DOCKET NO. _____

TEXAS-NEW MEXICO POWER COMPANY'S REQUEST FOR APPROVAL OF AN ADVANCE METERING SYSTEM (AMS) DEPLOYMENT AND AMS SURCHARGE	§ § § § § §	**Before the Public Utility Commission Of Texas**

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DOCKET NO. _____

TEXAS-NEW MEXICO POWER COMPANY'S REQUEST FOR APPROVAL OF ADVANCED METERING SYSTEM (AMS) DEPLOYMENT PLAN AND REQUEST FOR AMS SURCHARGES	**§ § § § § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

TEXAS-NEW MEXICO POWER COMPANY'S PETITION AND APPLICATION

NOW COMES Texas-New Mexico Power Company (TNMP) and file its Request for Approval of Advanced Metering System (AMS) Deployment Plan and Request for AMS Surcharges. In support thereof, TNMP respectfully shows as follows:

I. Jurisdiction

Texas-New Mexico Power Company is a transmission and distribution utility (TDU) as that term is defined in Section 31.002(19) of PURA.[1] The Commission has jurisdiction over TNMP and over the subject matter of this proceeding under PURA § 39.107.

II. Representatives

TNMP's authorized representative for service of pleadings, motions, orders, and other documents is:

Mr. Stacy Whitehurst
Supervisor of Regulatory Policy Planning
Texas-New Mexico Power Company
225 E. John Carpenter Freeway
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Irving, Texas 75062
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Stacy.Whitehurst@pnmresources.com

[1] Public Utility Regulatory Act (PURA), TEX. UTIL. CODE ANN. §§ 11.001 through 66.016 (Vernon 2007 & Supp. 2009).

TNMP's authorized legal representative is:

Scott Seamster
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PNMR Services Company
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Irving, Texas 75062
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III. Relief Requested by Texas-New Mexico Power Company

Through this petition and application, in accordance with P.U.C. SUBST. R. 25.130(d), TNMP requests approval of the proposed Advanced Metering System Deployment Plan attached hereto as Attachment A. TNMP's Statement of AMS Functionality in accordance with P.U.C. SUBST. R. 25.130(d)(3) is Attachment B hereto. Under the advanced meter deployment plan, TNMP will provide full deployment of advanced meters to approximately 240,000 retail electric customers over the period 2011-2015.

In addition, pursuant to PURA § 39.107(k), TNMP requests approval of an AMS Surcharge tariff to recover the reasonable and necessary costs it will incur under the deployment plan for the full deployment of advanced meters to residential and non-residential customers in its retail electric service area, except for those customers who have interval demand recording (IDR) meters or take unmetered service. TNMP's proposed AMS Surcharge tariff is set forth in Attachment C hereto. TNMP requests that the requested AMS Surcharge tariffs become effective with the earlier of either the 1st billing cycle of the next month following a final order, or November 1, 2010, and be in effect for twelve (12) years.

IV. Persons Affected

The relief sought by TNMP will affect all retail electric providers (REPs) serving residential and non-residential customers in TNMP's service areas, except those who have IDR meters or take unmetered service. Retail end-use customers may be affected, depending on the

actions taken by the REPs to pass the AMS surcharges through to the end-use customers they serve.

V. Notice

TNMP proposes that notice be provided: (1) by mailing notice, in the form attached as Attachment D, to all REPs doing business in Texas listed on the Commission's website as of the date of this petition and application; (2) by publishing notice, in the form attached as Attachment E, for two weeks in newspapers having general circulation in each county in TNMP's service areas; and, (3) by serving a copy of this petition and application on each party to TNMP's most recent base rate case, Docket No. 36025[2]. Although the Commission has exclusive jurisdiction over this proceeding, TNMP will also provide notification of this petition and application to all municipalities in TNMP's service areas.

VI. Texas-New Mexico Power Company's Filing

In addition to this petition and application and the attachments hereto, TNMP submits the direct testimonies and exhibits of the following witnesses in support of the relief which it seeks:

Stacy R. Whitehurst, Supervisor of Regulatory Policy and Planning for TNMP in the Regulatory Policy Department at PNMR Services Company

- provides an overview of the filing made by TNMP pursuant to P.U.C. SUBST. R. 25.130 and to introduce TNMP's witnesses and the subject matters of their testimonies;
- describes the objectives sought through the installation of an AMS system;
- provides an overview of the AMS technology being deployed at TNMP; and,
- provides an explanation of certain McKinsey Model Assumptions.

Allan Burke, Director Retail Electric Provider (REP) Relations Department of Texas-New Mexico Power Company

- presents TNMP's deployment schedule and the effects to TNMP Operations.

[2] *Application of Texas-New Mexico Power Company for Authority to Change Rates*, Docket No. 36025.

Gary Kessler, **Domain Architect for Smart Grid for PNMR Services Company**

- presents the technology solutions that are required for TNMP to successfully implement an AMS solution.

Kim Morris, Director of Architecture within the Business Technology Services Department of PNMR Services Company

- presents the back office budget requirements and assumptions to successfully implement an AMS solution.

Henry Monroy, Director, Utility Accounting for PNMR Services Company

- presents the accounting requirements and assumptions to successfully implement an AMS solution.

Michael Montgomery, Regulatory Project Manager in the Cost of Service and Pricing Group in the Regulatory Policy and Planning Department at PNMR Services Company

- presents the McKinsey model and cost allocation and rate design.

The evidence sponsored by the above witnesses establishes that TNMP's deployment plan meets the requirements of P.U.C. SUBST. R. 25.130; the AMS Surcharges requested by TNMP meet the requirements of P.U.C. SUBST. R. 25.130(k); and, the waivers sought by TNMP meet the requirements of P.U.C. SUBST. R. 25.130(g)(3).

VII. Request for Protective Order

Certain of the materials pertaining to TNMP's AMS initiative and the implementation of the deployment plan either, (1) consist of confidential and commercially sensitive information, the public release of which would harm the Applicant and adversely affect the costs of providing advanced meters, or (2) consist of proprietary information of vendors with whom the Applicant has contracted in order to achieve the AMS objectives and which TNMP is contractually obligated to maintain as confidential.

TNMP, accordingly, requests the issuance of a Protective Order under P.U.C. PROC. R. 22.142(c) in the form attached as Attachment F and the adherence by all participants to this proceeding with such protective order.

VIII. Proposed Procedural Schedule

In order to ensure that this proceeding can be processed as expeditiously as reasonably possible, the Applicants respectfully request that the Commission not refer this proceeding to the State Office of Administrative Hearings and, instead, retain full jurisdiction over this proceeding. Moreover, in furtherance of as expeditious a proceeding as reasonably possible, TNMP respectfully requests that the Commission adopt the following procedural schedule for this proceeding:

TNMP Filing	Wednesday, May 26, 2010
Intervention Deadline	Friday, July 09, 2010
Intervenor Testimony	Wednesday, July 21, 2010
Staff Testimony	Wednesday, July 28, 2010
Intervenor Rebuttal/TNMP Rebuttal	Wednesday, August 04, 2010
Hearing	Wednesday, August 11, 2010
Initial Briefs	Wednesday, August 18, 2010
Reply Briefs	Wednesday, August 25, 2010

The objective of the proposed schedule is to enable the Commission to issue a final decision in this proceeding by October 23, 2010 [3]. Such issuance of a final order is necessary for TNMP to be able to initiate orders for equipment with the vendor and make the necessary modifications and enhancements to the IT systems so as to be in the position to proceed with the initial roll-out of advanced meters beginning on or about January 1, 2011, as contemplated in the deployment plan.

[3] P.U.C SUBST. R. 25.130(d)(7) contemplates commission approval or rejection of the Deployment Plan within 150 days of a request of approval.

IX. Conclusion and Prayer

For the reasons set forth herein and in the direct testimonies of the witnesses, TNMP requests the Commission to:

(1) approve the proposed notice;

(2) approve the proposed procedural schedule;

(3) approve the AMS Deployment Plan designated Attachment A;

(4) approve the AMS Surcharge designated Attachment C;

(5) issue the Protective Order designated Attachment F; and,

(6) grant TNMP such other and further relief as they show themselves to be justly entitled.

Respectfully submitted,

TEXAS-NEW MEXICO POWER COMPANY

By: _____

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State Bar No. 00784939
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CERTIFICATE OF SERVICE

A true and correct copy of the foregoing Petition and Application has been served by electronic transmission, facsimile transmission, or first class mail on all parties to PUC Docket No. 36025 on this 26 day of May, 2010.

_____
Scott Seamster

TEXAS-NEW MEXICO POWER COMPANY'S ADVANCED METERING SYSTEM DEPLOYMENT PLAN

1. **Purpose.** The purpose of this document is to present the Texas-New Mexico Power Company's (TNMP) plan for deploying an advanced metering system in its respective service areas (AMS Deployment Plan) The information required by P.U.C. SUBST. R. 25.130(d)(4) is contained in this document.

2. **Advanced Meter Technology.** The advanced meter technology that TNMP plans to deploy will provide or support the minimum system features indentified in P.U.C. SUBST. R. 25.130(g)(1) adopted by the Public Utility Commission of Texas (Commission). The specific features of the proposed advanced metering technology are described in the following subsections (a) through (k):

   (a) The advanced meters TNMP plans to deploy can be read automatically and remotely.

   (b) The advanced meters TNMP plans to deploy will utilize a two-way communication system. The communications technology that TNMP plans to use is described in Section 3 below.

   (c) TNMP is proposing to deploy approximately 240,000 of SmartSynch's AMI Intelligence™ smart metering solution which features a communications module that is integrated into the several vendors electricity meters, such as GE I-210+c, Elster's REX, Landis+Gyr Focus. TNMP will be utilizing GE's I-210+c meter for the AMS deployment. The I-210+c SmartMeter can communicate with C12.21 head-end systems (such as MV-90) and complies with ANSI C12.19 protocols for data storage. At time of deployment, all SmartSynch Meters deployed will transmit data using C12.22 ANSI communications. Those meters in the field that are not C12.22 compliant will be upgraded from C12.19 via an over-the-air firmware update.

   (d) The I-210+c SmartMeter is a single phase electronic watt-hour meter for use in residential and light commercial service locations. The I-210+c's key features include Time of Use, Demand and Load Profile, Power Quality and Low Voltage Monitoring, Remote Connect/Disconnect, Remote Meter Programming, and C12.19/C12.21 compatibility. GE's I-210+c SmartMeter also will include a ZigBee Smart-Energy compliant wireless component for in-premise HAN communications. Badger ORION wireless component for multi-utility gas and water reads are optional.

   (e) The meter construction and two-way communications capability will enable TNMP to process remote connects and disconnects of power service. The advanced meters have the ability to measure, store, and report both energy inflows and outflows, as necessary for net metering purposes. Deployed meters will be four channels at a minimum. This data will be available in 15-minute intervals and provide approximately 2,880 meter "reads" per month as opposed to the historic single read per month. Additionally, they have the capability to provide direct, real-time access to customer usage data subject to

the limitations and priorities of the associated network infrastructure (e.g., the amount of data that can be handled by the back-office systems and the data traffic for HAN communications).

(f) These meters will also be enabled to operate with a customer's HAN device through the ZigBee wireless component. Communication with HANs allows for increased demand response and demand side management by providing pricing signals to customers, controlling selected appliances and their usage profiles, and providing energy consumption information to consumers via the web portal (described in more detail below) or in-home monitors. They can also support a more robust and efficient OMS and coordination with distribution automation by providing voltage threshold signals to the distribution system. The ZigBee protocol will be Smart Energy compliant.

(g) The single phase self-contained advanced meters to be deployed that are rated at 200 amps or less contain a service switch that can be used to remotely connect or disconnect service via the advanced meters system (AMS) network. The advanced meters to be deployed have the capability of load-side voltage detection, and the service switch will not close if load-side voltage is detected. The service switch also has the capability to open when a configured current limit level is exceeded. The service switch will have the capability to reconnect after a configurable amount of elapsed time.

(h) TNMP's AMS has the capability to time-stamp meter data. Periodic meter reading data is consistent with American National Standards Institute ("ANSI") C12.19 file table standards accepted by the Electric Reliability Council of Texas (ERCOT), and can be time (hour, minute, and second) and date stamped.

(i) TNMP's proposed advanced meter will have the capability to interact with devices inside a customer's premise. The ZigBee HAN communication device inside the advanced meter will have the capability to communicate with a HAN device in the home for sending pricing signals, supporting demand response, pre-payment options and other communications as specified in the implementation phase of Substantive Rule 25.130.

(j) The AMS installed by TNMP will have the capability to reconfigure and upgrade the advanced meters over the communication networks, as technology advances, and in TNMP's determination, the upgrade becomes economically feasible. TNMP will comply with market notification requirements in P.U.C. SUBST. R. 25.130(g)(5). TNMP's AMS will have the capability to provide firmware upgrades for the HAN communication device in the advanced meter, which will allow changes to be implemented as industry standards are modified or added.

(k) At this time, TNMP is not aware of any issue that would restrict the ability to upgrade these minimum capabilities as technology advances.

For more information on the associated meter technology, see the TNMP's Statement of AMS Functionality, Figure 1 and Attachment B.

3. Communication Technologies.

TNMP's core meter communications will be based on the existing cellular communications network provided by AT&T. Current tests by these providers have indicated 96% coverage for TNMP's service territory, and subsequent discussions have resulted in a commitment by the cellular providers to guarantee functional communications for 100% of the customers receiving smart meters. In areas where AT&T is lacking coverage, TNMP's meter technology allows for us of alternative cellular carriers that may have better coverage. In 2009, to have "shovel ready" project in order to meet the requirements of the Department of Energy Smart Grid Grant Application, TNMP expanded the pilot program to nearly 10,000 meters.

TNMP's service territory is extremely geographically diverse and dispersed. The geographic diversity, coupled with TNMP's smaller customer base (relative to other primary ERCOT participants), challenges the feasibility of a large capital investment for a communications infrastructure. The communications infrastructure required for the Company's service territory would be prohibitively expensive for the customer base, and consequently, cellular communication represents a cost-effective solution to smaller utilities with a geographically dispersed rural customer base.

This approach is not unique in terms of technology, and represents a low-risk technological solution to Advanced Metering. For many years, Commercial and Industrial (C&I) meter reading has been done using the Plain Old Telephone System (POTS) by having a data collection system call each meter for a reading, then collecting the information and passing it on to the back-office. This has always been done for major commercial customers with complex billing requirements such as Time of Use, Critical Peak Pricing and Interval Pricing. TNMP's AMS solution is designed to utilize the technology created for C&I meters, simplify it, and move it to a residential form factor and small commercial application, lower the meter cost, and insert cellular telephony in place of the POTS communications.

Key points to note regarding TNMP's cellular communications solution are:

(A) The solution utilizes TCP/IP protocol from the back-office to the meter and/or smart grid device endpoints;

(B) Reliance on Public Wireless Networks of any technology; specifically TNMP's solution will utilize GPRS and HSPA for most service areas;

(C) Home Area Networks can use either the ZigBee OR 6LoWPAN 802.15.4 protocols;

(D) Uses IEEE standards throughout the network from back-office to device end-point;

(E) Highly secure because it uses device level encryption (AES 256), application level encryption and network level security in addition to a private network on the cellular carrier via Application Private Network (APN). Additionally this technology is the only technology being used by DOD for AMI on existing military bases and;

(F) Bandwidth extensibility without capital investment by the utility.

In the ERCOT market, most of the utilities have chosen to implement a different approach as the majority of their customers are in urban and suburban areas. Specifically, all of the major utilities have chosen to implement private communications networks versus using public networks. With a larger customer base to spread out the costs, large utilities have the economies of scale that help keep AMS infrastructure charges lower than TNMP on a per customer basis. The three major TDSPs have chosen two different approaches: mesh/tower and tower based systems. Both solutions are being built on private, utility-owned networks that will be funded by the consumer through rate increases and surcharges.

4. Systems Developed During the Deployment Period.

i) Back-office Systems

Two back-office systems are integral to the deployment of TNMP's smart grid program: outage management system and the meter data management system is described in more detail below:

(1) Outage Management System (OMS).

TNMP's current plans are to install Milsoft Utility Solutions' DiSpatch outage management system. The DiSpatch Outage Manager is a component of the DiSpatch Client and provides a tabular view of the outages. The Outage Manager is used to modify and review outage information and access complete outage history. Milsoft's DiSpatch tool provides many capabilities which will include:

- Trouble Call Management – interacting with IVR to automatically interact with effected customers, communicate accurate caller information to dispatchers, and maintain call histories;
- Outage Management – predict outage points, dynamically react to multiple outages in real-time, communicate outage circuit information to dispatchers, and dynamically process restorations;
- Reporting – compile and report outage statistics in customized reporting formats; and,
- Crew Management – perform crew assignments, identify required truck types, and automatically determine primary crew.

DiSpatch will be tightly integrated with TNMP's existing circuit load flow analysis tool ("WindMil") which is also a Milsoft product. The OMS will utilize engineering maps and data through WindMil in assisting with the management of outages

(2) Meter Data Management System (MDMS).

TNMP will be implementing Itron's EE MDMS solution. At a minimum, MDMS provides a database repository and utility-specific business logic to:

- Automate and streamline the complex process of collecting meter data from multiple meter data collection technologies;
- Evaluate the quality of that data and generate estimates where errors and gaps exist; and
- Deliver that data in the appropriate format to TNMP's billing systems.

The MDMS will pre-process granular interval meter data at large volumes very quickly. AMS now has every meter in the entire meter population bringing back complex billing data in 15 minute intervals. The MDMS performs a number of tasks; it will:

- Aggregate and pre-process this granular interval data;
- Perform data validation, computation and editing of missing data; and
- Create billing ready data for Banner.

As TNMP smart meters are deployed, the MDMS will handle the storage and distribution of non-billing data and messaging such as two-way commands, outage alarms, tamper alarms and demand response events.

ii) Customer Education

As an integral part of the Company's AMS deployment plan, TNMP is implementing a customer education program that is designed to reach customers who will be receiving an advanced meter. Through this program, TNMP is seeking to educate those customers about the benefits of advanced metering technology and how this capability can help customers save energy and money, and help provide better system reliability.

TNMP's customer education program is centered on various customer outreach tools, such as community events, presentation materials (chamber meetings or city council forums), and electronic communications. Customers will receive several information sources that will provide an overview of TNMP and its role in the community, TNMP's use of technology to improve electric delivery and reliability, and information about what the advanced meter means for consumers.

5. **Timeline for Web Portal Development.** TNMP is working with other Transmission and Distribution Service Providers (TDSPs) in ERCOT to implement a common AMS web portal under development in Project No. 34610. In the event the common web portal is not available for TNMP's initial AMS deployment, TNMP will provide alternate methods of delivery for the AMS data, which will include access to the data from TNMP's secure web site or other secure web interfaces.

6. Deployment Schedule by Specific Area (geographic information).

(a) On April 16, 2009, TNMP selected the SmartSynch/AT&T SmartMeter™ solution for a 10,000 unit point-to-point deployment to residential customers throughout the utility's Texas market. TNMP's decision was spurred by the successful performance of five SmartSynch system pilots deployed during the

last 14 months in Clifton, Lewisville, Texas City, Dickinson, and Brazoria, Texas. The pilots supported the collection of billing reads, remote service connect/disconnect capabilities and real-time event alarm notification. TNMP's deployment of this point-to-point deployment will place approximately 400 meters in Lewisville and Fort Stockton. The remaining meters will be installed in the Gulf Coast service area. The installation on these 10,000 meters was completed at the beginning on January 2010.

(b) TNMP's deployment of advance meters will align with TNMP's service territory designations as described in the ERCOT Retail Market guide for working disconnect for non-pay. In the retail market guide, TNMP's service territory is broken into the following geographic designations: Gulf Coast, Central Texas, West Texas and North Central. For TNMP's deployment, these four geographic designations will be used; except the North Central Texas area will be separated into two separate areas. The first area is the Greater Lewisville area, which contains the Cities of Lewisville and Coppell. The second area will be all remaining cities in the North Central service area. TNMP will designate these two subareas of its North Central service area as "Lewisville" and "North Texas" throughout the AMS deployment.

(c) TNMP will complete a full deployment in all service territories by the end of year 2015. TNMP plans to install approximately 44,000 by the end of 2011, approximately 48,000 by the end of 2012, approximately 46,000 by the end of 2013, approximately 42,000 by the end of 2014, and approximately 35,000 by the end of 2015.

(d) Figure 2 provides a detailed listing of the areas and the quarters in which the TNMP plans to deploy the proposed AMS. It may become necessary to revise this schedule and sequence over the course of the deployment of AMS due to changing circumstances. Should that be the case, TNMP will report on any changes to this proposed schedule and sequence in its monthly progress reports that will be filed pursuant to P.U.C. SUBST. R 25.130(d)(9).

7. Reports.

(a) Commencing with the approval of this AMS Deployment Plan by the Commission, a monthly status report meeting the requirements of P.U.C. SUBST. R. 25.130(d)(9) will be filed with the Commission within 15 days of the end of the month to which it applies during the AMS deployment period. TNMP will notify all certified REPs of the availability of the report through the standard market notice requirements. The monthly progress report will include the number of advance meters installed by ESI ID, variations in the AMS Deployment Plan, significant problems TNMP' has experienced, the number of advanced meters replaced as a result of the AMS problems, and any status of AMS feature Deployment.

(b) Upon request by a REP, TNMP will provide a report to the requesting REP stating the estimated cost and schedule for providing a non-standard advanced meter or non-standard advanced meter feature.

(c) TNMP will, jointly with other TDSPs involved in developing the common portal, hire an independent, third party to conduct a security audit of the common AMS web portal requirements as the development of the common web portal begins and will provide the results of that audit to the Commission in a compliance filing for the reporting. Additionally, TNMP, within two years after initially providing commercial AMS service, will engage an independent security auditor to conduct an audit of the Company's mechanisms for customer and/or REP access to meter data consistent with P.U.C. SUBST. R. 25.130(j)(3).

(d) TNMP will provide annual reports to the Commission, which shall include actual costs spent to date in deploying the AMS, the actual net operation cost savings, and the variances from projections, to determine the surcharges authorized by the Commission. The first such report will be filed by February 1, 2012, and cover the period of the first year of the deployment and in which the surcharges have been in effect.

8. **Schedule for Deployment of Web Portal Functionalities.** As mentioned previously, TNMP has completed a 10,000 meter pilot for 2010. Until the functionalities associated with the common Web Portal under development in Project No. 34610 are available, TNMP will provide alternate methods of delivery for the AMS data, which will include access to the data from TNMP's secure web site or other secure web interfaces.

FIGURE 1

Smart Grid Program AMS Elements

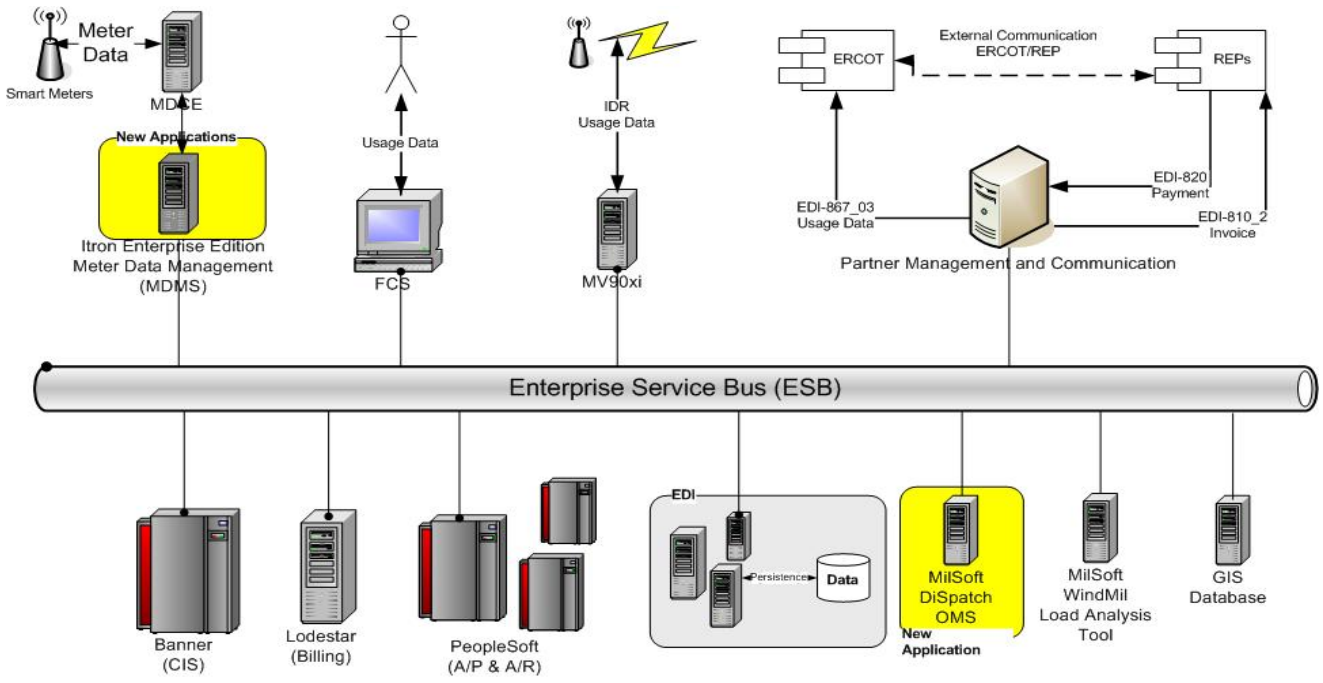

FIGURE 1 cont.

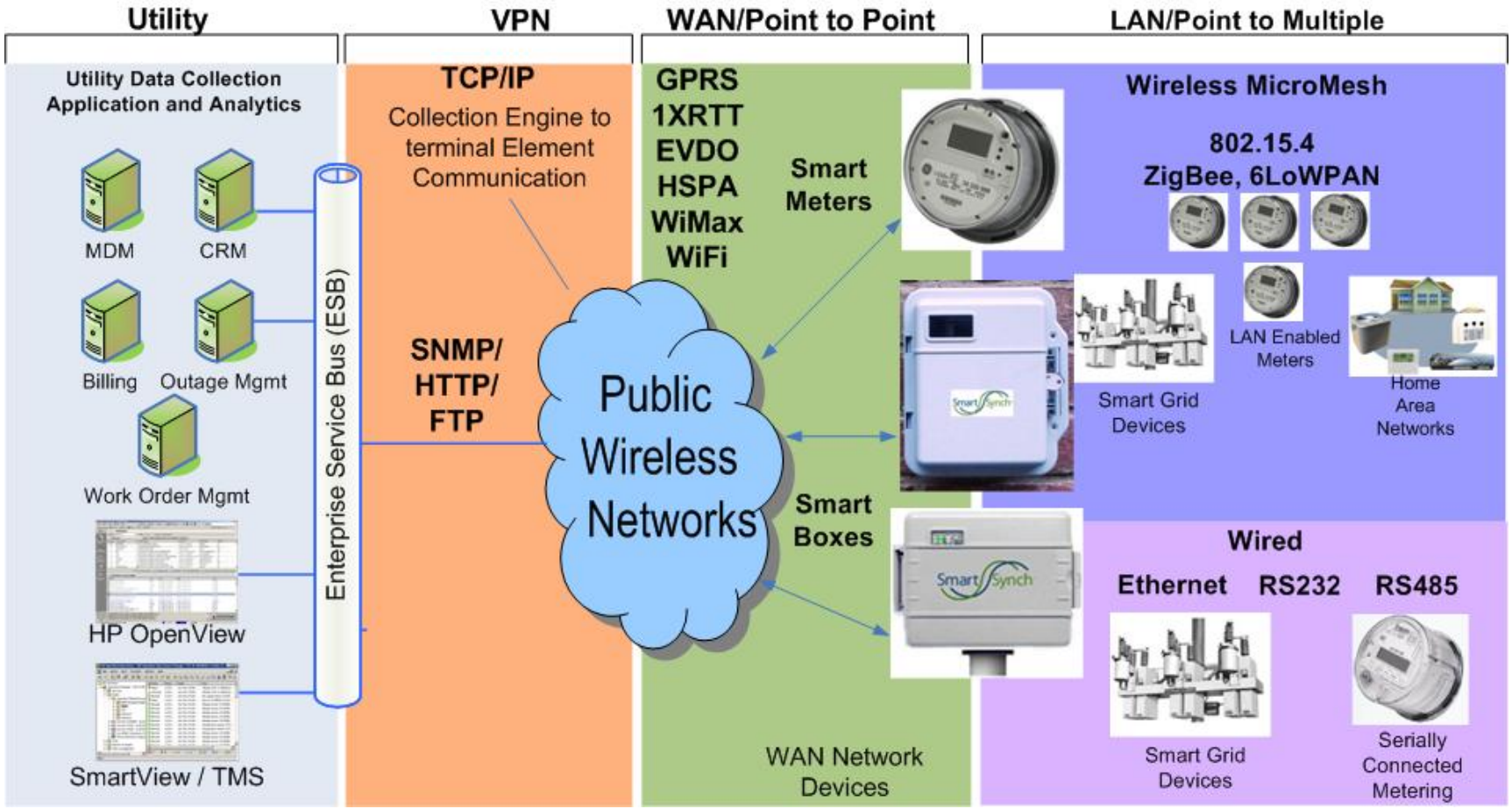

FIGURE 2

		GULF COAST	LEWISVILLE	NORTH TEXAS	CENTRAL TEXAS	WEST TEXAS	GROWTH	TOTAL
Pilot & 2010		10,804	2,201	1	94	-	-	13,100
2011	**Q1**	10,000	-	-	-	-	927	10,927
	Q2	11,000	-	-	-	-	927	11,927
	Q3	11,978	-	-	-	-	927	12,905
	Q4	11,282	-	-	-	-	927	12,209
	Total	44,260	-	-	-	-	3,707	47,967
2012	**Q1**	11,218	-	-	-	-	494	11,712
	Q2	12,961	-	-	-	-	494	13,455
	Q3	12,213	-	-	-	-	494	12,707
	Q4	11,900	-	-	-	-	494	12,394
	Total	48,292	-	-	-	-	1,975	50,267
2013	**Q1**	11,424	-	-	-	-	494	11,918
	Q2	5,079	7,000	-	-	-	494	12,573
	Q3	-	12,000	-	-	-	494	12,494
	Q4	-	11,000	-	-	-	494	11,494
	Total	16,503	30,000	-	-	-	1,975	48,478

		GULF COAST	LEWISVILLE	NORTH TEXAS	CENTRAL TEXAS	WEST TEXAS	GROWTH	TOTAL
2014	Q1	-	8,391	2,701	-	-	494	11,586
	Q2	-	-	10,478	-	-	494	10,972
	Q3	-	-	10,271	-	-	494	10,765
	Q4	-	-	2,875	7,203	-	494	10,572
	Total	-	8,391	26,325	7,203	-	1,976	43,895
2015	Q1	-	-	-	10,064	-	501	10,565
	Q2	-	-	-	8,335	-	501	8,836
	Q3	-	-	-	-	8,539	501	9,040
	Q4	-	-	-	-	7,762	501	8,263
	Total	-	-	-	18,399	16,301	2,004	36,704
Grand Total		**119,859**	**40,592**	**26,326**	**25,696**	**16,301**	**11,637**	**240,411**

TEXAS-NEW MEXICO POWER COMPANY'S
ADVANCED METERING SYSTEM STATEMENT OF FUNCTIONALITY

1) Purpose.

The purpose of this document is to present Texas-New Mexico Power Company ("TNMP") Statement of AMS Functionality. The information required by P.U.C. SUBST. R. 25.130(d)(3) is contained in this document.

2) Technological requirements.

The advanced meter system described in TNMP's AMS Deployment Plan submitted to the Commission as Attachment A meets the requirements specified in P.U.C. SUBST. R. 25.130(g).

3) Service Area Variances between Technology and Meter Functions.

TNMP's plan is to use a two-way communication system over public wireless, IP-based Smart Grid technology for its AMS. TNMP reserves the right to deploy alternative technologies or file a waver in areas where sufficient wireless coverage does not exist.

4) Request for Waivers.

There are certain individual retail customers and service types where exceptions to the AMS requirements contained in Substantive Rule 25.130 are appropriate. In its Request for Approval of Advanced Metering System Deployment Plan and Advanced Metering System Surcharge, TNMP is requesting a waiver to relieve the Company of the obligation of installing an advanced meter that would have all of the functionalities contemplated by P.U.C. SUBST. R. 25.130 in the following circumstances:

1) Loads that may cause a safety or health issue if disconnected will not have an advanced meter with disconnect functionality installed. For example, TNMP proposes not to include the disconnection function for traffic lights, metered streetlights, railroad crossings, police stations, hospital facilities, service points providing cathodic protection, and TNMP's emergency facilities.

2) Loads that do not require and will never require a home area network ("HAN") device will not have an advanced meter with a HAN device installed. For example, TNMP proposes not to include a HAN device for metered streetlights and other applications that would not benefit from a HAN device, such as electric gates, communications power supplies, sprinkler controls, and cathodic protection power supplies.

3) Loads that currently have poly-phase and/or higher than class 200 (200 amp rating) meters will not have a disconnect device until poly-phase advanced meters with a disconnect device are available in the market

4) Loads that have poly-phase and instrument rated meters will not have a HAN device until those advanced meters with HAN devices are available in the market.

5) TNMP not be required to install advanced meters under the circumstances set forth in P.U.C. SUBST. R. 25.130(g)(6), in advance of the full deployment of advanced meters in a given area.

6) TNMP seeks any and all waivers required from P.U.C. SUBST. R. 25.130(g)(1)(E)(i) and (G) if and only to the extent those rules require real-time access to data for end-use customers. End-use customers, however, will not have access to data through a web portal unless and until (a) provided by their REP, or (b) the Texas common data repository (hereinafter, Common Repository) and Texas common web portal (hereinafter, Common Portal) are in place pursuant to the *Implementation Project Relating to Advanced Metering,* Project No. 34610. Once the Common Portal is completed, customers (in addition to REPs and authorized third parties) will have secure access to data through the Common Portal.

5) Table of Functionality.

The following table describes how the Companies' AMS meets each of the minimum system features set forth in P.U.C. SUBST. R. 25.130(g)(1):

Rule	Requirement	TNMP Implementation
(A)	Automated or remote meter reading;	• ***TNMP's AMS technology meets this standard.*** • TNMP will gather 15 minute interval data each day from AMS meters. • TNMP will provide a register reading time stamped at 23:59:59 (hh:mm:ss) for each meter. • All collected reading data will be made available no later than day after. • TNMP meter data gathering process will include a scheduled demand reset of polyphase meters.
(B)	Two-way communications;	• TNMP will provide two-way communications between the Common Portal and AMS meter. • TNMP will support REP and consumer ability to directly "ping" or "poll" meters as defined by the PUCT AMIT workshops, Project No. 34610. Please see Section (E), below. • TNMP AMS meters will support two-way communications between the AMS meter and ZigBee Smart Energy 1.0 HAN devices that have been certified by the ZigBee Alliance as a ZigBee Compliant Platform and have been certified in the TX Market. **Constraints:** • TNMP' AMS does not support at this time, unsolicited messages from HAN devices that are not

		covered by the ZigBee Alliance SmartEnergy protocols, such as, low battery or other device operating status messages. SmartEnergy profile messages from a provisioned HAN device, such as customer load event opt-out notices, are supported. • TNMP seeks any and all waivers required from P.U.C. SUBST. R. 25.130(g)(1)(E)(i) and (G) if and only to the extent those rules require real-time access to data for end-use customers. End-use customers, however, will not have access to data through a web portal unless and until (a) provided by their REP, or (b) the Common Repository and Common Portal are in place pursuant to the *Implementation Project Relating to Advanced Metering,* Project No. 34610. Once the Common Portal is completed, customers (in addition to REPs and authorized third parties) will have secure access to data through the Common Portal.
(C)	Remote disconnection and reconnection for meters rated at or below 200 amps;	• ***TNMP's AMS technology meets this standard.*** • TNMP will deploy advanced meters rated at 200 amps or less that contain a service switch capable of remotely connecting or disconnecting service via the AMS network.
(D)	The capability to time-stamp meter data sent to the independent organization or regional transmission organization ("RTO") for purposes of wholesale settlement, consistent with time tolerance standards adopted by the independent organization or RTO;	• ***TNMP's AMS technology meets this standard.*** • TNMP's proposed AMS has the capability to time-stamp meter data. Periodic meter reading data is consistent with the American National Standards Institute (ANSI) C12.19 file table standards accepted by ERCOT, and can be time (hour, minute, and second) and date stamped.
(E)	The capability to provide direct, real-time access to customer usage data to the customers and the customer's REP, provided that: i. Hourly data shall be transmitted to the electric utility's web portal on a day-after basis. ii. The Commission Staff using a stakeholder process, as soon as practical shall determine, subject to Commission approval, when and how 15-minute interval recorder data shall be made available on the electric utility's web portal;	• ***TNMP's AMS technology meets this standard.*** • TNMP' AMS System will be able to support 15 - minute settlement at ERCOT provided (a) the settlement requirements do not exceed those developed in Project No. 34610 and (b) settlement at ERCOT, prior to the deployment of the Common Repository, follows the interim market schedule for settlement agreed to by the ERCOT Market Advanced Readings and Settlements Task. • Until the Common Repository and Common Portal are available, TNMP will make meter usage interval data and midnight meter register reads available to REPs via a TNMP or third party -hosted secure site.

		Constraints: • End-use customers will not have access to data through a web portal unless and until (a) provided by their REP, or (b) the Common Repository and Common Portal are in place pursuant to Project No. 34610. • Functionality beyond what is contained in the AMIT requirements and future direction such as real time switching or move-ins is out of scope. **Explicitly excluded functionality:** • Move in Request • Non-Midnight move-ins • Two move-ins in the same 24-hour period • Real-time move in • Customer selected time of move-in • Switch Request • Non-Midnight switch • Multiple switches in the same 24-hour period • Real-time switching • Accelerated first available switch date • Customer selected time of switch • Disconnect For Non-Pay • Time-specific disconnect • Real-time disconnect • Real-time reconnect after DNP • Time-specific reconnect • Cancels / Date Changes • Time-specific time changes • Real-time cancels • Move out • Time-specific move out
(F)	Means by which the REP can provide price signals to the customer;	• ***TNMP's AMS technology meets this standard.*** • TNMP will enable REP price signals over the AMS communications network to ZigBee Smart Energy 1.0 in-home HAN devices. TNMP is currently testing the provisioning capabilities.

(G)	The capability to provide 15-minute or shorter interval data to REPs, customers, and the independent organization or RTO, on a daily basis, consistent with data availability, transfer and security standards adopted by the independent organization or RTO;	• ***TNMP's AMS technology meets this standard.*** • TNMP is working with other Transmission and Distribution Service Providers (TDSPs) to implement an envisioned Common Repository and Common Portal pursuant to the *Implementation Project Relating to Advanced Metering,* Project No. 34610. The project is currently in the planning phase. As part of this planning phase, TNMP is analyzing its existing systems and is identifying necessary upgrades to its infrastructure that will be needed as part of the implementation of the Common Portal. • Starting no later than the first quarter of 2011 and during the interim period until the Common Repository and Common Portal are available; TNMP will provide or support the following. • TNMP will provide REPs with available 15-minute VEE meter usage data via a TNMP-hosted secure site on a daily (no later than day-after) basis. • TNMP will provide daily (no later than day-after) available meter register reads via a TNMP-hosted secure site. • TNMP will forward such data directly to ERCOT per the Market Advanced Readings and Settlement (MARS) subcommittee guidance and schedule. **Limitation:** • End-use customers will not have access to unless and until (a) provided by their REP, or (b) the Common Repository and Common Portal are in place pursuant to Project No. 34610.
(H)	On-board meter storage of meter data that complies with nationally recognized non-proprietary standards such as in American National Standards Institute (ANSI) C12.19;	• ***TNMP's AMS technology meets this standard.*** • The on-board meter storage feature of the TNMP advanced meter is already C12.19 compliant.
(I)	Open standards and protocols that comply with nationally recognized non-proprietary standards such as in ANSI C12.22, including future revisions thereto;	• ***TNMP's AMS technology meets this standard.*** • The on-board communication card will be C12.22 compliant. The meter communications card acts as a C12.22 Gateway to the Head-end system which is compliant with ANSI C12 standard. Those meters not C12.22 compliant will be upgraded remotely during TNMP's initial AMS rollout so that all meters will be C12.22 compliant.

(J)	Capability to communicate with devices inside the premises, including, but not limited to, usage monitoring devices, load control devices, and prepayment systems through a home area network, based on open standards and protocols that comply with nationally recognized non-proprietary standards such as ZigBee, HomePlug or the equivalent; and	• TNMP's proposed AMS system will support HAN communications with in-home devices using ZigBee SmartEnergy V1.0.
		• TNMP will support the following HAN functionality by 3rd quarter 2011.
		  • TNMP can support up to 5 provisioned HAN devices per market requirements.
		  • TNMP can support REP-to-HAN pre-nodal use projections as proposed in PUCT Project No. 34610) by 3rd quarter 2011 with limitations:
		  o REPs can use group messaging for time-of-use price information updates;
		  o ESP device message receipt acknowledgement messages are gathered and returned to REP during normal data gathering processes.
		Constraints:
		• PUCT Project No. 34610 HAN business and technical requirements are still in development. Several HAN requirements, as listed below, have been proposed that are not covered in TNMP' AMS filing. TNMP will incorporate, to the extent the means to provide such functionality are commercially available, and the HAN business and technical requirements as set forth in PUCT Project No. 34610. In the event the means to resolve such constraints or provide such functionality are not commercially available, TNMP will use reasonable efforts to develop or encourage the development of such means.
		• HAN functionality not covered in TNMP filing include:
		  • Signal repeaters or range extenders between AMS meters and provisioned HAN devices will not be supported;
		  • Detailed monthly HAN communication and operational activity reporting will not be supported;
		  • Extensive real time two-way communication sessions between REPs and provisioned HAN devices, including unsolicited messaging initiated by HAN devices to the REP can be supported but at additional cost to the REP for bandwidth

		consumption over the allotted amount; • AMS bandwidth monitoring sufficient to report in near real time bandwidth availability throughout the AMS communications network is not supported; • HAN message queue monitoring and status reporting for REPs will be available Q4/2011; • TNMP support for near real time messaging to REPs from provisioned HAN devices is supported at additional cost to the REP for bandwidth consumption over the allotted amount; and • TNMP's ability to move HAN provisioning information from one meter to another meter when replacing meters is not supported. • TNMP's AMS per this filing is limited in how it can support two-way communications between REPs and HAN devices. TNMP will support two way REP-to-HAN communications as follows: • HAN device provisioning confirmation messages by Q4/2011 • Notification when customer "opts out" of a load control event initiated by a REP by Q4/2011 Notification a meter fails to deliver a REP message to a provisioned HAN device by Q1/2012
(K)	The ability to upgrade these minimum capabilities as technology advances and, in the electric utility's determination, become economically feasible.	• ***TNMP's AMS technology meets this standard.*** • TNMP meters and communications modules can be remotely upgraded with firmware or configuration changes. This requirement has been tested during TNMP's meter trials.

TEXAS-NEW MEXICO POWER COMPANY
TARIFF FOR RETAIL DELIVERY SERVICE

6.1.1.6.8 RIDER AMCRF – ADVANCED METERING COST RECOVERY FACTOR

APPLICATION

Applicable, pursuant to PURA § 39.107(h) and Substantive Rule § 25.130, to Retail Customers receiving metered service for which the Company will install and Advanced Metering System ("AMS") at any time during the AMS cost recovery period approved by the Public Utility Commission of Texas.

Rider AMCRF is not applicable to Retail Customers whose: (1) load is required to be metered by an interval data recorder meter by the independent System Operator (ERCOT), (2) load was metered by and interval data recorder meter prior to the effective date of PUCT Substantive Rule § 25.130 (May 30, 2007), or (3) load is unmetered.

NET MONTHLY BILL AMOUNT

The AMCRF for each of the Company's applicable retail rate schedules is as follows:

Rate Schedule	Year 1- 5 Surcharge	Year 6- 12 Surcharge	
Residential Service	$ 4.80	$ 4.17	Per ESI ID per month
Secondary Service Less than or Equal to 5 kW	$ 5.00	$ 5.00	Per ESI ID per month
Secondary Service Greater than 5kW	$ 16.70	$ -	Per ESI ID per month
Primary Service	$ 20.13	$ -	Per ESI ID per month
Lighting Service (Metered Facilities)	$ 11.04	$ -	Per ESI ID per month

NOTICE

This rate schedule is subject to the Company's Tariff and Applicable Legal Authorities.

Attachment D

To the Addressed Retail Electric Provider:

On _____ __, 2010, TEXAS-NEW MEXICO POWER COMPANY (TNMP) filed with the Public Utility Commission of Texas (Commission) a Request for Approval of Advanced Meter System (AMS) Deployment Plan and Request for AMS Surcharges. TNMP requests the Commission to approve their AMS deployment plan pursuant to P.U.C. SUBST. R. 25.130 and to approve, pursuant to P.U.C. SUBST. R. 25.130(k), the AMS surcharges for recovery of the reasonable and necessary costs which TNMP will incur under said deployment plan.

If approved, TNMP's surcharges will go into effect with the November 2010 billing month (which commences on November 1, 2010). The AMS surcharges will apply to electric service to residential customers and non-residential customers, other than those who have interval demand recording (IDR) meters or take unmetered service. The AMS surcharge will be billed to the retail electric providers (REPs) providing retail electric service to such customers in TNMP's service areas. The costs recovered through the AMS surcharges will be reviewed by the Commission in a reconciliation proceeding to be held in the future on a schedule to be determined by the Commission.

A copy of TNMP's filing is available for inspection at its offices at 225 E. John Carpenter Freeway, Suite 1500, Irving, Texas 75062, telephone (469) 484-8500.

Persons who wish to intervene in or comment upon the filing should notify the Public Utility Commission of Texas as soon as possible, as an intervention deadline of _____ __, 2010, has been imposed. A request to intervene or further information should be mailed to the Public Utility Commission of Texas, Post Office Box 13326, Austin, Texas 78711-3326, and reference Docket No. _____. Further information may also be obtained by calling the Public Utility Commission of Texas at (512) 936-7120 or (888) 782-8477 (toll free). Hearing- and speech-impaired individuals with text telephones (TTY) may contact the Commission at (512) 936-7136.

Very truly yours,

Kendall A. Evans
Regulatory Policy and Planning

Attachment E

NOTICE OF REQUEST FOR APPROVAL FILED WITH THE PUBLIC UTILITY COMMISSION OF TEXAS

On ____ ___, 2010, TEXAS-NEW MEXICO POWER COMPANY (TNMP), a regulated electric transmission and distribution utility, filed with the Public Utility Commission of Texas (Commission) a Request for Approval of Advanced Meter System (AMS) Deployment Plan and Request for AMS Surcharges. The requested AMS surcharge is designed to recover the reasonable and necessary costs that TNMP will incur under the AMS deployment plan

If approved, the requested AMS surcharge will go into effect with the November 2010 billing month (which commences on November 1, 2010). The AMS surcharge will apply to electric service to residential and non-residential customers in TNMP's service area, other than those who have interval demand recording (IDR) meters or take unmetered service. The AMS surcharge will be billed to the retail electric providers (REPs) who provide retail electric service to these customers. The amount of AMS surcharge borne by an individual end-use retail customer will depend on whether its REP passes the approved AMS surcharge along to the end-use customer. The costs recovered through the AMS surcharge will be reviewed by the Commission in a reconciliation proceeding to be held in the future on a schedule to be determined by the Commission.

A copy of TNMP's filing is available for inspection at TNMP's offices at 225 E. John Carpenter Freeway, Suite 1500, Irving, Texas 75062, telephone (469) 484-8500.

Persons who wish to intervene in or comment upon the filing should notify the Public Utility Commission of Texas as soon as possible, as an intervention deadline of _____ __, 2010, has been imposed. A request to intervene or further information should be mailed to the Public Utility Commission of Texas, Post Office Box 13326, Austin, Texas 78711-3326, and reference Docket No. _____. Further information may also be obtained by calling the Public Utility Commission of Texas at (512) 936-7120 or (888) 782-8477 (toll free). Hearing- and speech-impaired individuals with text telephones (TTY) may contact the Commission at (512) 936-7136.

DOCKET NO. _____

TEXAS-NEW MEXICO POWER COMPANY'S REQUEST FOR APPROVAL OF ADVANCED METER SYSTEM (AMS) DEPLOYMENT PLAN AND REQUEST FOR AMS SURCHARGES	**§ § § § § §**	**PUBLIC UTILITY COMMISSION OF TEXAS**

PROTECTIVE ORDER

This Protective Order shall govern the use of all information deemed confidential (Protected Materials) or highly confidential (Highly Sensitive Protected Materials) by a party providing information to the Public Utility Commission of Texas (Commission), including information whose confidentiality is currently under dispute.

It is ORDERED that:

1. **Designation of Protected Materials**. Upon producing or filing a document, including, but not limited to, records stored or encoded on a computer disk or other similar electronic storage medium in this proceeding, the producing party may designate that document, or any portion of it, as confidential pursuant to this Protective Order by typing or stamping on its face "PROTECTED PURSUANT TO PROTECTIVE ORDER ISSUED IN DOCKET NO. _____" or words to this effect and consecutively Bates Stamping each page. Protected Materials and Highly Sensitive Protected Materials include not only the documents so designated, but also the substance of the information contained in the documents and any description, report, summary, or statement about the substance of the information contained in the documents.

2. **Materials Excluded from Protected Materials Designation**. Protected Materials shall not include any information or document contained in the public files of the Commission or any other federal or state agency, court, or local governmental authority subject to the Texas Public Information Act. Protected Materials also shall not include documents or information which at the time of, or prior to disclosure in a proceeding, is or was public knowledge, or

which becomes public knowledge other than through disclosure in violation of this Protective Order.

3. **Reviewing Party**. For the purposes of this Protective Order, a "Reviewing Party" is any party to this docket.

4. **Procedures for Designation of Protected Materials**. On or before the date the Protected Materials or Highly Sensitive Protected Materials are provided to the Commission, the producing party shall file with the Commission and deliver to each party to the proceeding a written statement, which may be in the form of an objection, indicating: (1) any and all exemptions to the Public Information Act, TEX. GOV'T CODE ANN., Chapter 552, claimed to be applicable to the alleged Protected Materials; (2) the reasons supporting the providing party's claim that the responsive information is exempt from public disclosure under the Public Information Act and subject to treatment as protected materials; and (3) that counsel for the providing party has reviewed the information sufficiently to state in good faith that the information is exempt from public disclosure under the Public Information Act and merits the Protected Materials designation.

5. **Persons Permitted Access to Protected Materials**. Except as otherwise provided in this Protective Order, a Reviewing Party shall be permitted access to Protected Materials only through its "Reviewing Representatives" who have signed the Protective Order Certification Form. Reviewing Representatives of a Reviewing Party include its counsel of record in this proceeding and associated attorneys, paralegals, economists, statisticians, accountants, consultants, or other persons employed or retained by the Reviewing Party and directly engaged in this proceeding. At the request of the PUC Commissioners, or their staff, copies of Protected Materials may be produced by Commission Staff (Staff) or the Commission's Docket Management and Advising Division (CADM) to the Commissioners. The Commissioners and their staff shall be informed of the existence and coverage of this Protective Order and shall observe the restrictions of the Protective Order.

6. **Highly Sensitive Protected Material Described**. The term "Highly Sensitive Protected Materials" is a subset of Protected Materials and refers to documents or information

which a producing party claims is of such a highly sensitive nature that making copies of such documents or information or providing access to such documents to employees of the Reviewing Party (except as set forth herein) would expose a producing party to unreasonable risk of harm, including but not limited to: (1) customer-specific information protected by § 32.101(c) of the Public Utility Regulatory Act[1]; (2) contractual information pertaining to contracts that specify that their terms are confidential or which are confidential pursuant to an order entered in litigation to which the producing party is a party; (3) market-sensitive fuel price forecasts, wholesale transactions information and/or market-sensitive marketing plans; and (4) business operations or financial information that is commercially sensitive. Documents or information so classified by a producing party shall bear the designation "HIGHLY SENSITIVE PROTECTED MATERIALS PROVIDED PURSUANT TO PROTECTIVE ORDER ISSUED IN DOCKET NO. _____" or words to this effect and shall be consecutively Bates Stamped in accordance with the provisions of this Protective Order. The provisions of this Protective Order pertaining to Protected Materials also apply to Highly Sensitive Protected Materials, except where this Protective Order provides for additional protections for Highly Sensitive Protected Materials. In particular, the procedures herein for challenging the producing party's designation of information as Protected Materials also apply to information that a producing party designates as Highly Sensitive Protected Materials.

