Before the

Federal Communication Commission

Washington, D.C. 20554

In the Matter of

Comments Sought on the Implementation of Smart Grid Technology

NBP Public Notice #2

GN Docket Nos. 09-47, 09-51, 09-137

DTE Energy Comments

DTE Energy submits comments regarding Smart Grid Technology as it relates to a National Broadband Plan. DTE Energy is a public utility in the state of Michigan with both electric (Detroit Edison) and gas (Michigan Consolidated Gas) serving over 2 million customers. We support an action for a private broadband licensed spectrum for public utilities. The following comments are answers to questions from the September 4, 2009 Public Notice. DTE Energy's responses to those questions are bolded after each of these questions.

Included in this response are two tables for many Smart Grid and related applications, that detail both what network requirements are required along with what communication technologies are suitable to reliably and securely support providing delivering electric power and promote energy efficiencies to reduce greenhouse gas emissions.

a. What are the specific network requirements for each application in the grid (e.g., latency,

bandwidth, reliability, coverage, others)? If these differ by application, how do they

differ? We welcome detailed Smart Grid network requirement analyses.

Because of the complexity of this question, we have answered it in the following table:

Table 1 Smart Grid Applications versus Network Requirements.

		Network Requirements (see definitions below)										
Item	**Smart Grid and Related Applications**	AC Independence	Bandwidth Throughput Estimated	Coverage	IP Based & Routable	Latency	Network Managem ent Ability	Priority	Real Time Data	Reliability and Performance	Security	Standards Compliance
1	**AMI** Cell Relay to Electric Meters	Minutes, report customer outage	>200 Kbs	throughout entire electric service area	preferred	Medium	Yes	Medium	No	High	Physical-No Cyber-Yes	Preferred
2	**AMI** Electric Meters to Gas Meters	not required	< 20 Kbs	throughout entire electric and gas service area	not required	High	No	Medium	No	High	Physical-No Cyber-Yes	Preferred
3	**AMI** Collection Engine to Cell Relay	min. 4 hours to collect outage data	>200 Kbs	throughout entire electric and gas service area	Yes	Medium	Yes	Medium	No	High	Physical-No Cyber-Yes	Preferred
4	**Distributed Generation:** Transfer Trip & SCADA Wind, Solar, & Fuel Generators	8 Hour min., to manage loads	>20 Kbs	throughout entire electric service area	Yes	Low	Yes	High	Yes	High	Physical-No Cyber-Yes	Needed
5	**Distributed Intelligence** pole to pole Team mesh comm.	8 Hour min., to manage loads	>20 Kbs	throughout entire electric service area	Yes	Low	Yes	High	Yes	High	Physical-No Cyber-Yes	Needed
6	**Fault Data** File Uploads	8 hour min. to access data for timely restoration	>200 Kbs	throughout entire electric service area	Yes	Medium	Yes	High	No	High	Physical-No Cyber-Yes	Preferred
7	**Field Worker Access** Work & Time Management, Email, Document access	not required	>200 Kbs	throughout entire electric and gas service area	Yes	Medium	Yes	Medium	No	Medium	Physical-No Cyber-Yes	Preferred
