Before the
Department of Energy
Washington, D.C. 20585

In the Matter of	)
	)
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 UTILITIES TELECOM COUNCIL

The Utilities Telecom Council hereby files its reply comments in response to the Department of Energy (DOE) request for information on the communications needs of electric utilities and other such critical infrastructure industries (CII).[1] The comments on the record – including those by APPA, EEI and NRECA, as well as API[2] -- strongly support utility access to licensed spectrum in order to support smart grid and other CII communications needs. Utilities and other CII agree that they lack access to suitable spectrum to support smart grid and other communications needs. They also agree that while they may use commercial services for some communications needs, private internal networks are essential for mission-critical communications which affect grid reliability or worker or public safety. By contrast, only a few comments oppose utility access to spectrum, and they raise general policy arguments in support of the use of

[1] Department of Energy, *Implementing the National Broadband Plan by Studying the Communications Needs of Electric Utilities to Inform Federal Smart Grid Policy,* 75 Fed. Reg. 26206 (May 11, 2010)("DOE RFI").

[2] *See generally* Comments of the American Public Power Association (APPA) at 16; Comments of the Edison Electric Institute (EEI) at 16; Comments of the National Rural Electric Cooperative Association (NRECA) at 16; and the American Petroleum Institute (API) at 11, 16.

commercial networks to the exclusion of private networks. The record as a whole reflects that the communications needs of utilities are not so cut and dry; and therefore policymakers should not force utilities to make a choice between commercial and private networks. Instead, utilities should be provided the options they need to meet their communications needs, and providing access to spectrum is an essential component to meet the communications needs of utilities and other critical infrastructure industries.

I. Utilities and other CII need access to 30 MHz of licensed spectrum below 2 GHz for smart grid and other communications needs.

The comments on the record in response to the DOE RFI on utilities' communications needs agree that utilities need access to spectrum to support smart grid and other communications applications. While utilities will use various different technologies at various different parts of their communications network, they generally rely on wireless technologies using licensed spectrum for wide-area access and high capacity point-to-point backhaul for mission-critical communications. Currently, utilities lack access to suitable spectrum, because additional capacity and coverage are needed and existing spectrum bands are subject to interference and congestion. While utilities have resorted to using various alternatives, such as unlicensed spectrum, many utilities express concerns about interference and their ability to expand capacity to meet increasing communications needs in the future. As such, in order to ensure that utilities will meet their current and future communications needs, utilities need access to 30 MHz of spectrum in a frequency range below 2 GHz.

a. There is no one-size-fits-all solution, but wireless is a key component.

The comments on the record provide a treasure trove of detailed data about the various different technology solutions that utilities use to meet their communications needs. While utilities report that they are primarily using fiber for their core backbone communications, they generally use wireless to backhaul traffic to the backbone and to provide last mile access.[3] They use a variety of wireless technologies, including microwave and land mobile, using a variety of frequency bands.[4] These wireless technologies predominately rely on licensed spectrum, although utilities do use unlicensed wireless solutions, particularly for AMI.[5] Utilities prefer to use licensed spectrum because it is less susceptible to interference and congestion.[6]

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[3] *See e.g.* Comments of Exelon Corporation at 2 (illustrating the four tiers of the network and the various technologies that are used); Comments of Great River Energy at 2-4 (describing various tiers of the network and various applications supported by those tiers.); Comments of Pepco Holdings, Inc. at 2-4 (stating that utility data networks "will be comprised of multiple tiers of communications" and that the core backbone layer will be comprised of fiber and microwave, but the "next two levels of our Power Delivery WAN present challenges" where it needs access to spectrum for wireless communications.) *See also* Comments of Baltimore Gas & Electric at 3-5 (describing the different technologies used at the WAN, LAN and HAN layers of the network).

