Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act	)	GN Docket No. 09-137

COMMENTS—NBP PUBLIC NOTICE #2
T-MOBILE USA, INC.

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TABLE OF CONTENTS

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COMMENTS—NBP PUBLIC NOTICE #2
T-MOBILE USA, INC.

T-Mobile USA, Inc. ("T-Mobile") hereby submits its responses to the questions raised by the Federal Communications Commission ("FCC" or "Commission") in its Public Notice seeking tailored comments regarding the implementation of Smart Grid technology.[1/] T-Mobile is the fourth largest wireless carrier in the United States and serves approximately 33 million customers.

INTRODUCTION AND SUMMARY

T-Mobile has been actively involved in developing smart meter technology that uses SIM cards and transmitters embedded in meters to transmit information on electricity usage and outages to electric utilities over T-Mobile's wireless network. Using wireless carriers' general

[1/] *Comment Sought on the Implementation of Smart Grid Technology*, NBP Public Notice #2, DA 09-2017 (rel. Sept. 4, 2009) ("Public Notice").

purpose networks – which can be tailored to provide a wide variety of specialized services depending on what the customer wants and needs – to deliver Smart Grid services is in the best interests of both consumers and utilities. Wireless carriers' networks are more reliable and secure than the special purpose networks that would be constructed by utility companies, and they are far more cost-effective for the consumer because wireless carriers already have made many of the substantial investments needed to run a network successfully.

T-Mobile has strategically partnered with Echelon Corporation, a San Jose, California-headquartered company with extensive worldwide experience offering Advanced Metering Infrastructure ("AMI") and other Smart Grid services. Echelon uses carriers' IP-based networks for communications between a utility company and its Smart Grid devices. Echelon has deployed and tested its Networked Energy Services ("NES") System with over 100 utilities around the world, including Duke Energy in the United States, Vattenfall in Sweden, E.ON in Sweden, and NUON in the Netherlands.

Echelon and its utility company customers have found that the reliability and availability of Echelon's smart metering solution – the NES System – is far superior to other options. The NES System has consistently delivered average success rates for the collection of daily metering data from all end points of above 99.5 percent.

With the NES system, the T-Mobile network can be used to offer a wide variety of Smart Grid services. In addition to AMI, for example, the T-Mobile network can be used to support Smart Grid functions such as Demand Response, Distribution Automation, Supervisory Control and Data Acquisition ("SCADA"), Distributed Generation, remote disconnect and reconnect, and tampering notification. SIM cards can be embedded in many different intelligent devices (such as reclosers, switches, and capacitor banks) that can allow utilities to monitor and control them remotely by using and leveraging T-Mobile's network footprint and communications infrastructure to provide integrated network energy services for all Smart Grid applications.

The questions posed in the Public Notice to which T-Mobile has responded are set out below along with T-Mobile's responses.

RESPONSES TO QUESTIONS

QUESTION 1

Suitability of Communications Technologies

Question 1b: Which communications technologies and networks meet these requirements? Which are best suited for Smart Grid applications? If this varies by application, why does it vary and in what way? What are the relative costs and performance benefits of different communications technologies for different applications?

Response to Question 1b:

Commercial wireless companies' general purpose networks and wireless technologies using the Global Standard of Mobile Communications ("GSM") are well suited to meeting the requirements for Smart Grid applications. Today, there are almost 4 billion GSM and 3GSM connections worldwide.[2/] The technology is proven, secure, interoperable, ubiquitous, and reliable. The BlackBerries used by the U.S. Government today are secured by a Private Access Point Node ("PAPN") connection on a GSM network, the same type of connection that would be built for utilities.

A PAPN would create a private wireless network between T-Mobile and a T-Mobile partner, such that all of the partner's provisioned units would be an extension of its own network, similar to the way a Virtual Private Network client is used to connect to a corporate network. Using a PAPN, T-Mobile's wireless network would act as the transport to the partner's network.

[2/] *See* Press Release, GSMA, *Mobile World Celebrates Four Billion Connections* (Feb. 11, 2009) *available at* http://www.gsmworld.com/newsroom/press-releases/2009/2521.htm.

A tunnel connection using IP Security and generic routing encapsulation ("GRE") would be used to connect the two companies together.