8	**IED** Monitor & Control	not required	< 50 Kbs	throughout entire electric service area	Yes	High	Yes	Low	No	Low	Physical-No Cyber-Yes	Needed
9	**Physical Security**	Days	>512 Kbs	throughout entire electric and gas service area	Yes	Medium	Yes	Medium	Yes	Medium	Physical-Where Needed Cyber-Yes	Preferred
10	**Power Quality** Monitoring	not required	>200 Kbs	throughout entire electric service area	Yes	High	Yes	Medium	No	Low	Physical-No Cyber-Yes	Needed
11	**Relay Communication** Management	not required	>200 Kbs	throughout entire electric service area	Yes	High	Yes	Medium	No	Medium	Physical-No Cyber-Yes	Preferred
12	**Remote Configuration** Downloads	not required	>200 Kbs	throughout entire electric service area	Yes	High	Yes	Low	No	Low	Physical-No Cyber-Yes	Preferred
13	**SCADA** Central EMS to Sub Transmission Pole Device	72 hours	>20 Kbs	throughout entire electric service area	Yes	Low	Yes	High	Yes	High	Physical-No Cyber-Yes	Needed
14	**SCADA** Central EMS to Substation	72 hours	>256 Kbs	throughout entire electric service area	Yes	Low	Yes	High	Yes	High	Physical-Most Locations Cyber-Yes	Needed
15	**SCADA** Substation to Distribution device	72 hours	>20 Kbs	5 miles radius of substation: throughout entire electric service area	Yes	Low	Yes	High	Yes	Medium	Physical-No Cyber-Yes	Needed
16	**Smart House:** Customer Comm. to the Internet	not required			Yes	Medium	No	Low	No	Medium	Physical-No Cyber-No	Needed
17	**Smart House:** Utility Comm. To the Home	not required			Yes	High	Yes	Low	No	Medium	Physical-No Cyber-Yes	Preferred
18	**Smart House:** Utility Comm. within the Home e.g., Thermostats, Electric Vehicle	not required			not required	High	No	Low	?	Medium	Physical-No Cyber-Yes	Preferred
19	**Smart House:** Customer Comm. within the home	not required			not required	Medium	No	Low	Yes	Medium	Physical-No Cyber-Yes	Preferred
20	Utility to Utility Comm.		> 1 MBs		Yes	Low	Yes	High	Yes	High	Physical-Yes Cyber-Yes	Needed
	Definitions:											
	AC Independence		After the loss of electric service, what applications need backup power to provide restoration and for how long.									
	Bandwidth		Estimated or tested data rates are required to support this application during normal and emergency conditions									
	Coverage		Geographic areas that these networks are required to operate.									
	IP Based & Routable		Does this Smart Grid Application operate over an IP based routable network?									
	Latency Real Time Data		How quickly does field data need to be updated? **Low** indicates real time data is required.									
	Network Management Ability		How well can the Utility Company manage the Telecommunication network equipment for failures?									
	Physical Security		Remote Cameras, entrance etc.									
	Priority		How important is this data over other network data?									
	Reliability		How many service interruptions are tolerated and how well must this network provide accurate data?									
	Security		How secure must the network be from cyber and physical attacks?									
	Standards Compliance		How important is compliance with national standards for interoperability?									