[4] *See e.g.* Comments of Cleco Corporation at 7 (stating that "Cleco currently operates in many spectral bands, including 450MHz, 900MHz, 2.4GHz and 6GHz.") Comments of Northeast Utilities at 1-3 (reporting that it uses a variety of different wireless technologies, such as land mobile radio and private operational fixed (microwave) to support a variety of different applications, including voice and distribution automation. These wireless systems operate on a variety of different frequency bands, including 150 MHz, 217-219 MHz, 450 MHz, 900 MHz MAS, 6 GHZ and 11 GHz).

[5] *See e.g* .Comments of Florida Power and Light at 5-6 (describing how it uses unlicensed wireless solutions (e.g. 900 MHz mesh) for its AMI deployment.); Comments of San Diego Gas & Electric Company at 9 (reporting that while it generally uses licensed spectrum, there are two "notable exceptions" where it uses unlicensed and "lightly licensed" solutions for AMI and as part of a "Broadband Hot Zone" which it uses to support some of its transmission and distribution monitoring and control.); Comments of Southern California Edison at 4 (chart describes the various different technologies that SCE uses for its high-speed backbone network, inter-utility area network, teleprotection network, substation LAN, field area network (including unlicensed wireless mesh for AMI) and customer premise area network).

[6] *See e.g.* Comments of DTE Energy at 3 (stating that it is "concerned that over-crowding in the spread spectrum bands and encroachment by other services into the 6 GHz point-to-point microwave band will

b. Utilities lack access to suitable spectrum.

The comments on the record also agree that utilities lack access to suitable spectrum.[7] Existing spectrum bands are largely narrowband and are subject to interference and congestion.[8] Utilities need to be able to expand coverage and capacity in order to support smart grid and other communications needs.[9] While

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impact our current and future network builds. Furthermore, the only spectrum which can support point-to-multipoint data transmission at rates of 10 Mbps and higher is unlicensed, offering us no recourse against interference.") Comments of San Diego Gas & Electric at 9 (stating that while it does use unlicensed spectrum for some applications, "it remains the case that we would prefer to use licensed spectrum where it is available at reasonable cost.")

[7] *See e.g.* Comments of DTE Energy at 2 (stating that "[t]he most critical design element, and the one least within our control, is the availability of suitable RF spectrum."); Comments of Florida Power and Light at 3 (recommending that "Utilities require dedicated spectrum, or spectrum with preferential rights, to conduct core business operations in life-critical situations and during restoration from hurricanes and other disasters," and recommending that "FCC and DOE should strongly consider a dedicated wireless network (with common spectrum and equipment) for mission critical utility operations, first responders and public safety, consistent across the utility industry."); Comments of Exelon Corporation at 7 (recommending that "As communication system needs for electric utilities increase significantly to support smart grid applications (bandwidth, reliability, security and latency), electric utilities need reliable, upgradeable communication options that will be available during challenging events when other forms of communication are not available. The reliability of power delivery is directly related to the reliability of related communication systems. This includes a strong backbone, dedicated Utility spectrum and system ownership to support customer needs."); Comments of Great River Energy at 7 (stating that the number one communications gap is the lack of access to dedicated, licensed, broadband spectrum).

[8] *See e.g.* Comments of Great River Energy at 7 (explaining that existing narrowband voice frequencies, "which is our communications system of last resort and therefore of utmost importance for safety and operations of the electric grid, utilities compete for spectrum with cement companies, bus companies, pizza delivery and every other business that is eligible for these licenses in the Industrial Business band."); Comments of Motorola, Inc. at 2 and 6 (observing that the lack of any additional dedicated spectrum allocations for utilities has hampered expansion of these internal communications systems to meet operational needs."); Comments of Southern Company, Inc. at 6 (stating that "Southern Company has a company-owned wireless "narrowband" (12.5 or 25 KHz per channel) communications infrastructure to link these devices. Broadband is now needed to link these various remote devices with other information tools such as advanced applications.") Comments of San Diego Gas & Electric Company at 7 (stating that "most existing private network solutions provide narrowband not suitable for smart grid technologies and availability of licensed spectrum for the electric industry is currently limited.").