A PAPN allows the partner to manage IP connections based on its current architecture (*i.e.*, Dynamic Host Configuration Protocol ("DHCP") or Static addresses). When using a PAPN, the partner can authenticate each user if additional security is needed. Using a PAPN allows for two-way communication (both mobile-originated and mobile-terminated). The average build time of a PAPN is about 8-10 weeks, making this an easy and timely Smart Grid solution.

<u>Question 1c:</u> What types of network technologies are most commonly used in Smart Grid applications? We welcome detailed analysis of the costs, relative performance and benefits of alternative network technologies currently employed by existing Smart Grid deployments, including both "last mile," backhaul, and control network technologies.

<u>Response to Question 1c:</u>

Most networks used for Smart Grid services today are private, special-purpose networks built and operated by the electric utilities. Unfortunately, as discussed in more detail below, these special purpose networks do not provide the security or reliability of existing general purpose networks built by today's wireless carriers, and they are significantly less cost-effective.

<u>Question 1d:</u> Are current commercial communications networks adequate for deploying Smart Grid applications? If not, what are specific examples of the ways in which current networks are inadequate? How could current networks be improved to make them adequate, and at what cost? If this adequacy varies by application, why does it vary and in what way?

<u>Response to Question 1d:</u>

Commercial wireless carriers' existing general purpose networks are not only adequate for deploying Smart Grid applications, but should be the preferred means of doing so. *First*, wireless carriers' general purpose networks are more proven and robust than special purpose networks. Approximately 99.6 percent of the total U.S. population lives in a census block in which one or more different operators offers mobile telephone service.[3/] These carriers offer cutting-edge networks that are carefully maintained and constantly upgraded, and are run by entities with years of experience. In those areas where carrier networks do not cover a utility's grid footprint, carriers could use utility poles as micro-tower sites to ensure that the Grid footprint has ubiquitous coverage.

Second, wireless carriers' general purpose networks are more secure than specialized networks. They use licensed and encrypted spectrum, and are protected against cyber attacks.

Third, wireless carriers' general purpose networks are more reliable than specialized networks. Carrier networks have a 99 percent reliability rating. In contrast, specialized networks, which would rely on the use of unlicensed spectrum, would face interference concerns (because they would be required to avoid interference with any licensed operations and to accept interference from licensed operations), would have decreased resistance against denial of service and man in the middle attacks,[4/] and would be vulnerable to hacking because thousands of pre-written scripts are already available that can be accessed and used to exploit unlicensed networks.

Finally, public wireless carrier networks are more cost-effective for the consumer. It is extremely expensive to build and operate a specialized network. Our rough analysis demonstrates that it would take nearly $11 million annually to keep a private network of

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3/ *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, WT Docket No. 08-27, *Thirteenth Report*, DA 09-54 (rel. WTB Jan. 16, 2009).

4/ In denial of service attacks, hackers flood the network with so many data packets that they use up all of the network's resources and force it to shut down. In man in the middle attacks, a hacker places a rogue access point within range of wireless stations, causing wireless users to unknowingly connect to an unauthorized access point, giving the attacker valuable unauthorized information about the wireless network.

approximately 1.5 million Smart Grid wireless connections operating smoothly, including $5.1 million in personnel costs for field technicians, switch personnel, and engineers; an additional $1.5 million for employee benefits; $3 million in repair and maintenance costs; $800,000 in vehicle expenses; and $564,000 for other costs. Moreover, running that network would require an estimated 87,000 gallons of fuel each year. *See* Exhibit A (detailing the numerous line-item costs that running a network entails, including office expenses, insurance, telephone bills, postage costs, and many other expenses). This adds up to $110 million over 10 years to manage a relatively small specialized network.

There is no reason that electric company customers should absorb the costs of an expensive specialized network when many of these costs are unnecessarily duplicative of investments already being made by today's wireless carriers in their general purpose networks. In areas where wireless carrier networks cover an area served by several utility companies, this could mean that multiple utilities are building their own special purpose networks and imposing billions of dollars of costs on consumers – costs that could be avoided by tailoring the wireless carrier's existing and superior general purpose network to their specialized needs. And, as significant as these costs are, they do not even take into account the value of spectrum. As noted below, the utilities have asked the federal government to allocate an additional 30 MHz of spectrum for private networks, an extremely pricey proposition for consumers, rate-payers, and the general public.

