



April 17, 2009

Commonwealth of Pennsylvania
Pennsylvania Public Utility Commission
Box 3265
Harrisburg, Pennsylvania 17105-3265
Attn: Secretary James McNulty

Re: Smart Meter Procurement and Installation Plans
Docket No. M-2009 2092655

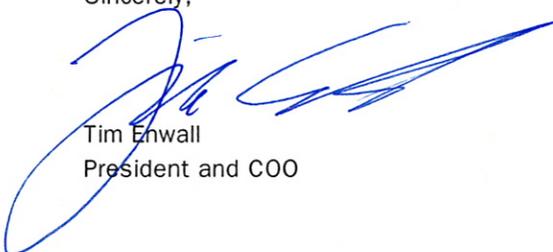
Dear Mr. McNulty,

Attached please find the comments of Tendril Networks, Inc. in regard to the docket referenced above. We appreciate the opportunity to submit these comments and look forward to further engagement with the Commission and staff on this important matter.

In addition to fifteen copies (enclosed), we have submitted these comments by electronic copy to the Commission's Act 129 e-mail account at ra-Act129@state.pa.us.

Should you have any questions or concerns, please contact me as indicated below.

Sincerely,



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COMMENTS OF TENDRIL NETWORKS, INC.

In Regard to Additional Questions Related to the Commission's Smart Meter Procurement and Installation Program at Docket No. M 2009 2092655

Tendril Networks is pleased to provide these comments to the Pennsylvania Public Utility Commission in response to the current proceedings in Docket Number M 2009 2092655. These comments focus on specific areas in which Tendril Networks has particular expertise related to the Home Area Network (HAN).

Tendril Networks is focused on developing solutions that enable true 21st century energy efficiency by establishing a dialog between consumers and their energy providers. The Tendril Residential Energy Ecosystem (TREE) is an open, extensible and standards-based Residential Energy Management System (REMS) that connects “smart” consumer devices (like thermostats and outlets) to existing utility back office applications and rich consumer portals.

General Remarks

Development of a “smart grid” has forcefully emerged as a national priority; yet individual states will be responsible for establishing implementation strategies and creating plans appropriate for each state market and each electric distribution company (EDC). In this context, we offer some general remarks describing “guiding principles” that we believe should be considered.

The Energy Independence and Security Act of 2007 established that, “it is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth...” This national policy includes, “provision to consumers of timely information and control options.” This policy was reinforced through funding provisions of the American Recovery and Reinvestment Act of 2009.

In March 2009, the Federal Energy Regulatory Commission issued a proposed policy statement and action plan that noted, “ultimately, the Smart Grid will facilitate consumer transactions and allow customers to better manage their energy costs.” We believe that providing information tools to the consumer is consistent with national policy. We also believe that these objectives are consistent with the goals established in Pennsylvania’s Act 129 of 2008.

In the Implementation Order for this proceeding, the PUC has stated that, “the Commission believes that the true usefulness of smart meters is to provide information to empower customers to control their electric use.” The Order further delineates minimum requirements including “non-discriminatory” and “open, non-proprietary two-way access” to smart meters and data.

We agree that open, non-proprietary consumer access to usage information is a guiding principle for development of policies governing smart grid technologies. We also believe that such access will accelerate technology innovation and help the consumer realize additional energy efficiency

benefits. In this regard, we support the efforts of the PUC to pursue multiple policy avenues that support greater access to information, consumer choice and consumer control of their energy usage.

OpenSmartGrid (“OpenSG”) Working Group

Many of our responses to the specific questions posed by the PUC reference the OpenSmartGrid (“OpenSG”) Working Group of the Utility Communications Architecture International Users Group (the “UCA IUG”). This is a Users Group comprised of utilities (who are the exclusive voters of all standards, requirements and policies that represent the utility industry) that represent more than 25% of all residential customers in the United States.

Separately, we strongly encourage the Commission to adopt and reference the UCA IUG and the working groups such as OpenSG. This is a very active, very large group that we believe is the most effective, open group that is working toward open smart grid standards, requirements and interoperability. We believe it is the authoritative source for technology-oriented requirements for the utility industry.

More information is available from <http://osgug.ucaiug.org>.