[9] *See e.g.* Comments of Alcatel-Lucent at 16 (stating that "While most utilities have access to narrowband spectrum that they use for Land Mobile Radio (LMR), narrowband LMR spectrum will not be sufficient for this level of application data throughput."); Comments of San Diego Gas & Electric at 2 (stating that "Broadband will, over time, be an increasingly attractive option for the functionalities that SDG&E will be incorporating into our smart grid design because of the capacity and quality broadband communications offers.") Comments of Southern California Edison at 1 (outlining SCE's network build out plan, including upgrading the capacity and functionality of the SCENet high-speed backbone network, build a next-generation and secure LAN, and leverage 4G wireless Field Area Network to expand DA capability and enable mobile broadband.)

unlicensed spectrum can meet some of utilities needs for high capacity communications, utilities are concerned that unlicensed solutions may be subject to interference now and in the future, which would undermine the reliability of their communications.[10] As such, utilities are using their existing licensed spectrum to the extent that they can, but there are clearly places in the network where additional spectrum will be necessary, such as at the distribution and access layers of the network.

c. Communications needs are increasing and utilities and other CII will need 30 MHz of spectrum below 2 GHz to meet current and future communications needs.

Utilities have demanding functional requirements and an abundance of different applications to support, including smart grid and emergency response communications, as well as other CII communications.[11] The demands on utility and other CII communications networks are expected to increase exponentially, as more smart grid applications are developed and more end use devices are deployed.[12] Utilities also

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[10] *See e.g.* Comments of Southern Company at Attachment A, at 12 (stating that Southern does use some unlicensed spectrum for last mile solutions, particularly point-to-point microwave…but "Southern tries to minimize its use of unlicensed spectrum due to interference concerns.")

[11] *See e.g.* Comments of Alcatel-Lucent at 9 (estimating throughput requirements between 1.6-3.7 kbps for smart grid applications, depending on normal or critical operations and depending on network configuration); Comments of Oncor Electric Delivery, Current and Future Communications Needs; Comments of Lower Colorado River Authority, Current and Future Communications Needs; and Comments of Baltimore Gas and Electric Current and Future Communications Needs. *See also* Comments of Florida Power and Light Company 4-19; and Comments of San Diego Gas and Electric Company at 22.

[12] *See e.g.* Comments of the Edison Electric Institute at 16-17 ("The implementation of the Smart Grid along with two-way communications between utilities and customers will exponentially increase the data traffic the utility communications systems will have to be able to handle.") Comments of Baltimore Gas & Electric Company at 5-6 (predicting that BGE expects its communications needs to grow substantially with increased customer interaction on AMI, as well as utility involvement in DA and compliance with security and interoperability requirements.); Comments of DTE Energy Company at 9 (stating that "Bandwidth levels will continue to increase as new Smart Grid applications come on-line and customer interest picks up. Smart Grid networks need to be designed with plenty of bandwidth available at the

report that new security requirements are going into effect and will also contribute towards this increasing demand.[13] Given that wireless will be a key component of utility networks, utilities need access to additional spectrum to keep pace with increasing demand on a cost effective basis.

Comments generally agree that access to 30 MHz of licensed spectrum below 2 GHz will meet utilities current and future communications needs.[14] This will allow utilities to ensure cost effective and reliable communications for wide-area coverage

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outset, rather than be inserted into existing systems already at or near their carrying capacity."); Comments of San Diego Gas & Electric Company at 2 ("The explosion in smart grid technologies and applications has a huge impact on the need for electric utilities to create and manage a flexible communications architecture characterized by multiplexing, seamless integration and the capacity to serve both our current and future requirements.") *See also Id.* at 6, 7 ("For many utilities, the implementation of energy policies driving renewable resources and electric vehicles lie in their future. For SDG&E, that future is already here."); Comments of Southern Company at 29 ("Southern Company foresees that growth of Smart Grid applications and services will drive the move to broadband. With the advent of many devices on the grid, more points will be controlled and monitored, resulting in the need for higher bandwidth. Also, as millions of addresses are utilized and the conversion from serial to IP communications occurs, conversion to Internet Protocol version 6 (IPv6) will be essential. Another essential component will be an integrated management system for control and monitoring.")