Question 1e: How reliable are commercial wireless networks for carrying Smart Grid data (both in last-mile and backhaul applications)? Are commercial wireless networks suitable for critical electricity equipment control communications? How reliably can commercial wireless networks transmit Smart Grid data during and after emergency events? What could be done to make commercial wireless networks more reliable for Smart Grid applications during such events?

We welcome detailed comparisons of the reliability of commercial wireless networks and other types of networks for Smart Grid data transport.

<u>Response to Question 1e:</u>

As discussed in response to Question 1d, commercial networks are extremely reliable. They are therefore absolutely suitable for critical electricity equipment control communications. Commercial wireless networks have redundant systems in place in the event of an outage, and they have disaster recovery protocols in place for emergency events. T-Mobile, for example, has the ability to separate its network geographically into a West Coast network operations center ("NOC") and an East Coast NOC in the event of a natural disaster. Commercial wireless network facilities are built with battery and generator back-up to avoid disruption of service due to power outages, and individual towers have battery back-up as well. All mobile switching locations have two sources of emergency back-up power in the event of a momentary or extended power failure, the base stations necessary for coverage all have battery back-up and are equipped with generator access, and all mobile switching locations are protected by pre-action dry fire systems. T-Mobile's switching stations also maintain spare equipment inventory for critical network elements. Specialized networks, run by entities that have a different core business, would not and could not be expected to meet this same level of back-up security. Keeping a spare inventory of parts and batteries is extremely expensive, especially because batteries and some other materials have a short shelf life and need to be replaced regularly, even if unused. In contrast, T-Mobile and other wireless carriers' core business depends on having these materials available and frequently upgrading parts so as to offer the most state of the art network available. It is a win-win for consumers if Smart Grid depends on T-Mobile's network, because they receive the most advanced services at a substantially lower cost than if utility companies attempted to duplicate T-Mobile's efforts.

QUESTION 2

Availability of Communications Networks

Question 2b: What percentage of homes have no access to suitable communications networks for Smart Grid applications (either for last-mile, or aggregation point connectivity)?

Response to Question 2b:

Approximately 99.6 percent of the total U.S. population lives in a census block in which one or more different operators offers mobile telephone service.[5/] Regardless of the current coverage, however, wireless carriers could quickly and easily extend their coverage to ensure 100 percent of the population is covered by Smart Grid. Carriers have many different types of communication towers, and could use a variety of approaches in different areas to ensure coverage. For example, we could put micro-towers on utility poles to fill in any gaps in coverage. Many carriers already use utility poles today for commercial network coverage, and would simply need to enter into business arrangements with the utility receiving the Smart Grid service for this purpose.

Question 2c: In areas where suitable communications networks exist, are there other impediments preventing the use of these networks for Smart Grid communications?

Response to Question 2c:

T-Mobile believes public wireless networks are well suited for Smart Grid communications. There are steps the Commission could take, however, to ensure that networks can be used to their fullest advantage as quickly as possible. The Commission should work with FERC and the PUCs to help design the appropriate regulatory incentives for utilities to employ commercial networks for Smart Grid services. It is well-established that rate-based regulated

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[5/] *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, WT Docket No. 08-27, *Thirteenth Report*, DA 09-54 (rel. WTB Jan. 16, 2009).

firms like electric utilities have a strong bias in favor of making capital investments on which they can earn a return, even where such investments are not cost-effective or in the best interest of the consumer. As demonstrated by the responses to Questions 1d and 1e above, it is far more cost-effective for a utility – and therefore for its customers – to utilize a commercial network for Smart Grid applications and services than to build its own network. In order to overcome the regulatory bias in favor of capital investments, however, regulators may need to consider some special incentives to encourage utilities to look to commercial networks for these purposes. These incentives could include allowing the imposition of special surcharges for the costs of Smart Grid services or reduced depreciation for those capital investments (in smart meters, for instance) that the utility must in fact incur to provide Smart Grid services.

The Commission also should create an appropriate regulatory environment for the provision of Smart Grid services. Obligations that attach to the provision of consumer-based wireless service, such as universal service contributions and other fee requirements that increase the costs of providing service, should not be imposed on Smart Grid services.