7. **Restrictions on Copying and Inspection of Highly Sensitive Protected Material**. Except as expressly provided herein, only one copy may be made of any Highly Sensitive Protected Materials except that additional copies may be made in order to have sufficient copies for introduction of the material into the evidentiary record if the material is to be offered for admission into the record. A record of any copies that are made of Highly Sensitive Protected Material shall be kept and a copy of the record shall be sent to the producing party at the time the copy or copies are made. The record shall include information on the location and the person in possession of the copy. Highly Sensitive Protected Material shall be made available for inspection only at the location or locations provided by the producing party, except as provided by Paragraphs 9 and 13. Limited notes may be made of Highly Sensitive

[1] Public Utility Regulatory Act, TEX. UTIL. CODE ANN., § 32.101 (c) (Vernon 2007 & Supp. 2008) (PURA).

Protected Materials, and such notes shall themselves be treated as Highly Sensitive Protected Materials unless such notes are limited to a description of the document and a general characterization of its subject matter in a manner that does not state any substantive information contained in the document.

8. **Restricting Persons Who May Have Access to Highly Sensitive Protected Material**. With the exception of Commission Staff, The Office of the Attorney General (OAG), and the Office of Public Utility Counsel (OPC), and except as provided herein, the Reviewing Representatives for the purpose of access to Highly Sensitive Protected Materials may be persons who are: (1) outside counsel for the Reviewing Party, (2) outside consultants for the Reviewing Party working under the direction of Reviewing Party's counsel or, (3) employees of the Reviewing Party working with and under the direction of Reviewing Party's counsel who have been authorized by the presiding officer to review Highly Sensitive Protected Materials. The Reviewing Party shall limit the number of Reviewing Representatives that review each Highly Sensitive Protected document to the minimum number of persons necessary. The Reviewing Party is under a good faith obligation to limit access to each portion of any Highly Sensitive Protected Materials to two Reviewing Representatives whenever possible. Reviewing Representatives for Commission Staff, the OAG, and OPC, for the purpose of access to Highly Sensitive Protected Materials, shall consist of their respective counsel of record in this proceeding and associated attorneys, paralegals, economists, statisticians, accountants, consultants, or other persons employed or retained by them and directly engaged in these proceedings.

9. **Copies Provided of Highly Sensitive Protected Material**. A producing party shall provide one copy of Highly Sensitive Protected Materials specifically requested by the Reviewing Party to the person designated by the Reviewing Party who must be a person authorized to review Highly Sensitive Protected Material under Paragraph 8, and be either outside counsel or an outside consultant. Other representatives of the reviewing party who are authorized to view Highly Sensitive Material may review the copy of Highly Sensitive Protected Materials at the office of the Reviewing Party's representative designated to receive the information. Each reviewing party may make two additional copies of Highly Sensitive

documents for outside consultants whose business offices are located outside of Travis County. The additional copies may be maintained at the outside consultants' offices outside of Travis County. All restrictions on Highly Sensitive documents in this Order shall apply to the additional copies maintained in the outside consultants' offices. Any Highly Sensitive Protected documents provided to a Reviewing Party may not be copied except as provided in Paragraph 7 and shall be returned along with any copies made pursuant to Paragraph 7 to the producing party within two weeks after the close of the evidence in this proceeding. The restrictions contained herein do not apply to Commission Staff, OPC, and the OAG when the OAG is a representing a party to the proceeding.

10. **Procedures in Paragraphs 10-14 Apply to Commission Staff, OPC, and the OAG and Control in the Event of Conflict**. The procedures set forth in Paragraphs 10 through 14 apply to responses to requests for documents or information that the producing party designates as Highly Sensitive Protected Materials and provides to Commission Staff, OPC, and the OAG in recognition of their purely public functions. To the extent the requirements of Paragraphs 10 through 14 conflicts with any requirements contained in other paragraphs of this Protective Order, the requirements of these Paragraphs shall control.

11. **Copy of Highly Sensitive Protected Material to be Provided to Commission Staff, OPC and the OAG**. When, in response to a request for information by a Reviewing Party, the producing party makes available for review documents or information claimed to be Highly Sensitive Protected Materials, the producing party shall also deliver one copy of the Highly Sensitive Protected Materials to the Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is representing a party) in Austin, Texas. Provided however, that in the event such Highly Sensitive Protected Materials are voluminous, the materials will be made available for review by Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is representing a party) at the designated office in Austin, Texas. The Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is representing a party) may request such copies as are necessary of such voluminous material under the copying procedures set forth herein.

12. **Delivery of the Copy of Highly Sensitive Protected Material to Staff and Outside Consultants**. The Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is

representing a party) may deliver the copy of Highly Sensitive Protected Materials received by them to the appropriate members of their staff for review, provided such staff members first sign the certification provided in Paragraph 15. After obtaining the agreement of the producing party, Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is representing a party) may deliver the copy of Highly Sensitive Protected Materials received by it to the agreed, appropriate members of their outside consultants for review, provided such outside consultants first sign the certification attached hereto.

13. **Restriction on Copying by Commission Staff, OPC and the OAG**. Except as allowed by Paragraph 7 or by this Paragraph 13, Commission Staff, OPC and the OAG may not make additional copies of the Highly Sensitive Protected Materials furnished to them unless the producing party agrees in writing otherwise, or, upon a showing of good cause, the presiding officer directs otherwise. Limited notes may be made by Commission Staff, OPC (if OPC is a party), and the OAG (if the OAG is representing a party) of Highly Sensitive Protected Materials furnished to them and all such handwritten notes will be treated as Highly Sensitive Protected Materials as are the materials from which the notes are taken. Commission Staff, OPC (if OPC is a party), and the OAG (if OAG is a party) may make two additional copies of Highly Sensitive documents for outside consultants whose business offices are located outside of Travis County. The additional copies may be maintained at the outside consultants' offices outside of Travis County. All restrictions on Highly Sensitive documents in this Order shall apply to the additional copies maintained in the outside consultants' offices.

14. **Public Information Requests**. In the event of a request for any of the Highly Sensitive Protected Materials under the Public Information Act, an authorized representative of the Commission OPC, or the OAG may furnish a copy of the requested Highly Sensitive Protected Materials to the Open Records Division at the OAG together with a copy of this Protective Order after notifying the producing party that such documents are being furnished to the OAG. Such notification may be provided simultaneously with the delivery of the Highly Sensitive Protected Materials to the OAG.

15. **Required Certification**. Each person who inspects the Protected Materials shall, before such inspection, agree in writing to the following certification set forth in the Attachment to this Protective Order:

I certify my understanding that the Protected Materials are provided to me pursuant to the terms and restrictions of the Protective Order in this docket, and that I have been given a copy of it and have read the Protective Order and agree to be bound by it. I understand that the contents of the Protected Materials, any notes, memoranda, or any other form of information regarding or derived from the Protected Materials shall not be disclosed to anyone other than in accordance with the Protective Order and unless I am an employee of the Commission or OPC shall be used only for the purpose of the proceeding in Docket No. _____. I acknowledge that the obligations imposed by this certification are pursuant to such Protective Order. Provided, however, if the information contained in the Protected Materials is obtained from independent public sources, the understanding stated herein shall not apply.

In addition, Reviewing Representatives who are permitted access to Highly Sensitive Protected Material under the terms of this Protective Order shall, before inspection of such material, agree in writing to the following certification set forth in the Attachment to this Protective Order:

I certify that I am eligible to have access to Highly Sensitive Protected Material under the terms of the Protective Order in this docket.

A copy of each signed certification shall be provided by the reviewing party to Counsel for the producing party and served upon all parties of record.

16. **Disclosures Between Reviewing Representatives and Continuation of Disclosure Restrictions After a Person is no Longer Engaged in the Proceeding**. Any Reviewing Representative may disclose Protected Materials, other than Highly Sensitive Protected Materials, to any other person who is a Reviewing Representative provided that, if the person to whom disclosure is to be made has not executed and provided for delivery of a signed certification to the party asserting confidentiality, that certification shall be executed prior to any disclosure. A Reviewing Representative may disclose Highly Sensitive Protected Material

to other Reviewing Representatives who are permitted access to such material and have executed the additional certification required for persons who receive access to Highly Sensitive Protected Material. In the event that any Reviewing Representative to whom Protected Materials are disclosed ceases to be engaged in these proceedings, access to Protected Materials by that person shall be terminated and all notes, memoranda, or other information derived from the protected material shall either be destroyed or given to another Reviewing Representative of that party who is authorized pursuant to this Protective Order to receive the protected materials. Any person who has agreed to the foregoing certification shall continue to be bound by the provisions of this Protective Order so long as it is in effect, even if no longer engaged in these proceedings.

17. **Producing Party to Provide One Copy of Certain Protected Material and Procedures for Making Additional Copies of Such Materials**. Except for Highly Sensitive Protected Materials, which shall be provided to the Reviewing Parties pursuant to Paragraphs 9, and voluminous Protected Materials, the producing party shall provide a Reviewing Party one copy of the Protected Materials upon receipt of the signed certification described in Paragraph 15. Except for Highly Sensitive Protected Materials, a Reviewing Party may make further copies of Protected Materials for use in this proceeding pursuant to this Protective Order, but a record shall be maintained as to the documents reproduced and the number of copies made, and upon request the Reviewing Party shall provide the party asserting confidentiality with a copy of that record.

18. **Procedures Regarding Voluminous Protected Materials**. Production of voluminous Protected Materials will be governed by P.U.C. PROC. R. 22.144(h). Voluminous Protected Materials will be made available in the producing party's voluminous room, in Austin, Texas, or at a mutually agreed upon location, Monday through Friday, 9:00 a.m. to 5:00 p.m. (except on state or Federal holidays), and at other mutually convenient times upon reasonable request.

19. **Reviewing Period Defined**. The Protected Materials may be reviewed only during the Reviewing Period, which shall commence upon entry of this Protective Order and continue until the expiration of the Commission's plenary jurisdiction. The Reviewing Period shall reopen if the Commission regains jurisdiction due to a remand as provided by law. Protected

materials that are admitted into the evidentiary record or accompanying the evidentiary record as offers of proof may be reviewed throughout the pendency of this proceeding and any appeals.

20. **Procedures for Making Copies of Voluminous Protected Materials**. Other than Highly Sensitive Protected Materials, Reviewing Parties may take notes regarding the information contained in voluminous Protected Materials made available for inspection or they may make photographic, mechanical or electronic copies of the Protected Materials, subject to the conditions hereof; provided, however, that before photographic, mechanical or electronic copies can be made, the Reviewing Party seeking photographic, mechanical or electronic copies must complete a written receipt for copies on the attached form identifying each piece of Protected Materials or portions thereof the Reviewing Party will need.

21. **Protected Materials to be Used Solely for the Purposes of These Proceedings**. All Protected Materials shall be made available to the Reviewing Parties and their Reviewing Representatives solely for the purposes of these proceedings. Access to the Protected Materials may not be used in the furtherance of any other purpose, including, without limitation: (1) any other pending or potential proceeding involving any claim, complaint, or other grievance of whatever nature, except appellate review proceedings that may arise from or be subject to these proceedings; or (2) any business or competitive endeavor of whatever nature. Because of their statutory regulatory obligations, these restrictions do not apply to Commission Staff or OPC.

22. **Procedures for Confidential Treatment of Protected Materials and Information Derived from those Materials**. Protected Materials, as well as a Reviewing Party's notes, memoranda, or other information regarding or derived from the Protected Materials are to be treated confidentially by the Reviewing Party and shall not be disclosed or used by the Reviewing Party except as permitted and provided in this Protective Order. Information derived from or describing the Protected Materials shall be maintained in a secure place and shall not be placed in the public or general files of the Reviewing Party except in accordance with the provisions of this Protective Order. A Reviewing Party must take all reasonable precautions to insure that the Protected Materials including notes and analyses made from

Protected Materials that disclose Protected Materials are not viewed or taken by any person other than a Reviewing Representative of a Reviewing Party.

23. **Procedures for Submission of Protected Materials**. If a Reviewing Party tenders for filing any Protected Materials, including Highly Sensitive Protected Materials, or any written testimony, exhibit, brief, motion or other type of pleading or other submission at the Commission or before any other judicial body that quotes from Protected Materials or discloses the content of Protected Materials, the confidential portion of such submission shall be filed and served in sealed envelopes or other appropriate containers endorsed to the effect that they contain Protected Material or Highly Sensitive Protected Material and are sealed pursuant to this Protective Order. If filed at the Commission, such documents shall be marked "PROTECTED MATERIAL" and shall be filed under seal with the presiding officer and served under seal to the counsel of record for the Reviewing Parties. The presiding officer may subsequently, on his/her own motion or on motion of a party, issue a ruling respecting whether or not the inclusion, incorporation or reference to Protected Materials is such that such submission should remain under seal. If filing before a judicial body, the filing party: (1) shall notify the party which provided the information within sufficient time so that the providing party may seek a temporary sealing order; and (2) shall otherwise follow the procedures set forth in Rule 76a, Texas Rules of Civil Procedure.

24. **Maintenance of Protected Status of Materials During Pendency of Appeal of Order Holding Materials are not Protected Materials**. In the event that the presiding officer at any time in the course of this proceeding finds that all or part of the Protected Materials are not confidential or proprietary, by finding, for example, that such materials have entered the public domain or materials claimed to be Highly Sensitive Protected Materials are only Protected Materials, those materials shall nevertheless be subject to the protection afforded by this Protective Order for three (3) full working days, unless otherwise ordered, from the date the party asserting confidentiality receives notice of the presiding officer's order. Such notification will be by written communication. This provision establishes a deadline for appeal of a presiding officer's order to the Commission. In the event an appeal to the Commissioners is filed within those three (3) working days from notice, the Protected

Materials shall be afforded the confidential treatment and status provided in this Protective Order during the pendency of such appeal. Neither the party asserting confidentiality nor any Reviewing Party waives its right to seek additional administrative or judicial remedies after the Commission's denial of any appeal.

25. **Notice of Intent to Use Protected Materials or Change Materials Designation**. Parties intending to use Protected Materials shall notify the other parties prior to offering them into evidence or otherwise disclosing such information into the record of the proceeding. During the pendency of Docket No. _____ at the Commission, in the event that a Reviewing Party wishes to disclose Protected Materials to any person to whom disclosure is not authorized by this Protective Order, or wishes to have changed the designation of certain information or material as Protected Materials by alleging, for example, that such information or material has entered the public domain, such Reviewing Party shall first file and serve on all parties written notice of such proposed disclosure or request for change in designation, identifying with particularity each of such Protected Materials. A Reviewing Party shall at any time be able to file a written motion to challenge the designation of information as Protected Materials.

26. **Procedures to Contest Disclosure or Change in Designation**. In the event that the party asserting confidentiality wishes to contest a proposed disclosure or request for change in designation, the party asserting confidentiality shall file with the appropriate presiding officer its objection to a proposal, with supporting affidavits, if any, within five (5) working days after receiving such notice of proposed disclosure or change in designation. Failure of the party asserting confidentiality to file such an objection within this period shall be deemed a waiver of objection to the proposed disclosure or request for change in designation. Within five (5) working days after the party asserting confidentiality files its objection and supporting materials, the party challenging confidentiality may respond. Any such response shall include a statement by counsel for the party challenging such confidentiality that he or she has reviewed all portions of the materials in dispute and without disclosing the Protected Materials, a statement as to why the Protected Materials should not be held to be confidential under current legal standards, or alternatively that the party asserting confidentiality for some reason

did not allow such counsel to review such materials. If either party wishes to submit the material in question for in camera inspection, it shall do so no later than five (5) working days after the party challenging confidentiality has made its written filing.

27. **Procedures for Presiding Officer Determination Regarding Proposed Disclosure or Change in Designation**. If the party asserting confidentiality files an objection, the appropriate presiding officer will determine whether the proposed disclosure or change in designation is appropriate. Upon the request of either the producing or reviewing party or upon the presiding officer's own initiative, the presiding officer may conduct a prehearing conference. The burden is on the party asserting confidentiality to show that such proposed disclosure or change in designation should not be made. If the presiding officer determines that such proposed disclosure or change in designation should be made, disclosure shall not take place earlier than three (3) full working days after such determination unless otherwise ordered. No party waives any right to seek additional administrative or judicial remedies concerning such presiding officer's ruling.

28. **Maintenance of Protected Status During Periods Specified for Challenging Various Orders**. Any party electing to challenge, in the courts of this state, a Commission or presiding officer determination allowing disclosure or a change in designation shall have a period of ten (10) days from: (1) the date of an unfavorable Commission order; or (2) if the Commission does not rule on an appeal of an interim order, the date an appeal of an interim order to the Commission is overruled by operation of law, to obtain a favorable ruling in state district court. Any party challenging a state district court determination allowing disclosure or a change in designation shall have an additional period of ten (10) days from the date of the order to obtain a favorable ruling from a state appeals court. Finally, any party challenging a determination of a state appeals court allowing disclosure or a change in designation shall have an additional period of ten (10) days from the date of the order to obtain a favorable ruling from the state supreme court, or other appellate court. All Protected Materials shall be afforded the confidential treatment and status provided for in this Protective Order during the periods for challenging the various orders referenced in this Paragraph. For purposes of this

Paragraph, a favorable ruling of a state district court, state appeals court, Supreme Court or other appellate court includes any order extending the deadlines set forth in this Paragraph.

29. **Other Grounds for Objection to Use of Protected Materials Remain Applicable**. Nothing in this Protective Order shall be construed as precluding any party from objecting to the use of Protected Materials on grounds other than confidentiality, including the lack of required relevance. Nothing in this Protective Order constitutes a waiver of the right to argue for more disclosure, provided, however, that unless and until such additional disclosure is order by the Commission or a court, all parties will abide by the restrictions imposed by the Protective Order.

30. **Protection of Materials from Unauthorized Disclosure**. All notices, applications, responses or other correspondence shall be made in a manner which protects Protected Materials from unauthorized disclosure.

31. **Return of Copies of Protected Materials and Destruction of Information Derived from Protected Materials**. Following the conclusion of these proceedings, each Reviewing Party must, no later than thirty (30) days following receipt of the notice described below, return to the party asserting confidentiality all copies of the Protected Materials provided by that party pursuant to this Protective Order and all copies reproduced by a Reviewing Party, and counsel for each Reviewing Party must provide to the party asserting confidentiality a letter by counsel that, to the best of his or her knowledge, information, and belief, all copies of notes, memoranda, and other documents regarding or derived from the Protected Materials (including copies of Protected Materials) that have not been so returned, if any, have been destroyed, other than notes, memoranda, or other documents which contain information in a form which, if made public, would not cause disclosure of the substance of Protected Materials. As used in this Protective Order, "conclusion of these proceedings" refers to the exhaustion of available appeals, or the running of the time for the making of such appeals, as provided by applicable law. If, following any appeal, the Commission conducts a remand proceeding, then the "conclusion of these proceedings" is extended by the remand to the exhaustion of available appeals of the remand, or the running of the time for making such appeals of the remand, as provided by applicable law. Promptly following the conclusion of these proceedings, counsel

for the party asserting confidentiality will send a written notice to all other parties, reminding them of their obligations under this Paragraph. Nothing in this Paragraph shall prohibit counsel for each Reviewing Party from retaining two (2) copies of any filed testimony, brief, application for rehearing, hearing exhibit or other pleading which refers to Protected Materials provided that any such Protected Materials retained by counsel shall remain subject to the provisions of this Protective Order.

32. **Applicability of Other Law**. This Protective Order is subject to the requirements of the Public Information Act[2], the Open Meetings Act[3], and any other applicable law, provided that parties subject to those acts will give the party asserting confidentiality notice, if possible under those acts, prior to disclosure pursuant to those acts.

33. **Procedures for Release of Information Under Order**. If required by order of a governmental or judicial body, the Reviewing Party may release to such body the confidential information required by such order; provided, however, that (1) the Reviewing Party shall notify the party asserting confidentiality of such order at least five (5) calendar days in advance of the release of the information in order for the party asserting confidentiality to contest any release of the confidential information; (2) the Reviewing Party shall notify the producing party that there is a request for such information within five (5) calendar days of the date the Reviewing Party is notified of the request for information; and (3) the Reviewing Party shall use its best efforts to prevent such materials from being disclosed to the public. The terms of this Protective Order do not preclude the Reviewing Party from complying with any valid and enforceable order of a state or federal court with competent jurisdiction specifically requiring disclosure of Protected Materials earlier than contemplated herein.

34. **Best Efforts Defined**. The term "best efforts" as used in the preceding paragraph requires that the Reviewing Party attempt to ensure that disclosure is not made unless such disclosure is pursuant to a final order of a Texas governmental or Texas judicial body or written opinion of the Texas Attorney General which was sought in compliance with the Public Information Act. The Reviewing Party is not required to delay compliance with a lawful order

[2] TEX. GOV'T CODE ANN. § 552.111 (Vernon 1994 & Supp. 2008).

to disclose such information but is simply required to timely notify the party asserting confidentiality, or its counsel, that it has received a challenge to the confidentiality of the information and that the Reviewing Party will either proceed under the provisions of §552.301 of the Public Information Act, or intends to comply with the final governmental or court order.

35. **Notify Defined**. "Notify" for purposes of Paragraphs 33 and 34 shall mean written notice to the party asserting confidentiality at least five (5) calendar days prior to release; including when a Reviewing Party receives a request under the Public Information Act. However, the Commission or OPC may provide a copy of Protected Materials to the Open Records Division of the OAG as provided herein.

36. **Requests for Non-Disclosure**. If the producing party asserts that the requested information should not be disclosed at all, or should not be disclosed to certain parties under the protection afforded by this Order, the producing party shall tender the information for in camera review to the presiding officer within **five (5) calendar days** of the request. At the same time, the producing party shall file and serve on all parties its argument, including any supporting affidavits, in support of its position of non-disclosure. The burden is on the producing party to establish that the material should not be disclosed. The producing party shall serve a copy of the information under the classification of Highly Sensitive Protected Material to all parties requesting the information that the producing party has not alleged should be prohibited from reviewing the information.

Parties wishing to respond to the producing party's argument for non-disclosure shall do so within **three (3) working days**. Responding parties should explain why the information should be disclosed to them, including why disclosure is necessary for a fair adjudication of the case if the material is determined to constitute a trade secret. If the Presiding Officer finds that the information should be disclosed as Protected Material under the terms of this Protective Order, the Presiding Officer shall stay the order of disclosure for such period of time as the Presiding Officer deems necessary to allow the producing party to appeal the ruling to the commission.

[3] TEX. GOV'T CODE ANN. § 551.001 (Vernon 1994 & Supp. 2008).

37. **Sanctions Available for Abuse of Designation**. If the Presiding Officer finds that a producing party unreasonably designated material as Protected Material or as Highly Sensitive Protected Material, or unreasonably attempted to prevent disclosure pursuant to Paragraph 36, the Presiding Officer may sanction the producing party pursuant to P.U.C. PROC. R. 22.161.

38. **Modification of Protective Order**. Each party shall have the right to seek changes in this Protective Order as appropriate from the Presiding Officer.

39. **Breach of Protective Order**. In the event of a breach of the provisions of this Protective Order, the producing party, if it sustains its burden of proof required to establish the right to injunctive relief, shall be entitled to an injunction against such breach without any requirements to post bond as a condition of such relief. The producing party shall not be relieved of proof of any element required to establish the right to injunctive relief. In addition to injunctive relief, the producing party shall be entitled to pursue any other form of relief to which it is entitled.

ATTACHMENT A

Protective Order Certification

I certify my understanding that the Protected Materials are provided to me pursuant to the terms and restrictions of the Protective Order in this docket, and that I have been given a copy of it and have read the Protective Order and agree to be bound by it. I understand that the contents of the Protected Materials, any notes, memoranda, or any other form of information regarding or derived from the Protected Materials shall not be disclosed to anyone other than in accordance with the Protective Order and unless I am an employee of the Commission or OPC shall be used only for the purpose of the proceeding in Docket No. _____. I acknowledge that the obligations imposed by this certification are pursuant to such Protective Order. Provided, however, if the information contained in the Protected Materials is obtained from independent public sources, the understanding stated herein shall not apply.

_____ _____
Signature Party Represented

_____ _____
Printed Name Date

I certify that I am eligible to have access to Highly Sensitive Protected Material under the terms of the Protective Order in this docket.

_____ _____
Signature Party Represented

_____ _____
Printed Name Date

ATTACHMENT B

I request to view/copy the following documents:

Document Requested	# of Copies	Non-Confidential	Confidential &/or HS

_____ _____

Signature Party Represented

_____ _____

Printed Name Date

PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY
REQUEST FOR APPROVAL
OF AN ADVANCE METERING SYSTEM (AMS)
DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS
OF
STACY R. WHITEHURST

ON BEHALF OF
TEXAS-NEW MEXICO POWER COMPANY

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EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE

EXHIBIT SRW-2
CONFIDENTIAL CUSTOMER EDUCATION CAMPAIGN PROPOSAL

EXHIBIT SRW-3
RIDER AMCRF (ADVANCE METERING COST RECOVERY FACTOR)

EXHIBIT SRW-4
MOODY'S REVISED OUTLOOK FOR TNMP

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is Stacy R. Whitehurst. I serve as Supervisor of Regulatory Policy and Planning for TNMP in the Regulatory Policy Department at PNMR Services Company ("PNMR Services"), a wholly owned subsidiary of PNM Resources, Inc. ("PNM Resources"). My business address is 225 E. John Carpenter Freeway, Suite 1500 Irving, Texas 75062.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company ("TNMP" or "Company").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. Exhibit SRW-1 describes my background and experience, including proceedings in which I have provided testimony.

Q. PLEASE DESCRIBE YOUR DUTIES AS THE SUPERVISOR OF REGULATORY POLICY AND PLANNING FOR PNMR SERVICES.

A. As the Supervisor of Regulatory Policy and Planning, I report directly to the Vice President of Regulatory Affairs. I am in charge of all regulatory activities for TNMP, which include compliance filings, complaints, rulemakings and contested cases.

Q. HAVE YOU PREPARED ANY EXHIBITS?

A. Yes. I am sponsoring Exhibits SRW-1 through Exhibits SRW-4, which are attached to my testimony. Each of these exhibits was prepared by me or under my direction and control. The information contained in these exhibits is true and correct to the best of my knowledge and belief.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is the following:

- provide an overview of the filing made by TNMP pursuant to P.U.C. SUBST. R. 25.130 and to introduce TNMP's witnesses and the subject matters of their testimonies;
- describe the objectives sought through the installation of an AMS system;
- provide an overview of the AMS technology being deployed at TNMP; and provide an explanation of certain McKinsey Model Assumptions.

III. OVERVIEW OF TNMP'S APPLICATION

Q. WHY IS TNMP MAKING THIS FILING?

A. Through this petition and application, in accordance with P.U.C. SUBST. R. 25.130(d), TNMP requests approval of its proposed Advanced Metering System Deployment Plan and approval of an AMS surcharge. Under its advanced meter deployment plan, TNMP will provide full deployment of advanced meters to approximately 240,000 retail electric customers over the period 2010-2015. TNMP requests approval of an AMS Surcharge tariff to recover the reasonable and necessary costs it will incur under the deployment plan for the full deployment of advanced meters to residential and non-residential customers in its retail electric service area, except for those customers who have Interval Date Recorders (IDR) or take unmetered service.

Q. PLEASE LIST THE COMPANY'S OTHER WITNESSES AND THE TOPICS EACH WILL DISCUSS.

A. Below is the list of TNMP other witnesses and the topics each will discuss.

Allan Burke - Presents TNMP's deployment schedule and the effects to TNMP Operations;

Gary Kessler – Presents the technology solutions that are required for TNMP to successfully implement an AMS solution;

Kim Morris - Presents the back-office budget requirements and assumptions to successfully implement an AMS solution;

Henry Monroy - Presents the accounting requirements and assumptions to successfully implement an AMS solution;

Michael Montgomery – Presents the McKinsey model and cost allocation and rate design.

Q. PLEASE SUMMARIZE HOW TNMP'S PROPOSED AMS DEPLOYMENT PLAN MEETS THE REQUIREMENTS OF SUBST. R. 25.130.

A. TNMP's AMS Deployment Plan is attached as Attachment A to the petition and application, and is sponsored by Mr. Burke, Mr. Kessler and me. As required by P.U.C. SUBST. R. 25.130(d)(4), the AMS Deployment Plan describes the following: (i) the type of meter technology; (ii) the type of communications equipment supporting the AMS; (iii) the systems to be developed during the deployment period; (iv) the timeline for the web portal deployment; (v) the deployment by specific geographical area; (vi) when posting on the website will begin; and (vii) the schedule for deployment of the web portal functionalities. The plan also includes information pertaining to the estimated costs of all the AMS components and to the contracts for equipment and services that establish the reasonableness of the plan.

Q. PLEASE SUMMARIZE TNMP'S REQUEST IN THIS PROCEEDING.

A. TNMP is filing for Commission approval for an AMS deployment plan and an AMS surcharge. In this application, TNMP provides the testimony and supporting information of six witnesses. TNMP witnesses Kessler, Morris, Montgomery, Monroy, Burke, and myself provide actual and estimated costs for implementing AMS, the contracts for equipment and services, and estimated net operating cost-savings expected, if any.

Q. DOES TNMP'S DEPLOYMENT CONTAIN THE REQUIRED INFORMATION IN PUC SUBST R. 25.130(d)(4) AND THE FEATURES DESCRIBED IN PUC SUBST R. 25.130(g)(1)?

A. Yes. TNMP witnesses Kessler, Burke, and myself support TNMP's deployment plan and describe how TNMP's deployment contains the information requested PUC SUBST. R. 25.130(d) (4) and 25.130(g) (4).

Q. HOW DOES TNMP'S RESIDENTIAL SURCHARGE COMPARE TO THE OTHER APPROVED AMS SURCHARGES, AS WELL AS OTHER UTILITIES' NON-AMS FIXED CHARGES?

A. While TNMP's residential AMS surcharge is higher than Oncor, Centerpoint, AEP Texas North Company (TNC), and AEP Texas Central Company, a more appropriate comparison includes not only the AMS surcharge, but also the metering charge.

Tariff Charge	Centerpoint	Oncor	AEP TNC	AEP TCC	TNMP
Metering Charge	$ 1.79	$ 2.20	$ 5.24	$ 3.55	$ 2.20
AMS Metering Charge	3.24	2.19	3.15	3.15	4.80
Total Monthly "Metering" Cost	$ 5.03	$ 4.39	$ 8.39	$ 6.70	$ 7.00

As the table demonstrates, TNMP total fixed "metering" costs (as defined above and if approved), would be in the range of all ERCOT utilities with a Commission-approved AMS surcharge. It is also worth noting that TNMP's AMS surcharge is less than TNC's metering charge.

IV. OVERVIEW OF TNMP'S AMS DEPLOYMENT PLAN

Q. HAS TNMP PREVIOUSLY FILED A NOTICE OF DEPLOYMENT AND STATEMENT OF FUNCTIONALITY?

A. Yes. On August 4, 2009, TNMP filed a contingent notice of deployment and statement of functionality since it was seeking federal stimulus funds to expedite the deployment of advance meters in its service territory. TNMP is filing a new deployment plan, as described in Mr. Burke's testimony, with full deployment of meters in TNMP's service territory in five years. TNMP had previously proposed a full deployment within three years, which would have been possible through a 50 percent matching grant through federal stimulus funds. However, TNMP was not selected to receive such a federal grant.

Q. DID TNMP'S GRANT SUBMISSION CONTAIN COSTS JUST FOR THE PROPOSED DEPLOYMENT OF AMS?

A. No. TNMP's application for federal stimulus funds not only included the costs for deployment of an AMS, but included cost to implement a "Smart Grid". The costs for the "Smart Grid" included cost for SCADA (supervisory control and data acquisition) in every substation and distribution automation. TNMP has only included costs associated with the deployment of AMS.

Q. DOES TNMP EXPECT TO RECEIVE FEDERAL STIMULUS FUNDS IN THE FUTURE?

A. TNMP is not aware of any future opportunities to receive matching federal funds under the American Recovery and Reinvestment Act of 2009.

Q. ARE THERE SPECIFIC REASONS WHY TNMP IS DEPLOYING METERS OVER A LONGER TIME PERIOD THAN COMPARED TO THE ORIGINAL NOTICE OF DEPLOYMENT?

A. Yes. TNMP did submit an application[1] to the Department of Energy in order to be a recipient of federal stimulus funds that would have made more funds available to TNMP for a more expedient deployment. TNMP received notification during the fourth quarter 2009 that its filing was not selected to receive a federal grant. Currently, TNMP is trying to improve its credit rating metrics[2]. In addition, even though TNMP's last rate case was recently finalized with a unanimous settlement agreement, TNMP is not achieving its allowed rate of return.

Q. SUMMARIZE TNMP'S EFFORT TO FIND AN AMS SOLUTION.

A. TNMP has been seeking an AMS solution for several years, as discussed by TNMP witness Kessler. The solution has led TNMP to implement several pilot programs and demonstrations, all of which have been successful. I will describe the pilot effort and demonstration in more detail.

Q. PLEASE DESCRIBE TNMP'S PILOT EFFORTS?

A. TNMP has successfully implemented three pilot programs and has held two public demonstrations. The first pilot program consisted of 100 meters in the Clifton service area. Clifton was chosen specifically to test the communication ability and reliability, since this area is neither a highly populated nor a highly commercially developed area. In order to verify the accuracy of the meters and communications, TNMP duel-socketed these metering points to validate the data. While this initial pilot of meters does not have all the functionality of the rules[3], TNMP was able to determine that these meters could access existing cellular towers, could be remotely read, send 15-minute interval data, and send outage notifications[4]. The second pilot consisted on 400 meters in metropolitan areas: the Gulf Coast service area near Houston, and the Lewisville area. While TNMP was already confident that the cellular technology would not have any coverage issues, this allowed TNMP to have results in the areas where most of its residential customers reside. Finally, TNMP installed roughly another 9,400 meters in the fourth quarter of 2009 and the first quarter of 2010; approximately 80% were installed in the Gulf Coast service territory. TNMP has been successful at reading the meters, performing move-ins and move-outs, receiving outage notifications, and receiving tampering notifications.

[1] TNMP did receive confirmation that its application was complete and was considered on the merits of the technology and costs.
[2] On March 9th 2010, Moody's revised their outlook and ratings for TNMP, citing TNMP's improved cash flow. Exhibit SRW-4
[3] TNMP seeks recover of these meters; since these meters will be relocated to premises that do not require disconnect or reconnect capabilities, such as certain unmetered lighting.
[4] A key component of TNMP's AMS is the implementation of an outage management system.

Q. PLEASE DESCRIBE TNMP'S PILOT DEMONSTRATION EFFORTS.

A. TNMP has held two separate demonstrations; the first one was part of the REP annual in meeting in 2008. The second meeting was in 2009 for the additional members of Commission Staff that were not able to attend the REP meeting. At these meetings, TNMP was able to demonstrate the disconnect and reconnect functions, on-demand readings, and outage notifications (email from the meter) with a demonstration meter. A demonstration was also performed on a TNMP employee's[5] SmartSynch meter.

Q. PLEASE PROVIDE A SUMMARY OF TNMP'S ADVANCE METER TECHNOLOGY.

A. As described in detail in the testimony of TNMP witness Kessler, TNMP is proposing to deploy SmartSynch's AMI Intelligence™ smart metering solution, which features a communications module that is integrated into several vendors' electricity meters, such as GE I-210+c, Elster's REX, and Landis+Gyr Focus. The SmartMeter can communicate with C12.21 head-end systems (such as MV-90) and complies with ANSI C12.19 protocols for data storage. All SmartSynch Meters deployed transmit data using C12.22 ANSI communications. Those meters in the field that are not C12.22 compliant will be upgraded from C12.19 via an over-the-air firmware update.

The meter construction and two-way communications capability will enable TNMP to process remote connects and disconnects of power service. The advanced meters have the ability to measure, store, and report both energy inflows and outflows, as necessary for net metering purposes. Deployed meters will use four channels at a minimum. This data will be available in 15-minute intervals and provide approximately 2,880 meter "reads" per month as opposed to the historic single read per month.

These meters will also be enabled to operate with a customer's HAN device through the ZigBee wireless component. Communication with HANs allows for increased demand response and demand-side management by providing pricing signals to customers, controlling selected appliances and their usage profiles, and providing energy consumption information to consumers via the web portal or in-home monitors. They will also support a more robust and efficient OMS and coordination with distribution automation by providing voltage threshold signals to the distribution system. The ZigBee protocol will be Smart Energy compliant.

Q. PLEASE PROVIDE A SUMMARY OF TNMP'S COMMUNICATION TECHNOLOGY.

[5] TNMP's Business Unit Director gave permission to perform the demonstration of her residence.

A. TNMP's meter communications will be based on the existing cellular communications network provided by AT&T. Current coverage validation by this provider indicates the majority of ESIDs have coverage within TNMP's service territory. This is covered in more detail in Mr. Kessler's testimony.

The geographic diversity coupled with TNMP's smaller customer base (relative to other primary ERCOT participants) challenges the feasibility of a large capital investment for a communications infrastructure. The communications infrastructure required for the Company's service territory would be prohibitively expensive for the customer base, and consequently, cellular communication represents a cost-effective solution to smaller utilities with a geographically dispersed rural customer base.

This approach is not unique in terms of technology, and represents a low-risk technological solution to Advanced Metering. For many years, Commercial and Industrial (C&I) meter reading has been done using the Plain Old Telephone System (POTS) by having a data collection system call each meter for a reading, then collecting the information and passing it on to the back-office. This has always been done for major commercial customers with complex billing requirements such as Time-of-Use, Critical Peak Pricing and Interval Pricing. TNMP's AMS solution is designed to utilize the technology created for C&I meters, simplify it, and move it to a residential form factor and small commercial application, lower the meter cost, and insert cellular telephony in place of the POTS communications.

Q. HOW IS TNMP PROPOSING TO STRUCTURE THE LEVELIZED SURCHARGE?

A. Like the Centerpoint and AEP (American Electric Power) approved tariffs, TNMP proposes a tiered surcharge. This surcharge is levelized for the first five years, and then is decreased and levelized over the last seven years. What makes TNMP's surcharge different is that TNMP is unable to spread the amount associated with the AMS infrastructure, excluding the meter costs, over a large population, such as Centerpoint or Oncor; nor does TNMP have a mandated refund that can be applied to offset the surcharge, as AEP TCC and AEP TNC do.

Q. CAN YOU EXPLAIN WHY TNMP SEEKS A TWO-TIERED LEVELIZED SURCHARGE?

A. Yes. TNMP management realizes the importance of AMS to the ERCOT market, which is designed to allow customers to have better pricing transparency; improved metrics

with move-ins, move-outs, disconnects, reconnects, rereads, 15-minute settlement, and monthly meter reading; and automatic outage notifications. For TNMP, this is a project outside the normal transmission and distribution budget. This is not an example of shifting budget dollars from one project to another or adding budget dollars back into the budget that were previously cut. Over the last five years, TNMP has continued to invest in its distribution and transmission system[6]. However, due to TNMP's lower credit ratings and the effect that negative cash flows have on the company's credit metrics, the company has developed a two-tier levelized surcharge that would minimize those effects.[7]

Agency	***Rating***	***Outlook***
S&P	BBB-	Stable
Moody's	Baa1	Stable
Fitch	BBB	Stable

Without significant and sustained improvement to its credit metrics, TNMP may be facing a credit downgrade which has significant consequences to the Company and its customers. Access to credit will be severely restricted and the cost of additional debt will be significantly more expensive if TNMP were to be downgraded to below-investment grade. TNMP seeks a future in which it can help to bring a smarter grid to its service area and the many small and rural communities included in this service area. This two-tier levelized surcharge will accomplish that goal. A two-tiered levelized surcharge was approved by the Commission for TCC and TNC[8] and Centerpoint.[9]

V. COMPLIANCE WITH THE COMMISSION'S ADVANCE METER RULE

Q. PLEASE SUMMARIZE HOW THE AMS PROPOSED BY TNMP MEETS THE FUNCTIONALITY REQUIREMENTS OF SUBST. R. 25.130.

A. As discussed by TNMP witnesses Kessler and Burke, TNMP's AMS technology: (i) involves meter technology that will be able to implement automated or remote meter reading; (ii) will allow two-way communication; (iii) will allow remote disconnect and reconnect for meters rated at or below 200 amps; (iv) will have the capability to time-stamp data; (v) will have the capability to provide direct access to consumer usage data

[6] On March 4, 2010, TNMP filed for an interim transmission cost of service filing as contemplated under PUC Substr. 25.192. The increase on nearly $34 million in transmission plant addition between Apr 2008 and Dec. 2009.
[7] Exhibit SRW-4
[8] Docket No. 36928

to the REP and end-use consumer; (vi) will have the means to furnish price signals; (vii) will have the capability to provide 15-minute data to ERCOT; (viii) will provide on board meter storage capability meeting ANSI C12.19, (ix) will accommodate open standards and protocols that meet nationally recognized standards; (x) will have the capability to communicate with devices within the home based on open standards and protocols; and (xi) will provide the ability to upgrade these minimum capabilities as technology advances.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW FOR AUTOMATED OR REMOTE METER READINGS[10]?

A. Yes. TNMP's current pilot meters are being remotely read on a monthly basis for billing. TNMP's witness Kessler discusses how TNMP's AMS technology performs this requirement.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW FOR TWO-WAY COMMUNICATION[11]?

A. Yes. TNMP's current pilot meters can receive communication from TNMP to perform a monthly or off-cycle meter reading, can energize or re-energize the service point, and can receive other type of communication sent by TNMP. In addition, the meters can communicate back to TNMP. The meters can send meter readings, tampering notifications and outage notifications. TNMP's witness Kessler discusses how TNMP's AMS technology performs this requirement.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW FOR REMOTE DISCONNECTION AND RECONNECTION CAPABILITY FOR METERS RATED AT OR BELOW 200 AMPS[12]?

A. Yes. TNMP's current pilot meters have remotely disconnected or remotely executed a turn-off and performed reconnection or remotely executed a move-in. TNMP's witness Kessler discusses how TNMP's AMS technology performs this requirement. TNMP will seek several waivers on this requirement, which I discuss later in my testimony.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW FOR TIME-STAMP DATA SENT TO ERCOT[13]?

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[9] Docket No. 35639
[10] PUC Subst R. 25.130(g)(1)(A)
[11] PUC Subst R. 25.130(g)(1)(B)

A. Yes. TNMP's current pilot meters are unable to send 15-minute interval directly to ERCOT. TNMP's pilot meters' monthly meter reading data is being pulled and summarized for billing in TNMP's existing billing system. In order for TNMP to meet this requirement, TNMP is requesting approval and recovery of a meter data management system. TNMP's witness Kessler discusses the meter data management system and the necessity to be included as part of TNMP's deployment plan and surcharge.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW CUSTOMERS TO HAVE ACCESS TO USAGE DATA AND WILL ALLOW USAGE DATA TO BE POSTED ON THE JOINT TDSP WEB PORTAL[14]?

A. TNMP seeks a waiver from P.U.C. SUBST. R. 25.130(g) (1) (E) (i) if and only to the extent those rules require real-time access to data for end-use customers. End-use customers will not have access to data through a web portal unless and until (A) provided by their REP, or (B) the Texas common data repository (hereinafter, Common Repository) and Texas common web portal (hereinafter, Common Portal) are in place pursuant to the *Implementation Project Relating to Advanced Metering,* Project No. 34610. Once the Common Portal is completed, customers (in addition to REPs and authorized third parties) will have secure access to data through the Common Portal. TNMP will provide interval data to the joint web portal, as described by TNMP witness Kessler.

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW REPS TO SEND PRICE SIGNALS TO THE CUSTOMER[15]?

A. Yes. TNMP's AMS deployment allows for the use and communication to a home area network (HAN) energy monitoring device. A HAN energy monitoring device will allow customers to track daily usage against their budgets and take action to conserve before the billing period ends. Some energy monitors also allow the consumer to track usage against historical usage for the period. These monitors also can be used to communicate dynamic price signals from the REP to the consumer, as well as to provide demand response signals. TNMP's witness Kessler discusses how TNMP's AMS technology performs this requirement.

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[12] PUC Subst R. 25.130(g)(1)(C)
[13] PUC Subst R. 25.130(g)(1)(D)
[14] PUC Subst R. 25.130(g)(1)(E)
[15] PUC Subst R. 25.130(g)(1)(F)

Q. DOES TNMP'S PROPOSED AMS DEPLOYMENT ALLOW FOR 15-MINUTE INTERVAL DATA TO BE PROVIDE TO REPS, CUSTOMERS, ERCOT, OR THE JOINT TDSP WEB PORTAL ON A DAILY BASIS [16]?

A. TNMP's current pilot meters are unable to send 15-minute VEEE (Validate, Edit and Estimate) interval directly to ERCOT. TNMP's pilot meters' monthly meter reading data is being extracted and summarized for billing in TNMP's existing billing system. In order for TNMP to meet this requirement, TNMP is requesting approval and recovery of a meter data management system. TNMP's witness Kessler discusses the meter data management system and the necessity to be included as part of TNMP's deployment plan and surcharge. TNMP is only able to meet the requirement of this section of the rule with the approval of the back-office solution, as discussed by Mr. Kessler.

Q. DOES TNMP'S AMS DEPLOYMENT HAVE ON-BOARD STORAGE THAT COMPLIES WITH ANSI C12.19 TABLES AND OPEN STANDARDS AND PROTOCOLS THAT COMPLY WITH ANSI C12.22 STANDARDS[17]?

A. Yes. TNMP's witness Kessler discusses how TNMP's AMS technology performs these requirements.

Q. DOES TNMP'S AMS DEPLOYMENT ALLOW FOR THE COMMUNICATION WITH DEVICES INSIDE THE HOME THROUGH OPEN STANDARDS SUCH AS ZIGBEE OR HOME PLUG[18]?

A. Yes. TNMP's witness Kessler discusses how TNMP's AMS technology performs these requirements.

Q. DOES TNMP'S AMS DEPLOYMENT ALLOW FOR UPGRADE THESE MINIMUM CAPABILITIES AS TECHNOLOGY ADVANCES[19]?

A. Yes; upgrades can be accomplished over the air. TNMP's witness Kessler discusses how TNMP's AMS technology performs these requirements.

Q. IS TNMP PROPOSING ANY WAIVERS AS CONTEMPLATED BY PUC SUBST. R. 25.130(g)(3)?

A. Yes. I will identify the waivers TNMP requests later in my testimony.

[16] PUC Subst R. 25.130(g)(1)(G)
[17] PUC Subst R. 25.130(g)(1)(H) and PUC Subst R. 25.130(g)(1)(I)
[18] PUC Subst R. 25.130(g)(1)(J)
[19] PUC Subst R. 25.130(g)(1)(K)

Q. WHERE WILL TNMP'S ELECTRICITY DEPLOYMENT PLAN MADE AVAILABLE?

A. Besides TNMP's AMS website, which is not currently created, TNMP's deployment plan will be available at 1005 Congress Avenue, Suite 550, Austin, Texas. In addition, the deployment plan will be available at 225 E. John Carpenter Freeway Suite 1500, Irving, Texas. Market participants who wish to view the deployment plan in Austin will need to provide advance notice, since this office is not fully staffed on a regular basis.

VI. WAIVERS

A. As identified in TNMP's statement of functionality, TNMP requests waivers for the following:

Waiver on disconnection:

- Loads that may cause a safety or health issue if disconnected will not have an advanced meter with disconnect functionality installed. For example, TNMP proposes not to include the disconnection function for traffic lights, metered streetlights, railroad crossings, police stations, hospital facilities, service points providing cathodic protection, and TNMP's emergency facilities.
- Loads that currently have poly-phase and/or higher than class 200 (200 amp rating) meters will not have a disconnect device until poly-phase advanced meters with a disconnect device are available in the market

Waiver on HAN requirements:

- Loads that do not require and will never require HAN device will not have an advanced meter with a HAN device installed. For example, TNMP proposes not to include a HAN device for metered streetlights and other applications that would not benefit from a HAN device, such as electric gates, communications power supplies, sprinkler controls, and cathodic protection power supplies.
- Loads that have poly-phase and instrument rated meters will not have a HAN device until those advanced meters with HAN devices are available in the market.

Waiver on replacement outside of deployment plan:

- TNMP not be required to install advanced meters under the circumstances set forth in P.U.C. SUBST. R. 25.130(g) (6), in advance of the full deployment of advanced meters in a given area. TNMP will make efforts to install AMS meters on new meter installs.

Waiver on access to usage:

- TNMP seeks any and all waivers required from P.U.C. SUBST. R. 25.130(g) (1) (E) (i) and (G) if and only to the extent those rules require real-time access to data for end-use customers. End-use customers, however, will not have access to data through a web portal unless and until (A) provided by their REP, or (B) the Texas common data repository

(hereinafter, Common Repository) and Texas common web portal (hereinafter, Common Portal) are in place pursuant to the *Implementation Project Relating to Advanced Metering,* Project No. 34610. Once the Common Portal is completed, customers (in addition to REPs and authorized third parties) will have secure access to data through the Common Portal.

Q. ARE THERE ANY OTHER WAIVERS THAT TNMP REQUESTS?

A. Shortly after this filing, TNMP will be filing a general base rate proceeding as contemplated by PUC SUBST. R. 25.130(k) (4). TNMP requests a waiver to moving any AMS costs into base rate until TNMP has fully executed its deployment plan. Until TNMP has fully deployed AMS throughout its service area, TNMP will not be able to have a proper baseline for costs that will be used in any reconciliation proceeding.

VII. TNMP'S CUSTOMER EDUCATION PLAN

Q. DID TNMP INCLUDE EXPENSES EARMARKED FOR CUSTOMER EDUCATION?

A. Yes, as an integral part of the Company's AMS deployment plan, TNMP is implementing a customer education program that is designed to reach customers who will be receiving an advanced meter. Through this program, TNMP is seeking to educate those customers about the benefits of advanced metering technology and how this capability can potentially help customers save energy and money, as well as provide better system reliability. A key message for TNMP is that during the installation of the new meters, TNMP will be photographing the old meter and new meter reading, and performing an audit on 100 percent of the meter replacements. TNMP's customer education program is centered on various customer outreach tools, such as community events, presentation materials (chamber meetings or city council forums), and electronic communications. Customers will receive several information sources that will provide an overview of TNMP and its role in the community, TNMP's use of technology to improve electric delivery and reliability, and information about what the advanced meter means for consumers.

Q. WHAT TYPE OF MESSAGE IS TNMP'S CUSTOMER EDUCATION TRYING TO SEND?

A. TNMP is installing advanced meters in homes and buildings across its Texas service areas. Some of these areas are not in highly populated areas; in fact, except the

Lewisville and Gulf Coast service territory, most of the customers are in rural areas. The deployment process will take place from 2010 through 2015 to prepare the state to manage the ever-increasing energy needs of the future. TNMP's customers need to understand that this rollout is part of a long-term statewide initiative, led by the Texas Public Utility Commission and the Texas Legislature, to upgrade from analog to digital meter technology. This rollout will lay the foundation for customer programs that can reduce energy consumption, decrease energy costs through new pricing programs by REPs, and create new energy efficiencies opportunities.

While TNMP's role in the Energy Chain is limited to owning and maintaining power lines, providing customer education before, during, and after the deployment is critical to minimize customer confusion and educate customers on the benefits of advanced meters. Specifically, TNMP's customer education plan: 1) explains what a smart meter is; 2) explains the difference between a smart meter compared to a customer's existing meter; 3) helps the customer understand how a smart meter works in a smart grid; 4) explains TNMP's technology; 5) addresses the timing and deployment schedule; 6) shares the benefits to TNMP and customers; and, 7) explains the security/privacy of smart meters. The detail of a potential educational message is below.

