GEHMAN LAW PLLC

October 2, 2009

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

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Federal Communications Commission
Office of the Secretary

Re: GN Docket Nos. 09-47, 09-51, 09-137
Comments – NBP Public Notice #2

Dear Ms. Dortch:

Enclosed please find an original and two duplicates of the Comments of Sensus USA Inc. in the above captioned proceeding. Please stamp as received the third duplicate and return to me.

Please contact the undersigned if there is a question.

Very truly yours,

Julian P. Gehman

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

In the Matter of	)	
	)	
Implementation of Smart Grid Technology	)	GN Docket Nos. 09-47, 09-51, 09-137

COMMENTS OF SENSUS USA INC.

Sensus USA Inc. (Sensus) respectfully submits these comments on the Notice of Inquiry (NOI) regarding Implementation of Smart Grid Technology, released September 4, 2009, in the above captioned dockets. Sensus appreciates the opportunity to express its views on the questions raised in this proceeding.

I. INTRODUCTION

A. Background of Sensus

Sensus is a leading global supplier to the utility industry with over $800 million in annual revenue and approximately 4000 employees at over 40 locations on five continents. Sensus is also a leader in Smart Metering and Smart Grid systems, with over 3 million two-way, smart endpoints deployed over the past three years. Sensus' Smart Grid electric utility installations cover large investor owned utilities as well as rural and membership cooperatives, public utility districts and municipal utilities. Sensus customers include Southern Company, Alliant Energy, Portland General Electric, Hawaiian Electric, Jackson EMC, Sawnee EMC, Benton PUD, Clark Public Utilities and over 30 distribution utilities in the province of Ontario, Canada. Sensus is also the leading global supplier of water meters and a leading gas meter supplier in North America. Sensus has over 180 projects underway in the US to provide Smart Meter communications systems for gas and water distribution utilities utilizing the same technology that is used for electric utility Smart Grid applications.

B. Overview and Recommendation

Nearly all U.S. electric utilities are regional distribution monopolies, with a single network providing electric power to each residence or business located within the utility's service territory. This means that, with few exceptions, there is a need for just one Smart Grid radio network for the electricity grid in a particular region.[1] Sensus believes that the Smart Grid will largely be defined by the equipment and systems purchased and installed by these utilities. A utility typically takes three to four years to decide to make a major purchase such as Smart Meters and a Smart Grid system. Once installed, the expected useful life of this equipment is usually greater than 10 years. To date, electric utilities in the United States have contracted to purchase in excess of 50 million Smart Meters along with their associated communication systems: this represents more than one third of the of the metering points in the United States.

In other words, for over one third of the U.S. electricity market, the die is already cast for the next 10+ years. To be certain, new Smart Grid functions using different communication systems can be layered over the Smart Meter systems that are already installed. Nevertheless, once a Smart Metering system is deployed, it is far more economical and straightforward for utilities to use that system for

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[1] Natural gas and water distribution networks also need Smart Meters and Smart Grid operations. Generally, however, these systems generate a much lower volume of radio traffic for several reasons. Water and gas are commodities that can be stored, while electricity generally cannot be stored on the scale required by a power system. This storage capability places lower demand related to information latency for the water and gas systems. Additionally, water and gas meters' radio endpoints cannot be safely or economically line powered and are mostly battery operated. Water and gas utilities require a 20 year battery life, which limits the possible number of data transmissions. Consequently, water and gas radio endpoints are quiet 99.9% of the time and generate less data compared to electric endpoints. Sensus estimates that the spectrum required for Smart Grid communications for a natural gas or water distribution utility is about one third what is required for an electric utility. Some electric utilities also distribute natural gas (e.g., Alliant Energy) and can use one Smart Grid radio communication system for both electricity and natural gas. Where there are three separate utilities in a service area, approximately 1.67 times the spectrum needed for just the electric Smart Grid should be sufficient for the separate electricity, natural gas and water distribution utilities. Where there are two utilities (with electricity and natural gas provided by the same company), approximately 1.33 times the spectrum needed for just the electric Smart Grid should be sufficient. Because of these observations, Sensus believes that 600 to 900 kHz of licensed, narrowband spectrum in the 900 MHz band is more than sufficient to allow two to three systems to operate in a region.

additional Smart Grid applications. Sensus believes the U.S. Smart Grid will grow organically from its Smart Metering start, as utilities representing another one half or so of the U.S. market purchase Smart Meter systems and utilities that have deployed Smart Metering systems add other Smart Grid features and functions.