[13] *See* Comments of Exelon Corporation at 8 ("These systems will be designed to be secure, interoperable and scalable and meet existing and future standards such as NIST and NERC. New applications yet to be defined within the Smart Grid portfolio will require significant additional capacity including video surveillance and thermographs.").

[14] *See* Comments of DTE Energy Company at 10 ("DTE Energy is in agreement with the Utilities Telecommunication Council's (UTC) position that 30 MHz of spectrum below 2 GHz should be granted exclusively to utilities. This spectrum should be allocated over multiple bands to support a variety of mobile and fixed services in rural and urban environments."); Comments of Edison Electric Institute at 16 ("EEI firmly agrees and supports the UTC recommendation that utilities need access to 30 MHz of dedicated 1.8 GHz spectrum."); Comments of GE Digital Energy at 6 (recommending that DOE "Provide a minimum of 30MHz of non-exclusive licensed spectrum below 2 GHz dedicated specifically to critical infrastructure applications similar to the 3.65GHz band without the encumbrances of the Fixed Satellite Services (FSS). The 30 MHz of spectrum would allow for multiple 5 MHz or 10 MHz channels for broadband wireless connectivity using standards such as WiMAX / IEEE 802.16e."). *See also* Comments of Pepco Holdings, Inc. at 7 ("PHI fully supports the UTC's proposal to build the Smart Grid Communications Network on licensed spectrum in the 1.8GHz range harmonizing the US with Canadian Standards. Although we believe that 30MHz of spectrum is not immediately needed, it does provide the necessary spectrum to ensure the long term success of Smart Grid, enabling equipment vendors to build and provide standards based hardware to utilities while ensuring inter-operability between utilities broadly."); Comments of Florida Power & Light Company at 3 (recommending access to dedicated licensed spectrum for emergency response communications (e.g. in the aftermath of hurricanes) and for mission-critical communications.); and Comments of Northeast Utilities at 8 (recommending making available more primary data channels below 500 MHz and giving utilities access to the 1.8 GHz federal spectrum (i.e. 1800-1830 MHz)).

and for fixed point-to-point and point-to-multipoint backhaul at the access and distribution tiers of their networks.[15] Lower frequency ranges (i.e. below 1 GHz) are needed in areas where there are propagation issues associated with terrain, foliage, buildings and other conditions which can attenuate or block signals.[16]

Only a few comments opposed access to spectrum, raising general policy arguments that commercial networks are more appropriate.[17] While opponents claim that using commercial networks would be simple, cost-effective and spectrally efficient, "unfortunately, it's not that easy."[18] Utilities need to have reliable communications that meet their functional requirements, which the record shows, are demanding.[19] This is particularly true during storms and other emergencies, when utilities and other CII are restoring power and other critical infrastructure services. While minor outages on a commercial network may go unnoticed by most consumers, these "fractions of a second mean the difference between reliable and unreliable electric service."[20] Moreover, the

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[15] *See* Comments of the Utilities Telecom Council at 22 (describing the typical tiers of the utility network) and at 25-30 (explaining how access to additional spectrum is needed at these different tiers).

[16] *See e.g.* Comments of Northeast Utilities at 6 (reporting that "The terrain in New England is mountainous in areas. Much of our territory has an abundance of tall pine and oak trees making broad coverage of our wide service territory difficult and expensive on microwave point-to-multipoint frequencies. Frequencies below 500 MHz serve us best, but provide little bandwidth. If we keep our communications requirements simple we can get by, using low speed data.")