- ***Smart Meters***

  A Smart Meter is a device attached to a home or building that digitally reads and captures energy usage. A Smart Meter is one of the latest technologies that will enable consumers to better monitor and track energy use, and make more informed decisions on energy consumption.

- ***Smart Meters vs. Analog Meters***

  While the traditional, manual, analog meters have served Texas well, the Smart Meter digital technology is far more reliable, secure and accurate. It's a necessary evolution of technology to complement the state of Texas' future plans for a smarter, more efficient energy system.

- ***Accuracy***

  As identified in Mr. Burke's testimony, TNMP has identified several key steps to ensure the accuracy of the meter exchange process. Before the meter exchange process occurs, 100 percent of the new meters have been tested by General Electric and SmartSynch. In addition, TNMP performs an audit of a sample from every pallet of meters.

  TNMP's outside vendor is responsible for capturing the "out" reading of the old meter and the "in" reading of the new meter with a digital camera. These digital images will be audited. This audit includes 100 percent verification of all "out" readings and "in" readings before submission to TNMP for billing.

Finally, TNMP's billing system has a built in "high/low" meter reading verification that compares current consumption to be billed with historical consumption, if available.

- ***Smart Grid***

A smart grid is an intelligent power transmission and distribution network that controls the flow of electricity and data. It's the future of our country and state's energy infrastructure. A smart grid will increase real-time data and two-way communication with end users and utility resources. The ultimate vision for Texas' smart grid is to enable future technologies, reduce energy costs, integrate renewable energy sources and improve system reliability.

- ***Smart Meters and Smart Grid***

Smart Meters are the most visible aspect of a smart grid to consumers, although they are just one component of Texas' commitment to a more sophisticated energy system. A Smart Meter will produce an enormous amount of data, capturing power usage every 15-minutes, and reporting this back to the utility company hourly or daily. Information from Smart Meters will allow for the continued development of a smart grid for Texas.

  - ***The Technology***

    Smart Meters use two-way technology to "talk" through the existing cellular network infrastructure and send real-time meter data to customers, grid operators and utility companies. Eventually, the technology will allow sophisticated home appliances, energy systems and the Smart Meter to "talk" to each other. TNMP's Smart Meters utilize proven GSM cellular technology. The network provider is AT&T.

  - ***Timing and Deployment***

    Now through 2015, TNMP is installing Smart Meters for all residential and commercial users in TNMP's service areas across Texas. The switch to this advanced meter technology will allow for a more efficient and effective means of utility distribution and consumption. TNMP has planned a 5-year Smart Meters deployment, from 2010 to 2015, as part its aggressive – but fiscally responsible – timeline to allow all residential and commercial users the opportunity to benefit from this technology as soon as possible. TNMP's phased rollout begins along the Gulf Coast in 2010, followed by North Texas and Central Texas in 2013, and concluding in West Texas in 2015. This timeline was established to reach the greatest number of people as quickly as possible and to ensure a smooth transition for all involved.

  - ***Benefits***

    The Smart Meters' real-time, digital technology will send more accurate energy usage readings to utility companies, arming them with data to better serve customers. Capability to provide 15-minute interval data vs. the traditional once-a-month meter read to utility companies improved trouble-shooting capabilities for power disruptions. Less intrusive; remote

reading capability reduces need to access meter on property Enhanced reliability and speed for connection changes. Consumers will have access to real-time energy usage. Consumers will have capability to remotely communicate with in-premise devices to control energy usage, which will enhance efficiency to meet energy demand without adding resources, like power plants. TNMP will have the ability to remotely upgrade Smart Meters with future technologies. REPs will have the opportunity to offer more dynamic pricing, including peak pricing and peak pricing rebates.

- ***Security/Privacy of Smart Meters***

TNMP is committed to the highest standards of privacy and security for consumers' energy usage data. Smart Meters inherently are more secure, protected and precise than traditional, analog meters. The digital technology provides more accurate reads to the utility company which will result in pass-along benefits to the end user. Over time, consumers will have the opportunity to access specific personal energy usage information via a secure and password-protected Web portal.

- ***Cost Responsibility***

TNMP is committed to launching Smart Meters across its Texas communities in the most fiscally responsible manner, ever cognizant of the consumer costs involved. The Texas Public Utility Commission has approved a monthly consumer surcharge to cover the cost involved for this technology rollout for 12 years.

Advanced meters are a small investment for Texans for more responsible energy system in the future. Texans will see the financial and environmental benefits from this technology for decades to come.

- ***Cost Details***

Beginning in 2010, consumers who receive power from TNMP will see a minimal surcharge on their monthly electric bills. This 12-year surcharge will offset the costs involved to bring this technology to Texas residences and commercial facilities.

To offset the cost involved, consumers are encouraged to become more energy efficient at home and at work, including changing bulbs to compact fluorescent lights and unplugging appliances/devices when not in use.

Q. PLEASE DESCRIBE HOW THE CUSTOMER EDUCATION WILL BE IMPLEMENTED.

A. Since the majority of TNMP's advance meter deployment will be on residential premises, TNMP is implementing a customer education campaign that takes the form of two character mascots: Kilo and Wattson.

TNMP will roll out the customer education in areas before the deployment actually occurs, (using the same area identified in the deployment plan). The education process within the Gulf Coast service territory will begin before the January 1, 2011, deployment

and will end in West Texas during 2015. Throughout the customer education rollout, Kilo and Wattson will serve as mascots of the campaign, appealing to all ages and demographics. They are non-threatening vehicles to deliver the TNMP smart meter rollout using a down-to-earth message. The Kilo & Wattson campaign will focus on community events in order to spread the Smart Meter message.

Q. FOR THE INITIAL CUSTOMER EDUCATION ROLLOUT, PLEASE DESCRIBE THE COMMUNITY EVENTS THAT WILL HAVE THE TARGETED MESSAGING.

A. The types of events will be dictated based on the location of future deployment and scheduled community events. In the Gulf Coast area, in Alvin, the community events identified are high school football games, the 5th Annual SplashMania, FishFest, Frontiers Day, and Crawfish Festival. In Friendswood, the community events identified are the Holiday Hustle and Houston Rodeo. In Angleton, the community events identified are the Brazoria County Fair, Festival of Lights, Fall Family Fest, Heart of Christmas, and the Jingle Bell Run. In League City, the community events identified are the American Cancer Society's Pink Ladies golf tournament, Mardi Gras Galloway Gallop and Yachty Gras, Events at Kemah boardwalk, Spring Break celebration, Corvette Show and Crawfish festival, the Village Fair, and the Texas music festival. For Texas City, the community events identified are the Fun Fest, Chamber Golf Classic, and Music Fest by the Bay.

Q. WHY IS TNMP CHOOSING EVENTS SUCH AS THESE?

A. Whether it is a high school football game or season event, TNMP's involvement in community events will allow for deeper penetration in the various markets, thus increasing exposure and educational opportunities.

Q. WHAT TYPES OF COSTS ARE ASSOCIATED WITH THIS TYPE OF EDUCATION CAMPAIGN?

A. Please see EXHIBIT SRW-2 which is the detailed proposal, which has been incorporated into the McKinsey Model.

VIII. TNMP MCKINSEY MODEL ASSUMPTIONS

Q. ARE YOU TESTIFYING ON SOME OF THE ASSUMPTIONS MADE THAT ARE USED IN THE MCKINSEY MODEL?

A. Yes. In this section of my testimony, I will address some of the assumptions that were used in the "CustomerServiceBenefits" tab in the model. Mr. Burke will discuss the "Meter Reading Savings" in his testimony.

Q. DID TNMP INCLUDE ANY SAVINGS ASSOCIATED WITH "BILLING SAVINGS"

A. While one of the primary benefits of AMS is automated meter readings, and therefore taking the human element out of the equation, TNMP does not expect to see any billing savings. Currently TNMP's billing department handles daily billing exceptions and, these billing exceptions do not include any exceptions that were caught and corrected in the hand held that are used by meter readers. TNMP believes that these billing exceptions will still occur, because of the validation in the billing system, which tries to determine high/low billing exceptions before an invoice is sent to the REP. In addition to working billing exceptions, TNMP's billing department also performs the complex billing review of industrial bills and analysis and resolutions to MarkeTrak[20]. These functions will not be eliminated due to the implementation of AMS.

Q. DID TNMP INCLUDE ANY SAVINGS ASSOCIATED WITH "CREDIT AND COLLECTION" OR THEFT PREVENTION

A. No. The ERCOT market billing structure does not lend itself to any savings associated with "credit and collections". TNMP's customer is the REP and not the individual tenant at a business or residence. Therefore TNMP's customers are limited to the 70 REPs in TNMP service territory, and not the approximately 240,000 individual points where the advance meters will be installed. TNMP's billing group is the responsible group for handling REP defaults. Currently, TNMP does not maintain a revenue protection or theft prevention department; therefore the McKinsey Model included cost for additional headcounts, as discussed by TNMP witness Burke, since meter readers will not be viewing every meter each month.

Q. IN GENERAL, WHAT WILL HAPPEN TO ANY ACTUAL SAVINGS THAT ARE GREATER THAN THOSE ESTIMATED IN THE AMS SURCHARGE MODEL?

A. To the extent any additional savings are realized, they will be passed on to consumers either through a reduced discretionary fee, as part of the AMS reconciliation proceeding, or in a base rate case.

[20] MarkeTrak tracks ERCOT retail market issues and data discrepancies.

IX. ADDITIONAL REQUESTS

Q. ARE THERE ANY OTHER DETAILS OF TNMP AMS DEPLOYMENT THAT THE COMMISSION NEEDS TO APPROVE?

A. Yes. TNMP has included costs associated with in-home devices for approximately 13,000 low income customers, and requests the Commission approve an accelerated depreciation of the existing analog and load research meters.

Q. IS TNMP SEEKING RECOVERY OF COSTS THAT HAVE BEEN INCURRED AS A RESULT OF THE IMPLEMENTATION OF THE COMMISSION'S AMS RULE THROUGH PROJECT NO. 34610?

A. Yes. Under P.U.C. SUBST. R. 25.130(k)(1), the Commission:

> . . . shall establish a nonbypassable surcharge for an electric utility to recover reasonable and necessary costs incurred in deploying AMS to residential and non-residential customers other than those required by the independent system operator to have an interval demand meter. The surcharge shall not be established until after a detailed Deployment Plan is filed pursuant to subsection (d) of this section. In addition, the surcharge shall not ultimately recover more than the AMS costs that are spent, reasonable and necessary, and fully allocated, but may include estimated costs that shall be reconciled pursuant to paragraph (6) of this subsection

TNMP's participation in the AMS implementation project, including sharing the funding of Solution's Cube, (consultants retained by the Commission) are reasonable and necessary to the proposed AMS deployment and are reasonable and necessary to ensure deployment consistent with the Commission's expectations. In the absence of AMS deployment, TNMP would not incur these costs.

Q. IS TNMP SEEKING RECOVERY OF ESTIMATED COSTS FOR PROCESSING THIS CASE AT THE COMMISSION?

A. Yes. Similar to the other utilities that have filed for an AMS surcharge, TNMP has included estimated TNMP legal costs, noticing costs, and travel costs in the event this case goes to hearing. If the case does not go to hearing, then these costs will need to be reconciled. This estimate does not include any amount associated with any cost that Cities with original jurisdiction may seek to collect from TNMP. If Cities that have retained original jurisdiction seek repayment of consultant and legal fees, TNMP will seek to recover these costs from the customers in these cities through an AMS rate case expense surcharge. In addition, due to cash flow impacts, TNMP seeks approval to

reimburse Cities over the time period that an AMS rate case expense surcharge is in effect.

Q. PLEASE DESCRIBE THE COSTS ASSOCIATED WITH IN-HOME MONITORS?

A. Advance meters will allow customers to receive information on their energy use; allow customers to change their energy consumption patterns; and allow customers to receive price signals from REPs. To give low-income customers the opportunity to receive some of the benefits from AMS, TNMP has included the costs for approximately 13,000 in-home monitors to be distributed to the 13,000 customers that have been identified as receiving the low-income discount. This economic class of customers might not normally spend the money on an in-home monitor. It is TNMP's goal for the AMS surcharge to include the cost of an in-home device, chosen by Commission Staff or the shareholder process, and be available to low-income customers.

Q. WITH THE DEPLOYMENT OF ADVANCE METERS, IS TNMP REQUESTING APPROVAL FOR ACCELERATING THE DEPRECIATION OF ITS EXISTING METERS?

A. Yes. The Advance Metering rule allows for reasonable recovery of any non-AMS metering equipment that has not yet been fully depreciated. In fact, the Commission has identified the amortization of advanced meters in the range from five to seven years, depending on the useful life of the meter. Therefore, consistent with P.U.C. SUBST. R. 25.130(k), TNMP requests approval to amortize the existing non-AMS meters over five years in its next general rate proceeding initiated after the filing of this docket.

Q. IS TNMP IMPLEMENTING A NEW RATE RIDER FOR THE AMS SURCHARGE?

A. Yes. Please see EXHIBIT SRW-3. This rider is based on Oncor's approved rider.

Q. WHICH TNMP RATE CLASSES WILL BE AFFECTED BY THE AMS SURCHARGE?

A. The following TNMP rate classes will be affected by the AMS Surcharge: 6.1.1.1.1 Residential, 6.1.1.1.2 Secondary Less Than or Equal to 5 kW, 6.1.1.1.3 Secondary Greater Than 5 kW Non-IDR, 6.1.1.1.4 Primary Non-IDR, and 6.1.1.1.6 Schedule VI - Metered Lighting.

Q. DO THE CLASSIFICATIONS FOR THE PROPOSED AMS CLASSES COINCIDE WITH THE AVAILABILITY FOR EACH RATE SCHEDULE INCLUDED IN TNMP'S TARIFF?

A. Yes.

Q. WERE ANY CLASSES OF CUSTOMERS EXCLUDED FROM THE CALCULATION OF THE AMS COST RECOVERY FACTORS?

A. No rate classes were excluded, but a subset of customers, those customers that have an interval data recorder installed, are excluded as required under PUC. Substr. R. 25.130(k)(1) .

X. CONCLUSION

Q. WHAT ACTION DO YOU PROPOSE THAT THE COMMISSION TAKE IN THIS PROCEEDING?

Substantive Rule 25.130 authorizes electric utilities to assess a nonbypassable surcharge to recover costs incurred for deploying advanced metering systems that are consistent with the rule. TNMP is requesting approval of a Rider AMCRF, a two-tiered levelized surcharge that minimizes negative cash flow, and approval for accelerated depreciation on its existing meters in the TNMP's next rate case after the filing of this proceeding. TNMP requests an effective date of the earlier of the first billing cycle following a final order or November 1, 2010, for the new AMS surcharge.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared Stacy R. Whitehurst, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is Stacy R. Whitehurst. I am of legal age, a resident of the State of Texas, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

Stacy R. Whitehurst

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 25 day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

KENDALL ANN EVANS
Notary Public, State of Texas
My Commission Expires
November 13, 2013

Kendall Ann Evans
NOTARY PUBLIC in and for the
State of Texas

My Commission expires Nov 13 2013

STACY R. WHITEHURST

Education Background and Business Experience

Stacy R. Whitehurst is the Supervisor of Texas Regulatory Policy in the Regulatory Policy department at PNMR Services Company a subsidiary of PNM Resources, Inc. Mr. Whitehurst graduated from Texas A&M University in 1994 with a Bachelor's Degree in Political Science. Mr. Whitehurst has been employed in the electric utility industry since 2000, when Mr. Whitehurst took a position as a senior analyst with Texas-New Mexico Power Company. In this capacity, he was responsible for creation of and modifications to TNPE's customer information and billing systems to support the deregulation of electricity. In August 2003, Mr. Whitehurst took a position in the Regulatory Affairs department as a Senior Analyst. After the acquisition of TNP Enterprises by PNM Resources on June 6, 2005, Mr. Whitehurst took his current position.

Proceedings in Which Stacy R. Whitehurst Filed Testimony

JURISDICTION	DOCKET NO.	DESCRIPTION
Texas	29206	Application of Texas-New Mexico Power Company, First Choice Power, Inc. and Texas Generating Company, L.P. to Finalize Stranded Costs under PURA §39.262
Texas	31825	Application of First Choice Power Special Purpose, LP to Increase Its Price To Beat Fuel Factors
Texas	31994	Application of Texas-New Mexico Power Company to Adjust the Competition of Transition Charge Pursuant to PURA § 39.262(g)
Texas	32109	Application of First Choice Power Special Purpose, L.P. to Adjust Its Price To Beat Base Rates Pursuant to PURA §39.202 and PUC Subst. R. §25.41(g)(3)
Texas	32795	Staff's Petition to Initiate a Generic Proceeding to Re-Allocate Stranded Costs pursuant to PURA §39.533(f)
Texas	35460	Petition Of PNM Resources, Inc. and Cap Rock Energy Corporation Regarding Proposed Merger and Acquisition of Stock
Texas	36025	Application Of Texas-New Mexico Power Company For Authority To Change Rates
Texas	37613	Application Of Texas New Mexico Power Company For Approval Of An Energy Efficiency Cost Recovery Factor

Customer Education Campaign & Pricing

Filed Confidential

TEXAS-NEW MEXICO POWER COMPANY
TARIFF FOR RETAIL DELIVERY SERVICE

6.1. Rate Schedules
Applicable: Entire Certified Service Area **Page No.: 129**
Effective Date: November 1, 2010 **Original**

6.1.1.6.8 RIDER AMCRF – ADVANCED METERING COST RECOVERY FACTOR

APPLICATION

Applicable, pursuant to PURA § 39.107(h) and Substantive Rule § 25.130, to Retail Customers receiving metered service for which the Company will install and Advanced Metering System ("AMS") at any time during the AMS cost recovery period approved by the Public Utility Commission of Texas.

Rider AMCRF is not applicable to Retail Customers whose: (1) load is required to be metered by an interval data recorder meter by the independent System Operator (ERCOT), (2) load was metered by and interval data recorder meter prior to the effective date of PUCT Substantive Rule § 25.130 (May 30, 2007), or (3) load is unmetered.

NET MONTHLY BILL AMOUNT

The AMCRF for each of the Company's applicable retail rate schedules is as follows:

Rate Schedule	Year 1- 5 Surcharge	Year 6- 12 Surcharge	
Residential Service	$ 4.80	$ 4.17	Per ESI ID per month
Secondary Service Less than or Equal to 5 kW	$ 5.00	$ 5.00	Per ESI ID per month
Secondary Service Greater than 5kW	$ 16.70	$ -	Per ESI ID per month
Primary Service	$ 20.13	$ -	Per ESI ID per month
Lighting Service (Metered Facilities)	$ 11.04	$ -	Per ESI ID per month

NOTICE

This rate schedule is subject to the Company's Tariff and Applicable Legal Authorities.

Moody's Investors Service

Rating Action: Moody's revises outlook of PNM Resources, PNM & TNMP to stable

Global Credit Research - 09 Mar 2010

Approximately $2.5 billion of securities and loans affected

New York, March 09, 2010 -- Moody's Investors Service changed the rating outlook of PNM Resources, Inc. (PNMR: senior unsecured Ba2) and its subsidiaries Public Service Company of New Mexico (PNM: senior unsecured Baa3) and Texas-New Mexico Power Company (TNMP: senior unsecured Baa3), to stable from negative. In addition Moody's upgraded the senior secured obligations of TNMP to Baa1 from Baa2 and withdrew the (P) B1 rating assigned to a PNMR shelf registration for preferred stock that has expired. All other ratings of PNMR, PNM (including the Baa1 rating assigned to its $65 million secured pollution control revenue bonds), and TNMP are affirmed.

"The stable outlook for PNMR, PNM and TNMP considers the companies' improved financial and operating performance, including its progress on debt reduction and success in achieving regulatory outcomes that are reasonably supportive of credit quality," said Laura Schumacher, Vice President/Senior Analyst. "As a result, assuming a continued focus on efficient utility operations, we anticipate the companies will be able to sustain financial credit metrics within the ranges appropriate for their ratings and risk profiles." The stable outlook also considers improvement in the liquidity profile of TNMP.

The upgrade of secured debt at TNMP follows Moody's August 2009 upgrade of the majority of its senior secured debt ratings of investment grade regulated utilities by one notch. Issuers with negative outlooks were excluded from the August upgrade.

During 2009, PNMR's total consolidated debt burden was reduced by about $560 million. While the majority of this reduction came as result of PNM's sale of its gas utility assets, which generated cash proceeds of approximately $525 million after tax, improved performance by PNMR's unregulated retail energy provider in Texas also contributed to a reduction in parent level debt of about $270 million. Improved cash flow at PNM comes in part as a result of an emergency fuel cost recovery mechanism put in place in 2008, along with a 2009 rate increase and approval of a more permanent fuel cost recovery mechanism.

TNMP's cash flow improved, in part, as a result of its 2009 rate increase that was calculated based on among other things, actual interest expense resulting from its 2009 refinancing; as part of this decision the utility received authorization for formulaic rate making for transmission investment. The execution of a separate $75 million secured credit facility at TNMP significantly improved the utility's liquidity profile.

Going forward, we expect PNM and TNMP to demonstrate credit metrics that are appropriate for utilities rated at the lower end of the Baa rating range indicated in Moody's August 2009 Rating Methodology for Regulated Electric and Gas Utilities. For example, we anticipate the utilities' ratios of cash flow excluding the impact of working capital changes to debt to remain in the low to mid teens, with the potential for further improvement dependent on additional regulatory support.

While PNMR may demonstrate metrics similar to those of PNM and TNMP, its rating reflects the additional volatility of its unregulated businesses as well as the still significant amount of parent company leverage.

Moody's last rating action for TNMP occurred March 16, 2009 when a senior secured rating was assigned.

Moody's last rating actions for PNMR, PNM and TNMP occurred March 4, 2009 when the ratings were affirmed and the outlooks remained negative after those of PNMR and PNM were changed on April 25, 2008.

The principal methodology used in rating PNMR, PNM and TNMP was Rating Methodology: Regulated Electric and Gas Utilities, published August 2009 and available on www.moodys.com in the Rating Methodologies sub-directory under the Research and Ratings tab. Other methodologies and factors that may have been considered in the process of these issuers can also be found in the Rating Methodologies sub-directory on Moody's website.

Headquartered in Albuquerque, New Mexico, PNMR is a holding company which has as its primary subsidiaries, PNM, TNMP and First Choice Power, a Texas retail energy provider. PNMR also owns a 50% interest in Optim Energy, through which PNMR conducts unregulated energy operations primarily within the Electric Reliability Council of Texas (ERCOT).

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PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY

REQUEST FOR APPROVAL

OF AN ADVANCE METERING SYSTEM (AMS)

DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS

OF

GARY L. KESSLER

ON BEHALF OF

TEXAS-NEW MEXICO POWER COMPANY

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EXHIBIT GLK-1

GE I-210+C SINGLE PHASE METER SPECIFICATIONS

EXHIBIT GLK -2

GE I210+C™ ELECTRONIC METER PRODUCT DESCRIPTION, OPERATING INSTRUCTIONS, MAINTENANCE INSTRUCTIONS, UPGRADING.

EXHIBIT GLK-3 FILED HIGHLY CONFIDENTIAL AND HIGHLY SENSITIVE

GE WARRANTY

EXHIBIT GLK-4

AMS COMMUNICATIONS NON-COVERAGE AREAS

EXHIBIT GLK-5

AT&T DISASTER RECOVERY PLAN

EXHIBIT GLK-6

AT&T NERC CIP WHITEPAPER

EXHIBIT GLK-7

GSMA MOBILE BROADBAND DATA SUMMARY OCTOBER 2009

EXHIBIT GLK-8

SMARTSYNCH CASE STUDIES

EXHIBIT GLK-9

DEPLOYING AMI SOLUTIONS- AB EST PRACTICES APPROACH

EXHIBIT GLK-10 FILED HIGHLY CONFIDENTIAL AND HIGHLY SENSITIVE

KV2C METER DOCUMENTATION

EXHIBIT GLK-11 FILED HIGHLY CONFIDENTIAL AND HIGHLY SENSITIVE

I210+C RD ELECTRICITY METER REPORT OF TESTS CONDUCTED

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is Gary L. Kessler, and I am employed by PNMR Services Company ("PNMR Services"), a wholly owned subsidiary of PNM Resources, Inc. ("PNM Resources"). My business address is 225 E. John Carpenter Freeway, Irving, Texas 75062.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company ("TNMP" or "Company").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I hold a Bachelor of Science in Electrical Engineering from the University of Washington. I have been employed at PNMR Services as the Domain Architect for Smart Grid since March 2009. From 2007 to 2009, I held the position of Director of Operations Technology, working for PNM Resources. From 2001 to 2007, I held the position of Director of Technology and Operations for Avistar, a wholly-owned subsidiary of PNM Resources that developed technologies to enhance utility operations. During my employment at Avistar, I was responsible for identifying and developing technologies that aligned with key business strategies and resulted in revenue-generating products for the company.

Prior to my employment at PNM Resources, I was the Group Director of Product Development and Operations for Advanced Visual Systems from 1999 to 2001. I managed development of strategic products, services and technology roadmap for the company. From 1995 to 1999, I worked for AT&T Wireless Services as a Director of Engineering and Deployment. In this position, I was responsible implementation of third generation and Advanced Cellular Services and technologies into AT&T Wireless' cellular network. Prior to my experience at AT&T, I spent 13 years as a Regional Program Manager at Digital Equipment Corporation. I was responsible for marketing, development and implementation of comprehensive service programs and tools for Fortune 500 clients. Additionally, I have also been employed as a Group Program Manager for Silicon Graphics and Senior Engineer at Boeing Company.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS OR BEFORE ANY OTHER REGULATORY BODY?

A. Yes. I provided testimony in TNMP's most recent rate case, Docket No. 36025.

Q. WHAT ARE THE PRIMARY RESPONSIBILITIES OF YOUR CURRENT POSITION?

A. As a Domain Architect for Smart Grid at PNMR Services Company, I am responsible for the development of the Advanced Metering Systems (AMS) program for Texas New Mexico Power Company (TNMP), a PNM Resources ("PNMR") subsidiary. My responsibilities in this capacity include managing business cases for new technology proposals, developing new AMS technology architecture, assisting with technology development-related regulatory compliance and filings, evaluating and recommending vendors, and facilitating operations support and training in the implementation of AMS for TNMP.

Q. HAVE YOU PREPARED ANY EXHIBITS?

A. Yes. I have included several diagrams on the technical architecture, function, usage and security of the selected AMS technology.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I am testifying as the technical representative on the architecture, functionality and security of the AMS system created by TNMP and the selected vendors.

III. ADVANCED METERING SYSTEM & STATEMENT OF FUNCTIONALITY

Q. WHAT ARE THE SIGNIFICANT COMPONENTS OF TNMP'S AMS?

A. The components that are essential to the functioning of TNMP's AMS, in accordance to the Commission's rule §25.130, are as follows:

- Meter Data Management System (MDMS)
- Transaction Management System (TMS)
- Outage Management System (OMS)
- AMS Meters

- AT&T Cellular Network

Q. CAN YOU SUMMARIZE THE FUNCTIONS OF EACH OF TNMP'S AMS COMPONENTS MENTIONED ABOVE?

A. Yes.

1. Meter Data Management System (MDMS) – this component provides the core functionality for support of all business transactions pertaining to metering, metering logistics, and data associated with reading the meter. The MDMS ties together the Meter data and customer business transactions. The MDMS is the Database of Record for all TNMP meter data, meter transactions pertaining to customer activity, and meter logistics as it relates to change outs, meter type, serial number, and other requirements necessary to meet all components of §25.130 and the AMIT business use cases. See my testimony regarding the MDMS for further discussion.

2. Transaction Management System (TMS) – TMS is the head end data collection and meter communication system. It is responsible for collecting all meter data, routing alarms, and performing meter specific actions as dictated by the MDMS. TMS also performs network management, firmware updates, and meter health checks on a routine basis. TNMP plans to outsource to SmartSynch the operation and management of TMS. At the end of the deployment, TNMP will evaluate the cost benefit option of continuing to outsource this functionality versus procuring TMS and moving the functionality "in-house". The AT&T cellular network will then communicate directly with TNMP's back-office systems and use all of TNMP's security processes.

3. Outage Management System (OMS) – the OMS responds to meter outage messages and all alarms generated by the meters and processed by TMS. Generally, it is the responsibility of the OMS to manage all alarms generated by TMS. Specifically, the OMS will generate high-priority alarms for tampering events and outage events. Each event will create an actionable item in TNMP's work management system that causes intervention by a TNMP employee.

4. AMS Meters – These meters read consumer electric energy usage and pass it to the TMS system on request. The meters also perform remote connects and

disconnects, generate alarms based on events that transpire on the electric system such as outage notifications, tamper events, and other significant alerts.

5. AT&T Cellular Network – this is the communications backbone of the TNMP AMS network. The AT&T cellular network carries all the data to and from TNMP's deployed meters, providing an IP-based two-way communications link. For the TNMP network, this replaces the expensive, private networks that are generally built for AMS deployments. The data portion of the network, which will be used by the TNMP AMS system, is highly secure and extremely reliable, as described in the security portion of my testimony. I will describe the network in more detail later in my testimony.

Q. WHAT COMMUNICATION TECHNOLOGIES IS TNMP PLANNING TO USE IN ITS DEPLOYMENT OF ADVANCED METERS?

A. In an effort to provide the most cost effective, secure, and reliable AMS network to its consumers and customers, TNMP has chosen to utilize existing cellular public networks as the AMS network. TNMP has a widely distributed, non-contiguous service territory encompassing West Texas, Central Texas, North Texas and areas of East Texas. With this service territory, it is a prohibitively expensive solution to build-out a private network, either wireless or wired, to cover TNMP's service geography. The TNMP service territory is approximately 10,000 square miles with about 230,000 customers. That is approximately an average of 23 meters/ square mile, versus other Texas investor-owned utilities that range in meter density from approximately 10 to 400 meters per square mile (Centerpoint = 5,000 sq miles/2M meters; Oncor = 27,000 sq miles/3.4M meters; TNMP = 10,000 sq miles/230k meters; AEP Texas= 97,000/1M meters).

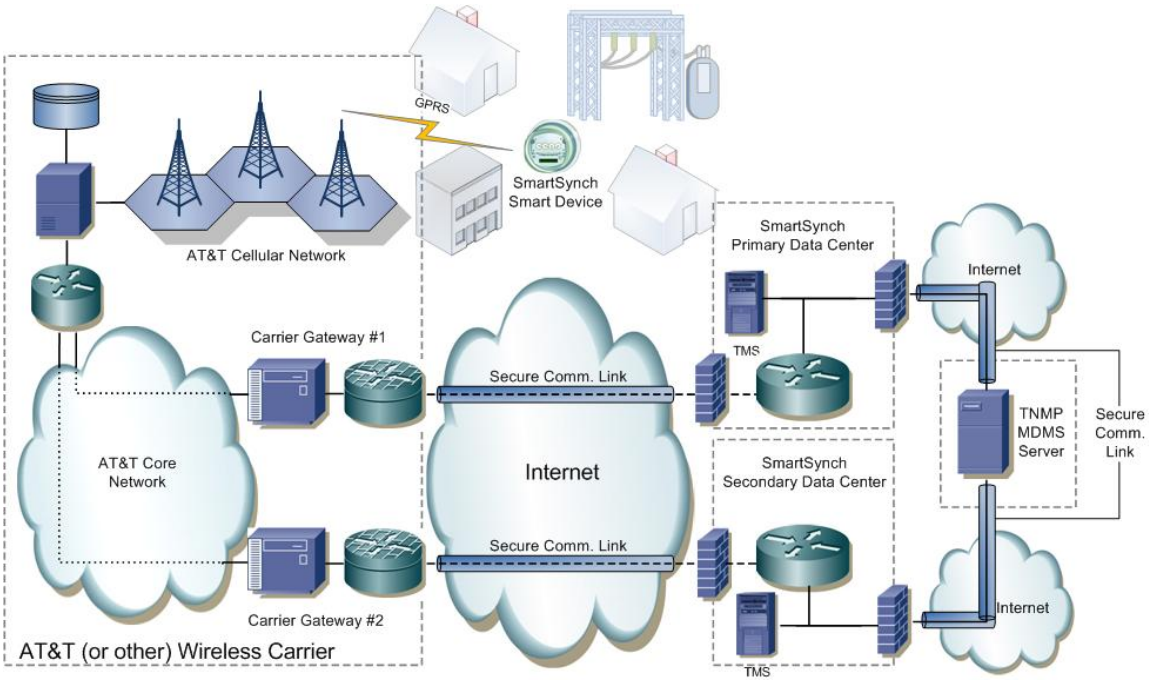
The majority of TNMP's AMS deployment will use the AT&T cellular network as the carrier of choice. AT&T has cellular coverage to the majority of TNMP's existing meter locations based on a geo-coded comparison with AT&T's existing coverage maps. For those customers who reside outside the current AT&T coverage areas, there are alternatives which have been identified by TNMP. During the course of the deployment, AT&T may expand their coverage to encompass some of these areas. A second consideration could be entering an agreement with an alternative carrier, such as Verizon, T-Mobile or Sprint. In the event that AT&T, or another carrier, is unable to provide service to these customers, TNMP will review alternative technologies, such as

satellite, Power Line Carrier, Wi-MAX, or private network, attempting to find a cost effective solution to provide AMS to those customers who fall in the deficient coverage area. TNMP will make its best effort to provide AMS to all the customers within its service territory using cost effective technology solutions.

The cellular tower to meter communications technology will utilize General Packet Radio Service (GPRS). General Packet Radio Services (GPRS) is a packet-based wireless communication service that provides data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone, computer users, and meters. GSM Association (GSMA - leading industry association for GSM) represents that GSM/GPRS is currently the largest cellular technology in use around the world, used in over 860 networks in more than 220 countries. Further information can be viewed at http://gsmworld.com/roaming/gsminfo/index.shtml or in the attached document from GSMA that provides an inventory of existing and proposed GSMA networks worldwide.

The following diagram illustrates TNMP's wireless architecture that is proposed for this AMS filing.

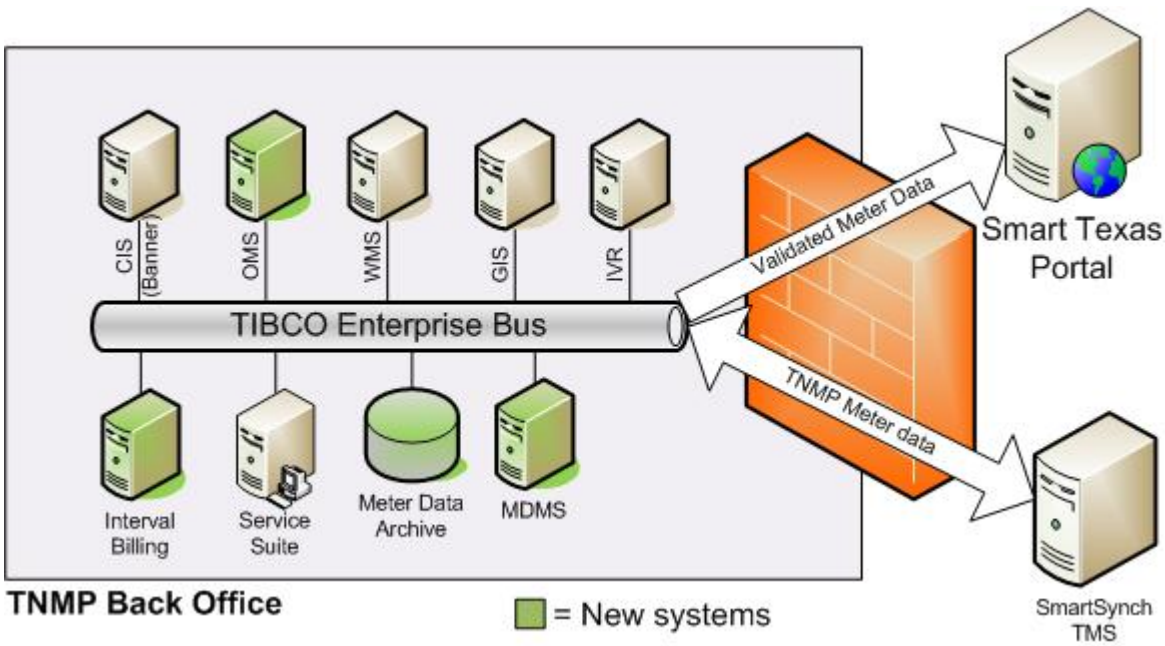
Figure GK 1 - TNMP Communications Network



Q. PLEASE DESCRIBE TNMP'S PROPOSED AMS.

A. TNMP's proposed AMS includes advanced meters, the associated computer hardware, testing and meter programming systems, server and applications software, public and private communications networks, and the back-office systems that will collect and provide time-differentiated energy usage to customers and their REPs through the Smart Meter Texas web portal described later in this testimony. The proposed AMS system is illustrated in two diagrams. Figure GK 1 illustrates the proposed communication architecture which will communicate with all deployed Smart Meters and will pass meter data, alarms, and information to SmartSynch's TMS system, and then to TNMP's Meter Data Management System. Figure GK 2, below, depicts the required back-office systems that will be implemented or modified as part of this filing. For the sake of clarity, the acronyms used in the diagram are defined as follows: CIS=Customer Information System; OMS = Outage Management System*; WMS=Work Management System; GIS=Geographic Information System; IVR=Interactive Voice Response Unit; Interval Billing=Interval Billing System*; Service Suite=In-Truck Dispatch; Meter Data Archive=AMS Meter data repository*; MDMS=Meter Data Management System*; TMS=Transaction Management System (Head-End Meter Reading)*

Figure GK 2 - AMS Back-office systems



Q. CAN YOU DESCRIBE THE EVOLUTION OF THE ADVANCED METER TECHNOLOGY TESTED AND USED BY TNMP?

A. TNMP has been conducting technology trials over the past three years of various meter and technology configurations. More specifics of the trials can be found in Mr. Burke's direct testimony. In December of 2007, TNMP installed 100 cellular based Elster A3 meters in the Clifton service territory. The Elster A3 meters do not have remote disconnect/reconnect as part of the configuration, as this feature was not available at the time of the trial. TNMP chose to dual meter 10% of the installations, using the old meter/new meter over a 3-month sample period. Results of the dual meter sample showed no difference in meter readings. These dual meter installations are still in place in the Clifton service territory.

In June of 2008, TNMP initiated a larger trial of meters using a hybrid technology of cellular network to a collector and Power Line Carrier (PLC) from the collector to the meter. The vendor, Echelon, provided AMS meters that had a remote disconnect switch which allowed TNMP to test the impact of remote service activation and de-activation. TNMP installed these meters in the Lewisville and Gulf Coast service territories, largely on high density occupancy buildings. After a year and a half trial, TNMP reviewed the results and determined that, although the meters performed accurately and allowed for reliable service activation and deactivation, the vendor would not meet the TX HAN requirements, and bandwidth to the meter was significantly limited such that market requirements for "real-time" meter reads may exceed the systems capabilities. No further installations were scheduled.

In May of 2009, TNMP began a larger trial of cellular-based meters that fully complied with Substantive Rule §25.130 requirements. These meters have been deployed in various locations in the TNMP service territory; specific locations can be found in Mr. Burke's direct testimony. TNMP has replaced all previous trial meters with this current technology. The results of the trial have been very successful. Key functionality tested with this technology has been: remote firmware upgrades, tampering alarms, remote service activation and deactivation (connect/disconnect), 15-minute data collection, two-way communication, and real-time meter "pings". TNMP has not tested HAN messaging yet, but will test that functionality once AMIT market requirements and use cases are

fully completed. The meters exhibit an extremely reliable communications history (99.9%) and are very consistent in the success of first-time read requests.

Q. WHAT AMS TECHNOLOGIES IS TNMP PLANNING TO USE IN THE DEPLOYMENT OF ADVANCED METERS?

A. Based on the results of the AMS meter trial, TNMP will use the GE-I210+c cellular based meter as the AMS solution for single phase residential and commercial installations. This meter is a multi-function residential meter that uses a vendor specific communications module plugged into the meter under the glass. A detailed description of the meter functionality and accuracy can be found in the attached exhibits[1]. An important distinction to make regarding this technology is that SmartSynch provides only the communications module, integrated into the GE meter. The Smart Synch module does NOT have any embedded meter functionality or metrology on the communications board, unlike other vendor solutions. All meter data is collected by the meter and stored in the GE meter on the register board. This avoids duplication of functionality and potential for meter data errors to occur. For non-IDR installations and poly-phase residential customers, TNMP will utilize the GE kV2c industrial meter. This meter meets and exceeds all PUCT requirements for AMS functionality, with the exception of a remote disconnect. The market currently does not support technology for remote disconnect, under glass, for poly-phase meters over 200 amps. I discuss this later in my testimony. Key features provided by the GE kV2c meter are:

- Revenue Accuracy (with DC Detection capability)
- Installation Verification and Tamper Detection Tools
- Coincident Demand Measures
- Power Quality Monitoring and Analysis
- AMR System Integration Options
- 20 Channel Recording
- Totalization Options (with 4 external inputs)
- 4-Quadrant Industrial or Substation Measures

[1] Exhibit GLK-1 through Exhibit GLK-3

- Per Phase AC Instrumentation (amps, volts, and frequency)

An expanded description of the GE kV2c[2] meter functionality can be found in the exhibits[3] attached to my testimony. For the purpose of this testimony, I will focus on the GE I210+c meter, as that meter technology will be the pervasive technology installed for this project.

The SmartSynch communications module will support upgrading the meter communications firmware to support the ANSI C12.22 standard. This can be done "over-the-air," where the firmware is upgraded remotely. The SmartSynch communications module also has the ability to perform over-the-air upgrades of the communications firmware and HAN communications protocols. The GE I210+c meter is used by multiple AMI vendors as part of their AMS solutions. As such, the GE I210+c is a highly reliable meter[4] with a calculated Mean-Time-Between failure of greater than 50 years. TNMP reserves the right to deploy more than one meter vendor as long as the meter meets all requirements of Substantive Rule §25.130(g) and is cost equivalent.

The GE I210+c meter is a widely utilized meter in the industry. Table GK-1 below is a short list of utilities deploying the GE I210 family meter:

Table GK 1 - US GE I210 Meter deployments

Utility	Communications Network	Meter Type	Approx. Endpoints
AEP	RF System	I-210+c / kV2c	Installed > 2M one way meters and >120k units (Pilot System 2way)
OG&E	RF System	I-210+c / kV2c	>800k units
PHI	RF System	I-210+c / kV2c	>1Million units

[2] Highly Confidential and Highly Sensitive Exhibit GLK-10

[3] Exhibit GLK-1 through Exhibit GLK-3

[4] Highly Confidential and Highly Sensitive Exhibit GLK-11

Florida Power & Light	RF System	I-210+	>4Million units
Pacific Gas & Electric	RF System	I-210+/kV2c	>4Million units
Misc REC Utilities	PLC System	I-210 / I-210+/kv2c	>1Million units

The GE I210+c uses a daughter card configuration for plug-in communications and networking modules. It is used by many other AMI providers, most notably Silver Spring Networks, Sensus and Trilliant, as noted by GE. The GE I210+c meters are deployed at several utilities, using different communications technologies to achieve a functional AMI solution.

Q. DO THE ADVANCED METERS SELECTED BY THE COMPANIES MEET THE TECHNOLOGICAL REQUIREMENTS OF SUBST. R. 25.130(G)?

A. Yes, the advanced meters to be deployed by TNMP, pursuant to the AMS Deployment Plan described by Mr. Whitehurst in his direct testimony, provide the capabilities to comply with all AMS requirements outlined in Substantive Rule §25.130 (g). The table below compares the meters proposed to be installed by TNMP to the minimum advanced meter functionalities set forth in Substantive Rule §25.130 (g)(1)(A-K).

Q. WILL TNMP'S AMS ALLOW AUTOMATED OR REMOTE METER READING?

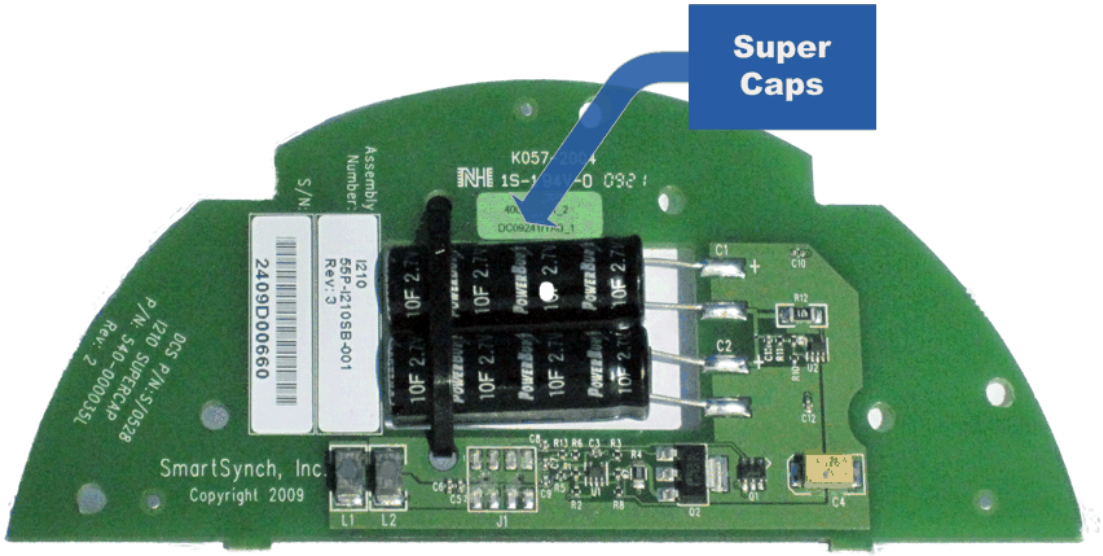
A. Yes. As described above, and in the testimony of Mr. Whitehurst, the TNMP AMS meets all technical AMS requirements defined in Substantive Rule §25.130 (g). The AT&T network provides highly reliable communications to the meter (as exhibited in the TNMP AMS meter trial where meter availability is often at 99.9%). During the TNMP trial, the AT&T cellular network has consistently provided repeatable communications with the deployed AMS trial meters. The details of the TNMP AMS meter trial are described in the direct testimony of Mr. Burke.

Q. WILL TNMP'S AMS ALLOW TWO-WAY COMMUNICATIONS?

A. Yes. The AT&T cellular communications network will provide for two-way communications and alarm signaling from the deployed AMS meter. The GE-I210+c

meters employ a push or pull technology for alarms and meter data. Meters can be programmed to push meter data at a specified time to the head-end system, or they can be read in a polled manner by the head-end system. Meter alarms are all pushed immediately to the head-end system. The GE I210+c communications board utilizes a "super cap" technology which allows the meter to provide a "real-time" outage and tamper alarms to the outage management system 1-2 minutes after power loss. The meter does NOT use batteries to power alarms. Lithium Ion (Li-On) Batteries are used as a backup power source for timekeeping whenever the meter experiences a power outage.

Figure GK 3- SmartSynch Comm Board



Aux board
Mounted behind main board

Using GPRS technology will provide a larger bandwidth pipe directly to the meter than most industry wide AMS solutions. As mentioned earlier in my testimony, General Packet Radio Services (GPRS) is a packet-based wireless communication service that provides data rates from 56 up to 114 Kbps, thus ensuring timely reading and reporting of meter data, bandwidth for future applications, and reliable communications. This bandwidth is on a per meter basis, as there are no "collectors" to diminish bandwidth in the TNMP AMS architecture, and few points of failure in the network.

Q. WILL TNMP'S AMS ALLOW REMOTE DISCONNECTION AND RECONNECTION?

A. Yes. This function is currently being used in production as part of the AMS meter pilot. Disconnects and reconnects are generally completed within 5 minutes of a request being issued by the operator. The disconnect mechanism is rated at 200 amps and is "under glass" on the GE I210+c meter.

Q. WILL TNMP'S AMS HAVE THE CAPABILITY TO TIME-STAMP METER DATA?

A. Yes**.** All meter data is time-stamped using a Greenwich Mean Time (GMT) format when read. When expressed in terms of a 24-hour clock, GMT is also called universal time (UT or Z). It is five hours ahead of the US Eastern Standard Time (EST), during standard period, and four hours ahead during the US daylight-saving period.

Q. WILL TNMP'S AMS HAVE THE CAPABILITY TO PROVIDE CUSTOMER USAGE DATA?

A. Yes. This functionality is available to external customers via the Smart Meter Texas (SMT) Web Portal project. Meter data will be stored in TNMP's MDMS after being properly validated in accordance with market rules in place. The data will then be "pushed" to the Smart Meter Texas ("SMT") Web Portal within the required time window as defined by the emerging AMS market rules

Q. WILL TNMP'S AMS PROVIDE A MEANS BY WHICH REPS CAN PROVIDE PRICE SIGNALS AND COMMUNICATE WITH DEVICES INSIDE THE HOME?

A. Yes. TNMP's AMS architecture will communicate to the Smart Meter Texas Web Portal to accept price signals and messages, and then pass those messages to the meter's ZigBee communications device for transport into the home. Status will be returned to the TNMP MDMS which will record the transaction status and pass it for posting on the Web Portal. An important point to note, in compliance to the new business requirements being developed by AMIT and as documented in the AMIT use cases, the status that is reported to the Web Portal is the success or failure of the transport of the message packet to the meter HAN interface, NOT if the message actually made it to the end device in the home, as currently defined AMIT use cases. The SMT portal will interface with TNMP's MDMS which will respond to request from the SMT.

Q. WILL TNMP'S AMS HAVE THE CAPABILITY TO PROVIDE 15-MINUTE DATA?

A. Yes. TNMP's AMS pilot is currently capturing 15-minute data at the meter and returning it to the Transaction Management System, hosted by SmartSynch. TNMP cannot

actively utilize the 15-minute data from the meter until the implementation of the TNMP MDMS and back-office systems.

Q. WILL TNMP'S AMS BE CAPABLE OF ON-BOARD METER STORAGE OF METER DATA?

A. Yes. The GE I210+c meters can hold 85 days of two channel, 15-minute interval data. The meter will hold 170 days of one channel, 15-minute data.

Q. WILL TNMP'S ADVANCED METERS HAVE OPEN STANDARDS AND PROTOCOLS?

A. Yes. The entire TNMP AMS architecture is based on open standards and emerging National Institute of Standards and Technology (NIST) recommended protocols. The communications protocol is TCP/IP from back-office to the meter. The GE I210+c meter utilizes ZigBee SE 1.0 for the Home Area Network (HAN). It is firmware programmable to ZigBee SE 2.0 and will support any 802.15.4 protocol. The meter communications to the head-end system will be C12.21. The C12.22 protocol will be implemented once the firmware update becomes available from SmartSynch.

Q. WILL THE AMS HAVE THE CAPABILITY TO UPGRADE THE ADVANCED METERS AS TECHNOLOGY ADVANCES?

A. Yes. Of primary concern to TNMP is the advance of communications technology and ability to conform to changing or new standards. As requirements change, and communications technologies advance and/or retire, the GE I210+c meter is modularly upgradable. The SmartSynch communications hardware and firmware is built on a single daughter board. The board is inserted into the meter cage and provides all communications (cellular and ZigBee) for the meter. Retrofitting a new board to the meter is a simple process with this technology and is completed by a simple swap out the old communications board. The following figure shows the installation location of the SmartSynch communications module. The module is installed as a "snap-in" under the meter faceplate board. This makes for a simple process to replace the existing communications board with a new or upgraded technology communications board.

Figure GK 4-GE Meter w/ Module installed

IV. COMMUNICATION TECHNOLOGY

Q. PLEASE DESCRIBE THE COMMUNICATIONS TECHNOLOGY SELECTED BY TNMP FOR ITS AMS?

A. As discussed in greater detail earlier in this testimony, the majority of TNMP's AMS deployments will use the AT&T cellular network as the carrier of choice. AT&T has coverage to the vast majority of the existing meter locations, based on a geo-coded comparison with current AT&T coverage maps as provided by AT&T. Those locations in the TNMP service territory are called out in an exhibit[5] attached to this testimony.