Because of the commitments that utilities have already made and because we believe that the Smart Grid will grow organically from the Smart Metering base, Sensus recommends that, if the Commission takes any action with respect to allocation of spectrum for Smart Grid applications, that it adopt an incremental approach and NOT attempt to institute a sweeping new Smart Grid regime.

An unintended consequence of the American Recovery and Reinvestment Act of 2009 (ARRA) has been the delay in deployments for many Smart Metering projects that were already under contract. Many utilities decided to wait for Stimulus Funding, and did not want to limit such funding by deploying too many Smart Meters before the ARRA grants were announced. The prospect of allocating new spectrum for Smart Grid applications may further slow the growth of Smart Metering and the Smart Grid. Utilities may defer planned purchases of Smart Metering systems until new systems and equipment are proven in trial applications. If this were to occur, both the job creation benefits and technology acceleration benefits envisioned under the Smart Grid portions of the ARRA could be further diminished. Consistent with the incremental approach, Sensus recommends that the Commission focus on allocating between 300 kHz and 1 MHz of licensed spectrum in the 900 MHz band to Smart Grid operations, with channelization similar to that of the narrowband PCS or multiple address system (MAS) services. Sensus believes that a good place to start is for the Commission to re-auction MAS and other 900 MHz spectrum that has been reclaimed or was not auctioned initially. Sensus believes that the Commission could take this kind of incremental action relatively expeditiously without any particular concern regarding unintended consequences.

II. SENSUS' RESPONSES TO NOI QUESTIONS

Sensus is pleased to respond to some of the Commission's specific queries.

A. Suitability of Communications Technologies.

The Commission is properly focusing on individual applications instead of a generic concept of Smart Grid. Sensus believes that allocating a large block of spectrum based on an aggregate amount of bandwidth needed for the aggregate of every single Smart Grid application is a mistaken approach. Referencing the FCC's Smart Grid Workshop conducted on August 5, 2009, Sensus partially concurs with slide five of the slide deck presented by Trilliant, Inc., entitled "Bandwidth is Critical." Sensus concurs that the aggregate bandwidth required by most or all Smart Metering and Smart Grid applications requested by electric utilities adds up to approximately 10 Mbps. However, Sensus does not concur that this translates into a need for 10 to 30 MHZ of new spectrum. This is so because not every Smart Grid application goes to any given endpoint. In fact, only a few Smart Grid applications get delivered to any given endpoint at any one time and the 10 Mbps is a value of the aggregate data flows to a utility head end system. The total bandwidth needed to deliver one or two applications to each recipient is considerably less than what would be required to deliver every application to every recipient.

1. Network Technologies

Most Smart Grid systems are private, with a small amount of Smart Grid traffic currently traveling over commercial wireless networks. Nearly every radio-based Smart Metering or Smart Grid system utilizes one of two types of radio systems: (1) a mesh architecture transmitting over unlicensed frequencies, or (2) cellular architecture with a "star" or point-to-multipoint configuration transmitting over licensed frequencies. Sensus' FlexNet system utilizes the latter approach, operating over licensed frequencies in the 900 MHz band. Depending on the particular customer and the applications, FlexNet uses between 100 kHz and 300 kHz to deliver all currently requested Smart Metering and Smart Grid applications to an electric power network. FlexNet has a secondary, store and forward, capability in case of emergency or to engineer around a particular RF path or interference problem, with the primary FlexNet mode being a cellular, "star" architecture. By contrast, the mesh operators accept the problems associated with unlicensed spectrum in exchange for not having the expense of licensed spectrum. Sensus believes that mesh operation over unlicensed spectrum is an inefficient use of spectrum and should not be the model for the Commission's allocation of spectrum to Smart Grid.

A radio system operates where the received signal strength sufficiently exceeds the received noise. Unlicensed spectrum has increasingly high noise as these bands become ever more used by various devices. Further, FCC rules limit the power and height of transmitters operating over unlicensed spectrum. Consequently, unlicensed spectrum has high noise and low signal strength. This makes it increasingly difficult to operate in unlicensed spectrum. Mesh systems address this with several techniques. One typical method is to move messages from node to node (hence the term "mesh") until an appropriately noise-free path can be established. While this is effective in overcoming noise, there is a cost in bandwidth and latency. Each hop to the next node doubles the bandwidth that was used for the first hop. This imposes a cost of greater bandwidth used. Each hop also has a hidden cost in time because the intermediate node must decode encryption and authentication as well as start the transmission process to the next node. Most mesh systems also use a frequency hopping spread spectrum approach which spreads the message traffic utilizing approximately 50 to 83 channels, over many MHz of spectrum, in order to reduce the impact of noise and interference. These techniques are spectrally inefficient.