Public Utilities Commission of Texas Policy

Additionally, many of our responses reference the Public Utilities Commission of Texas policy on advanced metering and HAN data. We believe that this policy (which preceded many of the recent recommendations from the OpenSG Working Group) is a robust model that Pennsylvania should consider. We hope that the Pennsylvania PUC will adopt similar policies. In particular, we note that under this policy AMI must be capable of providing consumers with direct, real-time access to electricity usage data, that data must be stored on the meter in a form that complies with nationally-recognized non-proprietary standards, and that AMI must be capable of communicating with other devices on the premises, such as monitoring devices, load control devices, and prepayment systems. Further, the Texas legislature has established that consumers will not have to pay an additional fee or have to obtain special permission to view their data.

These recommendations are summarized (with supporting references) in the “Public Utility Commission Report to the Legislature on Advanced Metering (September 2008.)” This report is accessible from:

http://www.puc.state.tx.us/electric/projects/34610/Commission_Report_on_Advanced_Metering_2008.pdf

Specific Comments:

1. Overall Adaptability:

- a. *Should there be some common “plug and play” format and/or hardware on the meter to accommodate future technology changes? If so, provide suggested standards for this capability.*

We believe that accommodating future technology changes should be a key objective. We note further that FERC, in their recently issued Draft Smart Grid Policy Statement, provide Interim Rate Policy guidance that includes a provision that applicants seeking cost recovery must, “show that the applicant has minimized the possibility of stranded investment in Smart Grid equipment by designing for the ability to be upgraded, in light of the fact that such filings will predate adoption of interoperability standards.”

Attempting to establish a single “standard” or a technology solution must recognize the rapid pace of technological advancement. Many elements of the communications hardware associated with the meters can be expected to have technology improvements within a 3-5 year cycle. (Most of the networking industry achieves significant advances in a 5-year timeframe.) Consumers should be able to benefit from these advances and enabled to directly upgrade to new technologies as they become available.

In this regard, we believe that requirements should provide for modularity at the communications interface for the meter. This allows the metrology of the meter to have a longer useful life (and depreciation schedule) while the communications interface can be upgraded. It is also critical that the communicating meters have the capability of upgrading software (often called firmware) remotely.

Currently, we note that the depreciation schedules for modern high-technology do not adequately match to depreciation cycles of metrology and other base electricity technology. This discrepancy should be anticipated and reflected in policy decisions by the PUC.

2. Home Area Network (HAN) Protocols:

- a. *What HAN protocol may be appropriate from the meter to the customer? What HAN open protocols are most readily available and accessible to customers? Should the Commission standardize a protocol? Should there be more than one protocol?*
- b. *Should smart meter information be available through a HAN or an internet browser? If through an internet browser, should this come from a website, or directly from the meter, or both? Through which browsers should this be made available?*
- c. *Should there be other interconnectivity between the meter and other equipment in the home? If so, how much? [read capability vs. two way communication]*

Overall, we believe that the PUC should accept any “nationally recognized, non-proprietary standard,” in a manner similar to the Texas PUC. Currently, there are many network communication protocols available, including 802.11 (WiFi), 802.3 (Ethernet), 802.15.1 (BlueTooth), 802.15.4/ZigBee, cellular, HomePlug, and many others. The most important factor is that these protocols (and others) are governed by standards-making body that is open, have an open governance process, have unrestricted IP rights and allow multiple sourcing options for that technology standard. We note that only ZigBee and HomePlug have actually been built into meter interfaces in any meaningful volume at the current time.

We do not believe that the PUC should standardize any protocol in a manner that would restrict future innovation and communications platforms. Specifically, we believe that information should be available to the consumer through ANY available communications channel (including internet and HAN). There is no sound reason to limit the access to

information and the Smart Energy Profile (open standard) assumes that this data is available.

The Smart Energy Profile reflects most of the common on-the-market smart meter data into the HAN interface so that it can be available to the consumer in the house. This information is therefore available to the consumer via the Internet or any communications medium they deem appropriate.

We believe that direct, near-time access to information is critical to achieving energy savings goals. Further, it is extremely important to accommodate two-way communication through the meter interface.