Q. HOW DOES THIS COMMUNICATION TECHNOLOGY WORK?

A. These meters function like a cell phone browsing the internet or downloading an application from the iTunes or the online Blackberry store. Each deployed meter has a GPRS radio embedded under the glass. The GPRS radio functions as a data modem and connects to the nearest AT&T cellular tower. The connection between the tower and the meter is only active on an "as-needed" basis. When a customer, or a REP,

[5] Exhibit GLK-4, GLK-7

makes a request to read the meter registers, the data flows from the web-portal, to the TNMP MDMS where the transaction is recorded and processed according to the business rules of the market. The appropriate data is then forwarded to TMS from the MDMS. TMS then passes data, using secure transactions, by communicating with AT&T servers. AT&T's cellular network then signals the meter to "wake-up" and the data is transmitted to the meter over the cellular air-link. Meter data is returned using the same pathway.

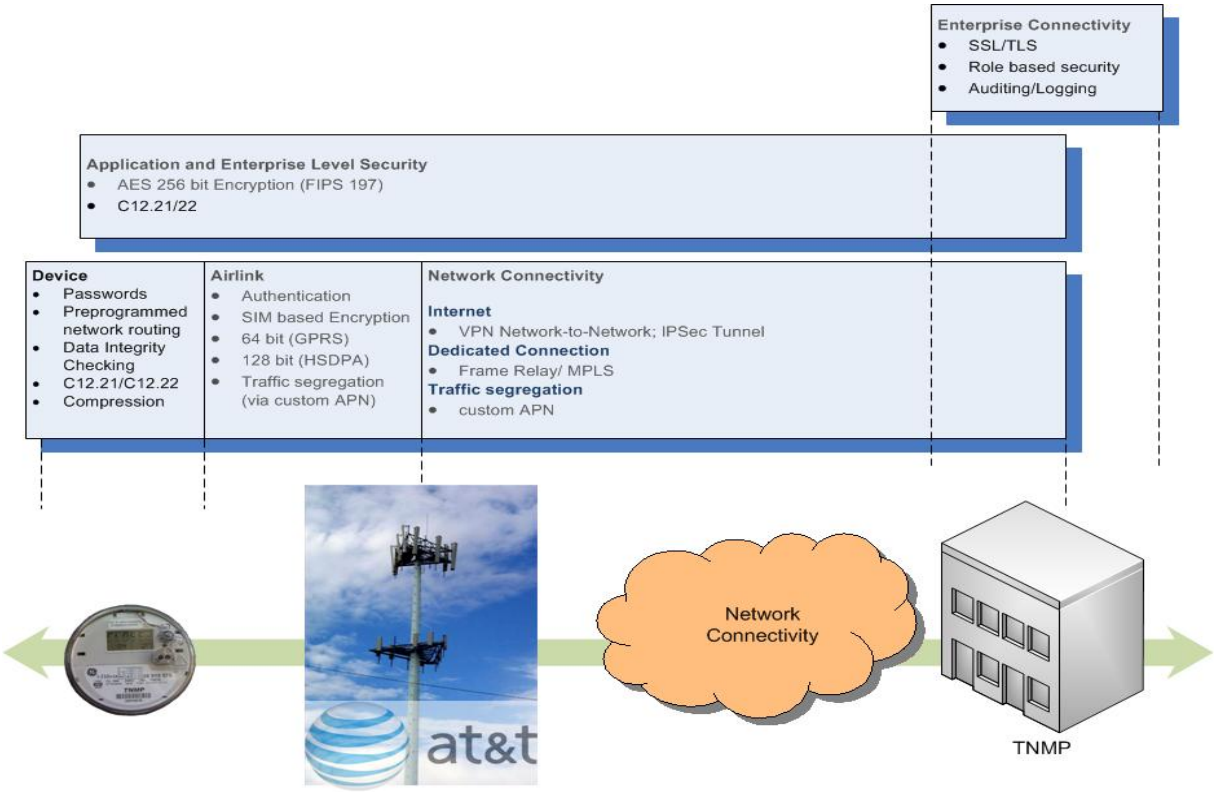
Q. WILL YOU DESCRIBE THE DATA SECURITY FEATURES OF TNMP'S PROPOSED AMS IN DETAIL?

A. Yes. I will address the data security by security domains as illustrated in Figure GK 4.

AMS Security (Communication and Application)

AMS security is tiered in three levels across four security domains. The levels are device, application, and network. The four security domains are: the device, the airlink, network connectivity, and enterprise connectivity. The following exhibit shows the security standards in use for each of the four security domains, and at what tier they are utilized in the network:

Figure GK 4 - Security architecture



Device: GE I210+c Meter Security

The meter devices employ the message security methods described above. If a device receives a message that does not meet all of the accepted criteria for compression, encryption, etc., that device will send a notification message to TMS that it has received an invalid message.

Meter passwords are set up when the meter is initially configured. This configuration establishes ownership of each device with TMS by loading appropriate encryption keys and reporting addresses. Once the GE I210+c meter is deployed, users can access it in one of three ways:

- **Via the optical port using manufacturer-provided software (such as MeterCat or PC Pro).** User authentication and level are verified by this software.
- **Via the optical port using SmartSynch's Stamp software.** A user name and password are required to log on to the software. In addition, all communications

between Stamp and the GE I210+c SmartSynch communications module are encrypted using the utility's encryption key (assigned during integration).

- **Wirelessly from TMS.** All communications between TMS and the GE I210+c are encrypted using a meter-specific key derived from the utility's encryption key and the meter's serial number.

All other communications are rejected and messages received by the GE I210+c are considered "spam." The meter notifies TMS if repeated spam messages are received. All messages from foreign devices are logged.

Air-link Security: Message Payload

All messages transmitted across the network are encrypted using keys that are built from multiple key seeds. Encryption requires three unique keys, which provide meter-specific encryption. One key is unique to SmartSynch, one key is unique to the utility, and the other is unique to the meter. The meter has to pass three authentication challenges from the network and then attaches to a VPN tunnel created specifically for TNMP's Access Point Name (APN), which is the AT&T designated private network that TNMP will utilize to communicate data to and from the meter to the back-office.

Many carriers base their billing plans on the amount of data transmitted. To optimize data transfer and reduce cost, significant compression and redundant data elimination is performed on each message. Meter data that does not contain information of value may be eliminated from the payloads transmitted across the network. Indicators are used in the message to indicate where zero or blank data was eliminated. In addition, messages are converted to a binary format where appropriate to reduce message size.

The AMS utilizes AES-256 encryption for all data transmissions. Each message that leaves TMS is subjected to the processes of data elimination, binary conversion, compression, and encryption. There are security measures in place to ensure that intercepting data from the cellular network and meter is extremely difficult. But the core of the security methodology employed is for SmartSynch's technology designed to keep data thieves from being able to successfully translate or interpret any data that they may steal (which is the same concept used for all Internet credit card transactions using SSL encryption). To steal meaningful data from the AMS, a data thief would need to complete all of the following:

- Determine/Utilize a specialized device for sniffing packets on the network and ensure the device can authenticate as a valid base station with the network.
- Steal/Determine the meter-specific portion of the encryption key
- Steal/Determine the utility-specific portion of the encryption key
- Steal/Determine the SmartSynch portion of the encryption key
- Steal/Determine the encryption algorithm that SmartSynch utilizes
- Decrypt the payload
- Steal/Determine the compression algorithm that SmartSynch utilizes
- Decompress the payload
- Convert the payload from binary to hex ASCII
- Determine/Steal SmartSynch's transport format
- Decode the transport payload
- Determine/Steal SmartSynch's command format
- Decode the command payload
- Break into the utility's TMS database and steal a relevant account number/TMS device ID mapping
- Break into the utility's billing system to match a stolen account number with a customer name in order to determine whose data had been stolen.

To date, theft of data from a SmartSynch meter in this manner (or any other manner) has never been accomplished. IF a data thief successfully performed these actions (which would be extremely difficult), there would be no guarantee that the stolen data actually would represent the intended customer or customers' data, or even that the stolen data would represent complete packetized messages (after intercepting data, a thief looking at a bit stream would have no way of knowing where the messages and packets within each message begin and end). Although it is technically possible to execute all the above steps, it has never been done to date, and such a process would be very time consuming, requires extensive technical knowledge and carrier proprietary communications equipment, and is extremely costly.

Air-link Security: TMS to GPRS Meter Devices

Each GPRS device connects via IP to the TMS system. For the GE I210+c meters using the GPRS network, the System adds another communications server to manage IP connections with large numbers of devices. A device with information to report will connect to the IP address of the communications server. This connection will be authenticated by the communications server to verify that the requesting device is a valid meter. The communications server not only authenticates the devices but also verifies and uses only the protocol defined and implemented in the SmartSynch communications module. Once the connection is authenticated, the communications will occur in the same encrypted manner as all other device communications.

The communications server may reside on the same computer as TMS or may be placed on a separate machine. The communications server will typically reside either outside the utility's network or in the network Demilitarized Zone (DMZ). To further enhance security, the utility's firewall would be configured to allow connections within valid IP and port ranges only, or other secure connectivity methodology as identified by PNMR's security organization.

Application Security

TMS is a browser-based system used to manage devices and data. The system incorporates the following security mechanisms:

- **Authentication.** Users are first authenticated as valid users of the system. An administrator must create users in the system. Each user is created with both a profile and a password. These items are stored in an encrypted format in the TMS database. If a profile is repeatedly attempted with invalid passwords, that profile will be disabled and the administrator will be notified. This prevents automated tools from attempting to determine the password. All invalid account and password access attempts are logged.
- **Authorization.** The TMS system operates on a "see and do" model. In other words, the users can see only the options for which they are authorized within the system. There are four levels of authorization:

1. **Administrators** have full access to all activities in the system. This includes all activities of the other users as well as the ability to administer users and system activities such as archiving data.
2. **Operators** can perform operations on devices. This includes the abilities to add, change, and delete devices and schedules. Most of the modifications to device configuration include the execution of commands over the air to the devices.
3. **Analysts** can run reports and exports in the system as well as view the monitoring functions. Analysts cannot send commands to devices.
4. **Contacts** are not actual users of the system and cannot log in. They can receive email notification of certain events.

- **Device Verification.** TMS is aware of those devices that should be reporting to it. If a message is received from a device outside of those registered, a message is logged as an alien message.

Enterprise Network Security: TNMP connectivity to SmartSynch's TMS & AT&T's Servers

The enterprise communications path for TNMP's AMS will be from the Smart Meter Texas portal to TNMP's back-office system (specifically the Meter Data Management System) which communicates to SmartSynch's TMS system. TMS sends and receives data from the AT&T servers which manage the AT&T cellular network. Messages sent to meters utilize a mailbox on the AT&T Server. The TMS system initiates a TCP/IP socket connection from inside the utility's firewall out to the AT&T Server in order to open the mailbox with an ID and password. TMS then polls the mailbox on the AT&T Server to see if any messages are available. Any messages are passed through the socket connection to TMS, which securely relays the data back to TNMP's MDMS.

Security Summary

The TNMP AMS utilizes several layers of distributed security to minimize the potential of unauthorized access to meter data. In addition, none of the messages actually provide identifying information of a device. Therefore, without access to a utility's billing system, there is no way to link a message to a particular customer.

Decommissioning

The most important cyber security risk is the unintended release of sensitive non-public data through the careless disposal of media and/or assets. TNMP's parent company PNMR, has an established a Media and Asset Disposal policy which outlines specific requirements that must be met for the secure disposal of PNM Resources media or equipment that contains sensitive non-public information.

a) Media or equipment that is known or suspected to contain information that may be associated with current/pending litigation or used in forensic activities must not be destroyed or released from PNM Resources control.

b) Media shall be disposed of securely when it is no longer usable, when the information contained on the media has no value, or when there is no legal reason to keep it.

c) Systems, network components, and storage media shall be purged of all PNM Resources information before being released from PNM Resources control to third parties for sale, lease return, donation, or salvage. Information on the magnetic media shall be rendered unrecognizable (purged/sanitized) prior to release.

d) In the event that PNM Resources cannot perform the required purging prior to the media being released from PNM Resources control, agreements must be in place with the receiving third party to perform and certify the required destruction.

e) If the media is not destined for maintenance, reuse, or salvage, it may be destroyed in lieu of being purged.

f) Under no circumstances shall deleting files or formatting the drive be considered an acceptable form of rendering magnetic media unrecoverable.

Security Inspection(s) or Audits

Security of TNMP's AMS infrastructure will be audited using both PNMR's internal and third-party security resources. Audits of security configurations and activity logs will be performed on several levels. Controls for review of access and alert logs will be maintained, and internal audits of these activities will be performed regularly. In addition, bi-annual third party audits of controls will also be conducted in accordance with current security practices. All audits will be conducted in accordance with

published industry standards including those of NIST Computer Security Division, ISO/IEC 27001 & 27002, and NERC CIP 002-009[6].

Q. PLEASE SUMMARIZE WHY THE SELECTED COMMUNICATIONS TECHNOLOGY WILL WORK FOR TNMP'S SERVICE TERRITORY.

A. TNMP's selected technology is not a revolutionary approach to remote meter reading. It's an outgrowth of Moore's Law, where technology becomes available at cheaper prices every 12-18 months. The technology selected by TNMP has been used in the Commercial and Industrial (C&I) metering space for several years. C&I meters have been deployed and read remotely using Plain Old Telephone Service (POTS). Itron's MV90 product was created specifically for the purpose of reading C&I or Interval meters remotely. SmartSynch has replaced the POTS service with cellular technology and then built hardware that can be inserted into a meter, much like a communications card into a computer. With Cellular Carriers now actively embracing this technology and approach[7], the pricing for using cellular service is now as cost effective as traditional meter reading in urban/suburban areas and much cheaper than traditional meter reading methods in rural areas.

This technology is already widely deployed in Europe. Bern Insight, European Analyst firm, projects that by 2014 EU Countries will have installed 10M GPRS based meters. Norway/Finland deployment is expected to add another 10M to that total.

The Smart Synch technology is deployed in 120+ clients in North America as listed in Table GK 2. TNMP has been using this technology in the AMS meter trial for 18 months and is achieving a 99.9% first time read success rate. TNMP is currently using all of the AMS meters in the trial as production meters, providing daily 15-minute usage data, connects and disconnects, re-reads, and tamper detection. TNMP's experience is that once installed, these meters can go into production within a couple of hours. This technology requires no network build-out and limited network testing as it uses existing AT&T cellular network technology and footprint.

[6] Exhibit GLK-6

[7] Exhibit GLK-9

Table GK 2 lists 125 utilities that have deployed all or some portion of a SmartSynch GPRS meter solution within their service territories. In some cases, the deployed solution was for 2-way read of Commercial and Industrial meters, and in other cases utilities deployed a solution for "hard-to-reads" and remote meters. In all cases, the deployed solution utilizes similar technology and architecture as the proposed TNMP solution. [8]

Table GK 2 - Utilities deploying similar AMI solutions

4-County Electric Coop	Erie Thames	New Hampshire Electric	Southern Company : Southern Company Services
Ameren	Essex Power Services	Niagara Falls Hydro	Southern Company: Alabama Power
American Electric Power (AEP)	Exelon (ComEd)	Niagara Mohawk Power Corp. (NIMO)	Southern Company: Georgia Power
Austin Energy	Festival Hydro Inc.	Niagara on the Lake Hydro	Southern Company: Gulf Power
Austin International Inc	FirstEnergy	Niagara Peninsula	Southern Company: Mississippi Power
Baldwyn County EMC	Florida Power & Light (FPL)	NSTAR	Southern Pine EPA
Baltimore Gas and Electric	Fortis Ontario : Cornwall Electric	NYSEG	Southern Rivers Energy
Blue Ridge Electric Coop	Fortis Ontario : Westario Power Inc.	Omaha Power Public District	Southwest Mississippi Electric Power Assoc.
Canadian Niagra Power	Georgia Systems Operation Co	Orlando Utilities Commission	St. Thomas
Central Florida Electric Coop	Gila River Community Utility Authority	Pacific Gas and Electric (PG&E)	SunRun, Inc
Central Iowa Power	Goderich Hydro	PacifiCorp	Tampa Electric Co.
Choctaw Electric Coop	Greystone Power Company	Pennsylvania Power & Light (PPL)	Tennessee Valley Authority

[8] Exhibit GLK-8

Citizens Electric	Grimsby Power Inc.	Portland General Electric	Tillsonburg (Town of)
City of Anaheim	Haldimand Hydro	Potomac Electric Power Corp. (PEPCO)	TNMP (AMS trial)
City of Griffin	Halton Hills Hydro Inc.	PowerDash LLC	Toronto Hydro
Clark County REMC	Hydro One	PowerStream	Trico Electric Cooperative Inc.
Clark Public Utilities	Hydro Ottawa	Progress Energy	Tucson Electric
Clay Electric Coop	Hydro Quebec	Public Service Electric and Gas (PSE&G)	University of Colorado
COBB Energy	Imperial Irrigation District	Puget Sound Energy	University of Mississippi
Collingwood Hydro	Indyne, Inc. (Cape Canaveral Air Force Base)	Reliant Energy	University of Mississippi Medical Center
Connecticut Power & Light	Jackson EMC	Roseville Electric	Utility Specialists, Inc.
Consolidated Edison of NY	Jamaica Public Service	Salem Electric	Veridian
Consumers Energy Coop	Kitchener-Wilmot	Salt River Project	Wabash Valley Power
Delmarva	Lockhart Power	San Diego G & E	Wasaga Distribution
Dominion	Los Angeles Department of Water and Power (LADWP)	Santee Cooper	WE Energies
DTE Energy	Madison Gas & Electric	Sawnee EMC	Welland Hydro
Duke Energy	Memphis Light Gas and Water	SCANA (SCE&G)	West Perth
Energycom Networks	MidAmerican Energy	SMUD	Whitby Hydro
Enersource	Midland Power Cooperative	Snapping Shoals EMC	Woodstock Hydro
Entergy	National Grid	Southern California Edison (SCE)	Xcel Energy

1

In summary, data over cellular is a proven technology with a high reliability and repeatability factor. The network infrastructure associated with communications of meter data is now maintained and managed by AT&T, a company whose core business is the success and quality of that network. The use of these public networks, run and maintained by large Carriers, allows TNMP to avoid the cost and responsibility of maintaining a private network, and still be allowed to take advantage of AT&T disaster recovery mechanisms[9]. TNMP's cost burden for AMS is reduced by not having to bear the maintenance and repair costs for the AMS communications infrastructure or cost of disaster recovery for that infrastructure.

As TNMP will use data over cellular to provide transport of meter data, there will be a cellular data plan associated with each GE I210+c installed in the field. The data plan for TNMP will be arranged with AT&T to provide 1 Megabyte (MByte or MB, where one byte = 8 bits) of data transported each month bi-directionally for each meter. TNMP's plan is a "bucket" plan of 240MB, paid for monthly. TNMP is responsible for overages against the total plan, but not individual meters. TNMP will monitor usage for each individual meter to network performance, bandwidth consumption, and conformance to market rules on "pinging" the meter. Individual meter overages will be assessed to the offending REP via a new tariff as a method to manage bandwidth and enforce market rules.

The GE I210+c meter, using SmartSynch's communications board, is extremely efficient in compression and transmission of data. The meter data uses about 1.1 kilobytes (kBytes or kB) of data for each transmission. A standard transmission is one day's worth of data at 1.1 kB for 96 increments of 15-minute data. A meter "ping" is also about 1.1 kB of data.

Q. PLEASE DISCUSS HOW TNMP CAN TAKE ADVANTAGE OF AT&T DISASTER RECOVERY MECHANISMS.

[9] Exhibit GLK-5

A. AT&T has a comprehensive and extremely mobile disaster recovery solution. As part of my testimony, I have attached exhibits[10] from AT&T's Disaster Recovery Webinar which provides summary overview of their Disaster Recovery capabilities and some examples of the response to Hurricane Ike and 9/11 in New York City.

Functionality of the TNMP AMS network during a disaster event would be compromised to some extent with regard to priority-of-service and possible outage of cell towers, affecting coverage. During a disaster event, as depicted in the attached exhibit[11] from the Webinar, AT&T will roll a large contingent of trucks to an area to re-establish cell coverage in the affected geographies. This is done using mobile cell towers, placed in strategic locations. Satellite service is also utilized for voice and data should there be extensive damage to the cell network. Once emergency service is restored, first responders and public safety will always have first priority in utilization of AT&T disaster resources. However, as a utility customer for AT&T with a private network, the AMS would have access to unused bandwidth during the evenings to collect meter data. As normal service is restored by AT&T, TNMP's AMS would resume normal operations.

By utilizing the AT&T network as our communications backbone, TNMP avoids the building and maintenance costs of the infrastructure of a private network dedicated to AMS, as well as the capital and O&M costs of repair during and after a disaster. These factors allow TNMP to lower overall costs during a disaster event and positively affect any ensuing proceeding to recover those AMS repair costs.

V. VENDOR SELECTION

Q. PLEASE DESCRIBE THE AMS VENDOR SELECTION PROCESS.

A. Vendor selection was accomplished via the Request for Proposal (RFP) process issued by PNMR's supply chain organization. An RFP was released to five of the AMS vendors currently doing business in the market. Three vendors responded with questions, and two submitted proposals. The process was managed by PNM Resources Supply Chain organization and supported by TNMP operations, PNMR Regulatory and PNMR

[10] Exhibit GLK-5

[11] Exhibit GLK-5

Business Technical Services groups. Proposals were evaluated on requirement conformance, technical merit, and submitted costs.

Q. WHAT WAS THE OBJECTIVE OF THE REQUEST FOR PROPOSAL?

A. The purpose of the proposal was to acquire a solution that meets the requirements of Substantive Rule §25.130 and could be implemented to meet all AMIT market use cases. In addition, TNMP wanted an AMS solution that would provide long term functionality without the burden of maintenance and management of AMS communications infrastructure, and which would provide a cost effective solution for rural and remote areas of the service territory. As TNMP is a highly capital constrained utility, effective use of O&M monies and Capital is of priority concern to management. Core business drivers for this solution were, and still are:

- Meet all requirements outlined in PUCT Substantive Rule §25.130.
- Meet all requirements generated by the PUCT AMIT meetings.
- Avoid building, designing, and maintaining a private network.
- A wireless network is preferred, with no or few Utility owned or operated assets.
- Wherever possible, use of utility or public network assets is preferred, preferably IP based.
- Avoid the use of public frequencies for reasons of security, bandwidth, and future spectrum clearing.
- Minimize network costs; ensure optimal use of network bandwidth for meter data
- Simple installation “Plug & Play” hardware. Flexible solution options.
- Modularized technology approach to minimize stranded assets and “future-proof” investment.
- Support of multiple meter vendors; no single source.
- Secure and reliable transactions; repeatable and measureable 99% first time read success.
- In-field meter and network diagnostic capabilities for troubleshooting.

- Communications framework that will support Smart Grid technologies at low lifecycle cost.
- Proven existing technologies with proven network protocols and architecture.
- Products that can support TNMP's service area geography, particularly very desolate meter locations.

Q. ONCE THE BIDS WERE RECEIVED, HOW WERE THEY EVALUATED?

A. Two teams were created: Core evaluation team and a Management evaluation team. The proposals were evaluated against TNMP business requirements, PUCT requirements, AMIT use case requirements, technical capabilities, financial soundness, vendor capability, vendor financial fitness, and proposed costs. Each proposal was scored against the requirements and cost evaluations. Vendor references were contacted and evaluated. Significant research was done on the vendor's products using blogs, internet research, and industry information about vendors' ability to deliver product and solutions. Then, as there were not large differences in costs, final selections from the core evaluation teams were done on technical merit and capability. The recommendations were passed to the management evaluation team, which reviewed the presentations from the core team, with the final selection made by the management team.

Q. WHAT FURTHER PROCEDURES WERE USED AFTER THE SHORT LIST OF PROPOSALS WERE SELECTED?

A. As there were only two responses, no short list was created.

Q. HAS TNMP ENTERED INTO THE CONTRACT FOR THE AMS?

A. At this time, TNMP has negotiated terms and conditions with SmartSynch, but no specific contract or statement of work for an AMS implementation. TNMP is not under contract for an MDMS vendor.

Q. IF TNMP HAS NOT ENTERED INTO CONTRACTS, IS TNMP PLANNING TO ENTER INTO CONTRACTS DUE TO THIS FILING?

A. Yes. It is TNMP's intention to complete contract negotiations with all major suppliers associated with providing software, hardware, and services necessary to complete this

project. Specific negotiations will be completed by PNM Resources Supply Chain organization in behalf of TNMP.

Q. WHAT PROCESS DID TNMP USE IN SELECTING A CONTRACTOR FOR METER INSTALLATION?

A. The selected vendor, SmartSynch, contacted five industry experienced meter installation vendors. Each vendor was provided identical deployment requirements and asked to respond in writing with their respective implementation approach, deliverables, and price. Upon receipt of responses from all five vendors, they were asked to present their response to TNMP and SmartSynch, whereby they were scored and their response and experience weighted. With the field of five narrowed to the top two, a Scope of Work was provided by SmartSynch, outlining the requirements and best practices required for deployment, and both vendors were invited to provide best and final response and pricing. Upon receipt of their best and final responses, each of the two vendors were invited to present a second time to SmartSynch and an expanded TNMP management team, where their responses and experience were scored. A mutual decision for vendor of choice was made by SmartSynch and TNMP.

VI. ADVANCED METER CAPABILITIES

Q. WHAT ARE THE FUNCTIONALITIES OF THE ADVANCED METERS INCLUDED IN TNMP'S AMS DEPLOYMENT PLAN?

The selected GE I210+c meter incorporates the appropriate technology and firmware to meet all of the functionality described in Substantive Rule § 25.130(g). A manufacturers technical and users manual is included as an exhibit[12] to corroborate listed technology and functionality.

The table below lists each requirement of Substantive Rule § 25.130(g) and the technology embedded in the TNMP AMS and/or meter which enables the AMS to meet the rule requirement:

[12] Exhibit GLK-2

1

Rule	Functionality	AMS Technology
(A)	Automated or remote meter reading;	The AMS provides a remote communications path using a cellular network and an embedded communication card within the GE I210+c meter.
(B)	Two-way communications;	The SmartSynch communications card provides GPRS communications using AT&T Cellular network.
(C)	Remote disconnection and reconnection for meters rated at or below 200 amps;	A 200 amp disconnect switch is built into the GE I210+c meter and is activated remotely from a head end server.
(D)	The capability to time-stamp meter data sent to the independent organization or regional transmission organization ("RTO") for purposes of wholesale settlement, consistent with time tolerance standards adopted by the independent organization or RTO;	The meter timestamps data in GMT format, consistent with RTO requirements and utilizes an atomic clock for time synchronization.

Rule	Functionality	AMS Technology
(E)	The capability to provide direct, real-time access to customer usage data to the customers and the customer's REP, provided that: Hourly data shall be transmitted to the electric utility's web portal on a day-after basis. The Commission Staff using a stakeholder process, as soon as practical shall determine, subject to Commission approval, when and how 15-minute interval recorder data shall be made available on the electric utility's web portal;	The AMS provides 115kbps access to the meter over a cellular GPRS connection. Hourly data is collected in the meter storage and transmitted to the utility on a daily basis. It is then processed and uploaded to the SMT webportal in accordance to the AMIT use cases currently under development.
(F)	Means by which the REP can provide price signals to the customer;	The AMS utilizes the cellular network to deliver a price signal to the meters Zigbee hardware, which is then broadcast to the customer's Zigbee device as defined in the developing AMIT HAN use cases.
(G)	The capability to provide 15-minute or shorter interval data to REPs, customers, and the independent organization or RTO, on a daily basis, consistent with data availability, transfer and security standards adopted by the independent organization or RTO;	The AMS meter can collect 5 or 15-minute data for transmission to the head-end system on a daily basis.

Rule	Functionality	AMS Technology
(H)	On-board meter storage of meter data that complies with nationally recognized non-proprietary standards such as in American National Standards Institute (ANSI) C12.19;	GE I210+c meters store meter data tables in ANSI 12.19 format. This is stated on page one of the GE Energy | GEH 7101 Users manual for the GE I210+c meter.
(I)	Open standards and protocols that comply with nationally recognized non-proprietary standards such as in ANSI C12.22, including future revisions thereto;	The AMS had been selected because it supports open standards from the meter to the back-office. ANSI C12.22 will be implemented as available from SmartSynch.
(J)	Capability to communicate with devices inside the premises, including, but not limited to, usage monitoring devices, load control devices, and prepayment systems through a home area network, based on open standards and protocols that comply with nationally recognized non-proprietary standards such as ZigBee, HomePlug or the equivalent; and	The SmartSynch communications board, installed inside the GE I210+c meter, utilizes 802.15.4 protocol, which is currently used in the Zigbee and 6LoWiPAN communications stacks. The deployed meters will utilize a Zigbee SE1.0 compliant stack to communicate with in premises devices.
(K)	The ability to upgrade these minimum capabilities as technology advances and, in the electric utility's determination, become economically feasible.	The GE I210+c is fully "over-the-air" (OTA) firmware upgradable, including the hardware used to provide in premise communications.

1

Q. DO THESE ADVANCED METERS MEET THE TECHNOLOGICAL REQUIREMENTS OF PUC SUBSTANTIVE RULE § 25.130(g)?

A. Yes, the advanced meters to be deployed by TNMP pursuant to its AMS Deployment Plan provide the capabilities that comply with the AMS requirements outlined in Substantive Rule § 25.130(g). There are, however, certain customer types and meter types where exceptions to those requirements are appropriate, and we are requesting in this proceeding a waiver which would relieve us of the obligation of installing a fully functional advanced meter that would have all of the functionalities contemplated by §25.130 in those circumstances. We are requesting waivers for the following circumstances:

- Loads that may cause a safety or health issue if disconnected will not have an advanced meter with disconnect functionality installed. For example, we propose not to include the disconnection functionality for traffic lights, metered street lights, railroad crossings, police stations, hospital facilities, service points providing cathodic protection, and TNMP‘s emergency facilities.
- Loads that do not require and/or will never require a HAN device will not have an advanced meter with a HAN device installed. For example, we propose not to include a HAN device for traffic lights, metered street lights, and other applications that would not benefit from a HAN device, such as electric gates, communications power supplies, sprinkler controls, cathodic protection power supplies, and TNMP’s emergency facilities.
- Loads that currently have poly-phase, class 200 (200 amp rating) meters, which includes commercial customers and some residential customers, will not have a service switch until a poly-phase meter with those devices becomes available in the market and are requested by the customer or designated REP.
- Loads that have poly-phase and instrument rated meters will not have a HAN device embedded in the meter. If poly-phase meters with HAN devices become available in the market, then TNMP shall review installing those meters on a requested basis by the customer or designated REP.

As the ANSI Standard C12.22 has not yet been adopted, and is not widely deployed, the advanced meters and communication modules that TNMP is deploying may not initially

be compliant with that standard. TNMP intends to have the AMS (end-to-end) compliant with ANSI Standard C12.22 when the product upgrades are available from the vendor. All TNMP advanced meters have the proven capability to remote-upgrade meter firmware so that the Company can ensure that the advanced meters do comply with ANSI Standard C12.22 when the appropriate firmware is available from SmartSynch.

Q. WHAT STEPS HAS TNMP TAKEN TO ENSURE THAT THE ADVANCED METERS WILL HAVE THE LONGEST POSSIBLE TECHNICAL LIFE?

In the selection of SmartSynch, TNMP evaluated all technologies available in the market place to understand the most robust technology for the TNMP service area. As part of the evaluation, one of the key requirements that emerged is "future-proofing" of the technology. At the expense of some initial upfront cost, but to ensure a lower asset lifecycle cost, TNMP chose to avoid metering technologies that had embedded communications on the meter board. Instead, TNMP has pursued a modular approach, where each meter has an under glass communication module that is installed into a meter chassis. Figure GK 4 depicts an installed communications module inside a GE I210+c meter. These modules can be removed and retrofitted with newer communications and hardware functionality. The current update process for TNMP is a retrofit process. AMS meters would be replaced with new technology over a 2-7 year period as part of the normal meter testing process required by the PUCT. Each removed meter would be replaced by a meter containing newer technology. The removed meter(s) would be shipped to the factory for retrofit and recertification. The retrofitted meters would then be returned to TNMP, placed in inventory, and reinstalled in the field. This process requires TNMP to purchase a small number of newer technology meters for initial installation, but appears to be the most cost-efficient use of equipment and resources for TNMP and the ratepayers.

VII. BACK-OFFICE SYSTEMS

Q. WHAT ARE THE BACK-OFFICE SYSTEMS BEING DEPLOYED IN CONNECTION WITH THE DEPLOYMENT OF ADVANCED METERS?

A. Implementation of AMS will require TNMP to perform a complete enterprise retrofit of the back-office systems. TNMP will not replace its CIS, but will need to install a Meter Data management system from Itron and an Outage Management system from MilSoft to

manage meter alarms and create work orders for actionable events created by the AMS. In addition, TNMP will need to install a new complex billing system to support creation of EDI billing data for 15-minute increments. In addition, SmartSynch's TMS meter reading server and software will require integration into the back-office. There will be significant work required to integrate all these systems together in order to communicate effectively with the Smart Meter Texas Web portal and existing TNMP legacy systems.

New systems integrated are:

- Itron's Enterprise Edition Meter Data Management
- Itron's Complex Billing System and Interval Data Capture
- MilSoft's DisPatch Outage Management System
- SmartSynch's Transaction Management System (Meter Reading Server)

Q. WHAT MODIFICATIONS TO THE EXISTING BACK-OFFICE SYSTEMS ARE NECESSARY TO SUPPORT THE PROPOSED AMS?

A. The following have to occur to support the proposed AMS solution:

1. Purchase and install a new Meter Data Management System (MDMS)
2. Purchase and install a new Complex Billing System to support interval data billing.
3. Purchase and install new Outage Management System (OMS) to support reading, routing, and management of AMS Meter alarms
4. Integration of new systems with TNMP's existing systems. This will require extensive work to allow the new systems to share data with Banner (CIS), GIS, the Meter Head-End System (TMS), Texas Common Portal, Meter Inventory System, EDI Transaction management system, and TIBCO Enterprise Data Transport.
5. Modifications to TNMP's EDI Gateway and Banner (Customer Information System) will be required so that these systems can handle messages and information required by new AMS market rules associated with EDI transactions to ERCOT.

Q. WHAT SYSTEMS RELATED TO THE TEXAS MARKET TRANSACTIONS WILL NEED MODIFICATIONS TO SUPPORT THE PROPOSED AMS?

A. Modifications to TNMP's EDI gateway, Banner, Meter Head-End System (TMS) and TIBCO are required to support the Texas Market Transaction.

Q. ARE THERE ASPECTS OF THE CURRENT IT HARDWARE AND SOFTWARE INFRASTRUCTURE THAT WILL NEED TO CHANGE TO SUPPORT THE PROPOSED AMS?

A. Yes, new acquisition of Hardware and Software is needed to support TNMP's AMS program. All new systems listed above will require both hardware servers and software purchases. Legacy support software and databases, such as Oracle will also require potential license negotiation as the MDMS and OMS will utilize these packages, therefore requiring more licenses.

Q. HAS TNMP ENTERED INTO ANY CONTRACTS TO PURCHASE THESE SYSTEMS?

A. No contracts have been established to purchase any systems. The vendors for the new systems have provided quotations only and have not been contracted to provide goods and services. This will occur after the approval of this filing.

Q. IS TNMP PLANNING TO USE A THIRD-PARTY SYSTEMS INTEGRATOR TO ASSIST WITH ANY OF THE IT EFFORTS?

A. Yes, TNMP will use the following (currently identified)Third-Party vendors namely:

1. Meter Head-End System Vendor: Itron
2. Meter Data Management Product Vendor: SmartSynch
3. Complex Billing System Product Vendor: Itron
4. System Integrator for Back-Office Integration: To Be Determined.

Q. WILL THE COMMON AMS WEB PORTAL BE AVAILABLE UPON TNMP'S INITIAL AMS METER DEPLOYMENT?

A. The Smart Meter Texas Web portal will not be available with TNMP data upon TNMP's initial meter deployment. TNMP data will be available in the common web portal after the implementation of TNMP Back-Office systems.

Public information relating to the Web portal can be found at the Public Utility Commission of Texas web site at the following URL link:

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

Q. WILL THE BACK-OFFICE SYSTEMS AND AMS WEB PORTAL FUNCTIONS BE AVAILABLE FOR THE INITIAL AMS DEPLOYMENT?

A. No. These are capital intensive projects which TNMP cannot begin spending for until approval of the deployment plan.

Q. PLEASE DESCRIBE THE SECURITY FEATURES THAT THE AMS WEB PORTAL IS EXPECTED TO HAVE.

A. Security features for the common AMS Web Portal developed by IBM is defined by the Portal Security Requirements.

The following Security features for the Integration between TNMP and Texas AMS Web Portal will be implemented:

Web Security: One-way HTTPS/SSL transport security for all data sensitive communications between the TNMP & AMS Web Portal

Web Services Security: WS-Security over HTTPS/SSL transport security with possible all/part SOAP message encryption for communications between TNMP and AMS Web Portal

FTP Security: Secure FTP communication with two-way SSL for communication b/w TNMP & AMS WEB PORTAL

Q. WILL TNMP MAKE PERIODIC REPORTS TO THE COMMISSION REGARDING DEVELOPMENT AND DEPLOYMENT OF THE AMS WEB PORTAL?

A. Yes, TNMP will make periodic reports to the commission as part of the overall deployment per requirement in Substantive Rule §25.130.

Q. TO DATE, HAS TNMP INCURRED COSTS ASSOCIATED WITH THE AMS WEB PORTAL OR ANY OTHER SYSTEMS AS PART OF THE PILOT?

A. Yes, TNMP has incurred cost associated with the AMS Web Portal; this includes participation in the Smart Meter Texas (SMT) program (Texas Common Portal Meeting, HAN Meetings). TNMP has also incurred cost in evaluating a suitable Meter Data Management Product Vendor, Complex Billing System product vendor, RFI, and RFP generation.

Q. ARE THESE SYSTEMS CRITICAL TO THE DEPLOYMENT OF ADVANCED METERS?

A. Yes. These are the core systems required to effectively acquire, process, and publish AMS data to the Smart Meter Texas Web Portal, create billing data for the REP, and to meet all necessary AMIT business use cases and TNMP operational requirements. Currently, TNMP has no back-offices systems that can support any functionality of AMS as defined in the current rule. This project would require installing and integrating all of the above mentioned back-office systems in order to comply with Substantive Rule § 25.130.

VIII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE MODIFICATIONS AND ENHANCEMENTS TO THE BACK-OFFICE SYSTEMS, THE CHANGES TO EXISTING IT INFRASTRUCTURE, AND THE WEB PORTAL.

A. Based on my experience, knowledge, and review, the modifications and enhancements to the IT systems that I have described are required to support the proposed AMS and the estimated costs that I sponsor for these activities are reasonable and necessary.

Q. IS THIS THE CONCLUSION OF YOUR TESTIMONY?

A. Yes.

AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared Gary L. Kessler, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is Gary L. Kessler. I am of legal age, a resident of the State of Texas, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

Gary L. Kessler

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 25th day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

OFFICIAL SEAL
Julia Miller
NOTARY PUBLIC - STATE OF NEW MEXICO
My Commission Expires: April 23, 2013

NOTARY PUBLIC in and for the
State of New Mexico

My Commission expires April 23, 2013

GE
Energy

I-210+c Singlephase Meter

I-210+c Singlephase Meter

The I-210+c is the latest addition to GE Energy's singlephase advanced meter family offering features beyond basic energy — such as demand, time of use, and load profile recording. It is GE's most robust and flexible meter, designed to offer utilities the ability to customize to suit their specific needs—adding or subtracting as much functionality as conditions require. The I-210+c also comes with the option of an integrated, factory-installed remote disconnect switch to help utilities more efficiently address issues such as non-payments, move-in, move-outs, and demand side management. The meter is also offered in network forms allowing utilities to more cost-effectively meter network services.

The meter's hardware and software platforms are designed to be highly versatile, offering plug-n-play capabilities for many features.

In its simplest configuration, the I-210+c can act as a basic energy meter, with no additional functionality. The design of the meter allows for easy upgrade of virtually all of the additional metering functionality available (with the exception of remote connect/disconnect, which must be installed at the time of order, at the GE factory). In its most robust configuration, the I-210+c acts as a flexible, advanced meter uniquely qualified to suit the needs of a dynamic utility environment.

Softswitches

With the addition of a softswitch, the I-210+c can be enabled with advanced metering functionality and/or become compatible with a suite of third-party AMI solutions. The softswitch, which is a software application used to enable the meter with additional functionality, can be loaded onto the meter at the time of order or after the meter has been put in service to add additional functionality to the meter. Features such as time-of use, cycle insensitive demand, load profile recording, AMI communications, and event logging can be added.

I-210+c Available Softswitches:

- **T_2:** Time-of-Use
- **R_2:** Demand and load profile recording (2-channel)
- **K_2:** Second measure
- **A_2:** Alternate communications (AMI modules or other communication devices)
- **E_2:** Event logging of up to 200 events
- **Q_2:** Power quality activates low voltage monitoring

AMI Plug-n-Play

Many utilities are in the process of making AMI related decisions and many have chosen to utilize more than one AMI solution to effectively manage the needs of their service territory. For these reasons, the I-210+c has been designed to allow for the interchangeability of AMI modules (that GE is compatible with). AMI communications can be added at the GE factory, added after the fact, or changed out and replaced with another compatible AMI module should the meter be redeployed to another part of the service territory.

Cycle Insensitive Demand

With the appropriate softswitches enabled, the meter can be set to calculate "Cycle Insensitive Demand" based on a GE-proprietary algorithm. This provides an alternative method for calculating the maximum demand where one-way AMI systems are employed, and eliminates the need for manual demand reset with 1-way AMI systems. This feature eliminates a significant limitation impacting utilities that have implemented, or who are considering implementing one-way AMI systems.

MeterMate* Meter Reading and Programming

GE Energy's MeterMate software is compatible with the I-210+c and provides unparalleled flexibility for customers to read and customize their I-210+c. Some advanced features allow the user to:

- Change factory program defaults including measurement detents
- Set or change sag and swell thresholds
- Perform a master reset to clear energy values, voltage event and power fail counters
- Obtain a meter program and data summary report
- Select Demand, Demand/LP or TOU modes of operation and the use of the program manager to create and edit programs for the selected modes of the meter
- Transfer programs created in the MeterMate system to the I-210+c meter using MM Comm*

The meter is equipped with technology to more fully address a utility's saftey concerns while ensuring the most efficient use of resources and protecting its revenues.

Remote Connect/Disconnect

The I210+c can be ordered with an integrated remote connect/disconnect switch mounted under the meter's cover. This is a factory installed option that must be specified at the time of order. To take advantage of all of the functionality this option offers, a two-way AMI device and system should be employed. This functionality is ideal for:

- Locations with frequent move-in/move-outs and locations that are undesireable or dangerous. With this switch, the utility will be able to remotely connect or disconnect service and avoid sending a technician to the site
- Situations involving non-paying customers
- New applications such as demand side management, emergency conservation, prepayment systems, customer system premises protection, and controlled outage restoration

State-of-the-Art Tamper Detection

The I-210+c has an optional Event Log feature which captures information about the 200 most recent events that happen in the meter including reverse energy flow (caused by meter inversion). This can be used to check for confirmation of meter action or evidence of tampering.

I-210+c has enhanced features to help utilities improve the level of service they provide their customers.

IEEE Reliability Indices

The I210+c has an optional power quality feature (activated when appropriate softswitches are added) that provides support for calculating IEEE® reliability indices (such as MAIFI, SAIFI, etc.) by collecting momentary and sustained interruptions and the accumulated duration of sustained interruptions.

Interval Recording

The interval recording option (which is enabled via a softswitch), in addition to being used as a billing tool for the utility, can be used as a customer service tool which can provide the customer with useful data regarding their energy consumption.

Meter specifications and related information

I210+c Meter ANSI® forms:

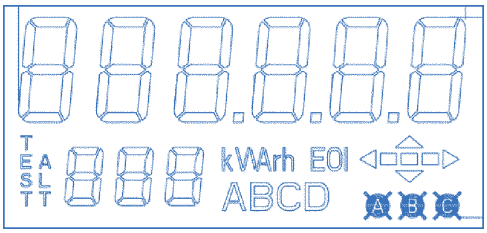
Form	Class	Volts
1S	100	120 & 240
2S	200 & 320	240
3S & 3CS	20	120 & 240
4S	20	240
12S	200 & 320	120 & 240
25S	200 & 320	120 & 240

A single polycarbonate cover is available with either of two variants including:

- With RESET latch and Optocom "D" ring
- Plain cover without RESET or "D" ring

I-210+c Display

Performance meets or exceeds ANSI C12.1, C12.10, C12.20, C37.90.1



Operating Range:

- Voltage: +20% -20% (or ±20%)
- Temperature: -40°C through +85°C
- Typical Starting Watts: <=5.0 Watts (Form 2S 240V CL200)
- Typical Watts Loss: 0.7 Watts
- Typical Accuracy: Within +/- 0.2%

For more information, please contact us via e-mail at energy.tdsolutions@ge.com, or visit our web site at ge.com/energy

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GEA-14872 (03/07)

GE
Energy

GE I210+c™
Electronic Meter

Product Description,
Operating Instructions,
Maintenance Instructions,
Upgrading.

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FCC COMPLIANCE STATEMENT

This product generates and uses radio frequency energy. It has been tested and verified that it complies with the limits for the Code of Federal Regulations (CFR) 47, Part 15–Radio Frequency Devices, Subparts A–General and B–Unintentional Radiators issued by the Federal Communications Commission for Class "B" digital devices. If, however, the product causes radio or television interference, notify:

Manager–Technology
General Electric Company
130 Main Street
Somersworth, NH 03878–3194

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1. Product Description

GE's I210+c™ meter is an electronic, single-phase or network, demand and time-of-use (TOU) electricity meter intended primarily for residential applications.

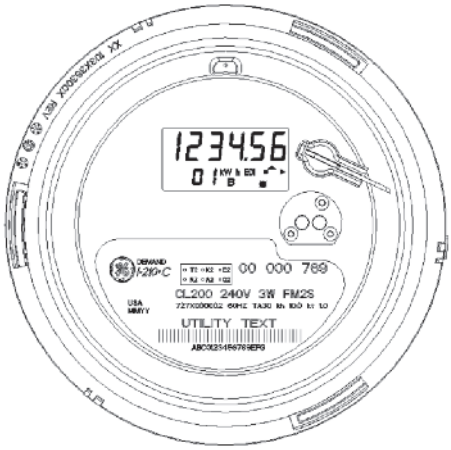


Figure 1-1: The I210+c™ Meter

The I210+c™ meter provides a wide range of additional features including: an extended range of software-configurable features (soft-switches); accurate timekeeping with the presence of an optional super capacitor or battery; enhanced energy, demand, and time-of-use billing measures; load profile recording; self-read capability; demand reset support; test mode; real-time pricing functionality; and rolling status and rolling billing period functions.

1.1 General Information

The I210+c™ meter is similar to the I210+ meter in physical construction while providing additional features as follows:

- May be configured for various metering needs: demand-only metering, demand/load profile (LP) metering, TOU or TOU/demand metering, TOU or TOU/demand meter with load profile metering.
- Supports AMR communications with any of above configurations.
- Supports up to two summations from the following: delivered-only kWh, received-only kWh, delivered + received kWh, delivered - received kWh, lagging-only kvarh, leading-only kvarh, lagging + leading kvarh, lagging – leading kvarh, phasor apparent kVAh, phase A line-to-neutral voltage. The values chosen for summations must be the same as the values used in demand and load profile recording.
- Provides up to four distinct TOU tiers, allowing time-of-use energy and demand values to be calculated for specific time periods, in addition to the overall energy and demand calculations. Also supports up to four seasons. Each season can have up to three day-types and one holiday day-type. The meter can store a total of 80 distinct tier switches.
- Includes a calendar with up to 50 programmable dates for specifying when daylight savings time changes, season changes, self-reads, demand resets, and holidays are to occur.
- Supports load profile recording for up to two channels.
- Provides memory for two self-reads
- Includes a test mode
- Provides both immediate and pending real-time pricing commands via communications.
- Supports ANSI Standards C12.18 and C12.19

The I210+c™ meter additionally incorporates several new features enhancing its capability.

- The rolling billing period feature provides up to two peak demands over a programmable period of time. The meter stores the overall daily peak demands, as well as the daily peak demands for two tiers, for the last 35 days. The peak demands are available for reading and display.
- Rolling status provides the cautions and errors that have occurred in the meter over the last programmable number of days. The meter stores the daily caution and error flags for the last 35 days. Rolling status is available for reading.
- DC detection is available as a meter caution. The meter will detect the presence of DC in the current signal. This caution can be selected for display and for reporting in the event log.

1.1.1 Physical Description

The I210+c™ meter uses a clear polycarbonate cover that is molded in one piece. Two types of covers are available, one with an integrated ANSI Type 2 optical communications port and a demand reset mechanism in the cover, and one without these two features.

The meter base assembly provides direct interchangeability with existing ANSI form single-phase meters. This standardization allows retrofit to existing installations and use with existing ring and ringless sockets.

The nameplate displays all information required by ANSI, including an area for customer-specific information.

A liquid crystal display is provided to indicate energy consumption and various other data. The display is covered in detail in Chapter 2, Operating Instructions.

An Alternate Display Switch, located on the right side of the meter face slightly above the one o'clock position, may be activated by a magnet. The switch and its use are also described in detail in Chapter 2, Operating Instructions.

The Demand Reset and Test switches are located at the two o'clock position of the meter face. The Test Switch has no external access. The cover must be removed to operate the switch.

An ANSI Type 2 optical port is located in the three o'clock position of the meter face. The optical port allows a computer to communicate with the meter for reading and programming using Standard Tables (ANSI C12.19) and PSEM (Protocol Specification for Electricity Meters [ANSI C12.18]). The I210+c™ optical port operates at a fixed baud rate of 9600.

The battery for the time-of-use option is visible at the 12 o'clock position. It is the industry-standard battery. An optional super capacitor is available instead of a battery.

1.1.2 Meter Forms

The mechanical configuration allows the meter to be directly interchanged with existing ANSI form single-phase and network meters. The standardization allows retrofitting to existing installations and use with existing ring and ringless sockets.

1.1.3 Physical Variants Available

The description of the meter and the available S-base forms have been provided below.

Table 1-1: ANSI Standard Meter Forms
The Form 2S is available with or without the test link.

Form	Wires	Circuit	Elements	SC/TR	Class
1S	2	1Ø	1	SC	100
2S	3	1Ø	1	SC	200 or 320
3S	2	1Ø	1	TR	20
4S	3	1Ø	1	TR	20
12S	3	Network or 3ØΔ	2	SC	200 or 320
25S	3	Network	2	SC	200 or 320

1.1.3.1 Voltage Ratings

The standard meter voltage rating is either 120 or 240 VAC with +/-20% line voltage variations. The meter will maintain an accuracy of 0.5% with line voltage variations of +/-10% from normal per ANSI C12.20 -1998.

1.1.3.2 Time Base

The standard meter keeps time from the line frequency. The meter may be programmed to use a crystal oscillator for timekeeping in areas where line frequency does not provide adequate stability for line-based timekeeping.

1.1.4 Hardware Options

The I210+c™ meter supports optional add-on AMR communication modules.

1.1.5 Demand Operating Mode

The basic I210+c™ meter has several operating modes. It is not necessary to buy different versions of the meter to get these features; all modes are built into every meter.