By contrast, Smart Grid systems using licensed spectrum, such as Sensus' FlexNet, take advantage of low noise levels found in licensed frequencies, and higher power and antenna height permitted under FCC rules. This greatly improves the chance of making a direct connection without having to hop from node to node. Sensus and others employ a "star" or point-to-multipoint configuration, along with cellular-like reuse of each frequency. This architecture reduces latency and uses ten to 50 times less bandwidth than mesh operations. Systems operating in licensed spectrum utilizing narrower bandwidth can be adapted for higher data rates. Sensus currently achieves over 29 KB/sec. in Part 24 and Part 101 licensed, narrowband channels utilizing state-of-the-art digital signal processing (DSP) techniques. Sensus certainly is not the only equipment manufacturer to do this. The Office of Engineering and Technology's equipment authorization web site routinely shows systems with high spectral efficiency on licensed frequencies.

From a public interest perspective, the FCC would need to allocate ten to 50 times less spectrum for Smart Grid operations simply by allocating narrowband, licensed spectrum with good propagation characteristics. As stated, Sensus recommends an allocation of 300 kHz to 1 MHz in the 900 MHz band, starting with re-auctioning the MAS licenses. The 10 MHz to 30 MHz of spectrum at 1.8 GHz that some are suggesting for Smart Grid is simply inappropriate. This is so for at least three reasons. First, as outlined previously, the aggregate bandwidth required for Smart Grid applications is significantly lower than estimated by some organizations arguing for new spectrum. Each recipient of a Smart Grid application needs to receive just one or two applications, not the full portfolio of applications. This makes the actual bandwidth used a fraction of the theoretical aggregate bandwidth required if every recipient were to receive every application. Second, licensed spectrum with a cellular, star architecture allows significantly more efficient use of spectrum. Third, propagation, incumbents and other factors make 900 MHz better suited for Smart Grid than 1.8 GHz.

2. Commercial Wireless Networks

Commercial wireless networks carry some Smart Grid traffic but are not well suited for certain Smart Grid operations. Many Smart Meters and other Smart Grid operations are located underground, in manholes, meter vaults, or in fault circuit detectors buried below manhole covers in New York City. Commercial wireless operators must install equipment specifically designed to reach each underground location. This creates a de facto private network. An analogy would be the Washington DC Metro system which had poor cellular service underground until the commercial wireless providers installed transmitters in the tunnels. Imagine the cost to a utility (or the operator if the operator bears the cost) for a commercial wireless operator to install a transmitter for nearly every manhole that has a meter or fault circuit detector. Sensus reaches underground locations efficiently using high-power, narrowband sub-channels, and when direct paths from the tower to the endpoint are not possible, endpoint-to-endpoint communication is implemented. Commercial wireless carriers are not likely to adopt these techniques unless a private network is built.

There are other issues making a commercial wireless network not well suited for Smart Grid operations. Generally an up-to-ten-second latency is accepted across a commercial wireless network , while utilities prefer a sub two-second latency. FlexNet demonstrates a one- to two-second latency.

The experience of 9/11 also illustrates how a commercial wireless network is not well suited for Smart Grid. After 9/11 and other disasters, the call volume on commercial wireless networks swamped capacity so that the commercial wireless networks effectively were not available even after they were brought back online. It took many days for traffic to return to normal on commercial networks and obviously during that time, the systems that would be needed to monitor and manage the grid would have delayed information. The utilities would be trying to manage their own restoration without adequate tools. A utility does not want to take a chance that its critical telemetry and Smart Grid signaling cannot be sent over a capacity-strained public network. Electric power companies respond to mini-emergencies all the time in the form of power outages. Electric power companies can roll their trucks and are very practiced in restoring service. Depending on the circumstances of a disaster, a utility likely could regain radio communications more efficiently by restoring its own private network than relying on others to restore the public network and then taking its chances on getting signaling through the capacity-strained public network.

CONCLUSION

The 10 MHz to 30 MHz of spectrum at 1.8 GHz that is being suggested for Smart Grid is simply inappropriate. Aggregate bandwidth required for Smart Grid applications is significantly lower than estimated by some commenters because each recipient of a Smart Grid application needs to receive just one or two applications, not the full portfolio of applications. Licensed spectrum with a cellular, star architecture allows significantly more efficient use of spectrum. Propagation, incumbents and other factors make 900 MHz better suited for Smart Grid than 1.8 GHz. If the Commission takes any action at all, Sensus recommends allocating 300 kHz to 1 MHz of spectrum in the 900 MHz band, starting with re-auctioning MAS spectrum.

Respectfully submitted,

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