b. 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?

This response has been tabulated to show which communication technologies are suited for which Smart Grid application.

Table 2 Smart Grid Applications versus Communication Technologies

		Communication Technologies Leased Suitability					Communication Technologies Private Suitability							
Item	**Smart Grid and Related Applications**	Analog Phone Services	Mobile Data Services	Data Service T1, Frame, Ethernet	Fiber	Satellite	FCC Licensed Narrow Band	FCC Licensed Wide Band PMP*	Fiber	Licensed Microwave	Unlicensed 900 MHz	Unlicensed 2.4 GHz	Unlicensed 5.x GHz	WiMax 802.16 3.65 MHz
								* When Available				802.11 802.15 ZigBee		
1	**AMI** Cell Relay to Electric Meters	No	No	No	No, to costly	No	No	No	No	No	Yes	No	No	maybe
2	**AMI** Electric Meters to Gas Meters	No	No	No	No, to costly	No	No	No	No	No	Yes	Yes	No	No
3	**AMI** Collection Engine to Cell Relay	No	Yes Limited cases	No	No, to costly	Very Limited	No	Yes	Yes Limited cases	No	Yes Limited cases	No	Yes, cost effective for major substations	Yes
4	**Distributed Generation:** Transfer Trip & SCADA Wind, Solar, & Fuel Generators	No	No	No	No, to costly	Limited when latency can be tolerated	limited	Yes	No	No	Yes Limited cases	No	Yes, cost effective for major substations	Yes
5	**Distributed Intelligence** pole to pole Team mesh comm.	No	No	No	No, to costly	No	No	Yes	No	No	Yes Limited cases	No	No	No
6	**Fault Data** File Uploads	No	Yes	No	No, to costly	No	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Yes
7	**Field Worker Access** Work & Time Management, Email, Document access	No	Yes	No	No, to costly	No	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Limited
8	**IED** Monitor & Control	No	Yes	No	No, to costly	No	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Limited
9	**Physical Security**	No	No	Yes, cost effective for major substations only	No, to costly	Yes	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Yes
10	**Power Quality** Monitoring	No	Yes	No	No, to costly	Limited	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Yes
11	**Relay Communication** Management	No	No	No	No, to costly	Limited	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Yes
12	**Remote Configuration** Downloads	No	No	No	No, to costly	Limited	No	Yes	Yes Limited cases	No	Yes Limited cases	No	No	Yes Limited cases
13	**SCADA** Central EMS to Sub Transmission Pole Device	No	No	No	No, to costly	No	Yes Limited cases	Yes	No	No	No	No	No	Yes
14	**SCADA** Central EMS to Substation	No	No	Yes, cost effective for major substations only	No, to costly	Yes, latency is acceptable for smaller substations	No	Yes	Yes, cost effective for major substations	Yes, cost effective for major substations	Yes Limited cases	no, due to RFI and propagation limitations	Yes, cost effective for major substations	Limited, where RFI and propagation limits can be overcome
15	**SCADA** Substation to Distribution device	No	No	No	No, to costly	No	No	Yes	No	No	Yes Limited cases	No	No	Yes Limited cases
16	**Smart House:** Customer Comm. to the Internet	No	Yes	Yes	No, to costly	N/A	No	Possible but not Desired	No	No	No	No	No	No
17	**Smart House:** Utility Comm. To the Home	No	Yes, but not cost effective	No	No, to costly	No	No	Possible but not Desired	No	No	Yes	No	No	No
18	**Smart House:** Utility Comm. within the Home e.g., Thermostats, Electric Vehicle	No	No	No	No, to costly	No	No	No	No	No	No	Yes	No	No
19	**Smart House:** Customer Comm. within the home	No	No	No	No, to costly	No	No	No	No	No	No	Yes	No	No
20	Utility to Utility Comm.	No	No	Yes	No, to costly	Yes	No	maybe	maybe	maybe	No	No	maybe	No

c. 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.

Refer to table 2. Based on each individual Smart Grid application, different technologies were suitable for select cases.

d. 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?

AMI: Cellular Data is suitable for some of the WAN (collection engine to Cell Relays) communications. Since we are depending on our AMI meters to provide current ands detailed outage information during storm emergencies and we have experienced Cell Data service outages as a result of storms, we prefer to provide a diversification of leased and private so as to improve our outage information accuracy.

SCADA in Substations: Leased wired data service into substations is a suitable solution for a percentage of sites. Since we have experienced a loss of this service during a wide area power outage (when we need our SCADA communication the most) we choose to distribute this throughout our service area so as not to lose several substations in one area. Also, our reluctance to install too many new leased service is because of the long and costly delays the TelCo has performed in the past. We have numerous examples of the TelCo taking over 6 months to provide service along with repeated "no-shows" by installers while our valuable technicians are waiting for them, many believe our technicians would be better off installing our own private communications instead of wasting time waiting for "no-show" TelCo installers. It is an agreed consensus that leased wireless data services, such as cellular, is not suitable to provide reliable and real time data. Electric utilities need to have a great control over all aspects of the electrical network that includes the communications required to maintain it. As we move towards smarter devices on our electrical distribution networks to improve customer service and reduce emissions, we become more dependent on the communications network. Therefore, for this communication network, we need to have a greater control of performance, scheduling of maintenance upgrades, quality of service, latency, and the technologies supported. Historically, cellular data service providers do not work with us to manage scheduled or unscheduled outages, we are lumped with other users competing for bandwidth, and the services (including technologies) is not driven by our needs, but rather their best money making consumer market.