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[17] Comments of the Cellular Telecommunications Industry Association at 14 (emphasizing that "The Federal Government Should Not Allocate Dedicated Smart Grid Spectrum, but Should Rely to the Maximum Extent Possible on Existing Commercial Wireless Networks.") Comments of the National Cable and Telecommunications Association at 3-5 (opposing the use of private internal networks for smart grid, claiming that commercial networks are more cost effective and capable).

[18] Comments of Pepco Holdings, Inc. at 3 (explaining why not use public carriers).

[19] *See e.g.* Comments of Southern Company Services at 8 (stating that "Reliability of communications is the primary issue for utility communications: if the grid control systems do not work, it is irrelevant what they could potentially do or how secure they are.")

[20] *Id.*

need for reliability belies opponents' specious arguments that utilities prefer to build their own private networks in order to rate base the cost of the network.[21] Utility costs are subject to oversight by state regulators, and these costs must be found to be justified, as well as reasonable and prudent.[22]

II. Utilities use commercial communications networks for some of their communications needs, but they need private internal networks for mission-critical applications.

Comments on the record demonstrate that commercial services can meet the functional requirements for some smart grid applications,[23] but that the majority of utilities will rely on private internal communications networks for mission-critical applications that affect grid reliability and worker/public safety.[24] Utilities generally

[21] *See e.g* Comments of the National Cable and Telecommunications Association at 6-7 (emphasizing that "rate of return regulation incentive structures perversely favor utility owned networks"). See also Comments of Honeywell Corporation at 3 (stating that "From a public policy standpoint, ratepayers should not be asked to shoulder the cost of upgrading utility owned and operated communications infrastructure when viable commercial alternatives are already deployed."); Comments of GridNet, Inc. at 15 (stating that "Most ISO's in the US have the real potential to earn a 'regulated rate of return on capital expenses'. This regulated rate of return is a powerful incentive to build their own.")

[22] UTC notes that state regulators in Maryland, Ohio and Hawaii have recently declined to approve cost recovery for smart grid deployments. This is contrary to the implication by opponents that utilities may simply rate base their smart grid communications costs. Moreover, private internal networks may be more cost effective than outsourcing communications to commercial carriers. *See e.g.* Comments of Silver Springs Networks at 5 (explaining that "private, purpose-built RF mesh neighborhood area networks can cost nearly 100x less than the OpEx of existing commercial networks, while providing superior coverage and reliability, as well as arguably more robust security"). *See also* Comments of Cleco Corporation at 2 (explaining that "While upfront costs for a commercial network would have been considerably less than building out a private system, ongoing operating expenses were much greater. However, the primary reason for establishing a private system was reliability.") and Comments of Baltimore Gas and Electric Company at 5 (stating that "[u]se of commercial networks is costly…").

[23] *See e.g.* Comments of Florida Power and Light Company at 3 ("Utilities rely on a blended solution of utility and commercial, wired and wireless networks."); Comments of Oncor Electric Delivery at 5 ("Oncor plans to continue to use both public (commercial) and private communication networks as appropriate to ensure optimal Smart Grid communications.")

[24] *See e.g.* Comments of Alcatel-Lucent at 16 ("We believe that the wide variety of commercial wireless carrier and unlicensed spectrum solutions in the 220MHz and 900MHz band are perfectly suitable for a utility's long-term needs for metering and other non-critical traffic. However, for grid control systems we firmly believe that many utilities will either need dedicated networks using licensed spectrum or will need to partner and share networks and spectrum with entities that have similar operational requirements, such as Public Safety."); Comments of Bonneville Power Administration at 10 (distinguishing between

suggested that commercial systems needed to improve coverage, availability, reliability and latency in order to meet their functional requirements for mission-critical applications.[25] Comments also expressed overarching concerns about the fundamental difference between carrier business models that are built on "best efforts" service levels and utility networks which are designed for high reliability.[26] Carriers and several equipment providers claim that their networks and products are capable of supporting a variety of smart grid applications and adapting to keep pace with evolving demands into

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Customer Interface and Business Enterprise communications that could be served using commercial services and other mission critical applications that should use private internal networks.); Comments of Cleco Corporation at 3 (explaining that Cleco chose to use a private wireless system, rather than a commercial wireless system, because of the need for reliability.); Comments of Motorola at 4 (recommending that "[s]ome elements of utilities' communications requirements are compatible with commercial networks; many elements that are more mission critical are not."); Comments of Pepco Holdings, Inc. (explaining that while commercial systems presently support field service communications and mobile data, as well as AMI, "commercial carrier leased services do not always represent the most reliable networks for [its] use.").