Demand mode is the most basic mode of operation. Demand mode does not require a battery. The demand soft-switch, N, must be enabled. The basic meter in demand mode provides:

- Energy measurement (two quantities)
- Demand (two quantities - block, or rolling demand, maximum, cumulative, and continuously cumulative displays). Alternatively, up to two thermal demand measures are also available.
- Fundamental-plus-harmonics measurements only
- Bidirectional energy measurements with various detenting choices
- Self-monitoring of meter operation for error conditions and caution conditions.
- Alternate display scroll
- Test mode, to test meter operation and site characteristics without affecting billing quantities or load profile data.
- Programming seal function for enhanced security (Canadian requirement)
- Security table of key meter events
- Up to two self-reads
- Demand reset support

- Programmable event logging
- Real-time pricing support
- Immediate real-time pricing activation through communications
- Support for ANSI Standards C12.18 and C12.19

1.1.6 Demand/Load Profile Operating Mode

Demand/load profile mode requires a battery or super capacitor and the R2 load profile recording soft-switch. The following features are provided in addition to the basic features provided by the meter in demand mode:

- Load profile recording for up to two channels
- Daylight savings time change support

1.1.7 TOU/Demand Operating Mode

TOU/demand mode requires a battery or super capacitor and the T2 time-of-use soft-switch. The following features are provided in addition to the basic features provided by the meter in demand mode:

- Programmable daily tier schedules for time-of-use support
- Programmable calendar for scheduling holidays, daylight savings adjustments, season changes, demand resets, and self-reads
- Pending real-time pricing activation through communications
- Rolling billing period support
- Rolling status

1.1.8 TOU/Demand and Load Profile Operating Modes

TOU/demand and load profile mode requires a battery or super capacitor and the T2 time- of-use and R2 load profile recording soft-switches. The following features are provided in addition to the basic features provided by the meter in TOU/demand mode:

- Load profile recording for up to two channels

1.1.9 On-site User Features

1.1.9.1 Operation

The I210+c™ meter has several features for ease of use on site, including:

- Nameplate and label information
- Numeric display with key annunciators, and several display modes including normal, alternate and test.

1.1.9.2 Maintenance

The I210+c™ meter is designed for unattended operation over a long life. When the meter or the site requires attention, the meter has features to facilitate these tasks.

- Many modes of operation and enhanced functions are built into the meter software and may be enabled without physical change to the meter.
- Upgrading from demand to demand/load profile or time-of-use operation requires no added hardware, aside from the battery or super capacitor that supports timekeeping during power outages.
- Disk analog on the display for field calibration testing.
- Test mode for convenient calibration testing without affecting billing data.
- Self-test of meter operation
- Flexible control of display for error conditions and cautions in the meter.

Maintenance instructions are covered in Section 3 of this manual.

1.1.10 Advanced Features and Soft-switches

Many advanced features of the I-210+c™ meter can be enabled with soft-switches. Soft-switches are logical controls that enable related groups of meter features. Without activation of a soft-switch, operation of the controlled features is suppressed. Soft-switches may be enabled in the meter as shipped from the factory, or may be turned on at any time by the use of MeterMate™ software.

The following soft-switches are available in the I-210+c meter:

- E2 Switch – Event log
- K2 Switch – Kvar and kVA measures
- Q2 Switch – Power quality measures
- R2 Switch – Two-channel recording
- T2 Switch – Time-of-use
- N2 Switch – Billing demands
- A2 Switch – Alternate communications

Operating features controlled by soft-switches are described in Section 4, Upgrading.

1.2 Programming and Reading Software

The meter is supported by the MeterMate™ software suite. This software facilitates setting up and using many meter features:

- Creation of custom meter programs
- Loading programs into the meter
- Setting site-specific meter parameters
- Viewing real-time data
- Reading meter data
- Load profile data analysis and reporting
- Meter program and meter data reporting
- Batched meter communications
- Meter mode conversion and soft-switch upgrading

Refer to Reading and Programming Instruction manual for MeterMate™ (GEH-5084I MeterMate™ MMCOMM Instruction Book).

1.3 Technical Information

This section contains the theory of operation and general circuit configuration of the GE I210+c™ meter.

1.3.1 Theory of Operation

The theory of operation of the I210+c™ meter is described in conjunction with the block diagram shown in Figure 1-3.

1.3.1.1 Sensing Devices

Voltages are sensed by high-impedance resistive voltage dividers. Currents are sensed by up to two current transformers, each feeding to the current signal sampling circuit. The sensors provide scaled signals to the metering chip.

1.3.1.2 Metering Chip

The voltage and current sampling, signal processing, and basic meter calculations are performed by the metering chip. The meter chip has a 22-bit delta-sigma ADC with an effective sampling rate of 2520 samples per second. It has two voltage and two current inputs, so it can meter single-phase and network services. The metering chip also drives the meter's LCD, provides real-time clock functionality, and drives the meter's calibration pulse.

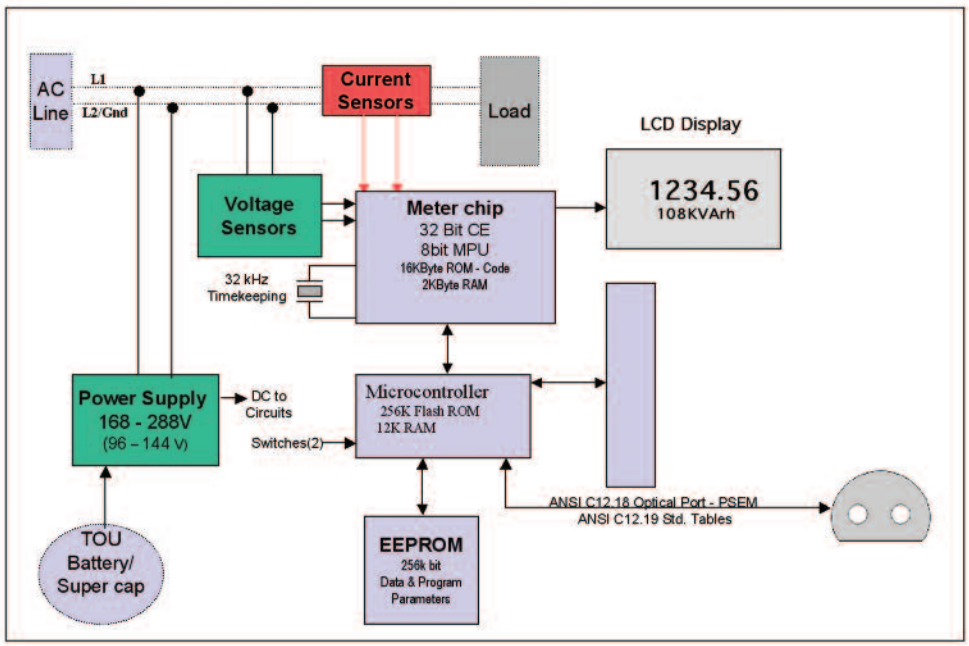


Figure 1-2: I210+c™ Meter Block Diagram

1.3.1.3 Microcomputer

The microcomputer is a 32-bit expandable single chip microcomputer. It receives basic metering data (Wh, varh, V2h) and status information from the Teridian meter chip every second. The microcomputer performs all of the high level metering functions such as summations, demand calculations, time-of-use functions and load profile recording. It also provides the communications interface to the optical port and the AMR communication port.

1.3.1.4 Nonvolatile Memory

The I210+c™ meter is equipped with two 32K x 8 EEPROM devices. All data values and program parameters are stored in these EEPROMs; a battery is not required for data storage. Meter data quantities are updated at each power fail event. Stored data is constantly checked to detect errors.

1.3.1.5 Power Supply

The I210+c™ meter is powered from the A-phase voltage line. It has a solid-state switching type power supply. The meter is available in two voltage ratings: 120V or 240V, +/-20% of rating. The supply operates for either 50Hz or 60Hz line frequency. (Note: the frequency at which the meter will operate is factory configured, it is not user programmable.)

Caution: *Do not exceed 288 volts RMS on the power supply voltage input terminals.*

1.3.1.6 Time Keeping Battery

A standard 3.6V, half-size AA, lithium battery maintains the meter clock when the meter is programmed as a time-of-use meter or demand meter with load profile recorder. Since all billing and programming information is stored in nonvolatile memory, the battery is primarily used for maintaining date and time information during a power outage. Under normal conditions, the battery should provide more than one year of service during outage conditions (time on battery backup) and more than 10 years of service during storage conditions (disconnected from terminals) or when properly installed in an energized meter.

A super capacitor is also available and may be ordered in place of a battery. The super capacitor, when fully charged, will provide a minimum of eight hours of backup. It is charged from the meter's power supply.

1.3.1.7 AMR Modules

In order to support meter communications with AMR modules, the basic meter provides a connector containing a power fail signal and power for AMR modules.

Note: *Only AMR vendors with Non-Disclosure Agreements with GE, providing modules tested by GE, will be considered within the warranty agreement*.

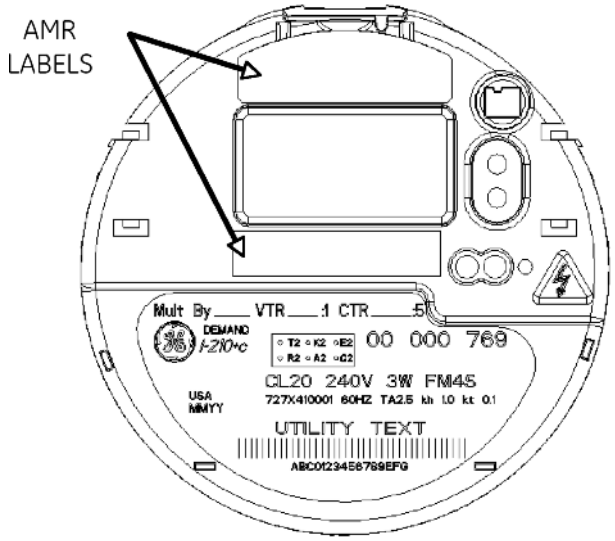


Figure 2-1: Meter Nameplate

2. Operating Instructions

2.1 Nameplate Information and Labels

The I210+c™ meter will include all ANSI-required nameplate. An area specified by ANSI shall be available for customer information and bar code data when it is provided by the customer.

Meters that incorporate AMR devices will include the AMR device ID (or serial number, as appropriate) either on the meter nameplate or on a separate nameplate.

Month and two-digit year of manufacture will be included along with the assembly.

Nameplate "Multiply By" shall be printed with the appropriate display multiplier filled in on any factory-programmed meter with a display multiplier other than one.

Provision has been made to allow an additional nameplate and/or label for AMR devices per FCC or other statutory guidelines.

See Figure 2-1 for a graphic representation of the meter nameplate. The meter nameplate is found on the front of the meter.

2.1.1 Labels

Space for AMR vendor-specific labels is also available on the nameplate. See Figure 2-1 for details.

2.2 Display Information

A maximum of up to 75 items can be selected for display from a total of 397 different user-selectable quantities. As the meter is very flexible, a wide range of quantities can be defined for mapping to meter calculations and display. In the table below "UOM" refers to "Unit of Measure", a general term for measurements that can be displayed as defined by the meter program. UOM quantities can be kWh or other integrating volt-amp quantities (such as kVA) or voltages.

Table 2-1: User-Selected Display Information

Display Item	Operational Modes Available
Current Season	
Maximum 1,2 UOM:	
Maximum Demand	All
Maximum Demand Date	TOU
Maximum Demand Time	TOU
Maximum Demand Rate A,B,C,D	TOU
Maximum Demand Rate A,B,C,D Date	TOU
Maximum Demand Rate A,B,C,D Time	TOU
Cumulative 1,2 UOM:	
Cumulative Demand	All
Cumulative Demand Rate A,B,C,D	TOU
Continuously Cumulative 1,2 UOM:	
Continuously Cumulative Demand	All
Continuously Cumulative Demand Rate A,B,C,D	TOU
Summations 1,2 UOM:	
Total Summation	All
Summation Rate A,B,C,D	TOU
Instantaneous:	
Momentary Interval Demand	All
Momentary Interval Power Factor	All
Momentary Interval Va RMS fundamental plus harmonics	All
Momentary Interval V_C RMS fundamental plus harmonics (network meters only)	All
Previous Interval 1,2 UOM:	
Previous Interval Demand	All
Rolling Billing Period Demand 1,2 UOM:	
Maximum Demand for Peaks 1 and 2	TOU
Maximum Demand Date for Peaks 1 and 2	TOU
Maximum Demand Time for Peaks 1 and 2	TOU
Maximum Demand Rate A,B for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Date for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Time for Peaks 1 and 2	TOU
Cumulative Demand for Peaks 1 and 2	TOU
Cumulative Demand Rate A,B for Peaks 1 and 2	TOU
Daily Maximum Demand	TOU
Daily Maximum Demand Time	TOU
Daily Maximum Demand Rate A,B	TOU
Daily Maximum Demand Rate A,B Time	TOU

Display Item	Operational Modes Available
Previous Season	
Maximum 1,2 UOM:	
Maximum Demand	TOU
Maximum Demand Date	TOU
Maximum Demand Time	TOU
Maximum Demand Rate A,B,C,D	TOU
Maximum Demand Rate A,B,C,D Date	TOU
Maximum Demand Rate A,B,C,D Time	TOU
Cumulative 1,2, UOM:	
Cumulative Demand	TOU
Cumulative Demand Rate A,B,C,D	TOU
Summations 1,2, UOM:	
Total Summation	TOU
Summation Rate A,B,C,D	TOU
Rolling Billing Period Demand 1,2 UOM:	
Maximum Demand for Peaks 1 and 2	TOU
Maximum Demand Date for Peaks 1 and 2	TOU
Maximum Demand Time for Peaks 1 and 2	TOU
Maximum Demand Rate A,B for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Date for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Time for Peaks 1 and 2	TOU
Cumulative Demand for Peaks 1 and 2	TOU
Cumulative Demand Rate A,B for Peaks 1 and 2	TOU
Last Reset	
Maximum 1,2, UOM:	
Maximum Demand	All
Maximum Demand Date	TOU
Maximum Demand Time	TOU
Maximum Demand Rate A,B,C,D	TOU
Maximum Demand Rate A,B,C,D Date	TOU
Maximum Demand Rate A,B,C,D Time	TOU
Cumulative 1,2 UOM:	
Cumulative Demand	All
Cumulative Demand Rate A,B,C,D	TOU
Summations 1,2, UOM:	
Total Summation	All
Summation Rate A,B,C,D	TOU
Rolling Billing Period Demand 1,2 UOM:	
Maximum Demand for Peaks 1 and 2	TOU
Maximum Demand Date for Peaks 1 and 2	TOU
Maximum Demand Time for Peaks 1 and 2	TOU

Maximum Demand Rate A,B for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Date for Peaks 1 and 2	TOU
Maximum Demand Rate A,B Time for Peaks 1 and 2	TOU
Cumulative Demand for Peaks 1 and 2	TOU
Cumulative Demand Rate A,B for Peaks 1 and 2	TOU
Real Time Pricing (RTP) 1,2 UOM:	
RTP Maximum Demand	Dmd/ DmdLP
RTP Cumulative Demand	Dmd/ DmdLP
RTP Summation	Dmd/ DmdLP
Last Reset	
Last Reset RTP Maximum Demand	Dmd/ DmdLP
Last Reset RTP Cumulative Demand	Dmd/ DmdLP
Last Reset RTP Summation	Dmd/ DmdLP
SECURITY LOG	
Number of Bad Passwords	All
Number of Demand Resets	All
Number of EEPROM Writes	All
Number of OPTOCOM Communications	All
Number of Power Outages	All
Number of Times Programmed	All
Number of Times for Real-Time Pricing Entries	All
Cumulative Power Outage Duration in seconds	TOU/DmdLP
Date of Last Calibration	All
Time of Last Calibration	All
Date of Last Demand Reset	TOU
Time of Last Demand Reset	TOU
Date of Last OPTOCOM Comm.	TOU
Time of Last OPTOCOM Comm.	TOU
Date of Last Power Outage	TOU/ DmdLP
Time of Last Power Outage	TOU/DmdLP
Date of Last Programming	All
Time of Last Programming	All
Date of Last Real-Time Pricing Entry	TOU
Time of Last Real-Time Pricing Entry	TOU
Date of Last Time Change	TOU
Time of Last Time Change	TOU
TEST MODE	
Test Mode Demand Interval length in minutes (block)	All
Test Mode Demand No of Subintervals. (rolling only)	All
Test Mode Demand Subint. length in minutes (rolling)	All
Test Mode Maximum Demand 1,2 UOM	All
Test Mode Time Out Length in minutes	All
Test Mode Thermal Interval Type: "0"=15 min., "1"=1 min.	All
Test Mode Accumulating Demand 1,2 UOM	All
Test Mode Power Factor	All
Time Remaining in Test Mode (Sub)interval in min. & sec. (Not valid for thermal demands)	All
CONSTANTS	
Demand Interval Length in minutes (block only)	All
Demand No. of Subintervals (rolling only)	All
Demand Subinterval Length in minutes (rolling only)	All
Demand Delay Length in minutes	All
Minimum Outage for Demand Delay in seconds	TOU
Display Demand Units ("0"=kW,kVA, etc.;"1"=W,VA,etc.)	All
Display Scalar: (for GE internal use)	All
Display Primary Volts/Amps Flag: "0"= Sec, "1"= Pri.	All
Display Multiplier (Scaled): (for GE internal use)	All
Meter ID 1	All
Meter ID 2	All
Program ID	All
Transformer Ratio – Current: X:5	All
Transformer Ratio – Voltage: X:1	All
EOI Duration in seconds	All
Load Profile # Channels	TOU/ DmdLP
Load Profile Interval Length in minutes	TOU/ DmdLP
Real-Time Pricing State: "0"= Disabled, "1"= Enabled	All
Seal Flag State: "0"= Unsealed, "1"= Sealed Official Government Metrology Control	All
Blank Data Display	All
All Segments	All
Firmware Version No. = 1, 2,...	All
Hardware Version No. = 1, 2,...	All
Transformer Factor	All
Network Status Info	All
VARIABLES	
Current Season	TOU
Current Date	TOU/ DmdLP
Current Day Of Week (1-7 means Sun-Sat)	TOU/DmdLP
Current Time	TOU/ DmdLP
Time Remaining in Demand (Sub)interval in minutes (Not valid for thermal demands)	All
Real-Time Pricing time remaining until activation in min.	All

2.2.1 Display Modes

There are three display modes:

- Normal
- Alternate
- Test

The user can switch between display modes using the display switch and the test switch.

2.2.1.1 Display Switch Actions

The display switch is actuated using a magnet as shown in Figure 2-2. Holding a magnet next to the Display Switch for varying lengths of time causes the meter to change display modes:

Less than 3 seconds:	Restarts the Normal Display scroll, or produces one Normal Display scroll if an Error, Caution or Diagnostic is frozen on the display.
More than 3 seconds:	Enters the Alternate Display mode for one scroll then returns to the Normal Display mode.

TIP: *The magnetic end of the SMARTCOUPLER™ will activate the display switch.*

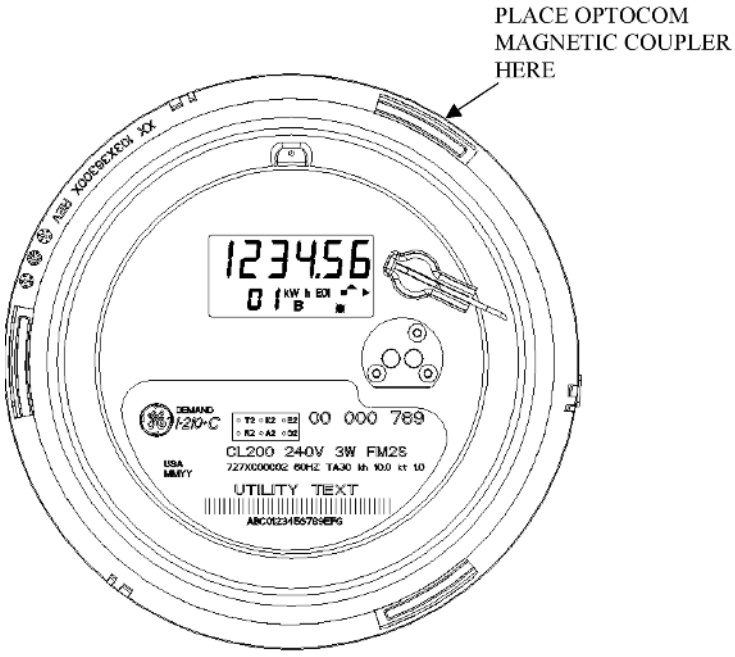


Figure 2-2: Alternate Display Mode Switch

2.2.1.2 Normal Display Mode

In Normal Display mode, the meter display scrolls continually through the Normal Display items until one of the following occurs:

- Demand reset is invoked
- Display Switch is actuated
- Communication is initiated
- Test mode is invoked
- A frozen error or caution message is triggered.

Note: *The test mode push button is not accessible with the cover in place.*

Normal Display items are selected during program development using MeterMate™ software. The meter returns to the Normal Display mode when other display modes have completed or timed-out.

TIP: *While the meter is communicating, the data annunciators are off and the LCD displays "BUSY".*

2.2.1.3 Alternate Display Mode

The Alternate Display is used to display information for the meter technician that is not contained in the Normal Display.

- *Display items:* Selected during MeterMate™ program development
- *Initiate:* Actuate the display switch for more than 3 seconds
- *Scroll:* The meter automatically scrolls through the Alternate Display items
- *Exit:* The meter automatically returns to the Normal Display mode after the last Alternate Display item

2.2.1.4 Test Mode

Test mode is used to display data for testing the meter. Normal accumulation of billing data is suspended in test mode.

- *Display Items:* Selected during MeterMate™ program development.
- *Initiate:* Hold the test (T) switch for one second (requires removing the cover) or use MeterMate™ software commands. See Figure 2-3 for the location of the test switch.

- *Scroll:* Momentarily actuate the display switch to advance to the next item in the Test Display scroll.
- *Reset Accumulators:* Hold the reset (R) switch to zero all accumulators and light all display segments. Test mode processing resumes when the reset switch is released. Pressing the reset switch does not affect billing data.
- *Exit:* Hold the test switch for one second or wait for the programmable test mode timeout period.

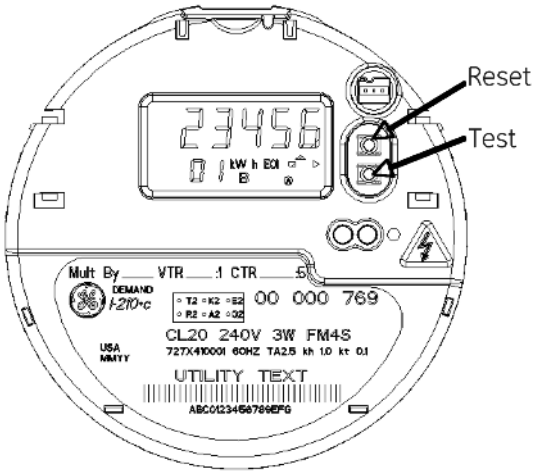


Figure 2-3: Reset and Test Switches

2.2.1.5 Frozen Display Mode

The Frozen Display mode stops the Normal Display to draw attention to an error, caution, or diagnostic in the meter.

- *Display Items:* Select errors, cautions and diagnostics to freeze the display during MeterMate™ program development.
- *Initiate:* Automatic when the meter detects a frozen error, caution or diagnostic.
- *Scroll:* Use a magnet to activate the display switch. The meter will perform one Normal Display scroll and then return to the Frozen Display.
- *Exit:* Clear the condition that caused the error, caution or diagnostic to return to the Normal Display mode.

2.2.2 Liquid Crystal Display Information

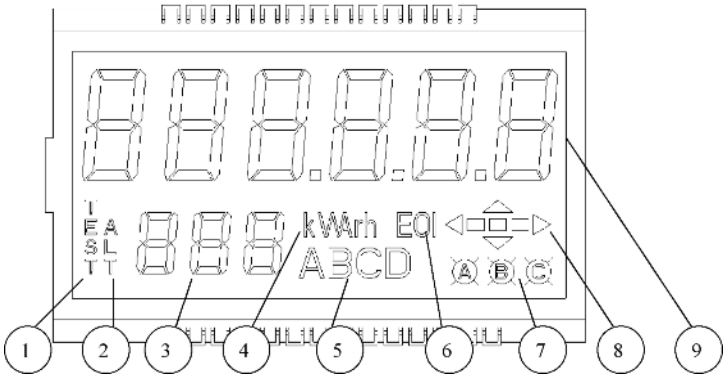


Figure 2-4: Liquid Crystal Display Information

1. The “TEST” annunciator indicates the meter is in Test mode.

2. The “ALT” annunciator indicates the meter is in Alternate Display mode.

3. The three small digits are used to display the current display label or code. “CA” or “Er” appearing in this location indicates a Caution or Error message in the display.

4. These letters are used to display the units of measure for the quantity currently being displayed. For example, energy displays will have a “kWh” annunciator and Apparent Power will have a “kVA” annunciator.

5. The letters A through D indicate the time-of-use (TOU) rate that is in effect. Only one letter at a time is displayed when the meter is operating in TOU Mode. If no letters are lit, the meter is in a non-TOU rate.

6. This display indicates an end-of-interval (EOI) condition.

7. When displayed, the “A” annunciator indicates the A voltage is present at the meter. If this annunciator is blinking, phase-A voltage is low.

The "B" annunciator will only be displayed during an all-segments display.

When displayed, the "C" annunciator indicates the C voltage is present at the meter. If this annunciator is blinking, C voltage is low (Network meters only.)

8. The left-right arrows indicate watt-hour direction of energy flow. The right arrow will be lit if the energy is delivered; the left arrow will be lit if the energy is received.

   The up-down arrows indicate var-hour direction of quadergy flow. The up arrow will be lit if the quadergy is lagging; the down arrow will be lit if the quadergy is leading.

   The meter's magnitude indicator consists of three segments, used to simulate the rotation of the disk on an electromechanical meter. Each state change represents Kt. One complete "revolution" represents ten state changes, which represent Kh watt-hours or var-hours. The meter illuminates the segments as follows:

   State

   0 ■ ❒ ❒
   1 ■ ■ ❒
   2 ■ ■ ■
   3 ❒ ■ ■
   4 ❒ ❒ ■
   5 ❒ ❒ ❒
   6 ❒ ❒ ❒
   7 ❒ ❒ ❒
   8 ❒ ❒ ❒
   9 ❒ ❒ ❒
   0 ■ ❒ ❒
   ...

   If the Wh direction is delivered (or the varh direction is lagging), the states change in increasing order with respect to the above illustration. If the Wh direction is received (or the varh direction is leading), the states change in decreasing order.

   Note: *If the calculated phasor VAh is below the configured creep threshold, the meter will turn off the Wh and varh direction arrows.*

9. These characters display the programmed metering quantities. There are three possible decimal point positions located between the four rightmost digits.

2.2.3 Display Examples

The following three figures show examples of possible I210+c™ meter displays.

2.2.3.1 kWh Display

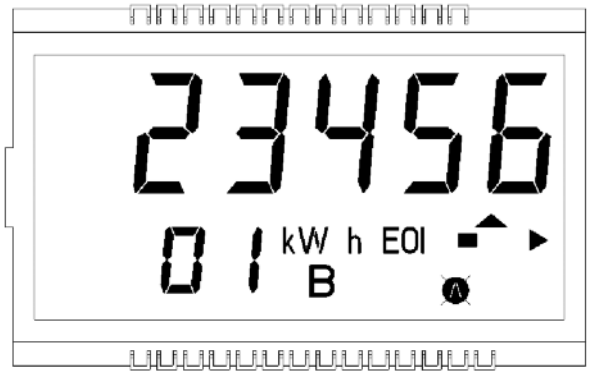


Figure 2-5: kWh Display

Figure 2-5 shows the following conditions:

- The Display Label is "01"
- Five-digit display of energy (kWh)
- Phase A voltage is present
- End-of-demand-interval indication. This indicator is lit at the end of each demand subinterval
- Displayed quantity is measured in kilowatt-hours
- Energy is being delivered to the load
- The one block indicates State 0 of the magnitude indicator
- Quadergy (kvarh) is lagging
- TOU rate B is in effect

2.2.3.2 Alternate Display Mode

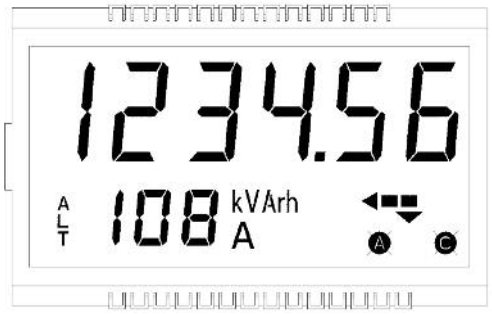


Figure 2-6: Alternate Display

Figure 2-6 shows the following conditions:

- Meter is in Alternate Display mode
- Display label "108" is displayed
- Phase A and C voltages are present
- Six-digit display of quadergy (kvarh)
- Displayed quantity is measured in kvarh
- The two blocks indicate State 1 of the magnitude indicator
- Quadergy (kvarh) is leading
- Energy is being received from the load
- TOU rate A is in effect

2.2.3.3 Test Mode Display

Figure 2-7 shows the following conditions:

- Meter is in TEST mode
- Display label is "905"
- Meter display is a six-digit demand display (kW) with three digits to the right of the decimal point
- Phase A voltage is present
- Meter display is in watt-hours
- Energy is being delivered to the load
- The three blocks indicate State 2 of the magnitude indicator
- Time-of-use metering rate D is in effect
- Quadergy (kvarh) is lagging

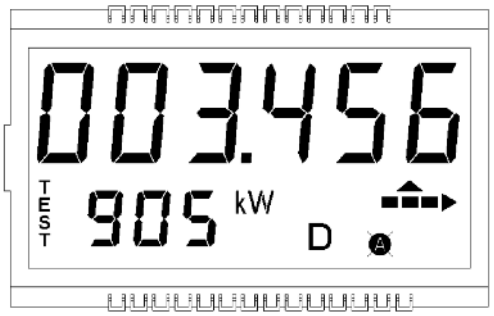


Figure 2-7: Test Mode Display

3. Maintenance Instructions

The information contained within this document is intended to be an aid to qualified metering personnel. It is not intended to replace the extensive training necessary to install or remove meters from service. Any work on or near energized meters, meter sockets, or other metering equipment presents the danger of electrical shock. All work on these products must be performed by qualified industrial electricians and metering specialists only. All work must be done in accordance with local utility safety practices and the procedures outlined in the current edition of the Handbook for Electricity Metering. The handbook is available from the Edison Electric Institute, 701 Pennsylvania Avenue N.W., Washington D.C. 20004-2696.

3.1 Recommended Procedures

The procedures described on the following pages are those recommended by the General Electric Company. Any procedures not described herein or referenced herein are not recommended.

3.1.1 Meter Testing Tools

The meter is equipped with a light-emitting diode (LED) for calibration and a liquid crystal display with disk analog and test displays. The calibration LED is part of the ANSI Type 2 Optical port as shown in Figure 3-1.

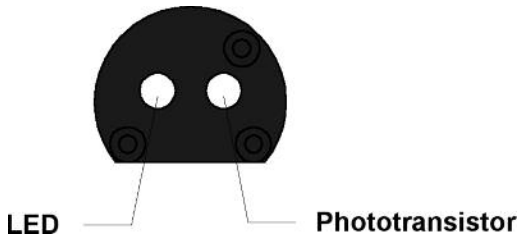


Figure 3-1: Optical Port

3.1.1.1 Calibration LED

The optical port LED emits calibration pulses (infrared light) until the meter detects the presence of optical port PSEM communications. This LED is the source of watt-hour and var-hour calibration pulses. Each calibration pulse is equal to the value assigned to Kt (watt-hours or var-hours). The duration of each output pulse is approximately 25 milliseconds.

The default unit for the calibration pulses is watt-hours. The meter may be switched to varh calibration pulses using MeterMate™ software.

3.1.1.2 LCD Display

The meter display has annunciators for quadrant, phase voltage, and energy flow indication as shown in Figure 3-2. The annunciators provide valuable information during the testing process

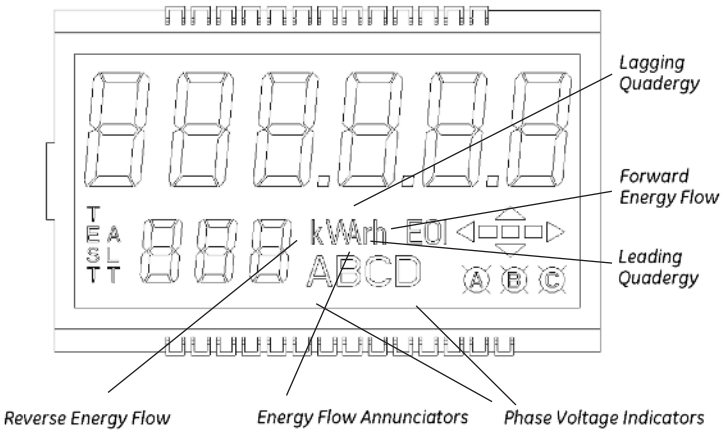


Figure 3-2: Liquid Crystal Display

Refer to section 2.2.2 for more information on these annunciators.

3.2 Test Mode

Test mode allows the meter to be tested without disturbing billing data or setting a new maximum demand. Test mode performs the same function as setting the pointers back on an electromechanical meter after testing.

Test mode may be entered by pressing the test switch for one second or by using MeterMate™ software commands. The test mode switch is operated by removing the Lexan cover and pushing the test switch.

3.2.1 Starting the Test Mode

To enter test mode, use the test switch on the face of the meter or MeterMate™ Meter Comm commands.

Upon entering test mode, several actions occur:

- The current demand interval is terminated.
- All test accumulators are set to zero.
- The subinterval countdown timer starts.
- Load profile recording is suspended, and load profile interval status bits reflect test mode was in effect during affected interval(s).

When test mode begins, the test annunciator is lit and the first item programmed for the test display is shown.

3.2.2 Operation During Test Mode

The same summation quantities that are calculated during normal operation are calculated in test mode. The selection of quantities to be displayed in test mode is fully programmable in the MeterMate™ software. Watt-hour, var-hour, and volt-ampere-hour are displayed in units rather than kilo-units; i.e. the data is displayed as Wh, varh, and VAh rather than kWh, kvarh, and kVAh. The same demand values calculated during normal operation are also calculated in test mode. The display formats for the demands are the same in test mode as they are in normal mode.

3.2.2.1 Energy Calculations

If the metering constants are not programmed, default values are used. Table 3 1 contains the default test mode values.

Table 3-1: Default Test Mode Values

Constant	Default Value
Demand decimal position	XXX.XXX
Number of demand subintervals	3
Demand subinterval length	5 minutes
Energy display format	XXX.XXX

The display does not scroll while the meter is in test mode. Each item remains displayed until the display switch is activated with a magnet. At that time, the next item in the display program is shown. The quantity displayed is updated every second.

The test mode display is fully programmable. Table 3 2 lists the default test mode display items for an unprogrammed meter. Items can be added or deleted using MeterMate™ software.

Table 3-2: Test Mode Default Display

Display ID	Display Quantity
94	Accumulating Wh
95	Previous interval kW demand
91	Time remaining in subinterval (MM SS)
92	Momentary interval demand
93	Maximum test kW demand

3.2.2.2 Displays Available in Test Mode Only

The following display items are available for display only in the test mode:

- Test mode maximum demands;
- Time remaining in test demand interval in block demand only;
- Time remaining in test demand subinterval in rolling demand only;
- Test mode summations;
- Test mode accumulating demand.

3.2.2.3 Test Reset

A test reset is initiated by pressing the reset switch while the meter is in the test mode. A test mode reset causes all test quantities to be reset to zero and a new subinterval to be started. An all-segments display is shown until the reset switch is released. The item displayed when the reset occurred remains in the display, but the value will be initialized.

In the event of a power outage, data for test mode energy and demand are not saved. These data are reset when power returns. Upon power-up, the meter remains in test mode and the item displayed when the outage occurs remains on the display. In a TOU meter or demand meter with load profiling, there may be a slight delay before re-entering test mode on power-up. During the delay, the meter is performing its catch-up tasks.

3.2.2.4 Exiting Test Mode

Test mode is exited in one of three ways:

1. By pressing and holding the test switch for more than one second;
2. By an MMDOS or MMCOMM command;
3. By expiration of the test mode time-out timer.

All test mode data is lost when test mode is exited. Upon exiting test mode in a meter programmed for rolling demand, the meter will start a new, possibly partial, subinterval. The past subinterval, as well as the current subinterval, is zeroed. Upon returning to the normal operating mode, a TOU meter or demand meter with load profiling will complete the time remaining in the current partial subinterval such that subsequent subintervals will be synchronized with the midnight boundary. The new subinterval in demand-only mode is the number of minutes remaining in the subinterval prior to entering test mode.

For meters that are programmed for thermal emulation, the thermal demand reading is set to zero immediately after test mode is exited.

The meter will automatically exit test mode when the time that the meter has been in test mode time has exceeded its programmed limit. This test mode time limit prevents accidentally leaving the meter in the test mode and losing billing information. The test mode time-out function is programmable from one minute to 99 hours.

Note: *Normal billing and load profile data accumulation is suspended during test mode operation. Upon exiting test mode accumulation of billing and load profile quantities will resume from the values in place when test mode was entered.*

3.3 Field Accuracy Test

Test mode allows the meter to be tested for accuracy in the field, without disturbing any billing data.

3.3.1 Field Testing with Test Mode

Testing the meter in the field can be accomplished three ways in test mode by using the:

1. Maximum demand reading in the display;
2. Disk analog display;
3. Instantaneous demand feature of the I210+c™.

3.3.2 Maximum Demand Reading Testing

This is the most accurate of the three test methods. For this test, you need a portable standard with a start/stop switch and a phantom load.

1. Make sure that the voltage coils are in parallel and the current coils are in series.
2. Connect the phantom load and the portable standard to the meter to be tested.

3. Apply voltage to the meter and the standard and wait 20 seconds for settling time.
4. Put the meter into test mode.
5. Change the display to maximum demand (display ID 93 using the default display items).
6. Switch on the desired current.
7. Check the flow indicator on the meter to make sure that the polarity is correct.
8. Reset the standard.
9. Simultaneously reset the meter and start the standard. The test reset takes effect when switch is released.
10. Turn the current off when the end-of-interval (EOI) annunciator comes on.
11. Compare the meter readings with the standard's readings. EOI comes at the end of every subinterval; numbers won't match before interval is completed and display is updated. Where rolling demand is used (n sub intervals composing a complete demand interval) the display value needs to be multiplied by n for comparison to the standard value.

3.4 Disk Analog Testing

The disk analog provides a precise means of checking the calibration of the meter. There are some practical limits to this method of testing. For example, if the load on the meter is very low, the test may take a long time. Conversely, if the load is high, it may be difficult to accurately time the switching of the standard.

The disk analog in the I210 Demand/TOU works as follows:

The meter's magnitude indicator consists of three segments, used to simulate the rotation of the disk on an electromechanical meter. Each state change represents Kt. One complete "revolution" represents 10 state changes, which represents Kh watthours or varhours. The meter illuminates the segments as follows:

State

0 ■ ❒ ❒
1 ■ ■ ❒
2 ■ ■ ■
3 ❒ ■ ■
4 ❒ ❒ ■
5 ❒ ❒ ❒
6 ❒ ❒ ❒
7 ❒ ❒ ❒
8 ❒ ❒ ❒
9 ❒ ❒ ❒
0 ■ ❒ ❒
...

If the Wh direction is delivered (or the varh direction is lagging), the state changes occur in increasing order. If the Wh direction is received (or the varh direction is leading), the state changes occur in decreasing order.

For this test you need a portable standard with a start/stop switch. Field-testing using the disk analog allows you to check the calibration of the meter without having to install a phantom load.

1. Make sure the voltage coils are in parallel and the current coils are in series.
2. Connect the portable standard to the meter.
3. Reset the standard.
4. Observe the disk analog. Each cycle of the disk analog represents Kh watt-hours of accumulation. (The Kh value is printed on the meter nameplate.)
5. When the disk analog transitions from all segments on to all segments off, start the standard.
6. Let the disk analog scroll through a predetermined number of times (10, for example).
7. Stop the standard when the disk analog transitions from all segments on to all segments off the desired number of times.
8. Calculate the accumulated watt-hours as shown in Equation 3-1.

   Accumulated Energy = (Kh) × (the number of complete disk analog cycles)

   Equation 3-1: Accumulated Watt-hours Calculation

   For example: if Kh equals 10 and 10 complete cycles were counted, then: *10 Wh x 10 complete scrolls = 100 Wh.*
9. Compare the results of the calculation to the reading on the standard.

3.5 Shop Test

Shop testing consists of verifying the meter's accuracy.

3.5.1 Meter Shop Equipment

The meter loading equipment must be capable of maintaining accuracy while supplying energy to the meter's switching power supply. Otherwise, meters may be tested in any shop that meets the requirements outlined in the current editions of the Handbook for Electricity Metering published by the Edison Electric Institute and the American National Standard Code for Electricity Metering.

3.5.1.1 Equipment Setup

The meter mounting equipment and its electrical connections must be used as required for the meter form number on the meter nameplate. If required for the test equipment used, the test link(s) must be opened.

3.5.2 Test Constant

The meter test constant (Kt) is the number of watt-hours per calibration pulse. This value is printed on the meter label.

3.5.3 Watt-hour Test Procedure

To test the meter, proceed as follows:

1. Note the meter Kt value listed on the nameplate.
2. Select the desired voltage and current level(s) on the test equipment. (Test voltage of 120V is assumed.)
3. Install the meter in the test socket, making certain that the socket is wired and/or configured for the appropriate meter form.
4. Align the optical pickup of the test equipment with the calibration LED.
5. Begin testing according to standard test procedures. Allow 15 seconds of settling time after applying voltage before making accuracy measurements.
6. Check the meter calibration under three load conditions: full load, light load, and full load with lagging power factor. A minimum test time of 30 seconds is needed to reduce test uncertainty. (Check the instruction book for your test board or standard to determine the actual minimum test time. Standards with heavily filtered inputs may require longer test times.)

3.5.4 Var-hour Testing

GE I210+c™ meters are digital sampling meters. All quantities are derived mathematically from the same set of voltage and current sample data used to compute watt-hours. Therefore, it is only necessary to check watt-hour calibration to ensure that all revenue quantities are accurate. However, some utilities are required by their public utilities commissions to verify the accuracy of var-hour data as well as watt-hour data.

1. Use MeterMate™ software to put the meter calibration LED into VArhour pulse output mode.
2. Set up the meter for testing as described above in the watt-hour test procedure. The test pulse value is now Kt var-hours per pulse.
3. Begin testing according to your standard var-hour test procedures. Allow 15 seconds of settling time after applying voltage before making accuracy measurements.

NOTE: *Test conditions with high power factors require very long varh test times. Typically varh testing is done at 120V and 0.5 PF.*

3.6 Battery and Super Capacitor Replacement

Lithium Inorganic 3.6 Volt Battery (Safety Precautions)

- Do not expose battery to temperatures above 100 degrees C. Do not incinerate, puncture, crush, recharge, short circuit and over-discharge battery.
- The contents are water reactive and the battery contents can form HCL (hydrochloric acid), SO_2 (sulfur dioxide) and H_2 (hydrogen), upon contact with water (only when forced open). Do not expose contents of battery to water. Do not expose contents to high humidity for extended periods of time.
- Dispose of batteries in accordance with local, state and federal hazardous waste regulations.

To obtain an MSDS (Material Safety Data Sheet), contact your local GE supplier.

Super Capacitor Safety Precautions

- Do not expose super capacitors to temperatures above 100 degrees C. Do not incinerate, puncture, crush, or disassemble super capacitors.
- Dispose of super capacitors in accordance with local, state and federal hazardous waste regulations

3.6.1 Replacing the Battery

CAUTION: *Battery and super capacitor installation must be done with NO power applied to the meter.*

1. Read data from meter;
2. Remove power from the meter;
3. Remove the meter cover;
4. Disconnect the battery or super capacitor wire from the connector on the front of the nameplate carrier;
5. Grasp the front and back edges of the battery holder and squeeze them together;
6. Pull the battery holder out of the slot at the top of the nameplate carrier.
7. Remove the old battery;
8. Place the new battery in the battery holder;
9. Slip the battery holder into the slot at the top of the nameplate carrier and press down until the battery holder clicks into place;
10. Connect the battery wire to the nameplate carrier battery connector;
11. Replace the meter cover;
12. Energize the meter;
13. Reprogram meter;
14. Reset the Accumulated Outage Duration (time on battery backup) value using MMCOMM commands (Reset, Battery).

3.6.2 Replacing the Super Capacitor

The procedure for replacing the super capacitor, should that be necessary, is the same. It will take approximately 5 minutes for a super capacitor to fully charge.

3.7 Service

The GE I210+c™ meter is factory-calibrated and requires no routine or scheduled service by the user.

3.8 Repair

Factory repair or replacement service is offered when you cannot fix a problem. Because of the high density and integrated design, the repair of on-board components is not recommended. Instead, return the whole meter to General Electric as described in the following paragraph.

3.9 Returning a Meter

If you wish to return a meter, call your General Electric sales representative for a Returned Material Authorization (RMA). The entire meter should be returned with the GE supplied Returned Material Authorization information form completed. Key information includes quantity, catalog number, serial number(s) and a complete description of the problem. Your General Electric sales representative will provide return instructions.

3.10 Cleaning

CAUTION: *Care must be taken during cleaning not to damage or contaminate any gold-plated contacts of the connectors.*

CAUTION: *Do not immerse the meter in any liquid. Do not use abrasive cleaners on the Lexan covers. Do not use chlorinated hydrocarbon or ketone solvents on the covers.*

3.11 Storage

The I210+c™ meter is a durable device; however, it should be handled and stored with care. The temperature and humidity levels in storage are not critical, but extremes of either factor should be avoided.

3.12 Troubleshooting Guide

The meter displays two types of codes: Error codes begin with Er and are shown in Table 3-3. Caution codes begin with CA and are shown in Table 3-4. Problems that do not cause any display codes are listed in Table 3-5.

3.13 Errors and Cautions

The GE I210+c™ meter continually checks for internal errors, hardware failures, and cautions. These events are reported in coded form on the LCD.

3.13.1 Error Reporting

The meter continuously checks its hardware components — ROM, EEPROM, flash, battery, metering chip, and microprocessor — to ensure that they are operating properly. When the meter detects that a hardware component is not operating properly, an error is reported. Error codes are displayed as soon as they are detected. The meter can be programmed to freeze error codes in the display when an error is detected. Refer to Table 3-3 for a list of errors. If subsequent tests indicate that the hardware component is operating properly, the meter will clear the error automatically.

Table 3-3: Error Code Display

Error Display	Probable Cause	Remedy
Er 000 002	Power outage occurred, and: a. Battery disconnected. b. Battery defective.	Set meter's date and time, read meter's load profile data and restart load profile recording (if applicable), and: a. Connect battery. b. Replace battery.
Er 000 020	Hardware failure	a. Check for proper installation. b. Check for proper grounding. c. Call for factory assistance
Er 000 200	Non-volatile memory data error	a. Check for proper installation. b. Check for proper grounding. c. Call for factory assistance
Er 001 000	Firmware ROM code error	Replace meter.
Er 100 000	Meter Chip error	Replace meter.

Errors are serious events and usually indicate a condition has occurred that may have compromised the meter data. Unless GE has issued a service advisory indicating that other actions should be taken, you should remove the meter from service and contact your GE sales representative. The only exception to this rule is the Battery Failure & Power Loss error display, Er 000 002. ***Do not return meters displaying Er 000 002.***

The Er 000 002 display indicates that the meter lost time during a power outage because of a weak, missing, disconnected, or defective battery. Replace the battery and set the meter's date and time to resolve this problem. If the meter has load profile data, the load profile recording function must be restarted. Be sure to read the meter's load profile data before doing this.

TIP: *When the meter is read through the optical port, error and caution conditions are returned with the meter data regardless of what display options are chosen in the meter program.*

3.13.1.1 Er 000002—Battery Failure & Power Outage

The Battery Failure & Power Outage error indicates that the battery failed to maintain power during an outage. The meter has reverted to a demand mode of operation. The meter will increment only billing summation, and maximum demand values upon energizing the meter after loss of date/time information. It will update these values for the overall quantities and the programmed default TOU rate. TOU operations are suspended. Load profile data accumulated prior to the loss of date/time information is stored in non-volatile memory. TOU and load profile data is available for reading via the optical port or remote communication link. The battery should be replaced after reading the meter electronically to extract the data. The time and date should be programmed to resume proper TOU operations. The load profile function must be restarted to restore load profile operations. The meter can stay in service.

Date & Time:	Lost
Load Profile recording:	Stopped
Register Function:	Remains TOU, but operates as a demand meter with a default TOU rate
Program:	OK
TOU schedule:	Stopped
TOU calendar:	Stopped
Billing Data:	Total summations and max. Demands are OK (rolling billing period demand if enabled will cease, and traditional demand will begin); summations and demands for the programmed default TOU rate will also be updated.

3.13.1.2 Er 000020—Hardware Failure

The Hardware Failure error indicates that the meter detected an internal hardware failure. The meter should be taken out of service and returned to GE.

Date & Time:	Stopped
Load Profile recording:	Stopped
Register Function:	Demand Only
Program:	OK
TOU schedule:	Stopped
TOU calendar:	Stopped
Billing Data:	May be corrupt

3.13.1.3 Er 000200—Non-volatile Data Error

The Non-volatile Data error indicates a failure in the memory used to store configuration information, billing data, self-reads, event logs and load profile data. When the meter is not communicating, it continually tests the integrity of the data stored in non-volatile memory. If the meter detects an error in the non-volatile data, it sets the Non-volatile Data error. If subsequent tests pass, the error is cleared. A meter with a persistent Non-volatile Data error should be removed from service and returned to GE.

Date & Time:	OK
Load Profile recording:	May be corrupt
Register Function:	Unchanged
Program:	May be corrupt
TOU schedule:	May be corrupt
TOU calendar:	May be corrupt
Billing Data:	May be corrupt

3.13.1.4 Er 001000—Firmware Code Error

The Firmware Code error indicates a failure in the memory used to store firmware. When the meter is not communicating, it continually tests the integrity of the firmware stored in memory. If the meter detects an error in the firmware, the meter sets Firmware Code error. If subsequent tests pass, the error is cleared. A meter with a Firmware Code error should be removed from service and returned to GE.

Date & Time:	OK?
Load Profile recording:	OK?
Register Function:	Unchanged
Program:	OK?
TOU schedule:	OK?
TOU calendar:	OK?
Billing Data:	OK?

3.13.1.5 Er 100000—Meter Chip Error

The Meter Chip error indicates the meter has detected an error in the operation of its meter chip. If subsequent correct operation occurs, the error is cleared. A meter with a persistent Meter Chip error should be taken out of service and returned to GE.

Date & Time:	OK?
Load Profile recording:	Corrupt data
Register Function:	Unchanged
Program:	OK
TOU schedule:	OK
TOU calendar:	OK
Billing Data:	Corrupt data

3.13.2 Caution Reporting

The meter also checks other conditions that are of concern but do not indicate a problem with the meter hardware. The meter reports these as cautions. Individual cautions may be enabled or disabled selectively. If a caution is enabled, it can be configured to be displayed and optionally freeze the display.

Table 3-4: Caution Code Display

Caution Display	Probable Cause	Remedy
CA 000 001	Low battery. Battery failed test.	Replace battery.
CA 000 010	Meter unprogrammed. Using default values.	Program the meter.
CA 000 040	Loss of program. Programming interrupted. Using previous values.	Program the meter.
CA 000 050	Loss of program and Meter is unprogrammed. Programming interrupted, Using default values.	Program the meter.
CA 000 100	DC detected	Investigate cause of DC component.
CA 000 400	Low potential on phase A.	Check circuit voltage.
CA 000 500	DC detected and Low potential.	Check circuit voltage. Investigate cause of DC component.
CA 004 000	Demand overload warning has exceeded programmed threshold.	Check for service overload conditions. Check programming threshold value.
CA 040 000	Leading kvarh warning.	a. Disable the warning. b. Check system operating parameters if leading kvarh is unexpected.
CA 400 000	Received kWh warning. a. CT polarity is incorrect b. Energy is flowing from load to line. c. Meter's internal wiring defective	a. Check meter socket and CT wiring. b. Disable caution. Check system operating parameters if reverse energy flow is unexpected. c. Check that sensor connector is properly seated.