SCADA at Sub-transmission and Distribution poles: We have not found any leased commercial service suitable for this SCADA communications. Many for the same reasons stated above for substation located SCADA. Coverage is also another major factor for this category. If given the right private frequencies and bandwidth, we can build private networks customized to meet our very specific needs. Our cellular service providers will not build a new cell site to provide coverage for our 12 to 20 distribution devices at each substation area.

How could current networks be improved to make them adequate, and at

what cost?

Commercial networks could be improved to suit our needs:

1. **If they are willing to build coverage to meet our needs.**
2. **If they are willing to give us priority of service over their other users out to the end device.**
3. **If they are willing to meet the NERC CIP 002 through 009 requirements and be open to have the utilities along with the federal authorities perform a review of their procedures for both cyber and physical security.**
4. **If they are willing to provide a minimum of 72 hour AC independence for their entire network path between our interfaces with them. That is, not only their data centers, but their remote field equipment such as SLC (subscriber loop carrier) huts. Even though these remote devices are battery powered, their capacity is short lived and often not maintained.**
5. **If they are willing to have their Network Operations Centers work tightly with ours to communicate network problems and schedule system network upgrades.**
6. **If their technology development and implementation was more aligned with our needs.**

If this adequacy varies by application, why does it vary and in what way?

Refer to the above chart. This chart demonstrates the many different network requirements for each of the smart grid applications. From this it is shown that commercial leased services do fit some needs and do not fit others.

e. How reliable are commercial wireless networks for carrying Smart Grid data (both in

last-mile and backhaul applications)?

Wired commercial service has shown to be reliable with the exception of DSL and analog dedicated lines. However, installation and service are often long and challenging. When there is major fiber cut, service is usually repaired promptly. When we have problems with decade old copper cables feeding our facilities, there has been much reluctance to permanently repair or replace the last few

thousand feet of overhead and underground cables. We have a decade history of numerous leased lines that fail, for a day or two, quite consistently whenever it rains.

Wireless commercial services are not reliable enough especially when we most need them, during a storm emergency. Unfortunately, the same storm that takes our power lines down and puts our customers out of service, very often causes their networks to fail. This failure is due to power lost at the cell tower (despite batteries and maybe generators), lost at the wired communication electronics between the cell tower back to their data centers, and on some occasions, power lost at their data centers.

Are commercial wireless networks suitable for critical electricity equipment control communications?

No.

How reliably can commercial wireless networks transmit Smart Grid data during and after emergency events?

As stated above, they are not reliable enough during a storm emergency.

What could be done to make commercial wireless networks more reliable for Smart Grid

applications during such events?

Commercial wireless service providers would need to give power utilities priority service through their network (out to the end device), eliminate all of the AC and storm susceptible links in their communication links, and have their Network Operation Centers work very closely with the utilities to manage (e.g., prioritize) outages.

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

We have designed our private communication networks for smart grid applications with:

(1) Suitable bandwidth to support the emergency communications (not just routine monitoring), (2) power backup to all communications equipment, and (3) an architecture that is most direct & simple along with having diverse path routing.

2. Availability of Communications Networks. Electric utilities offer near universal service, including in many geographies where no existing suitable communications networks currently exist (for last-mile, aggregation point data backhaul, and utility control systems). We seek to better understand the availability of existing communications networks, and how this availability may impact Smart Grid deployments.

You are correct in that both wired and wireless commercial leased services can be very challenging in some areas we need to have communications. Wired providers have been a problem at times in that it may require two or three local phone companies to provide end-to-end service. The problem with multiple phone companies is the inconsistency between them when it comes to installation, billing, and maintenance. We have had working circuits intentionally taken out of service because of discrepancies between companies and have had very long service repairs because of "finger pointing".