Telecommunications carriers are in the business of running telecommunications networks (unlike utilities, whose priority is providing power), and they place a high priority on keeping those networks up and running. In times of emergency, T-Mobile's highest priority would be on restoring its network functionality, to the benefit of its subscribers and utilities alike. T-Mobile provides upon request emergency priority access communication services to utilities today, and will continue to do so.

Question 2d: How does the availability of a suitable broadband network (wireless, wireline or other) impact the cost of deploying Smart Grid applications in a particular geographical area? In areas with no existing networks, is this a major barrier to Smart Grid deployment? We welcome detailed economic analyses showing how the presence (or lack) of existing communications networks impacts Smart Grid deployment costs.

Response to Question 2d:

As discussed in response to Question 1d above, it is significantly more cost-effective for Smart Grid applications to rely on public carrier networks than for utilities to build their own private networks. Those networks could be extended to cover the geographic areas served by the utility much more easily than it would be for the utility to deploy an entirely separate network.

QUESTION 3

Spectrum

Question 3e: Are current spectrum bands currently used by power utilities enough to meet the needs of Smart Grid communications? We welcome detailed studies and discussion showing that the current spectrum is or is not sufficient.

Question 3f: Is additional spectrum required for Smart Grid applications? If so, why are current wireless solutions inadequate?

Response to Questions 3e and 3f:

There is no need for utilities to obtain additional spectrum for Smart Grid communications because, as explained above, commercial networks, including commercial wireless networks, have sufficient capacity and coverage to provide Smart Grid services for utilities. The types of services and uses that would be required by Smart Grid are not spectrum-intensive, and commercial carriers can even provide such services at "off-peak" times, maximizing spectrum use. With demands for new spectrum constantly increasing, it is neither necessary nor prudent to allocate additional spectrum for power utilities when commercial wireless networks can meet their Smart Grid needs.

Respectfully submitted,

*/s/*______________________________

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October 2, 2009

Exhibit A

Line Items

Regular Salaries and Wages
Overtime
Bonus
Termination Pay
Capitalized-Internal Labor
Employee Benefits
PTO/ Vacation Expense Accrual
Education & Training - Employee
Reward & Recognition - Employee
Relocation
Subscriptions
Dues
Employee Uniforms
Employee Placement Fee
Job Candidate Travel
Job Placement Advertising - Print
Mobile Phone Op Exp - Employee
Management Consulting Services
Outsourcing
Contract & Temporary Personnel

Services Purchased - Other
Transportation & Lodging
Business Meals
Vehicle Expense
Meetings - Dept/Vendor/Customer
Leases and Rent
Straight-Line Leases and Rent Expense
Utilities
Enterprise WAN Expense
Lease Related Property Taxes
Rental Income Co-location
Computer Hard & Soft 1(Non-Cap)
Hard & Soft Maintenance Support
Printing and Photocopying
Furniture & Fixtures (Non-Cap)
Office Telco
Data Processing
Office Svcs-Equipment Lease
Office Svcs-Repair/Maint
Office Svcs-Janitorial

Office Svcs-Other
Office Svcs - Lease Related CAM Charges
LEC Usage-Recip Comp
IXC Long Distance
LEC Fixed Line Revenue
Cost of Long Distance & Toll
Usage-Local
Directory Assistance
E911 Costs
Line Service - Fixed
National Network
Express Mail
Postage
General Office Supplies
Warehouse Shipping Supplies
Repairs and Maintenance Supplies
Damages-Network Inventory
Obsolete Expense-Network
Freight Expense

Legal Fees
Legal Settlement Claims
Lobbyist Fees
Cost Center - Goods Issue Tax Accrual
Liability Insurance
Business Taxes & Licenses
Cost of Features
Decommissioning-Switch, Cell Sites
Repair&Maint
Repair&Maint-Contrct
RepairMaint-Insured
Restoration Commitment Expense
Damaged Cell Site Equipment
Clearing Acct-G/L Asset Proceeds
Gain-Disposal of PP&E
Losses from Disposal of PP&E
Canceled Project Expense
Misc Operating Inc/Exp
Charitable Contributions
Capitalized-Employee Overhead
Capitalized-External Labor