Low battery, loss of program and unprogrammed cautions are used to remind the user of actions that are required. Any meter with a low battery caution may lose time if the battery is not replaced before the next power outage.

Other caution codes report unusual operation such as receiving energy from the load, leading power factor, very high current flow, or low voltage.

TIP: *When multiple cautions occur they are combined. For example, CA040400 indicates leading quadergy and low potential.*

3.13.2.1 CA 000001—Low Battery

The Low Battery caution indicates a weak or missing battery. The meter periodically tests the battery. The meter sets the Low Battery caution if the battery voltage is low. The Low Battery caution is cleared when the battery test passes. The meter tests the battery under the following conditions:

- Power up
- 1st of each month (00:16)
- Activation of the Display Switch (not in Test Mode)
- MeterMate™ Meter Communication command

3.13.2.2 CA 000010—Unprogrammed

The Unprogrammed caution indicates that the meter is not programmed and is functioning in a default demand mode. The meter is shipped unprogrammed unless it is ordered factory-programmed. The MeterMate™ Meter Communications Unprogram command will put the meter into the Default Demand mode and set the Unprogrammed caution. Programming the meter clears the Unprogrammed caution.

3.13.2.3 CA 000040—Loss of Program

The Loss of Program caution indicates that a programming session was interrupted. The meter sets the Loss of Program caution when a programming session is terminated abnormally. The meter will roll back to the last good program and operate from it. If a meter has a Loss of Program caution, reprogram the meter and the Loss of Program caution will be cleared.

3.13.2.4 CA 000050—Unprogrammed and Loss of Program

The Unprogrammed and Loss of Program caution indicates that a programming session was interrupted while the meter was operating in default demand mode. The meter sets the Loss of Program caution when a programming session is terminated abnormally. The meter will roll back to the default demand program and operate from it. If a meter has an Unprogrammed and Loss of Program caution, reprogram the meter and the Unprogrammed and Loss of Program caution will be cleared.

3.13.2.5 CA 000100—DC Detected

The DC Detected caution indicates the presence of DC in the current signal. The meter checks for the presence of DC every second; if it detects the presence of DC for longer than the factory configured duration, the meter sets the DC Detected caution. The meter does not automatically clear the DC Detected caution. The DC Detected caution is cleared by a demand reset.

3.13.2.6 CA 000400—Low Potential

The Low Potential caution indicates that measured voltage falls below the programmed tolerance. The voltage is tested every five seconds using the voltage from the previous second. The meter sets the Low Potential caution when the test fails three consecutive times. The meter automatically clears the Low Potential caution when all active phases exceed the minimum threshold for two consecutive tests.

3.13.2.7 CA 000500—DC Detected and Low Potential

The DC Detected and Low Potential caution indicates that measured voltage fell below the programmed tolerance and the presence of DC in the current signal has been detected.

3.13.2.8 CA 004000—Demand Overload

The Demand Overload caution indicates that the kW demand exceeded the programmed threshold. The meter compares the value of the instantaneous kW demand quantity to the programmed threshold every five seconds using the demand from the previous second. The meter sets the Demand Overload caution when the kW demand exceeds its threshold for 3 consecutive tests. The meter does not automatically clear the Demand Overload caution. The Demand Overload caution is cleared by a demand reset.

3.13.2.9 CA 040000—Leading kvarh

The Leading kvarh caution indicates that the current leads the voltage instead of lagging it. The meter tests the direction of the quadergy every five seconds using the kvarh from the previous second. The meter sets the Leading kvarh caution when the direction of the quadergy is leading for three consecutive tests. The meter does not automatically clear the Leading kvarh caution. The Leading kvarh caution is cleared by a demand reset.

3.13.2.10 CA 400000—Received kWh

The Received kWh caution indicates that active energy was received from the load. The meter tests the direction of the active energy every five seconds using the kWh from the previous second. The meter sets the Received kWh caution when the direction of the active energy is received for three consecutive tests. The meter does not automatically clear the Received kWh caution. The Received kWh caution is cleared by a demand reset.

Table 3-5: Fault Symptoms Without Codes

Symptom	Probable Cause	Remedy
High/low demand registration	a. Socket wiring error. b. Meter internal wiring defective. c. Defective sensor.	a. Rewire according to applicable diagram. b. Check that voltage and current connectors are seated properly. Check the leads for damage. c. Replace meter.
Meter overheats	a. Meter socket has insufficient capacity or is not adequately wired. b. Meter is overloaded. c. Poor connection at socket terminal.	a. Replace mounting with a heavy duty model. b. Use transformer rated installation. c. Replace socket terminal.
Meter runs slow	a. Socket wiring error. b. Meter internal wiring defective. c. Defective sensor.	a. Rewire according to applicable diagram. b. Check that voltage and current connectors are seated properly. Check the leads for damage. c. Replace meter.
No display	a. Circuit de-energized. b. Test link(s) open. c. Meter internal wiring defective.	a. Check circuit voltages. b. Close test links. c. Check that the voltage and current sensors are properly connected. Also check the wires for damage.

4. Upgrading

4.1 General

The GE I-210+c™ meter contains *lethal voltages*. The meter must be completely disconnected from any external circuits before disassembly is attempted. Failure to observe this practice can result in serious injury or death.

Refer to the MeterMate software manuals (GEH-5082O, GEH-5084O) for instructions on how to install and enable software options.

4.2 Soft-switches

The basic I210+c™ meter provides a powerful platform for advanced metering. Features may be added to the basic meter through soft-switches, which enable built-in capabilities. Soft-switches may be ordered at the time the meter is purchased, or added in the field. Soft-switches may be removed from one meter and installed in another meter.

The following table lists the soft-switches available in the I210+c™:

Table 4-1: I210 Demand/TOU Soft-switches

Switch	Description
A2	Alternate Communication
E2	Event Log
K2	kvar and kVA measures
N2	Billing Demand
Q2	Voltage Measures
R2	Load Profile Recording (two channels)
T2	Time-of-use

4.2.1 Alternate Communication—A2 Soft-switch

The Alternate Communication Soft-switch allows a communication option board to communicate with the meter.

4.2.2 Event Log—E2 Soft-switch

The Event Log Soft-switch allows the meter to track the most recent 200 events. Use MeterMate™ Program Manager, Diagnostics Editor, to select the event types to be logged and how many occurrences should be tracked, up to a maximum of 200 events. Date and time stamps are included on logged events for Demand/LP or TOU meters. Logged events include:

- Cautions: Low potential, demand overload, leading kvarh, reverse energy flow, DC detection (set and clear events);

- Real-time pricing activation and deactivation;
- Test mode activation and deactivation;
- Externally initiated meter reading (local or remote);
- Programming sessions;
- Power up, power down;
- Demand resets;
- Self-reads.

4.2.3 kVA and kvar Measurements—K2 Soft-switch

The kVA and kvar Soft-switch adds kVA(h) and kvar(h) measurement capability.

- The K2 Soft-switch enables the following configurations for varh measurements.
  - — Fundamental plus harmonics varh lagging only
  - — Fundamental plus harmonics varh leading only
  - — Fundamental plus harmonics varh |lagging| - |leading|
  - — Fundamental plus harmonics varh |lagging| + |leading|
- The K2 Soft-switch enables Fundamental plus harmonics Phasor Apparent VAh measurement.

The I210+c™ meter can have up to two quantities defined in the measurement profile, with each of these being used for summations and demands.

4.2.4 Demand—N2 Soft-switch

The Demand (N2) Soft-switch adds billing demand calculations. If the N2 switch is not present, the meter will not calculate billing demands and will set demands to 0 (zero). The meter will always calculate non-billing demands for cautions.

4.2.5 Power Quality Measurements—Q2 Soft-switch

The Power Quality Measurements Soft-switch enables the following:

- Voltage (L-N): VA (max, min, store) for summations, demand, and load profile recording;
- RMS voltage measurement for reading and display;
- Low potential caution.

4.2.6 Basic Recording—R2 Soft-switch

The Basic Recording Soft-switch enables up to two channels of load profile recording. The number of active channels and days of load profile data are configurable using the MeterMate Program Manager Recorder Option editor.

4.2.7 Time Of Use—T2 Soft-switch

The Time-of-use Soft-switch enables TOU operation. The meter supports:

- Up to four TOU periods and four Seasons
- Up to three daily rate schedule types and one holiday schedule
- Up to 80 TOU schedule set points
- Up to 50 programmable dates:
  - — Holidays, season changes, Daylight Savings Time (DST), self-read, demand reset
  - — Perpetual calendar handles most dates
- Up to two billing and two demand measures per TOU period
- Self-read actions on specified dates, with or without a demand reset

4.3 Converting from Demand to Demand/LP or TOU Mode

The I210+c™ is four meters in one: demand, demand/load profile, TOU and TOU/load profile. The load profile recording and time-of-use options require soft-switches to extend the functionality of the basic demand meter.

The following items are required to enable demand/LP, TOU or TOU/LP operation:

- Computer with MeterMate™ software;
- Soft-switch holder with T2, and R2 switches
- SMARTCOUPLER™ device
- Timekeeping battery or super capacitor

If at any time you are unsure if the meter has been upgraded, select Check Meter on the MeterMate™ Upgrade menu. The screen will display the capabilities of the meter. To enable the TOU function, proceed as follows:

CAUTION: *Battery installation must be done with NO power applied to the meter.*

1. Plug the soft-switch holder into the parallel port or USB port of the computer.
2. Install and connect the battery. See section 0, Battery Replacement.
3. Apply power to the meter.
4. Connect the SMARTCOUPLER™ device to the serial port of the computer and the optical port on the I210+c™ Meter.
5. Using MeterMate™ Meter Comm software, go to the menu bar.
6. On the menu bar, select Upgrade.
7. On the Upgrade menu, select TOU.
8. This enables the TOU function in the meter. When the upgrade has completed, MeterMate™ returns to the Upgrade menu.
9. Mark the TOU box on the nameplate.
10. Repeat steps 8 through 10 for the Basic Recording, R2 Soft-switch.

TIP: *If you are not ready to install the TOU program, the meter may still be used as a Demand meter after the TOU switch is enabled. The battery may be put in place in the battery holder, but must not be connected until the meter has been programmed for TOU operation.*

4.4 Meter Disassembly

The GE I210+c™ meter contains lethal voltages. The meter must be completely disconnected from any external circuits before disassembly is attempted. Failure to observe this practice can result in serious injury or death.

CAUTION: *Do not interchange base and electronics module assemblies between meters. Calibration data stored in the meter is particular to a set of current sensors and electronics module. Interchanging these components causes the meter to lose calibration.*

The meter is disassembled in steps. First, remove the meter cover. Second, remove the electronics module from the base.

4.4.1 Removing the Meter Cover

Remove the meter cover as follows:

1. Remove the seal from the right side of the meter. If there is no seal, proceed to the next step.
2. Turn the cover counterclockwise approximately 30 degrees.
3. Lift the cover straight up.

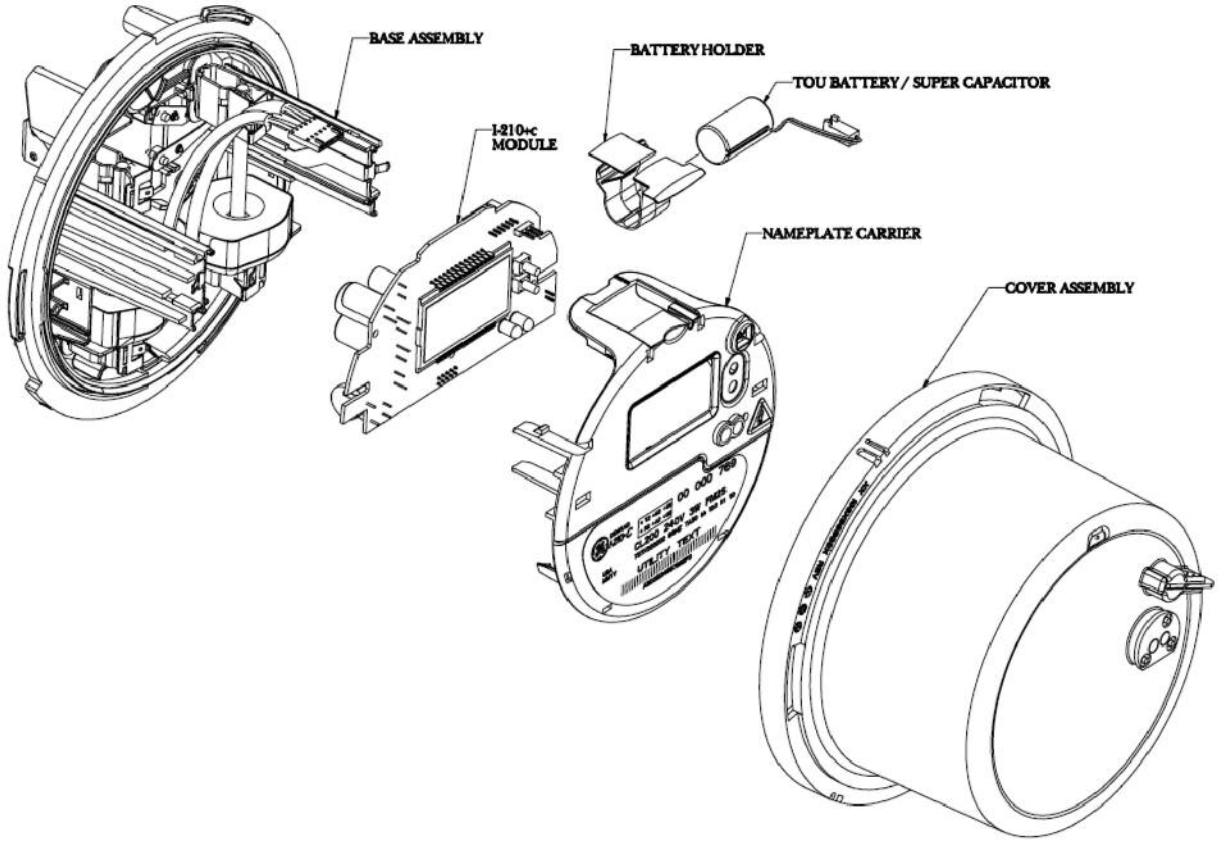
4.4.2 Removing the Electronics Module

To remove the electronics module, follow the instructions below:

1. Disconnect the CT connector from the socket on the electronics module.
2. Grasp the snaps on either side of the nameplate carrier between the thumb and index finger and press them together to release them from the notches on the base posts. It may be easier to unclip one side at a time. Ensure that all four snaps are disengaged and lift the module assembly off the base.
3. Place the module on a flat, clean, cloth-covered surface with meter face down.

CAUTION: *Do not pull on the wires to disengage the connectors. Pull only on the connectors.*

Figure 4-1: Exploded View of I210+c™ Meter



4.5 Meter Reassembly

1. Carefully align the module over base assembly posts and push down firmly to engage all four snaps on the post undercuts.
2. Connect the CT sensor connector to the socket on the electronics module.
3. Replace the cover by aligning it with the openings in the base and rotating it clockwise approximately 30 degrees.
4. Install security seals as required.

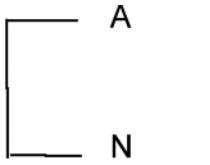
5. Site Guides

NOTICE: *The site information includes rudimentary connection diagrams. These diagrams are not metering installation guides.*

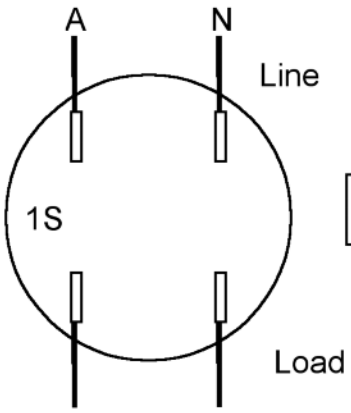
The PHASOR diagrams are shown for informational purposes only. The meter does not provide the information necessary to determine the phase relationships between voltages and currents.

I-210+c Site Guide

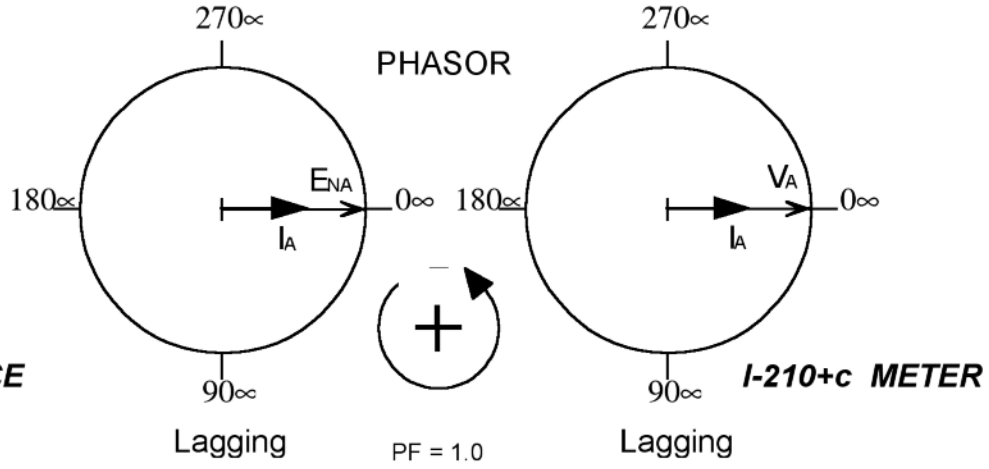
Form 1S *(Self-Contained)*



2-Wire
Single phase



BLONDE solutionL

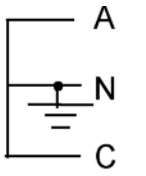


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

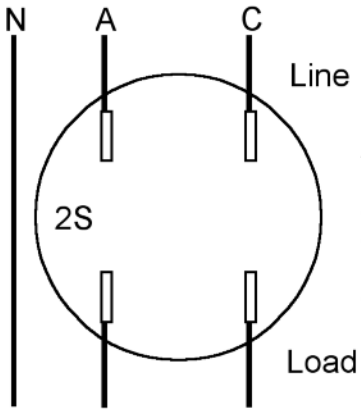
2-wire, 1-phase, 1-element

I-210+c Site Guide

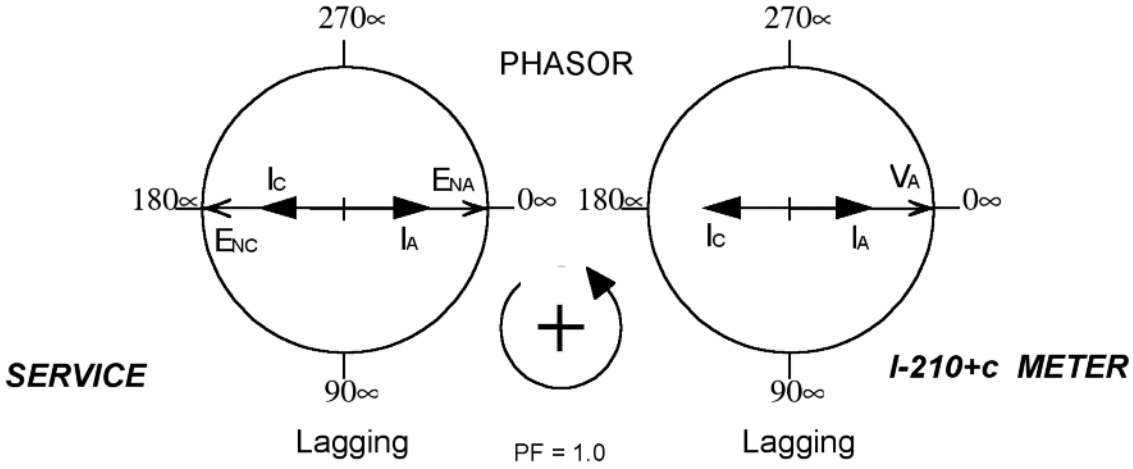
Form 2S *(Self-Contained)*



3-Wire
Singlephase



Accuracy is based on assumptions which, if not fulfilled, may result in systematic errors unrelated to meter calibration.

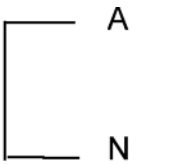


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

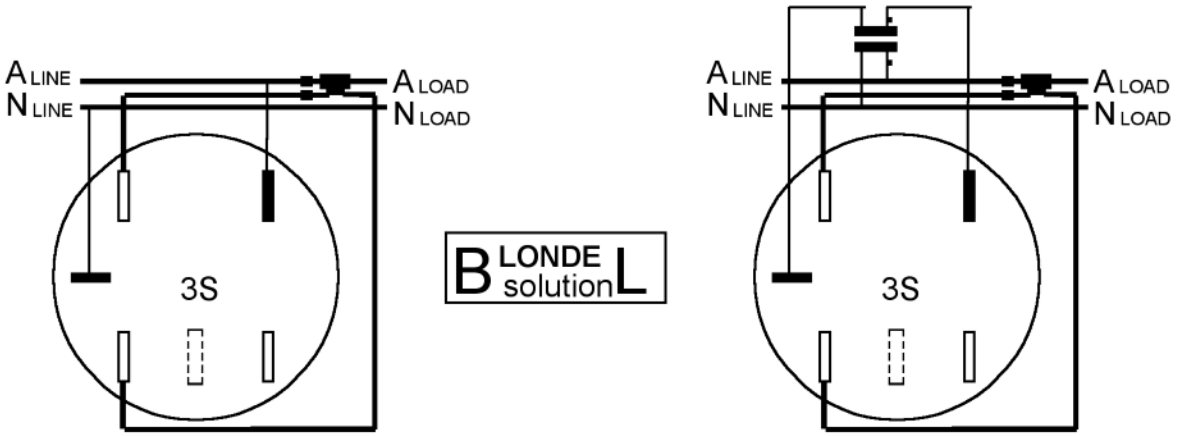
3-wire, 1-phase, 1-element

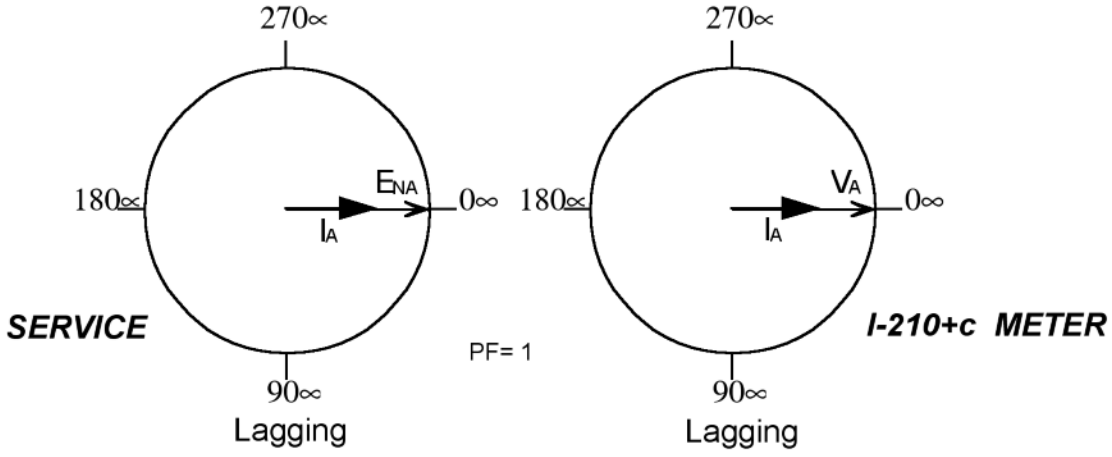
I-210+c Site Guide

Form 3S *(Transformer Rated)*



2-Wire
Single phase



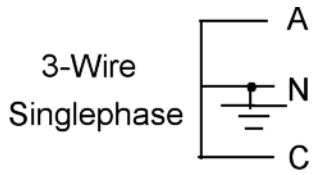


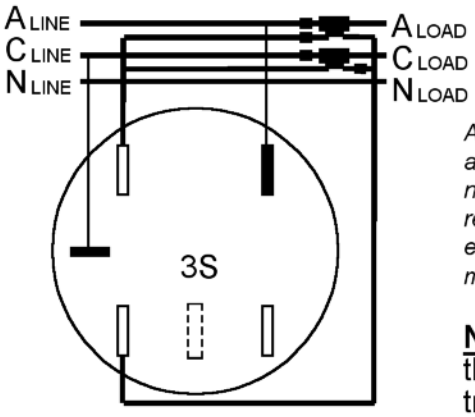
Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

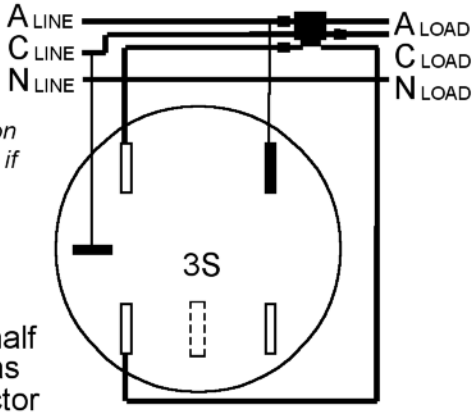
2-wire, 1-phase, 1-element

I-210+c Site Guide

Form 3S *(Transformer Rated)*

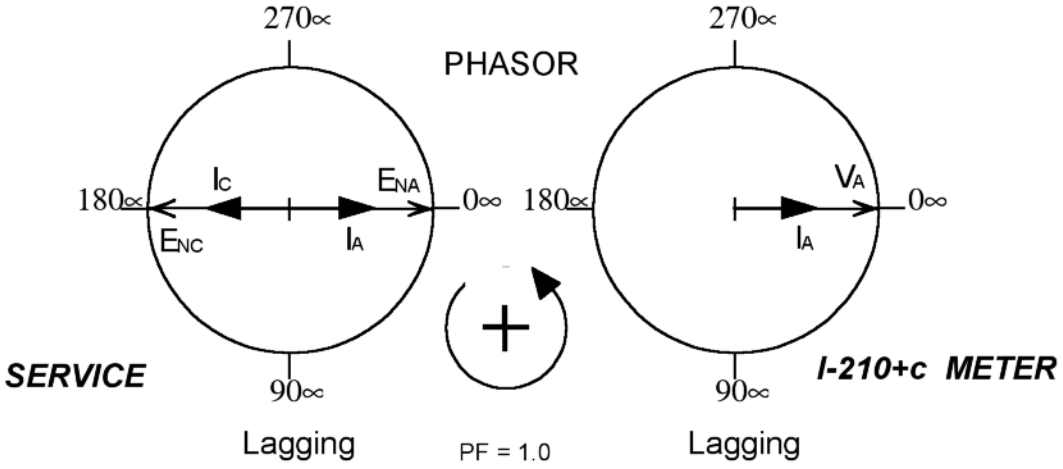






Accuracy is based on assumptions which, if not fulfilled, may result in systematic errors unrelated to meter calibration.

NOTE : Use half the CTs' ratio as transformer factor in determining meter multiplier, except for 3 – wire CTs.

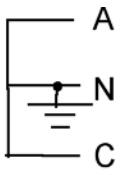


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

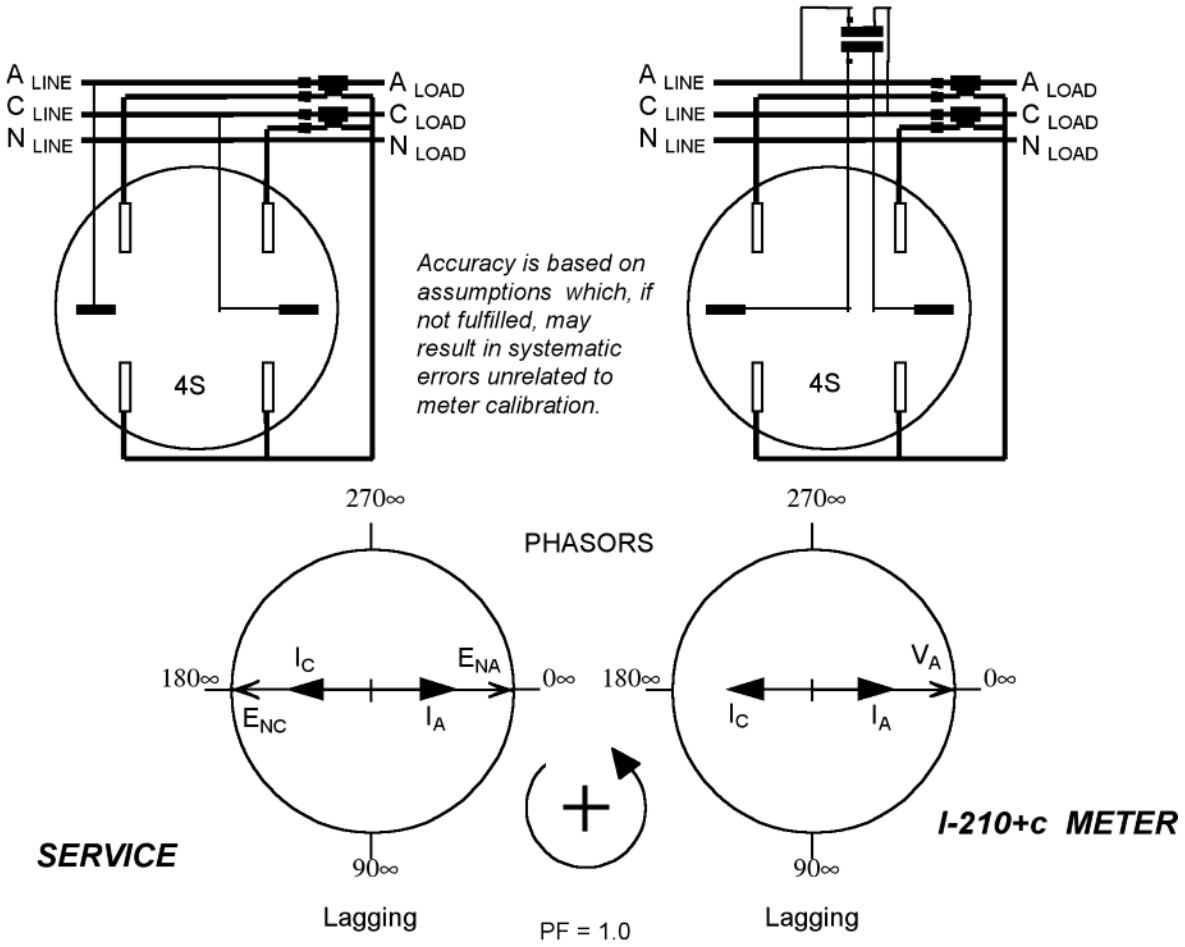
3-wire, 1-phase, 1-element

I-210+c Site Guide

Form 4S *(Transformer Rated)*



3-Wire
Singlephase

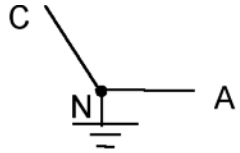


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

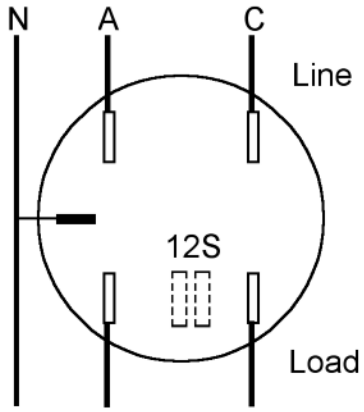
3-wire, 1-phase, 1-element

I-210+c Site Guide

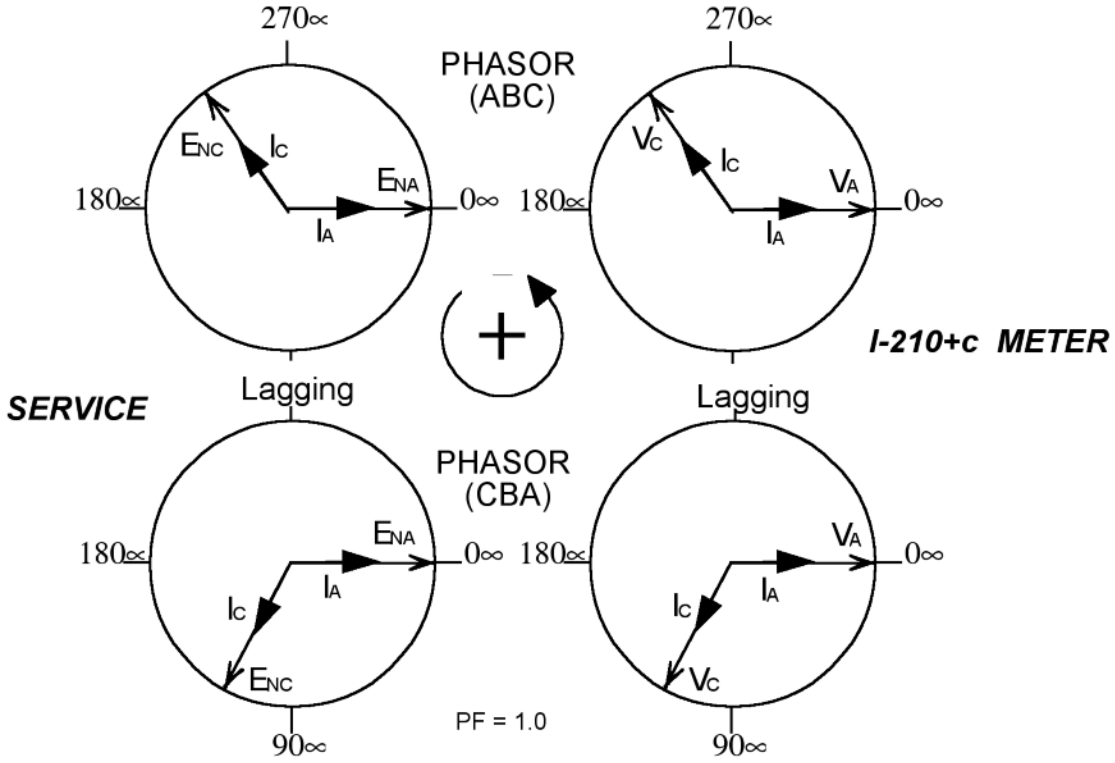
Form 12S *(Self-Contained)*



Network



BLONDE solutionL

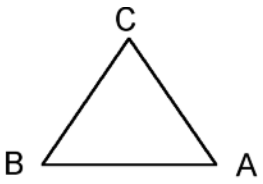


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

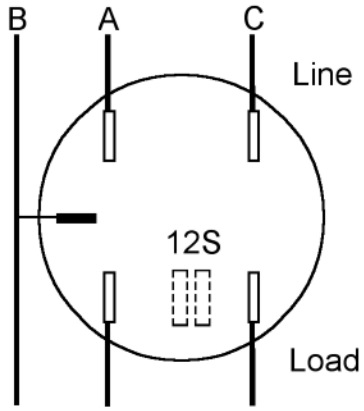
3-wire, Network, 2-element

I-210+c Site Guide

Form 12S *(Self-Contained)*



3-Wire, Delta



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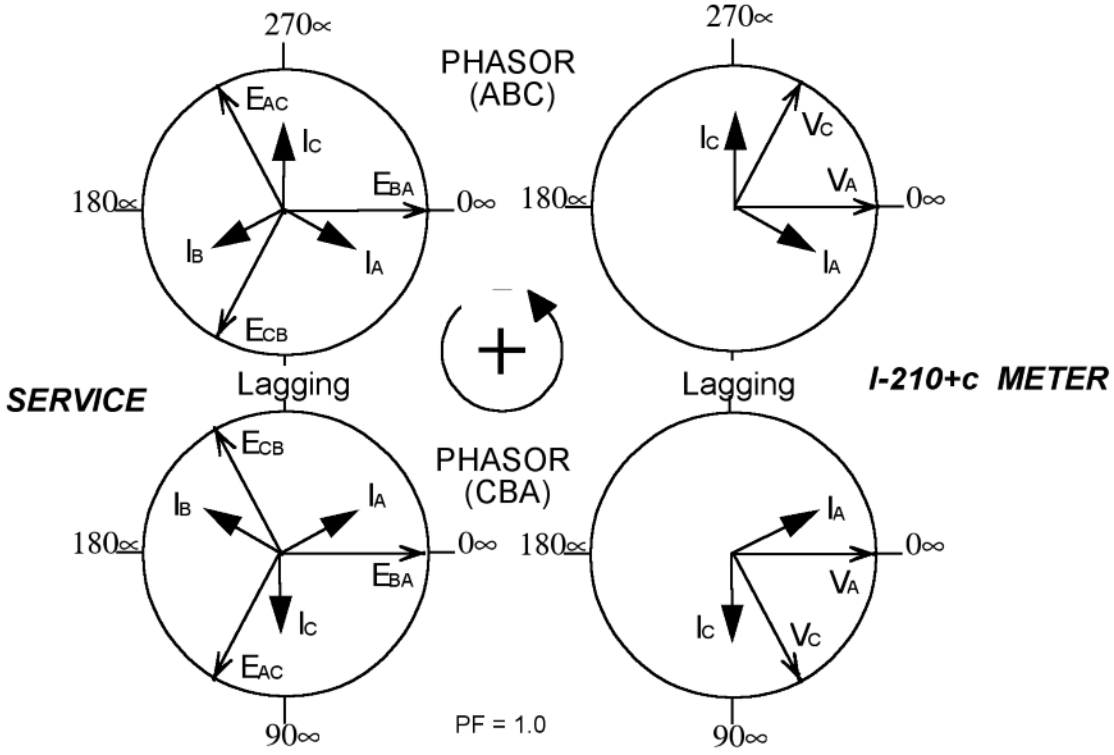
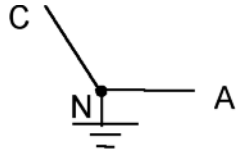


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

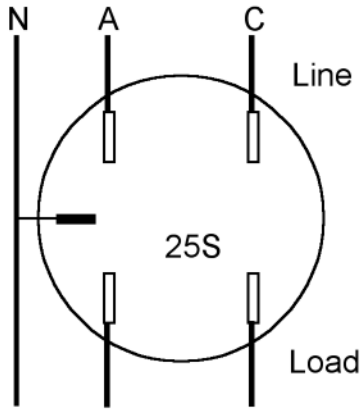
3-wire, 3-phase, 2-element

I-210+c Site Guide

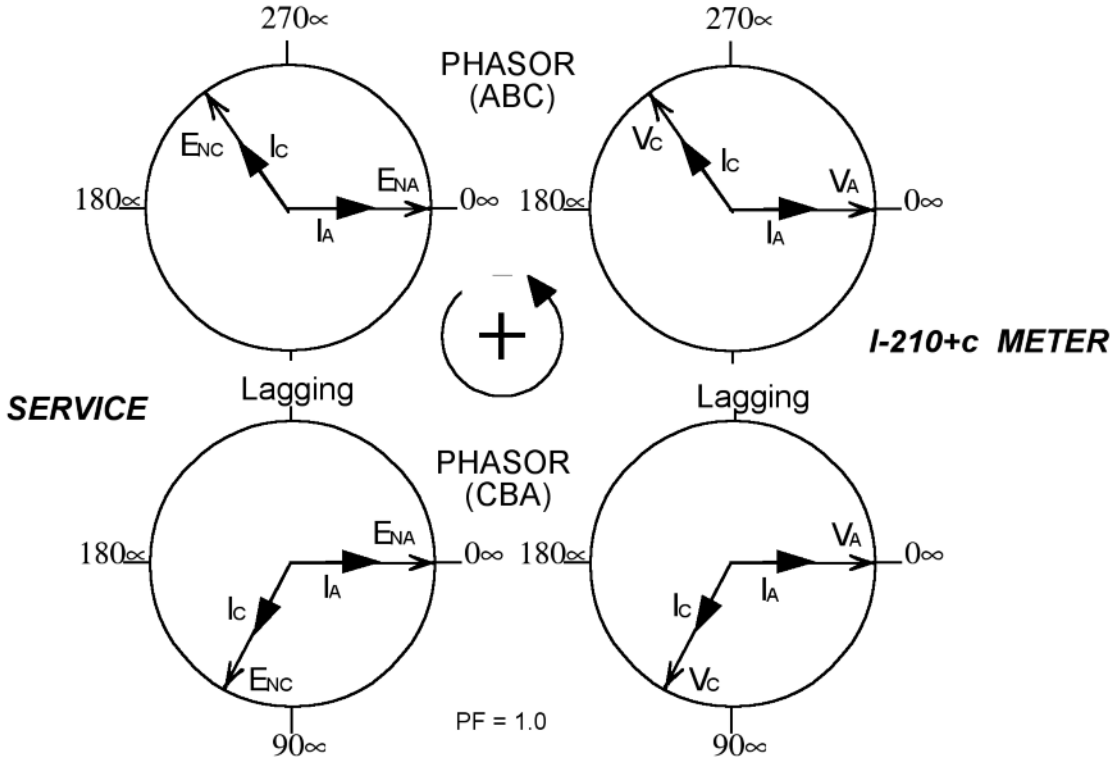
Form 25S *(Self-Contained)*



Network



BLONDEL solution

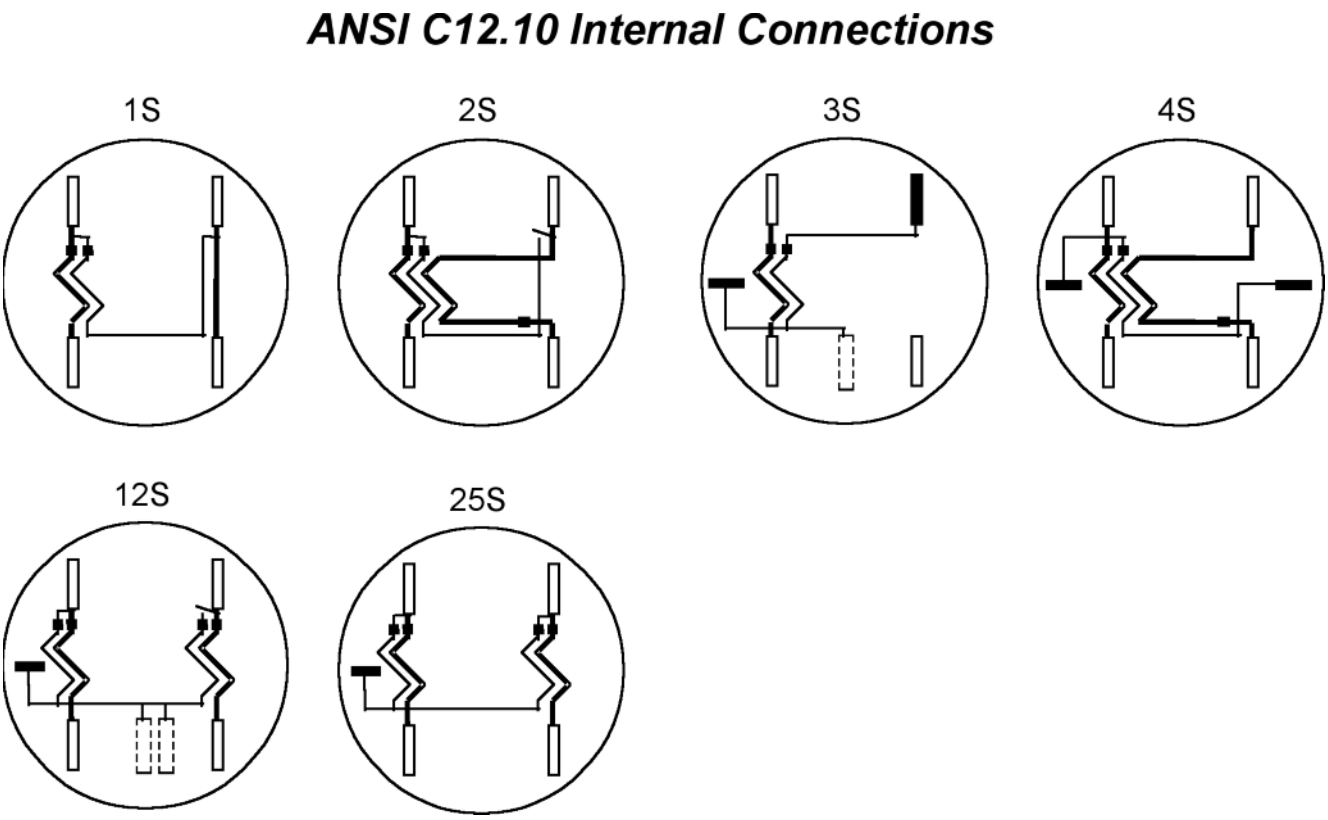


Actual installation procedures, materials, equipment, and connections must conform to applicable codes and standards

3-wire, Network, 2-element

6. Diagrams

Figure 6-1: ANSI Meter Diagrams



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TEXAS-NEW MEXICO POWER COMPANY **Exhibit GLK-4**
APPROXIMATE COVERAGE CALCULATIONS AS OF MARCH 25, 2010

City	Deployment Location	Number of Non-Com Points
Eliasville	North Texas	147
Fort Stockton	West Texas	568
Gatesville	Central Texas	3
Gordon	Central Texas	4
Graham	North Texas	11
Jean	North Texas	30
Loving	North Texas	61
Newcastle	North Texas	3
Nocona	North Texas	4
Olney	North Texas	183
Saint Jo	North Texas	1
Sanderson	West Texas	13
Strawn	Central Texas	2
Valley Mills	Central Texas	1
Total		1031

Deployment Location	Number of Non-Com Points	Total Points	Total Coverage
Gulf Coast		119,859	100%
Lewisville		40,592	100%
North Texas	440	26,326	98%
Central Texas	10	25,696	100%
West Texas	581	16,301	96%
	1031	228,774	99.5%

WEBINAR
Briefing on
AT&T Network Disaster Recovery

Robert Desiato, Director
Network Disaster Recovery
AT&T Global Network Operations

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Global Network Operations Mission

Ensure that the AT&T Global Network always connects people with their world—everywhere they live and work—and does it better than anyone else

Provide Comprehensive and Seamless Customer Application Service Quality, by preventing, detecting and correcting failures in the network before they impact the service experience.

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Network Scale and Scope

MPLS nodes serving Around the world

Hundreds of Thousands of backbone fiber Miles worldwide

Millions of Wireless Customers

Wi-Fi hot spots around the world

In the 2Q of 09 AT&T handled over 100 Billion Text messages

24x7x365
Network monitoring & management

Industry Leader
Leaders Quadrant
Global, Pan European, US, Asia Pacific
Network Service Provider, Web Hosting, IP Conferencing and Wireless Service
(Gartner surveys, 2006 through 2009)
Leader in Global Networking for Multi Nationals
(IDC 12/2008)
Most Complete footprint for enterprise managed service contracts of top 5 global providers
(Ovum 1/2009)
US Enterprise Telecom Leader (Oct 2008)
MPLS North American Leader
(Forrester 10/2008)

Best in Class
World's Most Admired Telecommunications Company, *Fortune* Magazine (2008-2009)
"Highest Customer Satisfaction" among large business customers of local telephone service
(J.D. Power and Associates, 2008)

100%
Fortune 1000 companies are AT&T customers

Thousands of Major network buildings—and many thousand of satellite locations

Millions of Access and Broadband Lines

Millions of Video and U-Verse customers,

Petabytes of data handled each day

Internet Data Centers around the world

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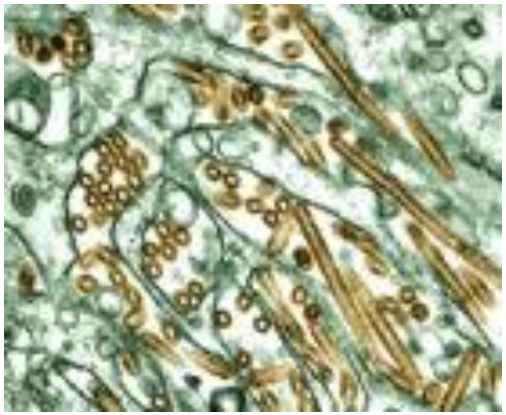
Securing Our Network

NETWORK RISKS



Am I Ready?
Are You Ready
Are We Ready?

PHYSICAL | LOGICAL | ECONOMIC | POLITICAL | SOCIAL

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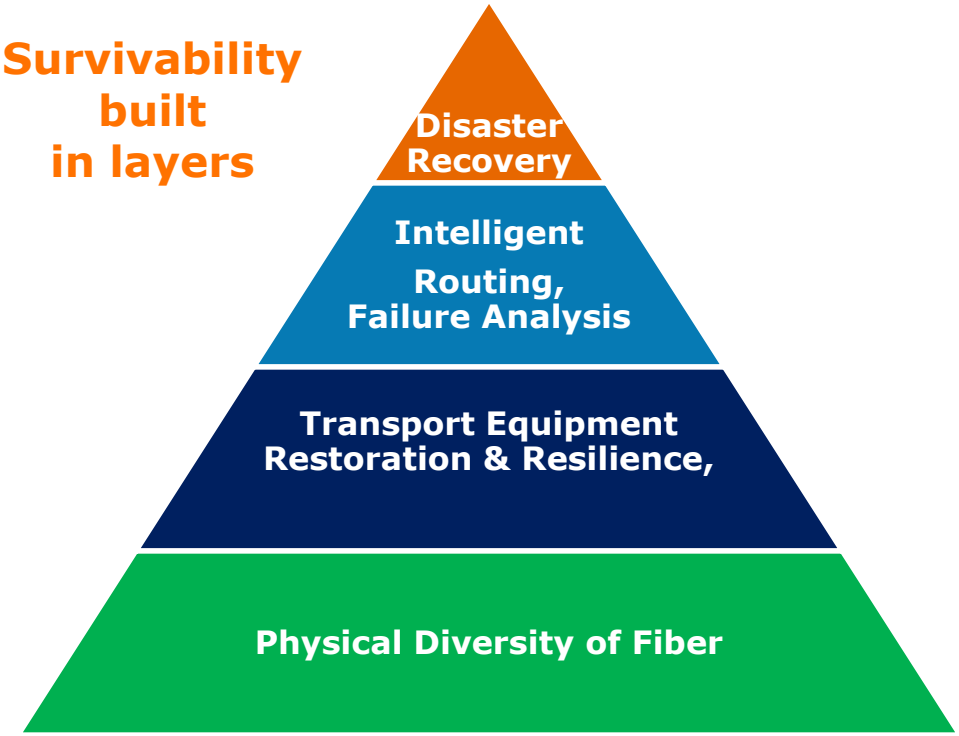
AT&T Network Survivability Protocol

Survivability built in layers



Network Disaster Recovery

- Manual Repair, if necessary.
- Automatic Reconfiguration
- Automation Isolation and Root Cause Correlation.
- Intelligent Monitoring
- Rigorous Pre-deployment Testing.
- Network Designed for Resiliency from the Ground Up.