Wireless commercial service has been a problem with coverage and lack of newer services, such as 3G, in several rural areas. Private wired and wireless communications at DTE Energy reaches out all existing areas we need it however, it does not have the throughput capacity to support these new Smart Grid technologies. Our current licensed wireless network can only support low speed serial communications and is limited to only one SCADA protocol per network path. That is, it cannot support medium speed IP multi protocol IP based communications.

a. What percentage of electric substations, other key control infrastructure, and potential

Smart Grid communications nodes have no access to suitable communications networks?

As we have described above, 100% of both wired and wireless leased commercial services are not suitable to support the reliability and security requirements for Smart Grid.

Less than 5% of DTE Energy substations have enough private wired (fiber) and wireless (licensed microwave) bandwidth to provide Smart Grid communications. These are at key locations where this service was cost justifiable. We have 1 % of our distribution equipment (outside of substations) with bandwidth suitable Smart Grid communications.

What constitutes suitable communications networks for different types of control infrastructure?

We welcome detailed analyses of substation and control infrastructure connectivity, potential connectivity gaps, and the cost-benefit of different alternatives to close potential gaps.

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

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

d. 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.

3. Spectrum. Currently, Smart Grid systems are deployed using a variety of communications technologies, including public and private wireless networks, using licensed and unlicensed spectrum. We seek to better understand how wireless spectrum is or could be used for Smart Grid applications.

Smart Grid Communication Network Description

The Smart Grid will have an open architecture communication network that will meet the reliability and robustness required to provide services to customers when they are needed. Having this robust communications network will help in restoring power sooner, provide real time information, control energy efficiency devices, and expedite field crews that will lead to reducing emissions. Also, the objective will be to eliminate purely manual restoration processes and field inspections.

The successful Smart Grid communication network will be better achieved by having a wideband FCC licensed power utility dedicated radio spectrum instead of shared unlicensed and uncontrolled spectrum and/or being dependent on an uncontrollable leased commercial service. The benefit to the utility customers (residential, commercial, and industrial) will be to provide more reliable power (reduced frequency and duration of outages), greater power quality (reduced surges and sags), and reduce carbon emissions (reduce power losses). A private radio system can accomplish these goals better by allowing the power utilities to custom design their networks to meet these exact needs and giving them the maximum control over that network to maintain its integrity and security.

The need to support all critical aspects of Smart Grid has been included from the very start in the designing of our next generation operations communication network. This network has been designed and installed to support a large variety of current and expected future Smart Grid and related applications such as SCADA, AMI, substation monitoring (including Relay Communications, Power Quality, and intelligent electrical devices), physical security devices, Distribution Management System (DMS) devices, along with Smart Home. Also, it has been designed to support the traffic for future field devices including mobile crews and fault data. The design aspects of this network centers around recovery during a major event such as a storm for: reliability, AC independence, simplicity, diversification/robustness, and performance.

Data security is a major design factor from the very beginning and the network supports upgrades as security requirements have been established such as the NERC CIP regulations.

AMI and Smart Home will be supported by this communication network to backhaul data between the Itron meter mesh network and our multiple data centers in Michigan. Also, the HAN (Home Area Network) ZigBee data traffic from smart thermostats, electric vehicle charging stations, smart appliances, load management control devices, etc. will also be transported over this network. The robust and low latency design of this communication network will provide for efficient and satisfied customer service. Also, customer usable applications such as time of use energy management during peak periods will be securely and reliably transported to support this load and cost reduction processes.

Distribution grid communications to both electrical substations and distribution devices will also be made over this same communication network. This communications will allow our operations centers to monitor any degradation (such as equipment alarms, low voltage conditions, or high temperature) in our electrical network that may lead to a customer power outage. Also, by having robust and reliable communications to distribution switches and capacitors, our operation center will be able to reconfigure the power lines to restore power, improve power efficiencies (voltage regulation and capacitor control) and correct power quality conditions to minimize the risk of damage to customer equipment. Having a dedicated and controllable network with diversified communication paths will improve our chances on making sure this vital communication, during a critical emergency, is successfully transported.