3. Utility usage data and meter access:

We note consumers and policy makers have identified key concerns related to energy efficiency, renewable power, grid reliability and real-time information about critical events. Therefore, information available to the consumer should anticipate data types beyond basic consumption patterns. The OpenSG Working Group has established requirements that specify (and continually update) the data types that are available, at which interfaces and that establish rules related to best practices in the industry. We believe that consumer equipment should have the ability to respond, automatically, to this kind of renewable mix, grid reliability, emergency and load control event information in all of the same ways as usage and price information.

a. What usage data should the utility acquire through the smart metering system?

We strongly recommend the Commission adopt the usage data requirements outlined by the utility industry in the OpenSG documents related to usage data. Similarly, we believe that the rich and detailed requirements established by the State of Texas in their recent rulemaking proceedings offer a robust model for the Pennsylvania PUC.

b. Should the Commission establish minimum standards on how often the utility should acquire the usage data from the meter?

c. Should the Commission establish minimum data intervals? If so, what should that be? [Examples: 15 minute, 30 minute, 1hr]

d. What minimum timeframe should the Commission establish on when usage data is made available by the Meter Data Service Provider (MDSP, usually the EDC) to the EDC, CSPs/EGSs and customers, respectively?

We believe the OpenSG Working Group requirements represent an appropriate recommendation at this time as they balance the available technology, and costs of technology, with frequency of updates. Inside the home, we believe there should be a mandated minimum of availability of appropriate consumption data every 15 seconds. Studies have shown that maximum consumer behavior changes results when the consumer can see their consumption patterns in near real-time and within a 15-second window. Current technology is fully capable of providing this level of access. The data demands of the EDC should not establish a limit for the consumer. Any limitations on the data available to the consumer will only serve to unnecessarily limit the consumer benefit. For data that is coming through the EDC and/or MDSP, we believe that a daily

minimum interval is appropriate. For data that is available directly through the HAN interface, we believe that 15 seconds is an appropriate interval given current technology.

- e. *Should this usage data be validated first?*
- f. *Should the Commission establish a common Validation, Error Detection, and Editing (VEE) protocol? If so, what should that be?*
- g. *Should the Commission establish a maximum period in which the MDSP should complete the VEE analysis? If so, what should that maximum period be?*

Ideally, both “raw” and validated data would be made available to consumers. However, we do not believe that validation of data should limit the customer benefit available from “provisional” raw data provided in near real-time.

- h. *How should customers be provided direct access to usage information? [examples, website access, HAN to an in-home display or other devices]*
- i. *Should the Commission establish standard protocols and communication medium for providing direct access to usage information from the meter to the HAN? If so, what should those be?*
- j. *How should this Commission provide direct access to the meter to third parties? What policies or regulations should this Commission promulgate to ensure that these third parties are provided timely access under reasonable terms and conditions to the customer metering facilities?*
- k. *What communications, software or hardware can facilitate this direct access to the meter for customers and their third parties, and should the Commission establish requirements and or standards to facilitate this access?*
- l. *What electronic access to customer meter data do CSPs and EGSs need from EDCs, that they currently do not have? Provide specific examples where these entities do not have such access currently, and provide examples, if available, of electronic transactions that can be adopted by this Commission to comply with this statutory requirement.*

It is absolutely critical to realizing meaningful consumer benefits that direct, near real-time usage information is available. The PUC should not establish a single standard protocol for delivery of that information. Rather, the information should be available through any and all means that are available with current technology and that match customer preferences.

One of the most fundamental value propositions of AMI and smart meters is the ability to provide consumers real-time (or near real-time, such as a 15-second interval) information about their consumption and behavior. This baseline information allows for greater savings and educates the consumer as they become more aware of their usage patterns. Access methods that are readily available currently include the utility-owned web site, access via OpenSG recommended third-party open standard mechanisms, directly from the meter inside the home, and via their phone (again using third-party access standards). As we have noted earlier, many other methods should be expected due to the rapid pace of technology innovation in the communications sector.

As stated earlier, we recommend the OpenSG Working Group requirements for protocols and communication medium(s) related to the provision of direct access to usage information from the meter to the HAN. Similarly, we recommend the Texas PUC’s policy language as a model for the Pennsylvania PUC in matters related to HAN data and protocols.

We note further that the OpenSG Working Group does not specify any terms and conditions for availability of information at the meter-to-home interface, indicating that

the Working Group believes it ought to be widely and freely available to **secured recipient devices**. We believe that HAN usage data should be freely available to the consumer and any third-party designee of the consumer.