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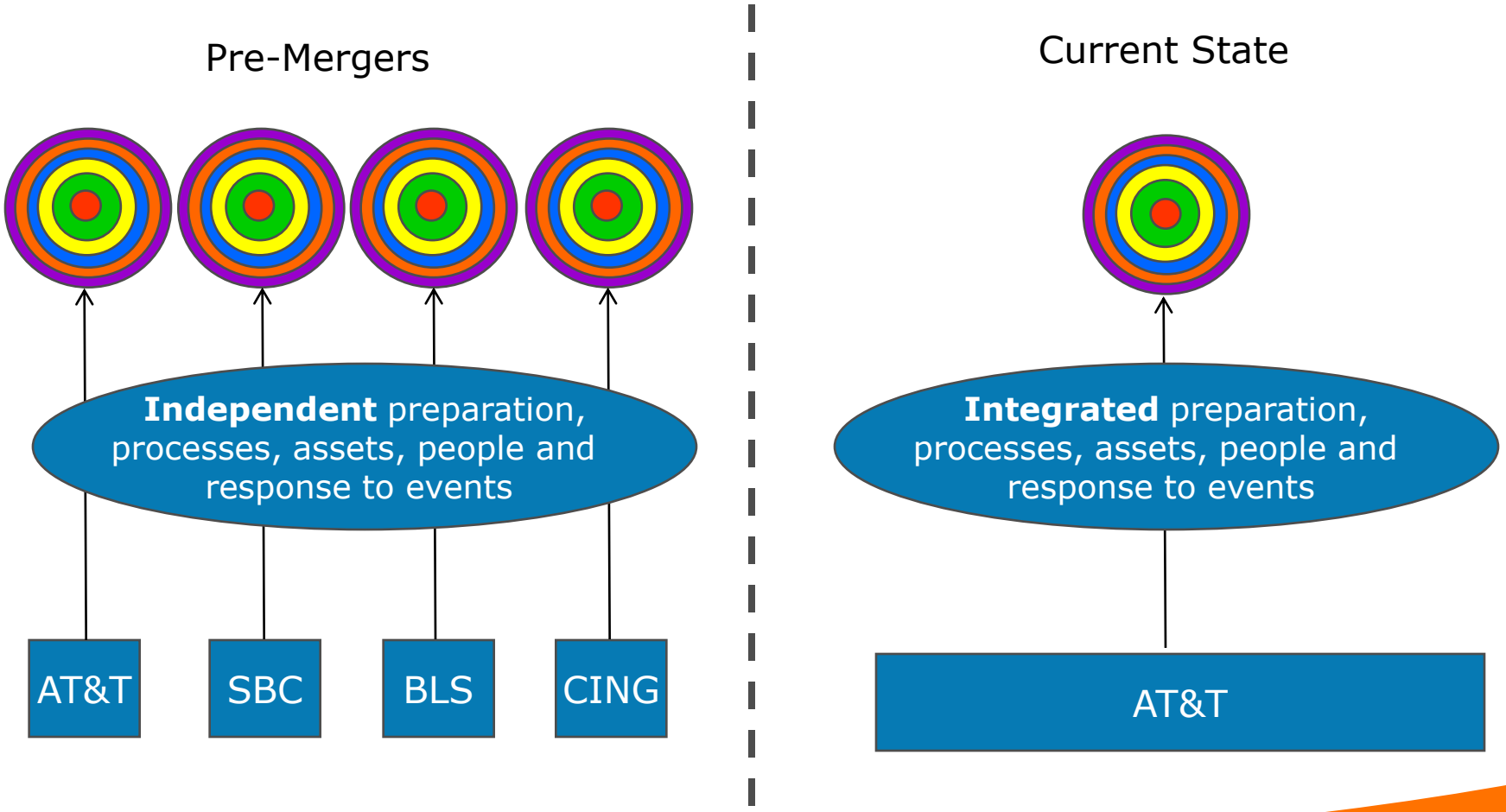
AT&T Post-Mergers – Better Response Capability

AT&T is positioned with phenomenal scale and depth of Resources and Technology available to apply to Network Recovery and Restoration.



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AT&T Network Continuity Best Practices

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AT&T NDR — Field Exercises

The NDR team has conducted field exercises three or four times a year since its formation in 1992. The exercises test as many of the NDR processes as possible, from the initial call-out, to equipment transportation and setup, to technology turn-up and testing. At these exercises, team members are given hands-on training on new technologies and the recovery equipment is operated in field conditions. The drills are held throughout the United States in a wide variety of weather and settings and using a variety of recovery scenarios.

NDR's 2010 exercise schedule:
Dates are for Employee Day, Customer Day

- **New Orleans – 3/16, 3/17**
- **Detroit/Dearborn – 5/11, 5/12, 5/13**
- **San Francisco (proposed) – 7/3, 7/14**
- **Philadelphia (Proposed) – 10/19, 10/20**

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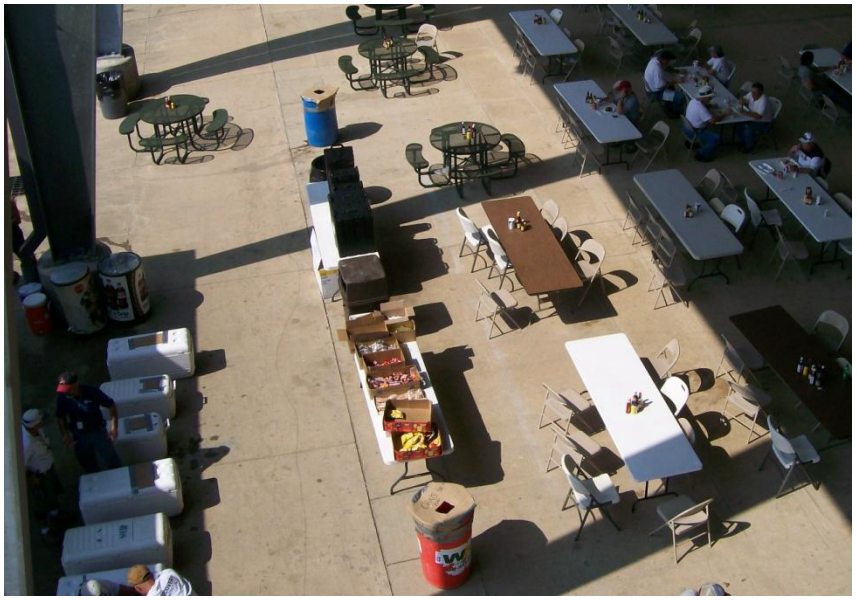
AT&T Network Disaster Recovery



Support Infrastructure

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AT&T Network Disaster Recovery

Theodore Vail

Dedicated **Teamwork**

Well-practiced and tested team of telecom disaster recovery professionals supplemented by a large pool of volunteers who train together during quarterly field exercises.

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AT&T Network Disaster Recovery

Hazardous Material Response

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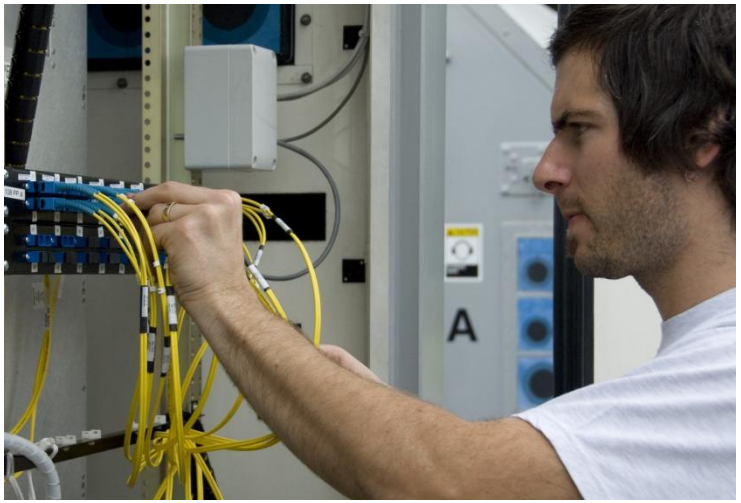
AT&T Network Disaster Recovery



MOW Recovery Equipment AGN

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AT&T Network Disaster Recovery

Specially Designed Recovery Equipment

Continue to invest in our Disaster Recovery Equipment including, Technology, Infrastructure and Support Elements

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AT&T Network Disaster Recovery

Recovery Technology Trailers

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AT&T Network Disaster Recovery

Power & Infrastructure

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AT&T Network Disaster Recovery

Command Centers

—

Emergency Communications

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Satellite COLTS

The Network Disaster Recovery Team has the ability to provide satellite-based cell communications during disaster recovery and special situations. This capability is provided by two platforms: Cell-on-Wheels (COW) and Cell-on-Light Truck (COLT).

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Emergency Communications Vehicle (ECV)

NDR satellite connectivity for voice over IP and data, which can be deployed when traditional connectivity to the AT&T Network is not available.

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Emergency Communications Vehicle/Command Center

NDR satellite connectivity for voice over IP and data, which can be deployed when traditional connectivity to the AT&T Network is not available. This equipment also provides workspace for up to four personnel.

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AT&T 3CP — Command, Control, Communications

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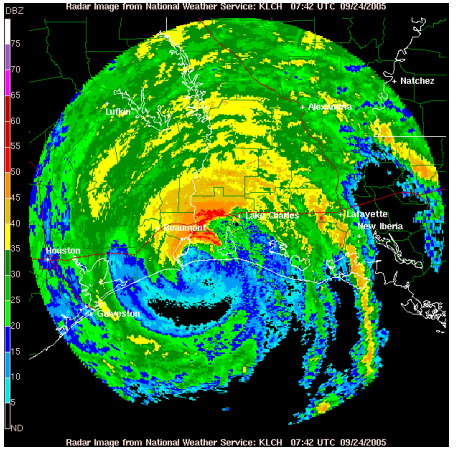
Pro-Active Predictive Preventive

High Profile Events
U.S. Presidential Inauguration

Hurricane Preparedness



High Profile Events
2008 European Football Championships
Switzerland & Austria

2008 Olympics in Beijing

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Examples of AT&T NDR — Deployments

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May 2009 — WV National Guard — Flood Response

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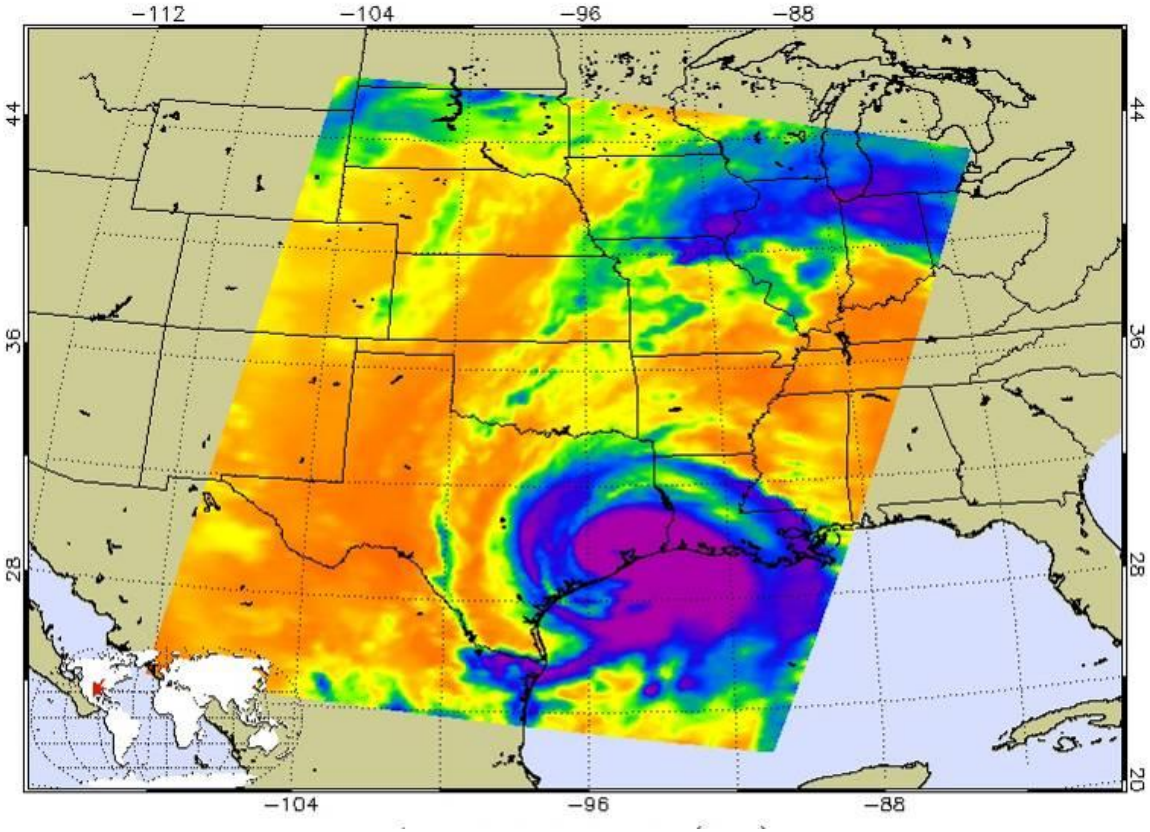
Hurricane Ike— September 2008



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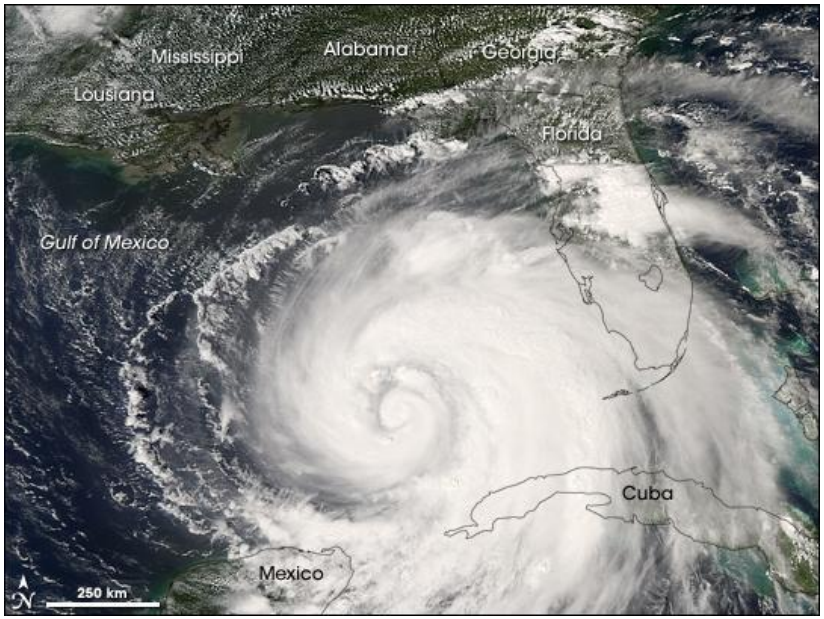
Hurricane Ike - September 2008



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Hurricane Ike— September 2008

Satellite COLT at UTMB Hospital in Galveston, TX

Network office recovery on Galveston Island

Satellite COLT at on the Bolivar Peninsula, east of Galveston Island

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Hurricane Katrina's Local/Wireless Impact – 2005

Switch Decommissioned

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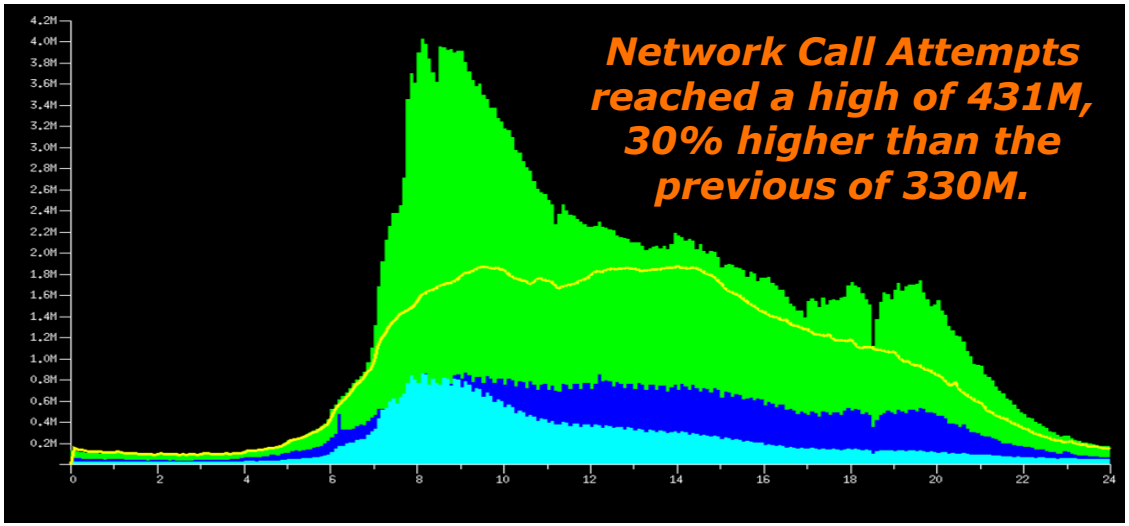
September 11, 2001 — New York City

AT&T transport node in the 6th sub-basement of the World Trade Center's South Tower was totally destroyed



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September 11, 2001 — WTC Response

Simultaneous Recovery/Restoration of the Destroyed Office & Support of Authorities

Emergency Communications Vehicle
1 Police Plaza, New York City

NDR Recovery Site for NYC/WTC Local Services
Jersey City, NJ

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AT&T — Always Prepared & Ever Vigilant

- Industry Leader
- Global Network Scale
- Integrated “Shared” NDR Assets
- Integrating Operations
- History of Successful Execution
- Extended Capabilities
- History and Habit of Investment
- Unrivaled Talent

Anytime… Anywhere… Any Event

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Thank You!

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North American Electric Reliability Corporation (NERC) – Critical Infrastructure Protection (CIP)

Utilities Facing Many Challenges: Cyber Security is One Area Where Help is Available

Art Maria, Solutions Engineering and Architecture, AT&T
Warren Causey, Sierra Energy Group

Executive Summary

Utilities are in the crosshairs of many forces in the world today. Among these are environmental global warming concerns putting pressure on the ability to generate sufficient electricity to meet future demand. Another is the multiplicity of computer and communications systems that must be protected against threats from those who would do harm to electric, natural gas and water distribution systems.

A Wall Street Journal article[1] in April 2009 focused attention on the security issue by quoting various federal officials who claimed many utilities already had been breached – especially by spies from hostile countries – with bits of code left behind that could be activated in time of war or for other reasons to bring down major portions of the U.S. electric grid.

Summary continued

However, utilities long have been aware of these issues, and many report 10,000 or more attempted network security breaches per month, and have done so for years, according to research from Sierra Energy Group (SEG), the research and analysis division of Energy Central.

In the aftermath of the 9/11 terrorist attacks on the U.S. the federal government moved to ensure utilities take all necessary measures to mitigate these attacks. Through the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corp. (NERC) the government issued a set of standards and requirements to ensure this mitigation. These standards and requirements are called NERC-CIP (CIP=Critical Infrastructure Protection). These mostly have been developed by private enterprise through vendors and other organizations.

Telecommunications carriers such as AT&T have addressed cyber security longer than most utilities because of the public nature of their communications systems. On the average business day, AT&T transports approximately 17 petabytes of data on its network. As a result, AT&T has gained significant knowledge and experience in regard to security architectures and encryption methodologies.

Utilities in the Crosshairs

The U.S. utility is challenged as never before in history. The challenges are myriad: from generation capacity constraints and declining capacity margins to environmental global warming remediation demands, to economic conditions, to cyber and physical security concerns. The April 2009 Wall Street Journal story referenced earlier brought additional attention to a security issue utilities have been aware of, and attempted to mitigate for years.

Before the Wall Street Journal article brought the issue to widespread public attention utilities knew they were under attack. SEG is aware that utilities have quietly collaborated with the FBI, various national laboratories, vendors, the Department of Homeland Security and others to mitigate these on-going attacks. What was different about the Wall Street Journal article was the claim by various government officials that some of these attacks have been successful and that cyber spies from hostile countries have been mapping the U.S. electrical grid, and leaving behind bits of sleeper code that could be activated and used to damage the grid or cause blackouts in the event of war.[2]

For several years it has been general knowledge that cyber spies have been disrupting utility systems and causing blackouts in Eastern Europe and around the globe; sometimes even demanding ransom money to cease the attacks. Electric, water and wastewater utilities in several countries have been affected according to SEG. Thus far, no similar attacks have been publicly acknowledged[3] in the U.S., but the Journal article pointed to the likelihood that such attacks may be inevitable and may have even already occurred.

Attack Vectors

The widespread use of the Internet as a communications mechanism is a major driver for increased cyber attacks, but the problems go much deeper. Since the 1980s utilities increasingly have been using computerized communications systems and networks, primarily SCADA (Supervisory Control and Data Acquisition) and DA (Distribution Automation), to communicate with and control many remote devices on electrical grids and both natural gas and water distribution systems. Many of the early SCADA and DA systems that are still in service today were built with early technologies that are relatively easy for sophisticated hackers with modern tools to breach and manipulate. Recent technology trends have emphasized the "networking" of all utility computers and control systems for efficiency and collaboration. As more networks are linked, the pathways for cyber spies become myriad and the means of protecting such networks becomes increasingly difficult to maintain. There now are a large number of cyber pathways at most utilities and a determined hacker – particularly one backed by a less-than-benign government – likely will find one.

Furthermore, prior to the September 11, 2001 terrorist attacks there really was not a systematic security approach to address utility critical infrastructure protection in the United States. Each utility was essentially on its own, and security of computer systems and even physical security at plants, substations and other facilities were the responsibility of individual utilities without any oversight. This created a significant risk in that there are more than 3,000 electric and natural gas utilities and approximately 15,000 water distribution utilities in the U.S. Before the terrorist attacks there were many different approaches to cyber and physical security.

Critical Infrastructure Protection

In 2008, FERC approved eight new CIP reliability standards designed to protect the nation's bulk power system against potential disruptions from cyber security breaches. These standards were developed by the NERC and provide a cyber security framework for the identification and protection of Critical Cyber Assets.

The eight Cyber security standards address the following:

- Critical Cyber Asset Identification
- Security Management Controls
- Personnel and Training
- Electronic Security Perimeters
- Physical Security of Critical Cyber Assets
- Systems Security Management
- Incident Reporting and Response Planning
- Recovery Plans for Critical Cyber Assets

As mentioned NERC-CIP is a framework to help address security of our national utility systems, but there is still much work to do. For example, there have been cases where security updates have not been installed on assets, and unfortunately many "patches" are only issued after a hacker or cyber spy already has found and taken advantage of a security flaw. Multiply potential flaws by the number of utilities and again by the number of utility networks and you can begin to understand the cyber-security challenges around securing utility networks.

AT&T has invested significant resources in developing cyber security systems for its networks, and thus has significant expertise that utilities may find helpful in addressing their own security needs.

For AT&T cyber security is the collective set of services, procedures and practices. These capabilities assure the information, applications and services AT&T's customers want and use are secure, accurate, reliable and available wherever and whenever they are needed. Cyber security is a corporate priority and AT&T is investing significant resources in making its network and customers' information secure.

Cyber security capabilities include understanding and identifying emerging threats in early phases of their development. Network exploits, malware, flooding attacks, protocol anomalies and other threats are generally visible and often abundant on the Internet long before they have any significant affect on enterprise security.

AT&T is uniquely established to understand and deal with cyber threat. These include:

- Operating as the largest provider of Internet services
- Operation of a global IP network footprint
- An Internet data analysis platform that examines internet threats including botnets, network worms, DoS attacks, network exploits and other activity anomalies
- An analysis team that operates 24x7 to assess any significant activities on the Internet that could affect network services
- An algorithm research team that continually investigates and tests methods for automated detection of network threats
- AT&T Labs and Chief Security Office researchers, who participate in the security and networking research communities

The technology within AT&T's network is rapidly evolving to support new applications and services. In the course of 2009 alone, AT&T expects to invest $17-18 billion in expanding the capabilities of its network and infrastructure to meet the rapid global expansion of advanced information technology and services to enhance reliability and security. The size and scope of AT&T's global network, coupled with AT&T's industry-leading cyber-security capabilities, gives it a unique perspective into malicious cyber-activity.

AT&T's advanced network technology currently transports on average more than 17 Petabytes each business day of IP data traffic and the load is expected to double every 18 months for the foreseeable future. AT&T's network technologies give the company the capability to analyze traffic flows to detect malicious cyber-activities, and in many cases get very early indicators of attacks before they have the opportunity to become major events. For example, AT&T implemented the capability within its network to automatically detect and mitigate most Distributed Denial of Service Attacks within the AT&T network infrastructure before they affect service to AT&T customers. AT&T has grown from one domestic scrubbing complex to multiple locations across the United States, as well as having scrubbing nodes in Europe and Asia. This gives the AT&T the ability to filter attack traffic as close to the source of the threat as possible.

AT&T has made significant investments in the security of its mobility network. AT&T's Radio Access Network (RAN) complies with 3GPP airlink security standards. The RAN uses secure protocols in order to maintain and manage communication with the mobile station as well as specific procedures including power control and handover management. An important security mechanism that protects the radio link against eavesdropping is encryption. Encryption protects both user data and network control information and occurs between the cellular towers and the wireless device.

Following authentication and key agreement the network and end user equipment uses a 128-bit key and strong encryption algorithms. Significant resources have also been invested in the AT&T core mobility and wide area network in order to comply with and exceed industry security standards.

Cyber Security Assets

AT&T is responsible for managing the security of a worldwide data network, which consists of multiple components converging into a common Multi-Protocol Label Switching (MPLS) network. In order to support these objectives, AT&T maintains a comprehensive global security organization comprised of over 700 security professionals. This organization is dedicated to the physical and logical security of the AT&T global network and its service offerings. It supports a broad range of functions from security policy management to customer-facing security solutions. The AT&T global security organization reviews and assesses AT&T's security control posture to keep pace with industry security developments and to satisfy regulatory and business requirements. AT&T actively participates in a number of global security organizations, and maintains a comprehensive set of security standards based in part on similar leading industry standards (COBIT, ISO/IEC 27001:2005, etc.). Given the dynamic environment that AT&T supports, the library of AT&T security standards is continually re-evaluated and modified as industry standards evolve and as circumstances require. In addition, AT&T supports the following programs.

Confidentiality

To ensure confidentiality, information is accessible only to those authorized. AT&T has implemented a three-tiered Information Classification framework for categorizing information based on sensitivity of the content and specific legal requirements.

Physical Access Control Requirements

AT&T operates in a highly secured environment where physical access to staff office space, switching centers, global network and service management centers and other network facilities is strictly monitored and controlled.

Network Element Access Controls

Access is provided to AT&T technical support personnel only on an as-needed basis for individuals with responsibility for network element maintenance and support.

Network Perimeter Protection

AT&T external network connections are protected by firewalls that screen incoming and outgoing traffic based on source and destination address, protocol and port, in accordance with the security policy.

Intrusion Detection

AT&T employs a combination of internally developed and commercial tools to detect attempts by unauthorized persons to penetrate AT&T Global Network. AT&T does not monitor individual customer connections for intrusions, except when part of a managed security service.

Workstation Security Management

Workstation security policies protect AT&T and customer assets through a series of processes and technologies including verification of personnel workstation accesses, PC anti-virus protection, operating system hardening and updates, full disk encryption where permitted by law to protect sensitive information on portable assets, along with a personal firewall intrinsic to remote access software implemented on workstations or portable PCs that remotely connect to the AT&T network.

Security Status Checking and Vulnerability Testing

AT&T conducts regular tests and evaluations to ensure that security controls are maintained and are functioning in accordance with policy. These initiatives include Security Status Checking and Vulnerability Testing, Security Incident Reporting and Management. AT&T uses a consistent, disciplined global process for the identification of security incidents and threats in a timely manner, to minimize the loss or compromise of information assets belonging to both AT&T and its customers and, to facilitate incident resolution.

Business Continuity and Disaster Recovery

AT&T Corporate Business Continuity Planning Services provides technical consultation and program management expertise to address the business continuity, disaster recovery and managed security needs of AT&T and its customers.

Security Products and Services

AT&T offers managed security products and services to its customers designed to assess and protect their vital network infrastructure, including managed services in the area of Intrusion Detection, Firewall Security, Endpoint Security, Token Authentication, Encryption Services, Security Email Gateway Services, Vulnerability Scanning and Consultative and Engineering Security Services.

Managed Services and Hosting

AT&T Managed Services take advantage of the security of AT&T's global Internet Protocol/Multi Protocol Label Switching (IP/MPLS) network. MPLS technology enables the creation of feature-rich network-based services coupled with AT&T's management expertise, tools and automation. AT&T's network-based managed services include Enhanced Virtual Private Network and Managed Internet Services.

Hosting Services

Hosting services provide utility computing services that offer tailored or turnkey solutions. The mix-and-match tailored solutions offer IT infrastructure, hardware and/or software components, reliable and secure data center facilities, value-added services (i.e., security, backup and restore, professional services, monitoring, portal/reporting, utility and disaster recovery), server virtualization and integrated client networking. A fully managed turnkey solution provides capacity on demand, managed firewall and network Intrusion Detection System (IDS) functionality, proactive alerting and patching dedicated virtual servers and, total isolation of each client's data in a data center environment.

AT&T has implemented in-depth access control layers with multiple levels of firewalls that isolate core network element functions from customer-facing interfaces. These security perimeters enable AT&T to offer voice and data interfaces to its customers while helping to preserve the integrity of its core network resources. AT&T offers a Commercial Connectivity Services (CCS) solution which allows utilities to define transport network paths for data delivery. This enables utilities to transport data from the Advanced Metering Infrastructure (AMI) to core IT infrastructure using authorized and encrypted capabilities.

CCS implements custom Access Point Names (APNs) that provide linkage from the wireless network to the utility's core IT infrastructure using either frame relay circuits or MPLS connectivity. AT&T also offers Enterprise on Demand (EOD), which enables customers to selectively activate and deactivate devices (SIMs) on a real-time basis. These capabilities involve multiple levels of security, access controls and encryption that many electric, natural gas and water utilities will find beneficial.

In addition to CCS and EOD, AT&T offers a suite of Security and Business Continuity Services that will assess vulnerabilities, secure data and infrastructure, detect attacks, respond to suspicious activities and provide for non-stop operations.

AT&T stands ready to work with utilities and bring its extensive experience and capabilities in cyber security to the many challenges ahead.

1. Electricity Grid in U.S. Penetrated by Spies by Siobhan Gorman, Wall Street Journal, April 8, 2009.

2. Ibid

3. Ibid

For more information contact an AT&T Representative or visit www.att.com/business.

10/26/09 AB-1760

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GSMA Mobile Broadband Data Summary October 2009

	Continent	Country	Operator	Operator WI Name	HSDPA Status	UMTS Freq Band	HSDPA Data Rate	Launch date	HSUPA Status	HSUPA Data Rate	Launch date	HSPA+ Status	HSPA+ Data Rate	Launch date	LTE Status
1	Europe	Andorra	STA	STA	Planned			Dec-07							
2	Africa	Angola	Unitel	Unitel	In Service		1.8Mbps	Sep-07							
3	South America	Argentina	Claro (CTI Movil)	CTI Movil	In Service		1.8Mbps	Nov-07							
4	South America	Argentina	Movistar	Movistar	In Service		1.8Mbps	Jul-07							
5	South America	Argentina	Telecom Personal	Personal (Telecom Argentina), Argentina	In Service		7.2Mbps	May-07	None						
6	Asia	Armenia	Vivacell	VivaCell (MTS), Armenia	In Service		1.8Mbps	Apr-09							
7	Central America	Aruba	SETAR	Setar, Aruba	In Service		7.2Mbps	Dec-07							
8	Oceania	Australia	3 / Hutchison Australia	3 / Hutchison Australia	In Service		3.6Mbps	Feb-07							
9	Oceania	Australia	Optus Australia	Optus Australia	In Service		3.6Mbps	May-07							
10	Oceania	Australia	Telstra	Telstra, Australia	In Service		14.4Mbps	Oct-06	In service	5.76Mbps	Feb-07				Planned
11	Oceania	Australia	Virgin Mobile	Virgin Mobile	In Service		3.6Mbps	Jul-07							
12	Oceania	Australia	Vodafone Hutchisn Australia	Vodafone Hutchison, Australia	In Service		14.4Mbps	Oct-06	In service						
13	Europe	Austria	3 Austria	3 (Hutchison), Austria	In Service		7.2Mbps	Sep-06	In service						Planned
14	Europe	Austria	mobilkom austria	mobilkom austria	In Service		21Mbps	Jan-06	In service	1.4Mbps		In Service	21Mbps	Mar-09	In trial
15	Europe	Austria	ONE	ONE	In Service		7.2Mbps	Jun-06							
16	Europe	Austria	T-Mobile / Telering Austria	T-Mobile / Telering Austria	In Service		3.6Mbps	Apr-06	In deployment						In trial
17	Middle East	Bahrain	Batelco	Batelco, Bahrain	In Service		14.4Mbps	Dec-07							
18	Middle East	Bahrain	Zain (MTC-Vodafone Bahrain)	Zain (MTC-Vodafone Bahrain)	In Service		1.8Mbps	May-06							
19	Asia	Bangladesh	GrameenPhone	GrameenPhone	Planned			Dec-10							
20	Europe	Belarus	life :)	life:) (Turkcell), Belarus	Planned							Planned			
21	Europe	Belgium	Belgacom Proximus	Belgacom Proximus	In Service		3.6Mbps	Jun-06							
22	Europe	Belgium	KPN Base	Base (KPN), Belgium	Planned			end of 2009							
23	Europe	Belgium	Mobistar	Mobistar	In Service		1.8Mbps	Aug-06							
24	Asia	Bhutan	Bhutan Telecom	Bhutan Telecom	In Deployment			Jun-08							
25	South America	Bolivia	Tigo		In Service		3.6Mbps	Jan-09							
26	Europe	Bosnia and Herzegovina	BH Telecom	BH Telecom	Planned			2009							
27	Europe	Bosnia and Herzegovina	Telekom Srpske	m:tel, Bosnia and Herzegovina	In Deployment			2009							
28	Africa	Botswana	Mascom	Mascom	In Service		1.8Mbps								
29	South America	Brazil	Brazil Telecom	Brasil Telecom, Brazil	In Deployment			Apr-08							
30	South America	Brazil	Claro	Claro (America Movil), Brazil	In Service		1Mbps	Nov-07							
31	South America	Brazil	CTBC	CTBC	In Service		1.8Mbps	Apr-08							
32	South America	Brazil	Sercomtel Celular	Sercomtel Celular	In Service		14.4Mbps	Dec-08	In service	5.76Mbps	Dec-08				
33	South America	Brazil	Telemig Celular	Telemig Celular	In Service		1.8Mbps	Nov-07							
34	South America	Brazil	TIM	TIM	In Deployment			Jul-08							
35	South America	Brazil	Vivo	Vivo	In Service		1.8Mbps		In service	1.4Mbps					
36	Asia	Brunei	DST (Datastream Technology)	DST (Datastream Technology)	In Service		7.2Mbps	May-08							
37	Europe	Bulgaria	Cosmo Bulgaria Mobile/Globul	Globul, Bulgaria	In Service		14.4Mbps	Sep-06	In Service	2Mbps					
38	Europe	Bulgaria	Mobitel Bulgaria (Vodafone)	M-Tel (mobilkom austria), Bulgaria	In Service		21Mbps	Mar-06	In service	1.4Mbps	Aug-07	In service	21Mbps	Sep-09	
39	Europe	Bulgaria	Vivatel/BTC Mobile	Vivatel/BTC Mobile	In Service		1.8Mbps	Jun-07							
40	Asia	Cambodia	CamGSM	Cellcard (Mobitel), Cambodia	In Service		1.8Mbps	Mar-08							
41	Asia	Cambodia	QB (Cambodia Advanced Communications)	QB (Cambodia Advanced Communi	In Service		1.8Mbps	May-08							
42	North America	Canada	BCE	BCE	Planned			2010							Planned

43	North America	Canada	MTS Mobility (MTS Allstream)	MTS Mobility (MTS Allstream), Canada	Planned										
44	North America	Canada	Rogers Wireless	Rogers Wireless	In Service		21Mbps	Nov-06	In service	2Mbps		In service	21Mbps	Aug-08	
45	North America	Canada	Telus Mobility	Telus Mobility, Canada	Planned			Sep-09	None						
46	North America	Canada	Globalive	Globalive, Canada	In Deployment										
47	North America	Canada	Videotron	Videotron, Canada	Planned										
48	North America	Canada	DAVE wireless	DAVE wireless, Canada								Planned			
49	North America	Canada	SaskTel	SaskTel, Canada	Planned			2010							
50	South America	Chile	America Movil - Smartcom (Claro)	Claro (America Movil), Chile	In Service		1.8Mbps	Dec-07							
51	South America	Chile	ENTEL PCS	ENTEL PCS	In Service		3.6Mbps	Dec-06							Planned
52	South America	Chile	Telefonica Chile	Telefonica Chile	In Service		1.8Mbps	Dec-07							Planned
53	Asia	China	China Mobile	China Mobile	In Trial			Jan-00							In trial
54	Asia	China	China Unicom	China Unicom, China	In deployment		7.2Mbps		In deployment						
55	South America	Colombia	Comcel	Comcel	In Service		1.8Mbps	Feb-08							
56	South America	Colombia	Movistar (Telefonica Moviles)	Movistar (Telefonica Moviles)	In Service		1.8Mbps	Dec-08							
57	South America	Colombia	Tigo		In Service		2.0Mbps								
58	Central America	Costa Rica	ICE Costa Rica	ICE Costa Rica	In Deployment			Jun-08							
59	Europe	Croatia	Tele2	Tele2, Croatia	In Service		7.2Mbps	Jun-08	In service	1.4Mbps					
60	Europe	Croatia	T-Mobile	T-Mobile, Croatia	In Service		7.2Mbps	Nov-06	None						
61	Europe	Croatia	VIPnet	Vipnet (mobilkom austria), Croatia	In Service		21Mbps	Apr-06	In service	1.4Mbps	Feb-07	In Trial	21Mbps	May-09	
62	Europe	Cyprus	CYTA Mobile	CYTA Mobile	In Service	900	1.8Mbps	Jul-08							
63	Europe	Cyprus	MTN (Areeba)	MTN (Areeba)	In Service		1.8Mbps	Apr-08							
64	Europe	Cyprus	Turkcell	Turkcell	In Service		1.8Mbps								
65	Europe	Czech Republic	Telefonica / 02 (Eurotel Praha)	Telefonica / 02 (Eurotel Praha)	In Service		3.6Mbps	May-06							
66	Europe	Czech Republic	T-Mobile Czech Republic	T-Mobile, Czech Republic	In Service			Jun-06	In deployment						
67	Europe	Czech Republic	Vodafone Czech Republic	Vodafone Czech Republic	Planned			Dec-07							
68	Europe	Denmark	3 Denmark	3 Denmark	In Service		21Mbps	Nov-06				Planned	21Mbps	2009	
69	Europe	Denmark	Sonofon	Sonofon, Denmark	In Service		3.6Mbps	Sep-07							
70	Europe	Denmark	TDC Mobil	TDC, Denmark	In Service		7.2Mbps	Jan-08							
71	Europe	Denmark	Telia (TeliaSonera)	Telia (TeliaSonera)	In Service		3.6Mbps	Dec-07	In deployment						
72	South America	Dominican Republic	Claro Dominicana	Claro (America Movil), Dominican Republic	In Service		3.6Mbps	Aug-07							
73	South America	Ecuador	Porta		In Service		1.2Mbps								
74	Africa	Egypt	Etisalat Mist	Etisalat Misr, Egypt	In Service		7.2Mbps	May-07	In service		Nov-07				
75	Africa	Egypt	Vodafone Egypt	Vodafone Egypt	In Service		3.6Mbps	May-07							
76	Central America	El Salvador	Claro (America Movil)	Claro (America Movil)	In Service		1.8Mbps	Jan-08							
77	Central America	El Salvador	Tigo		In Service		3.6Mbps								
78	Europe	Estonia	Elisa (Radiolinja Estonia)	Elisa (Radiolinja Estonia)	In Service		1.8Mbps	Jul-06							
79	Europe	Estonia	EMT	EMT	In Service		7.2Mbps	Apr-06	In service	1.5Mbps	Dec-07				
80	Europe	Estonia	ProGroup Holdings (Bravocom)	ProGroup Holdings (Bravocom)	In Deployment			Jul-06							
81	Europe	Estonia	Tele2	Tele2	In Service		1.8Mbps	Nov-06							
82	Europe	Faroe Island	Faroese Telecom	Faroese Teleocm, Faroe Island	In Deployment			Sep-09				In deployment		Sep-09	
83	oceania	Fiji	Vodafone Fiji	Vodafone Fiji	In Service		7.2Mbps	Nov-08	In service	2.0Mbps	Nov-08				
84	Europe	Finland	Elisa (Radiolinja)	Elisa (Radiolinja)	In Service		3.6Mbps	Apr-06	In service	1.4Mbps		In Deployment			
85	Europe	Finland	Finnet	DNA, Finland	In Service		2Mbps	Feb-07	In service	1.4Mbps	Jun-08				
86	Europe	Finland	TeliaSonera	Sonera (TeliaSonera), Finland	In Service		3.6Mbps	Aug-07	None						Planned
87	Europe	France	Bouygues France	Bouygues France	In Service		6.7Mbps		In service	1.4Mbps					
88	Europe	France	Orange France	Orange, France	In Service		7.2Mbps	May-06	In service	1.4Mbps					
89	Europe	France	SFR (Vodafone)	SFR, France	In Service		3.6Mbps	Jun-06	In deployment						
90	Oceania	French Polynesia	Mara Telecom	Mara Telecom	In Deployment			Dec-08							
91	Oceania	French Polynesia	Tikiphone	Tikiphone	Planned										

92	oceania	French Polynesia	Vini (Tikiphone)	Vini (Tikiphone)	Planned			Jun-08							
93	Europe	Georgia	Geocell	Geocell	In Service		3.6Mbps	Jun-08							
94	Europe	Georgia	Magticom	Magticom	In Service		14.4Mbps	Dec-08							
95	Europe	Germany	E-Plus	E-Plus, Germany	In Trial		7.2Mbps	2009	In trial	1.4Mbps	2009				
96	Europe	Germany	O2 Germany	O2 (Telefonica), Germany	In Service		7.2Mbps	Dec-06	In Service	2.0Mbps					
97	Europe	Germany	T-Mobile Deutschland	T-Mobile Deutschland	In Service		7.2Mbps	Mar-06	In service	1.4Mbps		Planned			In trial
98	Europe	Germany	Vodafone Germany	Vodafone, Germany	In Service		14.4Mbps	Mar-06	In service	3Mbps	Nov-07				
99	Africa	Ghana	MTN Ghana	MTN, Ghana	In Service		1.8Mbps	Jan-09							
100	Africa	Ghana	Zain Ghana	Zain Ghana	In Service		1.8Mbps								
101	Europe	Greece	Cosmote	Cosmote	In Service		21Mbps	Jun-06	In service	1.5Mbps	Apr-08	In Service	21Mbps	May-09	
102	Europe	Greece	Vodafone	Vodafone, Greece	In service		21Mbps	Mar-07	In service	5.76Mbps		In Service	21Mbps		
103	Europe	Greece	TIM Stet Hellas	Wind (Weather), Greece	In Service		7.2Mbps	Nov-06							
104	Asia	Guam	Guamcell	DoCoMo Pacific (NTT DoCoMo)	In Service		1.8Mbps		Planned						
105	Central America	Guatemala	Claro (America Movil)	Claro (America Movil)	In Service		1.8Mbps	Dec-07							
106	Central America	Guatemala	Tigo		In Service		1.5Mbps								
107	Europe	Guernsey Island	Sure/C&W (Guernsey Telecom)	Sure/C&W (Guernsey Telecom)	In Deployment			Dec-07							
108	Europe	Guernsey Island	Wave Telecom	Wave Telecom	In Deployment			Dec-07							
109	Central America	Honduras	Claro (America Movil)	Claro (America Movil)	In Service		1.8Mbps	Dec-07							
110	Central America	Honduras	Tigo		In Service		3.6Mbps								
111	Asia	Hong Kong	CSL New World Mobility	CSL New World Mobility	In Service		21Mbps	Sep-06				In Service	21Mbps	Mar-09	
112	Asia	Hong Kong	3 (Hutchison)	3 (Hutchison), Hong Kong	In Service		14.4Mbps	Dec-06	In service	1.4Mbps		In deployment			
113	Asia	Hong Kong	PCCW (Sunday)	PCCW (Sunday)	In Service		21Mbps	Mar-07				Planned	21Mbps	2009	
114	Asia	Hong Kong	Smartone-Vodafone	Smartone, Hong Kong	In Service		14.4Mbps	Jun-06	In service	5.76Mbps	Nov-06	In Trial			Planned
115	Europe	Hungary	Pannon GSM	Pannon GSM	In Service		3.6Mbps	Mar-07							
116	Europe	Hungary	T-Mobile Hungary	T-Mobile Hungary	In Service		7.2Mbps	May-06	In service	1.4Mbps	Dec-07				
117	Europe	Hungary	Vodafone Hungary	Vodafone Hungary	In Service		3.6Mbps	Jun-07							
118	Europe	Iceland	Nova	Nova	In Service		3.6Mbps	Apr-08							
119	Europe	Iceland	Telecom Iceland/Siminn	Siminn, Iceland	In Service		1.8Mbps	2007							
120	Asia	India	Bharti Televentures	Airtel (Bharti), India	Planned			Oct-10	None						
121	Asia	India	BSNL	BSNL	Planned			Mar-09							
122	Asia	India	MTNL	MTNL	Planned			Dec-08							
123	Asia	India	Spice Telecom	Spice Telecom	Planned			Dec-08							
124	Asia	Indonesia	Excelcomindo Pratama ProXL	Excelcomindo Pratama ProXL	In Service		2.6Mbps	Nov-06							
125	Asia	Indonesia	Hutchison CP Telecom	Hutchison CP Telecom	In Service		1.8Mbps	Jun-07							
126	Asia	Indonesia	Indosat	Indosat	In Service		14.4Mbps	Dec-06	In service	1.4Mbps	May-08				
127	Asia	Indonesia	Telkomsel	Telekomsel (Telekomunikasi Selular), Indone	In Service		3.6Mbps	Apr-07							
128	Asia	Iran	Etisalat (Tameen Telecom)		Planned										
129	Europe	Ireland	3 Ireland	3 (Hutchison), Ireland	In Service		7.2Mbps	Dec-06	None			In deployment			
130	Europe	Ireland	Meteor Mobile	Meteor, Ireland	In Service		14.4Mbps	Mar-09				Planned			
131	Europe	Ireland	O2 Ireland	O2 Ireland	In Service		7.2Mbps	Jul-07	In service	1.4Mbps	Jul-08				
132	Europe	Ireland	Vodafone Ireland	Vodafone Ireland	In Service		3.6Mbps	Nov-06							
133	Europe	Isle of Man	Manx Telecom	Manx Telecom	In Service		3.6Mbps	Nov-05							
134	Middle East	Israel	Cellcom Israel	Cellcom Israel	In Service		3.6Mbps	Jun-06	In deployment						
135	Middle East	Israel	Orange (Patner Communications)	Orange (Patner Communications), Israel	In Service		3.6Mbps	Mar-06	In deployment			In Deployment			
136	Middle East	Israel	Pelephone	Pelephone Communications, Israel	In Service		1.8Mbps	Jan-09	In Service		Jan-09				
137	Europe	Italy	3 Italy	3 (Hutchison), Italy	In Service		7.2Mbps	Feb-06	In service	5.8Mbps	Sep-07				
138	Europe	Italy	TIM Italy	TIM Italy	In Service		28Mbps	May-06	In service	5.8Mbps	Jun-09	In service	28Mbps	Jun-09	Planned
139	Europe	Italy	Vodafone Italy	Vodafone, Italy	In Service		7.2Mbps	Jun-06				Planned			
140	Europe	Italy	Wind	Wind	In Service		3.6Mbps	Jun-07							

141	Central America	Jamaica	Claro Jamaica	Claro Jamaica	In Service		1.8Mbps	Nov-07							
142	Central America	Jamaica	Cable and Wireless	LIME	In Service		3.6Mbps	Jun-09							
143	Asia	Japan	eMobile (eAccess)	eMobile, Japan	In Service		21Mbps	Mar-07	In Service	5.8Mbps	Nov-08	In Service	21Mbps	Aug-09	Planned
144	Asia	Japan	KDDI												Planned
145	Asia	Japan	NTT DoCoMo	NTT DoCoMo, Japan	In Service		7.2Mbps	Aug-06	In trial		Jun-09				Planned
146	Asia	Japan	Softbank (ex-Vodafone) Japan	Softbank (ex-Vodafone) Japan	In Service		7.2Mbps	Oct-06				Planned			Planned
147	Europe	Jersey Island	Airtel (Vodafone)		In Service		1.8Mbps	Jun-07							
148	Europe	Jersey Island	Jersey Telecom	Jersey Telecom	In Deployment			Dec-08							
149	Europe	Jersey Island	Sure (C&W Jersey)		In Service		2.0Mbps	Dec-07							
150	Africa	Kenya	Safaricom	Safaricom	In Service		7.2Mbps	May-08							
151	Middle East	Kuwait	Viva, Kuwait	Viva, Kuwait	In Service		21Mbps	Sep-08				In Service	21Mbps		
152	Middle East	Kuwait	Watiniya Telecom Kuwait	Wataniya Telecom, Kuwait	In Service		7.2Mbps	Dec-07							
153	Middle East	Kuwait	Zain (MTC-Vodafone)	Zain (MTC-Vodafone)	In Service		21Mbps	Jan-07	In deployment			In Service	21Mbps	Aug-09	
154	Europe	Latvia	Bite	Bite	In Service		7.2Mbps	Sep-06	In service	1.4Mbps	Jan-08				
155	Europe	Latvia	LMT	LMT	In Service		3.6Mbps	Sep-06							
156	Europe	Latvia	Tele2	Tele2	In Service		3.6Mbps	Mar-07							
157	Middle East	Lebanon	Alfa (Orascom)	Alfa (Orascom), Lebanon	Planned		21Mbps	Dec-09				Planned		Dec-09	
158	Africa	Libya	EL Madar	EL Madar	In Deployment			Jan-09							
159	Africa	Libya	Libyana Mobile Phone	Libyana Mobile Phone	In Deployment			Dec-07							
160	Europe	Liechtenstein	Mobilkom FL1	Mobilkom FL1	In Service		1.8Mbps	Feb-07	In deployment						
161	Europe	Liechtenstein	Orange	Orange	In Service		3.6Mbps	Sep-07							
162	Europe	Liechtenstein	Tele2 (Tango)	Tele2 (Tango)	In Deployment			Jun-08							

163	Europe	Lithuania	Bite	Bite	In Service		7.2Mbps	Jun-06	In service	1.4Mbps	Jan-08					
164	Europe	Lithuania	Omnitel	Omnitel	In Service		1.8Mbps	Jun-06								
165	Europe	Lithuania	Tele2	Tele2	Planned			Jun-07								
166	Europe	Luxembourg	P&T Luxembourg (LUXGSM)	P&T Luxembourg (LUXGSM)	In Service		7.2Mbps	May-07								
167	Europe	Luxembourg	Tele2 (Tango)	Tele2 (Tango)	Planned			Dec-07								
168	Europe	Luxembourg	VOX Mobile	VOX Mobile	In Service		1.8Mbps	Jun-07								
169	Asia	Macau	CTM	CTM	In Service		3.6Mbps	Jun-07								
170	Asia	Macau	Hutchison Telecom	Hutchison Telecom	In Service		3.6Mbps	Oct-07								
171	Europe	Macedonia	Comofon (Cosmote)	Cosmofon, Macedonia	In Service		1.8Mbps	Sep-08								
172	Europe	Macedonia	T-Mobile	T-Mobile (Makedonski Telekom), Macedonia	In Service		7.2Mbps	Jun-09								
173	Europe	Madeira	Optimus	Optimus	In Service		1.8Mbps	Feb-06								
174	Asia	Malaysia	Celcom Malaysia	Celcom Malaysia	In Service		1.8Mbps	Jun-06								
175	Asia	Malaysia	DiGi	DiGi, Malaysia	In Service		14.4Mbps	Mar-09								
176	Asia	Malaysia	Maxis Malaysia	Maxis Malaysia	In Service		1.8Mbps	Sep-06	In deployment							
177	Asia	Malaysia	U-Mobile (MiTV)	U-Mobile (MiTV)	In Deployment			Jun-07								
178	Asia	Maldives	Watiniya Telecom Maldives	Watiniya Telecom Maldives	In Service		1.8Mbps	May-08								
	Europe	Malta	Melita	Melita, Malta	In Service											
179	Europe	Malta	Mobisle Comm. (go mobile)	Mobisle Comm. (go mobile)	In Service		3.6Mbps	Dec-06								
180	Europe	Malta	Vodafone Malta Ltd	Vodafone Malta Ltd	In Service		1.8Mbps	Dec-06								
181	America	Martinique	Outremer Telecom		In Service		1.8Mbps	Dec-08								
182	Africa	Mauritius	Cellplus Mauritius	Cellplus Mauritius	Planned			Jun-08								
183	Africa	Mauritius	Millicom Mauritius (Emtel)	Millicom Mauritius (Emtel)	In Service		1.8Mbps	Sep-07								
184	Central America	Mexico	America Movil - Telcel	America Movil - Telcel	In Service		1.8Mbps	Feb-08								
185	South America	Mexico	Movistar	Movistar	In Service		1.8Mbps	Nov-08								
	Europe	Moldova	Orange Moldova	Orange, Moldova	In Service		14.4Mbps	Nov-08	In Service	5.76Mbps						
186	Europe	Moldova	Moldcell	Moldcell	In Service		7.2Mbps	Sep-08								
187	Europe	Monaco	Monaco Telecom/Monacell	Monaco Telecom/Monacell	Planned			Dec-07								
188	Asia	Mongolia	MobiCom	MobiCom, Mongolia	In Service		7.2Mbps	Apr-09								
189	Asia	Mongolia	Skytel	Skytel, Mongolia	In Deployment											
190	Europe	Montenegro	m:tel	M:Tel, Montenegro	In Service		7.2Mbps	Jul-07	None							
191	Europe	Montenegro	Promonte	Promonte, Montenegro	In Service		7.2Mbps	Jun-07	None			Planned				
192	Europe	Montenegro	T-Mobile	T-Mobile, Montenegro	In Service		3.6Mbps	Jun-07	None							
193	Africa	Morocco	Maroc Telecom	Maroc Telecom	In Service		3.6Mbps	Jan-08								
194	Africa	Morocco	Meditel	Meditel	In Service		3.6Mbps	Apr-07								
195	Africa	Mozambique	mcel	mcel	In Deployment			Jan-08								
196	Africa	Namibia	CellOne (Powercom)	CellOne (Powercom)	In Service		1.8Mbps	Jun-07								
197	Africa	Namibia	MTC	MTC	In Service		1.8Mbps	Nov-06								