Distributed energy resources data communications network will provide SCADA and transfer trip functionality as needed for wind turbine and solar panel sites. This communication network will be crafted to have several key requirements met such as low latency and security to make sure customer located wind turbine's availability is maximized to reduce carbon emissions elsewhere. Making sure that this network is secure is critical to prevent the integrity of operations from being compromised. Also, since some wind generators are required to be automatically tripped off line when there is a distribution circuit problem, this network will provide the communications to reliably and quickly support this action that protects customer equipment and provides safety for restoration workers.

This operational communication network will have network management capabilities to detect failed components and diagnostics to expedite service. The 24x7 monitoring of this network will provide timely responses with the correct technician and parts so that not only outage time is reduced but fuel emissions will be minimized. Timely system restoration will mean reduce chance of power interruption for customers. Also, an efficiently managed system reduces overall O&M costs which reduces customers service rates. Using leased commercial services provides a blind spot when it comes to managing the communication network. Even though the commercial service providers

have their own network management, it has been our experience, especially over the last 10 years as these companies have grown nationwide, that we have become a less and less significant customer to them when it comes to service. Since a wide area power outage will also disrupt commercial communications (loss of AC power to their equipment and added traffic congestion), we need networks designed for these types of emergencies. We need to have service priority and better network management between us.

a. How widely used is licensed spectrum for Smart Grid applications (utility-owned, leased, or vendor-operated)? For which applications is this spectrum used? We welcome detailed analyses of current licensed spectrum use in Smart Grid applications, including frequencies and channels.

We use private licensed narrowband 900 MHz MAS (952/928 and 940/932 MHz) radio data extensively throughout our entire electric service area to communicate to hundreds of substations and about a thousand pole-top-devices for SCADA communications. We use about 39 different MAS frequencies on approximately 109 FCC authorized licenses to make up this communication network. The narrow bandwidth (12.5 KHz channel) of this licensed wireless communication network limits the data speeds to be between 9.6 and 19.2 Kbs. Our radio network uses a serial (non IP) based protocol to work in this narrowband. There is a very limited and immature market for IP based radios to work in this narrowband, hence additional protocols required by new Smart Grid applications are not workable over this network.

b. How widely used is unlicensed spectrum? For which applications is this spectrum used?

We welcome detailed analyses of current unlicensed spectrum use in Smart Grid applications, including frequencies and channels.

We use unlicensed 902-928 MHz in addition to the licensed channels described above for our SCADA communication network. Difficulty on obtaining additional spectrum and the occasional need for wider bandwidth has driven us to use these unlicensed channels. Because of the lower power, higher noise floor, and potential for interference in these unlicensed frequencies, they are used for much shorter and less critical communication paths. We have less than 50 SCADA circuits on this unlicensed 900 MHz system. Since wider bandwidth channels that support IP are readily available on these unlicensed 900 MHz channels, we have implemented less than a dozen Smart Grid type applications that support multiple uses including SCADA, AMI, Relay, Power Quality, and network access.

We are using the 5.8 GHz unlicensed channels for point to point high bandwidth links to provide backhaul for some of these above networks.

c. Have wireless Smart Grid applications using unlicensed spectrum encountered interference problems? If so, what are the nature, frequency, and potential impact of these problems, and how have they been resolved?

Yes, we have encountered interference in urban, suburban, rural, commercial, and industrial areas and weigh heavily the risks associated with using them. The rural interference is from WISPs (Wireless Access Service Providers) that blanket many of the small towns where we also need to place communications. Industrial areas use this same spectrum for their own data and video needs. I would estimate our chances of finding an area clean enough is less than 50%, today. It is uncertain as more consumer and commercial products flood the unlicensed bands with more traffic, we are very concerned that this percentage will drop significantly. We want to build communication networks once and correct and not have to go back and suffer and adjust for performance degradations from these outside uncontrolled sources of unlicensed RF.

d. What techniques have been successfully used to overcome interference problems, particularly in unlicensed bands?

