements against physical damage.

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[21] While AT&T's current 3G network has these capabilities, AT&T does not prioritize any data traffic at this time.

AT&T and other commercial service providers also regularly monitor their networks and employ procedures to promptly detect and mitigate the effects of physical damage and to rapidly restore disabled network elements.[22] This allows capacity to be efficiently utilized without costly over-provisioning or raising a substantial risk of congestions. Commercial service networks are also generally well-equipped to address events that may cause severe or prolonged congestion. For example, most modern broadband data networks are "shared" in that they support multiple users and uses over some or all of their underlying facilities (*e.g.*, voice, video and data; residential, business and government customers). Because all connections do not simultaneously generate load, network operators can use techniques like statistical multiplexing to provision sufficient bandwidth to support the "peak" demand on the network at any given moment. By designing their networks to be able to support predictable peak demands, network operators can offer services far more affordable than if they had to provision dedicated capacity to every individual user (regardless of whether the user is actually using the network), while still maintaining a high-quality experience for their users. This translates to real opportunity for utilities to deliver Smart Grid capabilities to rate payers at a lower cost.

In the event of extremely high network usage caused by an unforeseen event, however, temporary congestion may be unavoidable. To prevent such temporary congestion from becoming severe or prolonged, broadband network operators design their networks with redundant paths in the network core to route traffic around congested nodes, impose traffic control measures and/or activate auxiliary equipment.

As noted above, the QoS provisioning provided with some managed services can help assure that designated traffic will have priority access to network resources that it requires.

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[22] For its part, AT&T has made considerable investments in network survivability, and when disaster strikes, AT&T's industry-leading Network Disaster Recovery program facilitates rapid service restoration. *See* AT&T Comments at 11-13.

Furthermore, as wireline and wireless priority communications services developed for public safety, law enforcement and national security communications – known as Government Emergency Telecommunications Service (GETS) and Wireless Priority Service (WPS) – migrate to broadband platforms, we expect these QoS capabilities to play a vital role in ensuring these and their successor services, such as the proposed wireless Data Priority Service, are able to support the government's critical communications needs.

To the extent there are potential vulnerabilities in broadband networks that can inhibit communications in the event of physical damage to broadband infrastructure or a surge in traffic, these vulnerabilities are typically found closer to the network edge. For example, the last mile of broadband networks – the physical connection between the customer location and the broadband network - is generally not characterized by the same level of redundancy as the network core. In the wireless context, wireless devices and the network are designed to always assign a device to the best cell available; should a cell site experience an outage, the devices being served by that site may well be able to attach to another nearby cell, providing a degree of inherent redundancy (depending on the cell site density in a given area). Regardless, physical damage and service outages near the network edge will typically affect only a small number of customers and will not impact the functioning of the rest of the network. Moreover, to the extent that certain users have mission critical communications needs and cannot tolerate temporary service outages (*e.g.*, some government or business users), customers can work with the commercial service providers to provision redundant facilities that employ diverse routing and/or to implement additional physically hardened facilities to meet their needs.

In addition to the preceding steps, using services that dedicate capacity to a customer renders the issue of congestion moot, unless the customer has not properly sized the configuration:

> Carriers and service providers typically offer managed services as an integrated, "packaged" solution to meet the requirements of enterprise customers. This can include communications and network services with integrated provisioning and operations management, application hosting and management services, data processing and storage services, mobility solutions, business continuity solutions, or combinations thereof. These offerings frequently include "private" communications capabilities through means such as dedicated circuit paths, software defined networks, and virtual private networks (VPN). Managed services are private communications because they provide only connections between certain points that the customer authorizes or is dedicated to delivering a particular type of capability. Managed communications services address the need for communications' security, separation, and resilience at significantly lower cost than construction of a unique, dedicated network.
>
> With a high degree of collaboration with its customer, a service provider can keep mission-critical data networks carrying both voice and data traffic running successfully during network anomalies or instances of congestion. Managed services are reliable, secure, and cost-effective solutions that take advantage of converged infrastructure. [23]

Naturally, if the customer under-specifies the capacity needs, congestion will be a possibility regardless of whether a commercial service was employed or a privately constructed network was employed. Commercial networks are designed to deal with network congestion, even those anticipated by Smart Grid applications deployments. Utilities working with their commercial service providers can take cost-effective steps to manage the risk of congestion.

c. Emergency Back-up

Commercial Service providers are not unduly susceptible to commercial power loss. As set forth in our initial comments,[24] AT&T has invested billions in reserve power infrastructure and deployable (portable) power generating equipment. Over 99% of AT&T wireless sites are

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[23] NSTAC Report at 9.

[24] AT&T Comments at 11.

engineered with reserve batteries and/or permanent generators. AT&T switching centers are typically equipped with redundant permanent generators with local fuel supply to allow greater than 4 days of run time. With regular refueling, these generators can maintain power at a location virtually indefinitely until commercial power is restored. In the unlikely event that both permanent generators sustain damage, each switching site is equipped with 8 hour battery reserve. Supplementing the preceding steps, AT&T maintains a rapid response fleet of portable generator assets to augment permanent systems as needed.

None of the commenters has provided any evidence that would demonstrate that the Smart Grid applications will need emergency power provisions more robust than those just discussed. For example, the applications outlined by UTC[25] require energy back-up well within the existing capabilities of AT&T's emergency power parameters. Indeed, of the thirty applications discussed, half do not have requirements for emergency power at all; all but five applications have requirements for 8 hours or less; only three applications have emergency power requirements that exceed 24 hours and even then none exceed back-up power requirements of 72 hours.[26]

Generalized statements that commercial network emergency power is insufficient, therefore, are not supported by the facts. Nevertheless, should specific instances arise in the future where commercial network emergency power might not be sufficient, such exceptional situations would best be addressed by the commercial carrier and the utility working together to jointly craft a mutually agreeable solution. This approach is much more cost-effective for rate payers compared to their subsidizing the build out of a private network.

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[25] *NBP RFI: Communications Requirements COMMENTS OF UTILITIES TELECOM COUNCIL,* Before the Department of Energy, *In the Matter of Implementing the National Broadband Plan by Studying the Communications Requirements of Electric Utilities To Inform Federal Smart Grid Policy*, July 12, 2010, at 16-29. *See also* a listing of the applications cited by UTC, attached hereto as Exhibit 1.

[26] Id.

IV. Recommendation and Next Steps

AT&T respectfully requests that the DOE advise the FCC that commercial service networks have the expertise to support Smart Grid deployment, which can be further enhanced by several targeted actions by the FCC: making more spectrum available to commercial carriers so that coverage for all parties can be enhanced; ensuring that the regulatory framework allows carriers to employ the full range of network management techniques so that diverse traffic and users can be optimally handled; and working with the NCS to support the development of data priority services, so that emergency prioritization of data communications for NS/EP and critical infrastructure users can be instituted on IP based networks. Finally, the DOE should encourage utilities to reach out to commercial service providers to explore in greater detail the suitability of commercial networks for Smart Grid applications.

V. CONCLUSION

AT&T appreciates the opportunity to contribute its views on these important issues and looks forward to continued engagement with the DOE and policy makers throughout state and federal government as the conversations about the implementation of the Smart Grid continues.

Respectfully submitted,

/s/

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