[25] Comments of Avista at 5 (explaining that carrier networks lack sufficient coverage and reliability, as well as prioritization of traffic or other guarantees on liability for communications failures); Comments of DTE Energy Company at 8-9 (citing two instances (i.e. 2003 Northeast Blackout and 2008 cellular switching outage) that highlight improvements that could be made to carrier networks to meet utility requirements.); Comments of Florida Power and Light Company at 11-12 (citing failed 1998 pilot using commercial services and 2004/2005 Gulf Coast Hurricanes as illustrations of how commercial systems need to be more reliable to meet utility communications requirements.); Comments of Northeast Utilities at 8 (suggesting improved maintenance of copper, improved responsiveness, better batttery backup for commercial networks); Comments of Southern Company at 25-26 (suggesting that carriers reduce latency, increase coverage, enhance reliability and guarantee availability); Comments of San Diego Gas and Electric Company at 22-23 (table compares commercial v. private networks in terms of meeting functional requirements).

[26] Comments of Alcatel-Lucent at 3, 18 (explaining that "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."); Comments of Motorola at 14 (stating that "In contrast, commercial networks provide best-effort levels of service based on the requirements of consumers who comprise a much higher number of users than specialized operations like utilities."); Comments of DTE Energy Corporation at 8 (stating that "Even if these enhancements were achieved, utilities would still be wary of commercial networks for all their communication needs due to the mismatch between our business model and theirs."); Comments of Southern Company Services at 24 (explaining that "Part of the inherent strength of SouthernLINC Wireless is that it is owned and controlled by the utility itself, and is therefore focused on resolving any issues that could affect utility operations. Although SouthernLINC Wireless has been established as a commercial carrier, its primary mission is to support the electric operating companies.
That kind of dedicated support cannot be replicated just through the language of a service agreement with a third-party carrier.")

the future.[27] Despite these claimed advances in reliability, coverage, congestion, and service restoration, it remains to be seen whether commercial services can actually meet utility functional requirements for smart grid and other utility communications needs. Utilities should be allowed to make that choice for themselves, rather than being forced to use commercial services in the absence of any other option (e.g. licensed spectrum). In any event, there is general agreement on the record that private internal communications networks must be used to support mission-critical applications, even though some communications needs may be met using commercial services.[28]

[27] *See generally* Comments of AT&T; Comments of Verizon and Verizon Wireless; and Comments of Qualcomm, Inc.

[28] Equipment providers as well as utilities have filed comments on the record that distinguish between mission critical and other communications needs when it comes to using commercial services. *See e.g.* Comments of Alcatel-Lucent; Comments of Motorola; Comments of GE Digital Energy; Comments of Hughes Network Systems; Comments of On-Ramp Wireless, Inc.; Comments of Silver Springs Networks, Inc. and Comments of Tropos Networks. *See also* Comments of Avista Corporation; Comments of Baltimore Gas & Electric Company; Comments of Florida Power and Light Company; Comments of Great River Energy; Comments of Pepco Holdings, Inc.; Comments of Oncor Electric Delivery Company; and Comments of Southern Company Services, Inc.

WHEREFORE, the premises considered, UTC thanks the Department of Energy for the opportunity to reply to the comments on the record, and looks forward to working with DOE to meet utility communications needs, including access to at least 30 MHz of spectrum for smart grid and emergency response communications.

Respectfully submitted,

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