We have mitigated problems many times by first doing extensive testing before construction then designing a licensed system if interference was found. We have occasionally been able to minimize interference by using more directional antennas, locking out some frequencies, and keeping the paths relatively short.

e. 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.

The current licensed bands available for power utilities are not suitable for Smart Grid. Every licensed channel available for power utilities allows for only for narrowband use and that is not suitable to support the data requirements for Smart Grid.

Smart Grid requires wideband services to support communications between substations, System Operations Centers, and field devices like distribution switches, breakers, capacitor banks, and various other field devices. Automated Meter Infrastructure requires wideband service to retrieve customer load profile data back to the Meter Data Management system and to support Smart Home HAN communications to each customer.

The wideband unlicensed bands have become unusable because of interferers and the lack of control. Licensed bands for utilities are narrowband and thus unsuitable for Smart Grid applications. Leased data carrier services (ie: cellular) do not have the reliability, availability, and do not meet the security requirements required by NERC CIP 002-009.

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

Yes

There is a great need to provide the power utility industry nationwide, including those areas adjacent to Canada and Mexico, with a primary user and dedicated wideband channel that will have high power, numerous antenna options, and 5 to 10 mile propagation characteristics from reasonable height antennas. Also, what is needed, is local support to accept this private communications within their communities.

i. Coverage: What current and future nodes of the Smart Grid are not and will not be in the coverage area of commercial mobile operators or of existing utility-run private networks? We welcome detailed descriptions of the location, number and connectivity required of each node not expected to be in coverage.

Currently there are no suitable commercial (wired and wireless) or private networks to meet our Smart Grid needs at any of our locations. Each of our options have a risk factor that makes them un-suitable for long term reliability.

ii. Throughput: What is the expected throughput required by different

communications nodes of the Smart Grid, today and in the future, and why

will/won't commercial mobile networks and/or private utility owned networks on existing spectrum be able to support such throughputs? We welcome detailed studies on the location and throughput requirements and characteristics of each communications node in the Smart Grid.

Throughput rates per Smart Grid Applications are detailed in the Table 1 above.

iii. Latency: What are the maximum latency limits for communications to/from different nodes of the Smart Grid for different applications, why will/won't commercial mobile networks be able to support such requirements, and how could private utility networks address the same challenge differently?

Latency rates per Smart Grid Applications are detailed in the Table 1 above. The Commercial service Latency rates for the majority of Smart Grid applications are not a problem. However, there are

some very critical timely applications that require real time data. For example transfer trip, sub-transmission monitoring, and high speed breaker operation require very fast response times to manage network irregularities and perform network real time power flow node analysis. From our experiences, leased wired services provide good low latency values, while some wireless latency rates are inconsistent. We have been told by our cellular carriers that when a cell site experiences a lot of congestion for data, all users will be served, however, traffic speeds will be reduced for that period of time. This occasional reduction in data rates has been experienced several times by our test teams in the Detroit and suburban Detroit area during afternoon peak periods.

Low Latency on a private system is accomplished in the design. As a network is custom designed for those applications requiring low latency, then only appropriate technologies are chosen such as ones we would have full control over the medium. There has been numerous times when no wireless solution could be found and a very costly fiber system was the only viable solution.

iv. Security: What are the major security challenges, and the relative merits and deficiencies of private utility networks versus alternative solutions provided by commercial network providers, such as VPNs? Do the security requirements and the relative merits of commercial versus private networks depend on the specific Smart Grid application? If so, how?

Whenever we use commercial services and our end devices support all the best security practices, we implement the security encrypted tunnels between each of our end devices and not depend on the carrier for security. If these end devices do not support the security tunnels, we need to depend on the carrier. The reason we are reluctant to depend on the carrier is that we have no control as to who they have, and who they will have in the future, that will have access to our data. Also, we have no control or knowledge (and perhaps no good means to monitor) if they may inadvertently open our routable circuits to the public Internet as a result of them performing a system upgrade or configuration change. If these circuits are transported between multiple carriers, then this risk is further exasperated.