4. Meter to EDC Communications:

- a. *Should the Commission standardize public protocols from the meter to the grid?*
- b. *If certain protocols are not effective in certain geographic or rural regions, should the Commission adopt a list of protocols that can accommodate all of Pennsylvania customer's communication requirements? If so, what additional protocols should be adopted?*
- c. *What bidirectional communication mediums [Example: broadband over powerline, cellular, phone lines, RF] are least cost? What are the pros and cons of each?*

As with the communications between the meter and the HAN, we believe the PUC is wise to refrain from dictating specific communications platforms. What is critical is that the data interfaces between parties – between the consumer and the utility, between other third-parties and the utility – remain available to those parties and are standardized. These standards being promulgated by the OpenSG Working Group are useful models.

5. Access to Price information:

- a. *How should customers be provided direct access to pricing information? [examples, website access, HAN to an in-home display or other devices]*
- b. *Should the Commission require the meter to communicate price information, or should this information be provided over another communication medium?*
- c. *What pricing information should the Commission require to be provided? [examples, RTP, Day ahead prices, default service rates]*
- d. *Should the Commission establish minimum standards on how frequently price information should be provided? If so, what should be the minimum standard?*
- e. *Should the Commission establish standard formats for presentation of price information? If so, suggest a format.*

We believe that all relevant pricing information should be available, based on customer class and tariffs in place. Once again, we refer to the OpenSG as a model resource.

6. Automatic Control:

- a. *How can smart meters “effectively support” automatic control of customer's electricity consumption by customers, utilities and the customer's third party?*
- b. *How is the smart metering system engaged in the initiation, maintenance, relinquishment, and verification of the automatic control of customer consumption?*
- c. *What smart metering protocols and communication mediums are needed to implement these automated controls? Should the Commission establish standard protocols and standards for this purpose?*
- d. *What energy consuming customer assets can be controlled by these smart meter systems for each of the customer segments, and how is control of these assets impacted by the choice of communication medium and protocol?*

If the AMI has a wide-area network communications interface, then the OpenSG Working Group requirements provide a useful model. If, on the other hand, the “smart meter” only has the HAN interface enabled (but not wide-area network communications), then all aspects of automatic control can be achieved with or without an EDC interface through the customer's existing communications interfaces (such as internet access).

If the AMI is supplying the network communications capability, then the EDC must be involved in establishing, maintaining, securing, and relinquishing the related devices that may be control devices, or intermediaries to control devices (for example, a single “energy hub” within the home). If the AMI is supplying meter data only through the

HAN interface, then control is provided by other systems including non-utility, third-parties.

The Commission, as described before, should not establish protocols and standards but, instead, should rely on open standards. The Smart Energy Profile data standard from the ZigBee Alliance is one example of a protocol and open standard that was created by the industry in response to the OpenSG Working Group requirements and is soon to be certified by the OpenSG Working Group. (It is currently the only such standard and open protocol.)

Within each customer segment, all assets can be controlled (limited only by the offerings in the current market). There is no meaningful impact of control of these assets based on protocol. As long as the devices conform to an open standard data protocol (such as the Smart Energy Profile from the ZigBee Alliance, but possibly other similar data protocols resulting from requirements established by the OpenSG Working Group or others) then the communications protocol is irrelevant. Communications platform bridging devices are available in the market and will be deployed as needed without a requirement from the PUC.

7. Smart Metering Acceleration:

- a. *To the extent permissible under the law, should the Commission provide an incentive to EDCs to accelerate their smart meter deployment by giving a credit towards the required Energy Efficiency and Conservation Goals? If so, how should such credit be determined?*

While we are not sufficiently knowledgeable about the details of the mechanisms for achieving the Energy Efficiency and Conservation Goals, we strongly support incentives that accelerate the deployment of smart meters. In our view, smart meters bring numerous additional benefits and support innovation resulting in direct consumer benefit. This should be supported. As a general observation, we believe that incentives of 50-100% provide meaningful motivation for industry participants.

8. Cost Recovery:

- a. *Should the Commission establish a standard format for providing the various components of the capital and operating costs and benefits of these smart metering systems to facilitate the comparison of the EDC plans? If so, please provide a suggested standard format.*

No comment.