When we design private circuits to transport our sensitive data, security is designed into that design so that we have the maximum control and not involving an outside unmanaged resource.

v. Coordination: Are there benefits or technical requirements to coordinate potential allocation of spectrum to the Smart Grid communications with other countries? What are they?

Since DTE Energy no longer has transmission (we have generation, sub-transmission, and distribution) we do not coordinate power with another country. However, since the majority of our

service area is above line A, we are subject to many frequency issues with Canada. As the FCC well knows, numerous frequencies in an allocated band have been unavailable to above Line A licensees, such as a portion of the MAS band that is designated as "Canadian Only". Also, individual license requests have taken 6 to 24 months because of the coordination process dealing with Industry Canada. We have several cases where frequencies we have been already authorized to operate on are also now shared (co-channel or adjacent channel) with a Canadian user without our consent. To make it worse, we are then subject to their coordination decision when we may want to make a modification to that channel. What is needed is a prearranged agreement with Canada so that are not subject to any coordination requirements and not prevented access to valuable spectrum.

vi. Spectrum allocation: Are there any specific requirements associated with Smart Grid communications that require or rule out any specific band, duplexing scheme (e.g., FDD vs. TDD), channel width, or any other requirements or constraints?

Yes there are many spectrum requirements that are required to provide a suitable network to support the most critical Smart Grid applications. They are:

Frequency: In order to practically construct private communications, frequency propagation and antenna heights need to be considered to allow 5 to 10 miles distances on structures less than 100 feet so they are generally more accepted by different communities.

Bandwidth: Bandwidths that allow for several Mbs are required for backhaul links, whereas bandwidths of 200 to 500 Kbs are required to support point to multi point communications out to pole mounted distribution devices.

Duplexing Scheme: Either TDD and FDD are acceptable for those applications with reasonable latency requirements. If the bandwidth was large enough to support short (e.g., 5 msec.) TDD rates, then virtually all latency issues we are aware of would be met.

Primary Access: Limitations from co-channel users will make it very difficult to design, license, construct, and manage a network. Licenses should at best, be coordinated for exclusivity, as primary users. At worst wideband licenses should mandate contention based protocols and be exclusive to utilities.

Adjacent Band Interference: We recommend guard channels between unlicensed and licensed bands to reduce interference.

Site versus Area Licensing: Licenses should be large areas of operation not per base station site with radius of operation. Large area licenses will allow streamlined coordination and licensing.

Technical Limitations on power, antenna gains, antenna heights, emissions, protocols:

Fixed and mobile limitations: ERP values for mobiles should be constant with base station ERPs so the systems are balanced.

Inter Power Utility Sharing: Since we have adjacent and overlapping power utilities, a suitable process would need to be made to fairly share this frequency band using exclusive licensing or contention based protocols.

g. If spectrum were to be allocated for Smart Grid applications, how would this impact current, announced and planned Smart Grid deployments? How many solutions would use allocated spectrum vs. current solutions? Which Smart Grid applications would likely be most impacted?

Since Smart Grid will be constructed for at least the next decade, therefore this question is very difficult to answer with any accuracy. Ideally, if a suitable wideband channel were made available, then we would foresee a great percentage (e.g., 75%) of our Smart Grid network using it. We would still use a percentage (e.g., 25%) for leased commercial services to meet special case needs and cost benefits. We are currently deploying Smart Grid application using existing available spectrum, however the current spectrum is not reliable and does not have the needed bandwidth for extended growth of all Smart Grid applications. This places us at risk. When new secure spectrum does become available, then we would then go back and upgrade the current plans with this new solution so as improve performance, reliability, and security.

The above responses summarizes that in addition to the commercial communication services we already use, public utilities need private spectrum that allows them to better manage their control of the network communications that allows the Smart Grid power technologies to operate. Since communications is a vital link in making all of Smart Grid work, in order for power utilities to control Smart Grid, they need to control the communication network.

Respectfully Submitted,

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