198	Asia	Nepal	Nepal Telecom	Nepal Telecom	Planned			Dec-07							
199	Europe	Netherlands	KPN (Telfort)	KPN (Telfort)	In Service		3.6Mbps	Dec-06	In Service	1.4Mbps	Mar-08				
200	Europe	Netherlands	T-Mobile Netherlands	T-Mobile Netherlands	In Service		1.8Mbps	Apr-06							
201	Europe	Netherlands	Vodafone Netherlands	Vodafone Netherlands	In Service		1.8Mbps	Jul-06							
202	Oceania	New Zealand	2 degrees	2 degrees, New Zealand	Planned			Jan-10				Planned			
203	Oceania	New Zealand	TCNZ	Telecom, New Zealand	In Service		14.4Mbps	May-09	In Service	5.7Mbps	May-09	In Deployment		Dec-09	
204	Oceania	New Zealand	Vodafone New Zealand	Vodafone, New Zealand	In Service		7.2Mbps	Oct-06	In Service			In Trial			
205	Central America	Nicargua	Claro (America Movil)	Claro (America Movil)	In Service		1.8Mbps	Dec-07							
206	Africa	Nigeria	Celtel	Celtel	In Trial			Nov-06							
207	Africa	Nigeria	Emerging Market Telecom Services (EMTS)	Emerging Market Telecom Services (EMTS)	Planned										
208	Africa	Nigeria	Globacom	Globacom	In Service		3.6Mbps	Dec-07							
209	Africa	Nigeria	MTN	MTN	In Service		3.6Mbps	Dec-07							
210	Asia	North Korea	Koryolink (Orascom)	Koryolink (Orascom)	Planned										
211	Europe	Norway	Hi3G Access	Hi3G Access	Planned			Jun-08							
212	Europe	Norway	Netcom (TeliaSonera)	Netcom (TeliaSonera)	In Service		3.6Mbps	Apr-07							
213	Europe	Norway	Telenor Mobil	Telenor Mobil	In Service		3.6Mbps	Oct-07							Planned
214	Middle East	Oman	Nawras Telecom (TDC)	Nawras Telecom (TDC)	In Service		7.2Mbps	Dec-07							
215	Middle East	Oman	Oman Mobile	Oman Mobile (Omantel), Oman	In Service		14.4Mbps	Jan-09	None						
216	South America	Panama	Movistar	Telecom Personal	In Service		1.8Mbps								
217	South America	Paraguay	CTI Movil	CTI Movil	In Service		3.6Mbps	Nov-07							
218	South America	Paraguay	Personal Paraguay	Personal Paraguay	In Service		1.6Mbps		In deployment						
219	South America	Paraguay	Tigo		In Service		3.6Mbps								
220	South America	Peru	Claro	Claro	In Service		3.6Mbps	Jul-07	In service	1.92Mbps					
221	Asia	Philippines	Digitel/Sun Cellular	Sun Cellular (Digital Mobile), Philippines	In Service		1.8Mbps	May-08							
222	Asia	Philippines	Globe Telecom	Globe Telecom, Philippines	In Service		2.0Mbps	May-06	None						
223	Asia	Philippines	RED Mobile (CURE)	RED Mobile (CURE)	In Service		1.8Mbps	Nov-08							
224	Asia	Philippines	Smart Comms	Smart (PLDT), Philippines	In Service		2.0Mbps	Jan-07	None						
225	Europe	Poland	Centertel (Orange)	Orange (Telekom Polska), Poland	In Service		7.2Mbps	Dec-06	In service	1.4Mbps	Dec-07				
226	Europe	Poland	Era	Era, Poland	In Service		21Mbps	Oct-06	In service	1.4Mbps		In Service	21Mbps	Sep-09	
227	Europe	Poland	P4	Project 4 Poland, Poland	In Service		14.4Mbps	Mar-07							
228	Europe	Poland	Polkomtel / iPlus	Plus (Polkomtel), Poland	In Service		3.6Mbps	Nov-06							
229	Europe	Portugal	Optimus	Optimus	In Service		21Mbps	Dec-06	In service	5.76Mbps	Dec-07	In Service	21Mbps		
230	Europe	Portugal	TMN	TMN (Portugal Telecom), Portugal	In Service		21Mbps	Apr-06	In Service	1.4Mbps		In Service	21Mbps	Jun-09	
231	Europe	Portugal	Vodafone Portugal	Vodafone Portugal	In Service		21Mbps	Mar-06	In service	5.76Mbps		In Service	21Mbps	2009	
232	South America	Puerto Rico	AT+T	AT+T	In Service		1.8Mbps	Nov-06							
233	South America	Puerto Rico	Claro Puerto Rico	Claro Puerto Rico	In Service		1.8Mbps	Dec-07							
234	Middle East	Qatar	Qtel	Qtel, Qatar	In Service		7.2Mbps	Jul-07	In service	2.0Mbps	Feb-09				
235	Middle East	Qatar	Vodafone	Vodafone, Qatar	Planned										
236	Asia	Reunion	Outremer Telecom		In Service		1.8Mbps	Dec-08							
237	Asia	Reunion	SRR(SFR)	SRR(SFR), Reunion	In Service		1.8Mbps	Jan-09							
238	Europe	Romania	Orange Romania	Orange, Romania	In Service		7.2Mbps	Jun-07	In service	1.4Mbps	Oct-07				
239	Europe	Romania	RCS&RDS	RCS&RDS	Planned			Jun-08							
240	Europe	Romania	Vodafone Romania	Vodafone Romania	In Service		7.2Mbps	Sep-07	In service	1.4Mbps	Mar-08	Planned			
241	Europe	Romania	Cosmote (zapp)	Cosmote (OTE), Roamania	In Service		21Mbps	Jul-09	In service	5.8Mbps	Jul-09	In Service	21.6Mbps	Jul-09	
242	Europe	Russia	MegaFon North-West branch	MegaFon North-West branch	In Service		3.6Mbps	Oct-07	In deployment						
243	Europe	Russia	MTS	MTS Group	In Service		3.6Mbps	May-08	None						
244	Europe	Russia	VimpelCom	VimpelCom	In Service		3.6Mbps	Sep-08							
245	Middle East	Saudi Arabia	EAE (Mobily)	Mobily, Saudi Arabia	In Service		7.2Mbps	Jun-06	In service		Mar-09				
246	Middle East	Saudi Arabia	STC (Saudi Telecom)	STC (Saudi Telecom), Saudi Arabia	In Service		1.8Mbps	Jan-06				In Deployment			

247	Middle East	Saudi Arabia	Zain (MTC SA)	Zain, Saudi Arabia	In Service		1.8Mbps	Aug-08	In deployment			In Trial				
248	Africa	Senegal	Orange Senegal	Orange Senegal	Planned											
249	Europe	Serbia	Telekom Srbija	Telekom Srbija	In Service		1.8Mbps	Dec-06								
250	Europe	Serbia	Telenor	Telenor	In Service		1.8Mbps	Mar-07								
251	Asia	Singapore	M1	M1, Singapore	In Service		14.4Mbps	Dec-06	In Service	5.76Mbps		Planned				
252	Asia	Singapore	SingTel Mobile	SingTel, Singapore	In Service		7.2Mbps	May-07				Planned				
253	Asia	Singapore	StarHub	StarHub	In Service		21Mbps	Aug-07	In service	5.76Mbps	Aug-07	In Service	21Mbps	Q2 2009		
254	Europe	Slovakia	Orange Slovensko	Orange, Slovakia	In Service		7.2Mbps	Sep-06	In service	1.46Mbps	Jan-08	Planned				
255	Europe	Slovakia	T-Mobile Slovensko	T-Mobile Slovensko	In Service		3.6Mbps	Aug-06								
256	Europe	Slovenia	Mobitel Slovenia	Mobitel Slovenia	In Service		7.2Mbps	Sep-06	In Service	1.4Mbps	Dec-07					
257	Europe	Slovenia	Si.mobil - Vodafone	Si.mobil - Vodafone	In Service		3.6Mbps	Sep-07								
258	Europe	Slovenia	T2	T2	In Deployment											
259	Europe	Slovenia	Tusmobil	Tusmobil	In Service		14.4Mbps	Jun-08								
260	Africa	South Africa	MTN South Africa	MTN, South Africa	In Service		7.2Mbps	Mar-06	In service	1.8Mbps						
261	Africa	South Africa	Telkom South Africa		In Service		7.2Mbps	Dec-08	In service	2.4Mbps	Dec-08					
262	Africa	South Africa	Vodacom South Africa	Vodacom, South Africa	In Service		7.2Mbps	Mar-06	In service	1.8 Mbps	Feb-08					
263	Asia	South Korea	KTF	KTF	In Service		3.6Mbps	Jun-06	In service	3.6Mbps						
264	Asia	South Korea	SK Telecom	SK Telecom	In Service		3.6Mbps	May-06	In service	5.76Mbps						Planned
265	Europe	Spain	Orange Spain	Orange Spain	In Service		3.6Mbps	Jun-06	In service	1.8Mbps	Mar-07					
266	Europe	Spain	Telefonica Moviles	Telefonica Moviles	In Service		7.2Mbps	Oct-06	In service	1.8Mbps	Jul-07	Planned		mid-2009		
267	Europe	Spain	Vodafone Spain	Vodafone, Spain	In Service		7.2Mbps	Jun-06	In service	1.92Mbps	Jun-07	In Trial		Oct-09		
268	Europe	Spain	Yoigo (Xfera / TeliaSonera)	Yoigo (Xfera / TeliaSonera)	Planned			Dec-07								
269	Asia	Sri Lanka	Bharti Airtel Lanka		In Service		1.8Mbps	Jan-09								
270	Asia	Sri Lanka	Dialog Telekom	Dialog Telekom	In Service		1.8Mbps	Aug-06				In Trial				
271	Asia	Sri Lanka	Millicom Sri Lanka (Celltel - TiGO)	Millicom Sri Lanka (Celltel - TiGO)	Planned			Dec-07								
272	Asia	Sri Lanka	Mobitel Lanka	Mobitel Lanka	In service		7.2Mbps	Dec-07	In service	1.92Mbps						
273	Africa	Sudan	Zain Sudan	Zain Sudan	In Service		3.6Mbps	Apr-08								
274	Europe	Sweden	3 Sweden	3 Sweden	In Service		7.2Mbps	Nov-06	In service	1.4Mbps	Sep-07	Planned		2009		
275	Europe	Sweden	Svenska UMTS-Nat (Tele2)	Tele2, Sweden	In Service		14.4Mbps	Apr-07								Planned
276	Europe	Sweden	Telenor	Telenor	In Service		3.6Mbps	Jun-07								Planned
277	Europe	Sweden	TeliaSonera	Telia (TeliaSonera), Sweden	In Service		14.4Mbps	Jun-07								Planned
278	Europe	Switzerland	Orange Switzerland	Orange Switzerland	In Service		1.8Mbps	Jul-06								
279	Europe	Switzerland	Swisscom	Swisscom, Switzerland	In Service		14.4Mbps	Mar-06	In service	1.4Mbps	Nov-07	In Deployment		Oct-09		
280	Europe	Switzerland	TDC Switzerland - Sunrise	TDC Switzerland - Sunrise	In Service		3.6Mbps	Feb-07								
281	Middle East	Syria	Areeba Syria	Areeba Syria	Planned			Dec-07								
282	Middle East	Syria	Syriatel	Syriatel	In Service		7.2Mbps	Aug-08								
283	Asia	Taiwan	Chungwa Telecom	Chungwa Telecom	In Service		7.2Mbps	Sep-06	In service	2.0Mbps		Planned				Planned
284	Asia	Taiwan	FarEastone	FarEastone	In Service		3.6Mbps	Feb-07								
285	Asia	Taiwan	Taiwan Mobile Co	Taiwan Mobile Co	In Service		3.6Mbps	Jan-07								
286	Asia	Taiwan	VIBO Telecom	VIBO Telecom	In Service		3.6Mbps	Sep-07								
287	Asia	Tajikistan	Indigo Tajikistan	Indigo Tajikistan	Planned			Mar-09								
288	Asia	Tajikistan	Josa Babilon Mobile	Babilon-Mobile, Tajikistan	In Service		7.2Mbps									
289	Asia	Tajikistan	Tacom	Tacom	In Service		3.6Mbps	Apr-07								
290	Asia	Tajikistan	TT Mobile	MLT (MegaFon), Tajikistan	Planned			Jun-09								
291	Africa	Tanzania	Vodacom Tanzania	Vodacom Tanzania	In Service		1.8Mbps	Mar-07								
292	Asia	Thailand	AIS	AIS	In Service		7.2Mbps	Dec-08								
293	Asia	Thailand	DTAC, Thailand	In Trial												
294	Asia	Thailand	Thai Mobile (TOT)	Thai Mobile (TOT), Thailand	Planned			Dec-09								
295	Asia	Thailand	True Move (True Corporation)	True Move (True Corporation), Thailand	In Trial											

296	Middle East	Turkey	Avea	Avea (Turk Telekom), Turkey	In Service		7.2Mbps	Jul-09							
297	Middle East	Turkey	Turkcell	Turkcell, Turkey	In service		21Mbps	Jul-09				In service	21Mbps	Jul-09	
298	Middle East	Turkey	Vodafone	Vodafone, Turkey	In Service		7.2Mbps	Jul-09							
299	Africa	Uganda	Uganda Telecom	Uganda Telecom	In Service		1.8Mbps	Nov-07							
300	Europe	Ukraine	life :)	life :)	In Trial										
301	Europe	Ukraine	Utel (Ukrtelecom)	Utel (Ukrtelecom)	In Deployment			Jun-07							
302	Middle East	United Arab Emirates	Du	Du	In Service		1.8Mbps	Apr-07							
303	Middle East	United Arab Emirates	Etisalat	Etisalat, United Arab Emirates	In Service		14.4Mbps	Apr-06	None						
304	Europe	United Kingdom	3 UK	3 (Hutchison), United Kingdom	In Service		3.6Mbps	Aug-06	In deployment						
305	Europe	United Kingdom	O2 UK	O2 UK	In Service		3.6Mbps	Feb-07	In deployment	7.2Mbps					
306	Europe	United Kingdom	Orange UK	Orange, United Kingdom	In Service		3.6Mbps	Feb-07	In deployment						
307	Europe	United Kingdom	T-Mobile UK	T-Mobile, United Kingdom	In Service		7.2Mbps	Aug-06	In service	1.4 Mbps	Jul-08				
308	Europe	United Kingdom	Vodafone UK	Vodafone, United Kingdom	In Service		14.4Mbps	Jun-06	In service	1.92Mbps	Dec-07				
309	South America	Uruguay	Ancel	Ancel	In Service		3.6Mbps	Jul-07							
310	South America	Uruguay	CTI Movil	CTI Movil	In Service		1.8Mbps	Mar-08							
311	South America	Uruguay	Movistar (Telefonica Moviles)	Movistar (Telefonica Moviles)	In Service		3.6Mbps	Jul-07							
312	North America	USA	AT&T	AT&T, United States of America	In Service		3.6Mbps	Dec-05	In service	1.4Mbps	Oct-07	Planned			Planned
313	North America	USA	Edge Wireless	Edge Wireless	In Deployment			Dec-07							
314	North America	USA	Stelera Wireless		In Service		7.2Mbps	Dec-07	In deployment		Jul-08				
315	North America	USA	Terrestar		In Deployment										
316	North America	USA	T-Mobile USA	T-Mobile, United States of America	In Service		1.8Mbps	May-08	None			In Deployment		Jan-10	
317	North America	USA	Verizon												Planned
318	Asia	Uzbekistan	MTS Uzbekistan	MTS, Uzbekistan	In Service		1.8Mbps	Dec-08							
319	Asia	Uzbekistan	Ucell/Coscom	Ucell, Uzbekistan	In Service		7.2Mbps	Sep-08	In Service	1.4Mbps					
320	South America	Venezuela	Digitel	Digitel, Venezuela	In Service		3.6Mbps	Mar-09							
321	South America	Venezuela	Movilnet	Movilnet, Venezuela	In Trial			Dec-09							
322	South America	Venezuela	Movistar	Movistar (Telefonica), Venezuela	In Service		1.8Mbps	Dec-08							
323	Asia	Viet Nam	Mobifone Viet Nam	Mobifone, Vietnam	Planned			Dec-09							
324	Asia	Vietnam	Viettel Telecom	Viettel Telecom, Vietnam	In Deployment			Dec-09				In Deployment			
325	Asia	Viet Nam	Vinaphone	Vinaphone, Vietnam	In Deployment			Oct-09							

SMARTSYNCH CASE STUDIES

Customer:	**LADWP**
Application:	Customer Load Profiling
Goal:	Ensure sufficient power supply during peak customer demand to minimize brown-outs.
Challenges:	Analyze pre- and post-peak consumption traits to gauge future demand by accessing more granular usage data beyond monthly kWh readings. Collect delivered and received load profile information on all solar installations.
Solution:	SmartSynch A3 SmartMeter, SmartSynch Data Acquisition System, and GPRS wireless network
Results:	LADWP is now able to retrieve load profile data, including usage and instrumentation profiling, and power quality data on an as-needed basis. Solutions also provide real time alerts, such as outage notifications, that enable utilities to minimize service interruptions for customers.

Customer:	**Hydro One, Ontario, Canada**
Application:	Billing Reads for Residential Customer Accounts
Goal:	Save time and labor by conducting electricity bill reads wirelessly as needed instead of manual, monthly kWh readings.
Challenges:	Collect energy consumption data wirelessly from smart meters as needed to calculate monthly electricity bills for select residential customers throughout Ontario.
Solution:	SENTINEL SmartMeter, SmartSynch Data Acquisition System, and GPRS wireless network
Results:	In July 2008, Hydro One began using data collected wirelessly from SmartSynch solutions to calculate monthly electricity bills for 25,000 residential customers. Smart Meters have consistently performed at the highest levels since their deployment. Additionally, SSI's SmartRouting Solution enables authorized customers to securely access their meters and monitor energy usage traits on their own.

Customer:	**Florida Power & Light (FP&L)**
Application:	Load Profile/Power Quality Data far C&I Customers
Goal:	Ensure sufficient power supply during peak customer demand and efficient use of power by select C&I customers in service area.
Challenges:	Research energy consumption traits during peak/non-peak periods by accessing more granular data than monthly kWh readings. Provide power quality and outage management notifications to customers.
Solution:	A3 SmartMeter SmartSynch Data Acquisition System, and GPRS wireless network. SmartSynch created an interactive Power Quality feature for the A3, which included low- and high-voltage events, three-phase outage reporting and MIVs events.
Results:	FP&L now retrieves daily load profile and power quality data, including usage and instrumentation profiling, for its largest commercial accounts on an as-needed basis. Solutions provide real-time alerts, such as outage notifications, enabling utilities to minimize service interruptions for customers. Customers are also able to conduct real-time reads via e-mail interface with SmartSynch's Data Acquisition System. Power Quality functionality is a revenue source FP&L actively markets to customers.

Customer:	**NSTAR**
Application:	Load Profile for Load Research Sites/TOU Accounts
Goal:	Ensure sufficient power supply during peak customer demand and accurate billing of Time-of-Use customer accounts..
Challenges:	Research energy usage traits to gauge demand. Access daily five-minute interval and register data - more granular than monthly kWh readings - to apply to Time-of-Use rates.

Solution: A3 SmartMeter, SmartSynch Data Acquisition System, and GPRS wireless network.

Results: Each solution provides two channels of 5-minute load profile data wirelessly per day. NSTAR monitors usage, trends, creates billing rates based on time of use, and maintains an energy supply to meet customer demand. SSI's Coverage Validation Unit site survey tool has helped NSTAR increase the effectiveness and reliability of each deployment.

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Deploying AMI Solutions

A Best Practices Approach

This paper is authored by Salim Patel, Richard Scafuto, Warren Westrup and Don Troxell.

Executive Summary

This white paper is intended to help Utility customers plan their AMI deployment by adopting best practices. The paper outlines best practices around the design, deployment and operation of wirelessly enabled smart meters. These best practices will help avoid common deployment, testing and management problems.

at&t

Smart Grid is a framework to modernize the power generation, transmission and distribution systems via the use of latest information technologies. The Department of Energy defines a Smart Grid as the transformation from a centralized, producer-controlled network to one that is less centralized and more consumer-interactive. Efficiency, reliability, flexibility, remote monitoring and grid visibility are some of the key attributes used to define a Smart Grid.

Fundamental enabling technologies for Smart Grid are sensing and measurement technologies with data from the sensing and measurement devices integrated with the utility's integrated system communications. These technologies provide real-time information and control to support faster and more accurate response such as remote monitoring, time-of-use pricing and demand-side management.

Within the Smart Grid framework, technologies like Advanced Metering Infrastructure (AMI) leverages 'smart' devices deployed at homes and other end-points to not only measure and analyze usage but also offer pricing based on time of use and device types. This is achieved via the use of two-way data transmission with the smart meter.

Wireless enabled devices like smart meters are being adopted in AMI solutions utilizing the AT&T wireless data network. A comprehensive approach in the planning, design and deployment of wireless AMI solutions can help avoid some of the common pitfalls. A robust wireless AMI solution must account for factors like wireless coverage variability and end-point manageability.

This white paper describes several best practices identified by AT&T that can help utilities avoid common deployment, testing and management problems associated with their wireless AMI deployment.

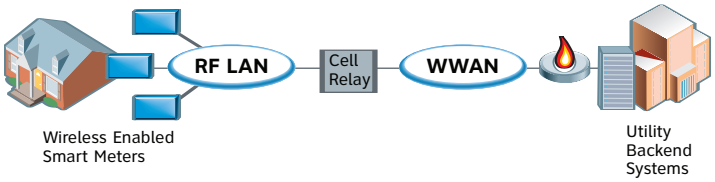
AMI Solution Reference Architecture

Wireless AMI solutions come in two basic flavors: mesh and point-to-point. In a point-to-point solution, each wireless end-point connects directly to the backend systems over a cellular/WWAN link. In a mesh solution, multiple end-points are aggregated locally over a WLAN; each aggregation point connects to the backend systems over a cellular link.

Mesh networks can be comprised of a Home Area Network (HAN), commonly based on Zigbee standard and a Local Area Network (LAN) that can operate in both licensed and unlicensed spectrum. The aggregation point, often called a Cell Relay (CR), is equipped with a cellular modem. The radios in the device (e.g. meter) end points transmit to the CR over a private RF network, primarily over unlicensed spectrum. It has the capability to aggregate multiple end-points and transport the information over the WWAN to the backend systems. The CR can be under-glass or pole mounted types. In the under-glass type the cellular modem and antenna is within the meter housing with no external antenna port. Pole mounted types have external antenna for improved wireless reception.

The CR connects to the backend systems, hosted by the Utility customer, over private links. AT&T offers a comprehensive solution for data center connectivity, which leverages custom Access Point Name (APN) defined in the GSM/UMTS standard.

Figure 1: Mesh AMI Solution Architecture



AT&T Mobility Commercial Connectivity Services

AT&T Mobility Commercial Connectivity Services (CCS) enables a customer to extend its private network into AT&T Mobility's cellular network CCS enables cellular connected devices to appear 'on the customer network' using the customer's IP addressing scheme and security policies.

There are three parts to the CCS design architecture: (a) cellular end-point configuration, (b) network connectivity and (c) customer network configuration. Each one has associated best practices that can stand alone, but following best practices on all three component parts can result in a more comprehensive solution.

Cellular End-Point Configuration

In both point-to-point and mesh architectures, each cellular end-point (or CR) should have a static IP address. A static IP address can better facilitate a correlation between IP address, phone number and wireless device serial number. Once entered into customer's databases and management systems, the IP address will be constant for the life of the device.

Dynamic IP addressing should be used only if the device has the ability to update the customer-owned server each time the IP addresses changes on the device. The customer must have a backend server that will log the current IP address of each device (dynamic DNS) and provide the ability for management systems to acquire the updated IP address when needed.

Each IP address should also be in the private IP address range. Utility customers may find it useful to refer to Internet Engineering Task Force (IETF) Request for Comment RFC 1918 – Address Allocation for Private Internets for private IP addressing standards. Unlike IP addresses in the public IP address range, these private IP addresses are not globally assigned and are not routable on the public Internet.

In addition to IP address considerations, wireless device functionality should be analyzed before deploying a wireless AMI solution. Specifically, some cellular devices have SMS capability. SMS can be used for device wake up or device management functions. For device wake up, after receiving an SMS message, the device issues a packet data protocol (PDP) connection request message to the wireless network. This limited connection request is relatively benign from a security perspective. For device management, the device is able to accept commands from users, execute the command and generate a reply to the SMS message. It is possible for unauthorized users to exploit the SMS device management functionality to gain access to the

device information and control device behavior by issuing commands. Accordingly, it is a good idea to disable the SMS command functionality or turn off SMS altogether via SIM provisioning. It is also recommended to disable voice call capability via SIM provisioning.

AT&T Network Connectivity

CCS provides multiple options for network-to-network connectivity. These options include Frame Relay, Network VPN and IP-enabled PVC. The Network VPN option can be used as the back up option for Frame Relay or IP-enabled PVC. CCS offers a number of customizations tailored to the customer needs.

To help ensure the highest level of CCS service availability, CCS is deployed with Geo-Diversity features as a standard practice. Redundant connections are deployed between the CCS customers' private Enterprise Network and 2 different Geo-Diverse AT&T Data Centers to help ensure that CCS service is not impacted in the event of a single CCS Network-to-Network connection outage.

AT&T has multiple Geo-Diverse Data Centers in the U.S. In the unlikely event of a catastrophic failure of a data center, the redundant data center can provide backup connectivity. Within data centers, each system has built-in redundancy and utilizes carrier grade appliances. Carrier grade systems are tested and engineered to high availability standards, and provide fast fault recovery.

Customer Network Configuration

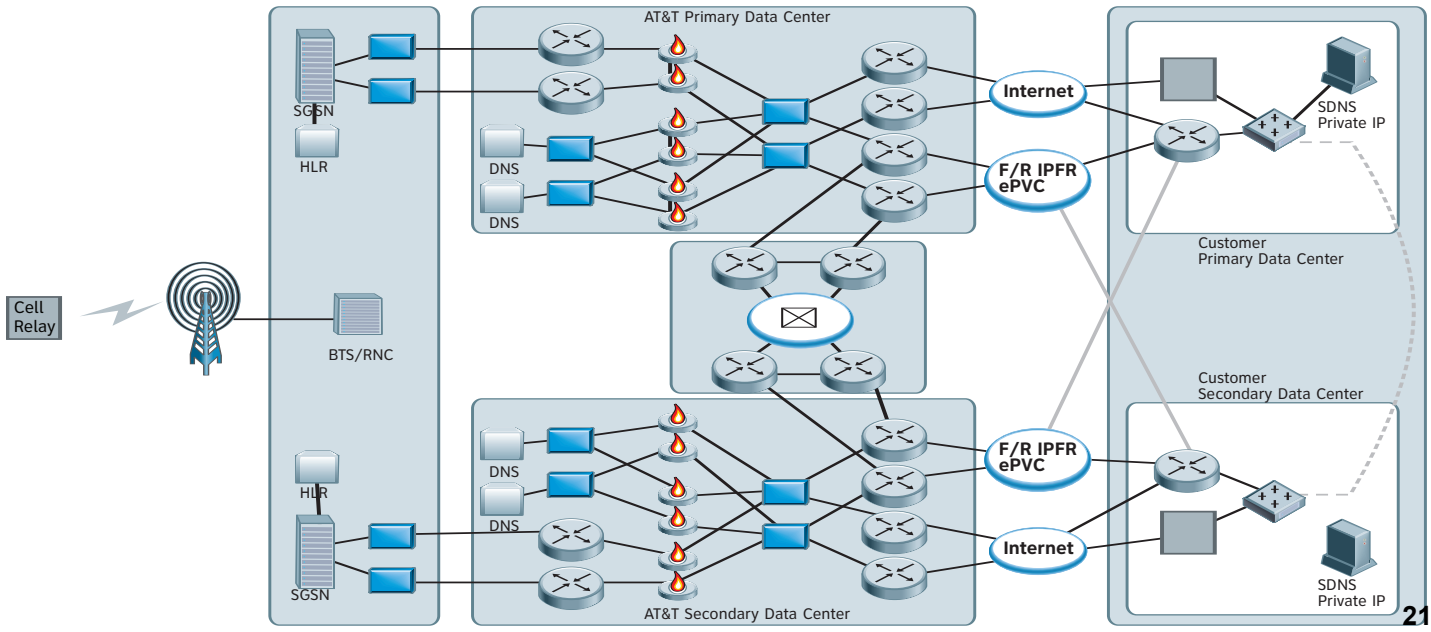
Utility customers desiring to connect their corporate data centers to AT&T's wireless network using one of the CCS offers should also build their network with full geo-redundancy. A primary/secondary data center concept should be employed where the customer's data centers are geographically separated. Each customer data center should not share a carrier's point of presence (POP) for connectivity. For example, two geographically diverse circuits traversing through the same fiber bundle can negate the geo-diverse redundancy. In addition, all IP addressing such as servers, NTP, DNS, etc. should use private static IP addressing as discussed earlier.

The customer's primary and secondary data centers should also be connected. If the AT&T primary data center fails, all traffic will be routed to the AT&T secondary data center and then to the customer's secondary data center. Two options are available if the customer would like the traffic to be routed to their primary data center. The first option is for the customer to provide a back-end network allowing traffic to flow through the customer's secondary data center to the customer's primary data center (red dotted line in figure 2). The second option is for the customer to add PVCs or IP-enabled PVCs on the front-end network (red solid line in figure 2). When building data links, the customer must calculate the maximum bandwidth required and provide adequate availability and performance.

All connectivity should employ BGP as the routing protocol. BGP is a standard protocol document in Internet Engineering Task Force (IETF) Request for Comment RFC 4271 providing a robust mechanism for network reach-ability. When choosing the BGP Autonomous Systems (AS) number, the customer can use their registered number (1-64511) or can use a number set aside for private use (64512-65535, excluding 64601). Within BGP the customer should provide a default route to AT&T. The customer can then manipulate how traffic is routed from the AT&T network to the customer's network without the need to contact AT&T.

The customers should provide their own Domain Name Servers (DNS). This allows easy IP address additions and changes to servers within their network. Mobile devices can make requests to names rather than IP addresses. If the customer wishes to change the IP address of that server, they can simply make a change to the DNS, without changing each wireless end-point.

Figure 2: AT&T CCS Reference Diagram



AT&T Enterprise On-Demand

AMI deployments are large in scale with millions of possible end-points. Wireless deployments of this magnitude require device activation and inventory management tools to ensure operational ease.

AT&T's Enterprise on Demand solution provides a unique set of services to give utility customers added flexibility with sizable wireless data deployments. EOD is a SIM ordering, activation and management platform that helps high-volume customers to self-manage large numbers of wireless end-points more cost-effectively. It provides customers flexibility and autonomy to control and administer wireless data services.

EOD activities are administered via a custom web portal. Some of the key functionalities include self-activation of SIM, SIM inventory management, feature management and reporting tools. It also provides access to enterprise help desk with ability to enter and track service tickets.

AMI Smart Meter Site Selection

Wireless coverage is variable in nature and smart device and cell relay (CR) location is a critical consideration. Unlike traditional mobile devices, the CR location is in the meter attached to a pole or a house and therefore fixed. RF conditions may change over time and a poor location choice will be detrimental to the CR performance.

CR placement can be a source of many issues. These issues are generally around the topic of accuracy of coverage information provided by service providers. Anecdotal reports points to a variance of up to 20dB between the RF propagation information provided to the customer and the actual observed signal levels. This can result in a reevaluation of the site selection process. Wireless propagation modeling is an estimation that depends on the accuracy of terrain and morphology information used in the tools.

Following are some best practices for the CR site selection process:

- Utility customer should develop a comprehensive Methods and Procedures (M&P) document for site survey and selection process to standardize the field team activities. This M&P will help vendors and sub-contractors adhere to the policies and best practices outlined by the utility customer.
- Prescreen site candidates using network data and other operational criteria; select a minimum of four candidates. Do not solely rely on wireless propagation data, combine propagation maps with drive test data and cell site information. Cell location, antenna height and orientation can help better predict expected coverage. Note that drive test data is not readily available in all areas and available data is generally at street level. AT&T can provide network data under NDA, but the customer should have the expertise to interpret and effectively utilize this information to streamline the site selection process.
- Survey each candidate; take at least ten measurements per candidate, and use the median value for final decision. Define multiple measurement points per location to identify any multipath effects in the area. Wireless coverage is non-line of sight in nature; coverage can vary at a location due to obstructions and moving objects close to or far from the measurement point. Build a fading margin of +/- 5dB in the measurements. Document the measurement by taking pictures of the location and identifying measurement points. Ensure no possibility of physical obstruction and analyze foliage growth. If possible, mount a cell relay close to the final location for measurement. Create a diagram onsite to document the test location and signal strength.
- Utilize a coverage validation tool or a cell relay in test mode as the survey device. Ensure proper calibration to avoid incorrect measurements. Do not use a phone in test mode; different phones have different front-end sensitivity and can provide readings not representative of a CR. Ensure that RSSI measurements are recorded in dBm (signal strength relative to 1mW) Some measurement devices may require correlating the actual reading with a translation table to calculate dBm values. Please refer to the user guide of the test equipment for details.
- Select a location with coverage from one dominant server (cell site). If possible, avoid hand off borders. This will result in consistent coverage, by avoiding 'ping-pong' between two or more cell sites. Record dominant cell ID and strong neighbor ID for future reference.
- Select the best overall candidate for installation, only select locations registering RSSI greater than -85dBm. Consider the +/- 5dB fade margin in making the final decision.
- Consider pole mounted CR with external antenna option to address locations with marginal coverage. External antenna options can help improve received signal strength.

AMI Deployment and Acceptance Testing

Deployment and acceptance testing refers to methods and procedures to install, turn up, test and document the CR installation.

Typically, CRs are installed if the selected location has an RSSI better than -85dBm. The technician installs and turns up the CR and confirms successful connectivity by visual inspection. No actual burn-in tests are conducted and backhaul connectivity is verified through Network Management Systems. This methodology is not comprehensive and can overlook common problems that can be easily addressed in the installation and commissioning process.

If after deployment the CRs encounter connectivity failure, the troubleshooting process determines the best course of action. The corrective measures can range from the use of previously surveyed alternate site or the use of pole-mounted, external antenna or repeater solution.

Following are some best practices to facilitate smooth deployment and help minimize costly relocations:

- Create a pre-production/lab environment for configuration and change management. Test and verify all new and modified system parameters before deployment in the lab environment.
- Use standard coverage validation tool or CR to verify surveyed RSSI and covering cell site. Ensure the signal strength at the exact installation location is better than -85dBm.

- Define a standard set of tests that can be conducted from the CR or from the backend systems. These tests can include ICMP pings to and from the CR, transfer of typical files (e.g., 5MB) to and from the CR, opening and closing of specific ports on the CR (e.g., port 1153) and other application layer testing available in the solution.
- After installing the CR conduct burn in testing, repeat the set of tests at least 3 times. Document test results like success rates, throughput, latency, serving Cell ID and signal strength. Make note of any anomalies encountered during the testing.
- Utility customer must define a troubleshooting and triage process to isolate problem source. The complete AMI solution leverages multiple radio technologies, connectivity solutions, service providers, device vendors, backend systems, etc. A comprehensive troubleshooting process can help avoid confusion during outage resolution. Utility customers should have in-house expertise to isolate problems by connectivity segments and have the proper escalation paths defined to contact the proper resources. AT&T Enterprise Technical Support is a help desk to help desk service available to utility customers with AMI solutions from AT&T. AT&T Enterprise Technical Support can troubleshoot issues related to AT&T's wireless network.

AMI System Monitoring and Reporting

CR performance and status monitoring is an important component of the AMI solution. However, most vendors do not have a comprehensive Operational Support System (OSS) strategy.

In some instances ping tools are in-use to monitor the CR status after install. These tools ping the CR at a user configurable setting. Summary reports are available to identify unresponsive devices. Ping tools are limited in scope and cannot provide reliable performance statistics. Some cellular enabled devices are capable of providing modem specific logs; these logs can provide more comprehensive performance indicators.

As smart meters proliferate, more focus will shift towards comprehensive troubleshooting and reporting capabilities. It is important to incorporate such capabilities in the design phase of the solution. Ongoing operational aspects like status monitoring, key performance indicators and reporting must be defined in details. Monitoring and reporting of wireless devices can be performed from the device and network perspective.

Device Side Metrics

Device side statistic refers to parameters reported by the wireless modem on the smart meter. These can include usage and performance statistics. Metrics like connection attempts and failures, throughput, latency, and PDP context statistics can be extracted from the modem logs. These metrics can extend the monitoring capability beyond ICMP ping.

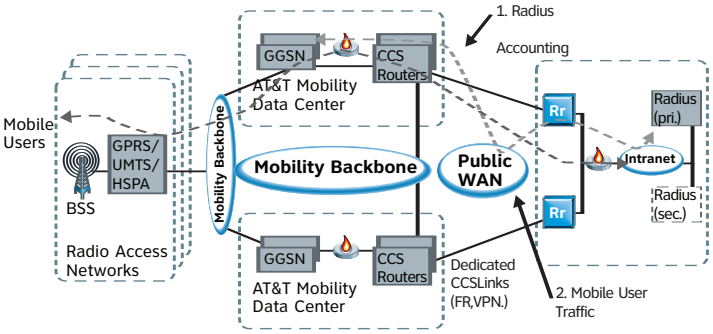
AMI vendors must provide Network Management Systems that can extract these statistics from individual end-points and provide canned reporting solutions. Care must be taken not to overload the smart device with management tasks.

Network Side Metrics

Network side statistics refer to metrics collected and reported by wireless networks. These statistics are reported at a cell site level; customer device specific reports are not readily available. Customer specific monthly manual reports can be generated, but they are not useful for near-real-time monitoring.

RADIUS accounting records is another option to collect, monitor and report CR activities from the wireless network perspective. These statistics can identify issues related to wireless connectivity. A utility customer wanting to leverage RADIUS records for end-point management must have a commercial RADIUS product that supports all required capabilities specified in the IETF RFCs defining the RADIUS protocol for accounting: RFC2866. This RFC is available online at www.ietf.org/rfc/rfc2866.txt .

Figure 3: Sample Customer Hosted RADIUS Accounting Solution



The various attributes available in a RADIUS start and stop records are summarized in the following tables:

Figure 4: RADIUS Start Record

AVP Name	AVP Type Code (Decimal)	Value Format	Value Default
User-Name	1	String	
Class	25	String	
Acct-Session-ID	44	String	
Acct-Status-Type	40	Integer	(1)
NAS-IP-Address	4	IP Addres	
NAS-Port	5	Integer	(60,000)
Service-Type	6	Integer	(2)
Framed-Protocol	7	Integer	(7)
Framed-IP-Address	8	IP Address	
NAS-Port-Type	61	Integer	(5)
Calling-Station-Id	31	String	MSISDN
Calling-Station-Id	30	String	(APN name)
NAS-Identifier	32	String	
Acct-Authentic	45	Integer	
Acct-Delay-Time	41	Integer	
NAS-Port-ID	87	String	(GGSN name)

Figure 5: RADIUS Stop Record

AVP Name	AVP Type Code (Decimal)	Value Format	Value Default
User-Name	1	String	
Class	25	String	
Acct-Session-ID	44	String	
Acct-Status-Type	40	Integer	(1)
NAS-IP-Address	4	IP Addres	
Service-Type	6	Integer	(2)
Framed-Protocol	7	Integer	(7)
Framed-IP-Address	8	IP Address	
NAS-Port-Type	61	Integer	(5)
Calling-Station-Id	31	String	MSISDN
Calling-Station-Id	30	String	(APN name)
NAS-Identifier	32	String	
Acct-Authentic	45	Integer	
Acct-Delay-Time	41	Integer	
Acct-Input-Octets	42	Integer	
Acct-Output-Octets	43	Integer	
Acct-Input-Packets	47	Integer	
Acct-Output-Packets	48	Integer	
Acct-Termin.-Cause	49	Integer	
Acct-Session-Time	46	Integer	
NAS-Port-ID	87	String	(GGSN name)
NAS-Port	5	Integer	(60,000)

AT&T can provide RADIUS start and stop records; this option is available as a part of the CCS offer. RADIUS accounting records are provided on a best effort basis. Start and stop records may be delivered out of sync, and utility customer's collection and reporting tool must be able to account for this anomaly. Standard UDP port 1813 is used for all RADIUS accounting records. It is recommended that utility customers implement RADIUS servers in an N+1 redundant configuration. AT&T GGSN will deliver these records directly to the customer RADIUS servers.

Utility customers can collect the various attributes recorded in the RADIUS accounting records and develop metrics to monitor end-point usage and performance. Metrics like uptime, session time, transferred packets, termination cause, etc. can be used to monitor end-point status and performance.

Key Performance Indicators and Thresholds

Key Performance Indicators refer to summary statistics derived from individual counters. KPI can collect a variety of counters and combine them to summarize performance conditions.

KPI's can be utilized to monitor status or performance on a near real-time basis. It can also be used for daily/weekly/monthly summary reports. Performance thresholds can be defined based on historical averages or industry standards.

AMI Security

AMI solution security must be viewed within the larger context of Smart Grid security. Smart Grid security is sub-divided in three security domains: generation systems, transmission systems and distribution systems. Each domain poses unique security challenges. System availability, data integrity and confidentiality are all important to the smooth operation of any AMI solution.

AMI solutions of today leverage a variety of connectivity options for normal operation. A single smart meter can have multiple wired and wireless connections like Zigbee, EDGE/UMTS etc. Each link or connection point should employ security features and access should be restricted by the utility to authorized users.

Some AMI vendors leverage SMS for management tasks. As discussed earlier, this is a potential security risk and utility customers should minimize the risk by either disabling the SMS command functionality or by turning-off SMS via SIM provisioning. Similarly, voice call functionality should be disabled. Any management connections and ports should employ access control mechanisms established by the utility customer. Utility customers should also encrypt their transmitted and stored data to help protect consumer privacy and minimize device tampering.

AMI and Smart Grid security is an important topic and is addressed in depth in a separate white paper.

Summary

The use of wireless technologies in AMI solutions may be a new trend but the technologies themselves are not. Wireless packet data networks have been in operation for almost a decade. Many of the best practices gleaned from AT&T's experience with wirelessly enabling a variety of applications directly apply to AMI solutions. AT&T believes that AMI deployments can greatly benefit from these best practices.

Specifically, a comprehensive plan that leverages best practices around the solution design, deployment methods, management tools and security measures can result in a successful and smooth AMI deployment.

References

Department of Energy, The Smart Grid – An Introduction, prepared for the U.S. Department of Energy by Litos Strategic Communication http://www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages.pdf.

For more information contact an AT&T Representative or visit www.att.com/business.

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PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY
REQUEST FOR APPROVAL
OF AN ADVANCE METERING SYSTEM (AMS)
DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS
OF
F. ALLAN BURKE

ON BEHALF OF
TEXAS-NEW MEXICO POWER COMPANY

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EXHIBIT FAB-1
TNMP DEPLOYMENT PLAN BY CITY BY QUARTER 2010 – 2015.

EXHIBIT FAB-2
TNMP SAMPLE GE I210+C FACTORY METER TEST RESULTS

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is F. Allan Burke. I serve as Director of the Retail Electric Provider (REP) Relations Department of Texas-New Mexico Power Company ("TNMP" or "Company"). My business address is 577 North Garden Ridge Boulevard, Lewisville, Texas, 75067.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I earned a Bachelor of Business Administration in Accounting in 1992 from The University of Texas at Arlington. I obtained my Certified Public Accountant license in 1995. I have over 15 years of professional accounting experience, including financial preparation and analysis, budgeting, and forecasting.

In March 1999, I joined Facility Works, Inc., an unregulated affiliate of Texas-New Mexico Power Company, as Controller. After a few weeks, it was determined that future financial profitability of Facility Works was questionable and a decision was made to terminate operations in October 1999. I returned in February 2000 to Texas-New Mexico Power Company as a project manager for electric deregulation. In 2002, I was promoted to Manager of the newly created REP Liaison Department, as a result of deregulation in Texas. Shortly after the TNMP acquisition by PNM Resources in 2005, I was promoted to Director – REP Relations.

I have previously filed testimony in Docket No. 36025, TNMP's most recent rate case.

Q. PLEASE SUMMARIZE YOUR DUTIES AS THE DIRECTOR OF REP RELATIONS FOR TNMP?

A. I am responsible for the REP Relations Department and report directly to the Vice-President of Texas Operations. The department is responsible for providing a primary point of contact for market issues that affect TNMP's billing and operations. The REP Relations Department handles the initial contact and resolution for Market Participants,

including ERCOT, Retail Electric Provider's (REP), and other Transmission and Distribution Service Providers (TDSP's).

Q. HAVE YOU PREPARED ANY EXHIBITS?

A. Yes. I am sponsoring Exhibits FAB-1 through FAB-2, which are attached to my testimony. Each of these exhibits was prepared by me or under my direction and control. The information contained in these exhibits is true and correct to the best of my knowledge and belief.

II. PURPOSE AND OVERVIEW OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony will be to:

- Describe the objectives sought to be achieved by TNMP's implementation of its AMS.
- Describe the implementation and deployment of TNMP's AMS.
- Describe costs that will be saved and incurred as a result of TNMP's implementation of its AMS.

Q. WHAT IS YOUR ROLE IN THE IMPLEMENTATION OF TNMP'S AMS?

A. From an operational perspective, I will be overseeing the implementation of approximately 240,000 advanced meters in TNMP's service territory. This entails coordinating the meter implementation schedule with the 3rd party vendor, accounting for both incoming and outgoing inventories, and handling any end-use customer and REP issues as they arise.

III. OVERVIEW OF TNMP'S APPLICATION

Q. WHY IS TNMP MAKING THIS FILING?

A. Through this petition and application, in accordance with P.U.C. SUBST. R. 25.130(d), TNMP requests approval of its proposed Advanced Metering System Deployment Plan and approval of an AMS surcharge. Under its advanced meter deployment plan, TNMP will provide full deployment of advanced meters to approximately 240,000 retail electric customers over the period 2011-2015. In addition, TNMP requests approval of an AMS Surcharge tariff to recover the reasonable and necessary costs it will incur under the

deployment plan for the full deployment of advanced meters to residential and non-residential customers in its retail electric service area, except for those customers who have Interval Data Recorder (IDR) meters or take unmetered service.

Q. PLEASE SUMMARIZE THE PRINCIPAL ELEMENTS OF TNMP'S AMS INITIATIVE.

A. This initiative involves the installation and operation of AMS technology across TNMP's non-contiguous service territories beginning in the first quarter of 2011 with completion of the system build out in 2015. The system will meet all the functionality requirements of the Commission's rules as described in detail by Mr. Gary Kessler. TNMP's plan is to use a two-way communication system over public wireless, IP-based, Smart Grid technology for its AMS. Mr. Kessler's testimony describes the back-office systems and enhancements required to enable the AMS system. He will also describe the required Web Portal integration and its deployment schedule. Together, these will provide market participants and customers with usage data as prescribed by the rule. As Mr. Stacy Whitehurst will describe, TNMP will implement activities to educate retail consumers and REPs about the benefits and information available through use of the AMS system so they may better take advantage of those benefits. Additionally, as described by Mr. Whitehurst, TNMP will provide low-income consumers with home energy monitors. These monitors will provide real-time energy usage information, which will enable these low-income customers to adjust their consumption to reduce their current electric bill. This information may also prepare them to take advantage of time-of-use pricing products that may be offered by REPs in the future.

IV. OBJECTIVES SOUGHT TO BE ACHIEVED BY AMS

Q. WHY DOES TNMP PROPOSE THE INSTALLATION OF THE AMS?

A. TNMP is the last major investor-owned utility in ERCOT with over 50,000 Electric Service Identifier (ESI ID's) that has not filed for an approval of a deployment and surcharge. TNMP proposes to install and operate AMS technology in order to make the benefits the technology provides available to the retail electric market participants as well as end-use retail customers. The Texas Legislature and the PUCT have both encouraged electric delivery utilities, through various rulemakings and workshops, over the last few years to deploy AMS so the consumers in the Texas retail market will be able to take advantage of potential new service offerings from REPs. Texas consumers will gain access to better understanding of their energy usage information through

various tools to better manage their energy budgets. End use customers will now be given a chance to better control their electricity usage with the increased knowledge that AMS provides them and their REPs, who hopefully will initiate energy conservation programs, such as time-of-use rates, dynamic pricing, and other energy efficiency and demand responsive products. These new offerings have the promise of helping to control the rate of demand growth in ERCOT, which has benefits for customers as well as the environment. Second, TNMP should see improved reliability with the advent of AMS. With instantaneous data from the meter, and the utilization of an Outage Management System (OMS), TNMP will know of outages before consumers. Third, the deployment and use of AMS is voluntary unless ordered by the Commission. From a financial forecasting perspective, it makes more sense for TNMP to proactively file and control any regulatory risk of being ordered to deploy an AMS before thorough investigation and analysis can be performed.

Q. PLEASE EXPLAIN HOW THE AMS WILL ENABLE TNMP TO PROVIDE BETTER SERVICE TO THEIR END-USE CONSUMERS.

A. As previously stated, TNMP is the last major ERCOT investor owned utility to file for approval of AMS deployment plan and surcharge. This will allow ERCOT and REPs to have data from more meter points in order to more timely and accurately allow full settlement of the wholesale market. AMS technology will enable TNMP to provide more granular, accurate, and timely electric consumption information to REPs and end-use consumers. It will provide the mechanism to perform connections and disconnections of service more quickly by means of the remote connection/disconnection switch in the new 200 amp meters. AMS technology will provide TNMP with real time outage information not currently available today. This information will enable faster, more accurate outage analysis and improved restoration response time. The new system will also provide TNMP with load and voltage data information for each meter point. That data will aid in finding, analyzing, and responding to power quality problems affecting consumers.

Q. WILL AMS ALLOW TNMP TO REDUCE THE COSTS OF PROVIDING SERVICE TO END USE CUSTOMERS AND REPS?

A. The primary cost savings for TNMP is related to reducing the cost of reading meters. Meter reading cost savings will be driven by reduced labor and fleet expenses due to eliminating the need to manually access each meter monthly to obtain usage information. In TNMP's rate case, Docket No. 36025, the test year adjusted meter

reading expense was $1,911,782[1] (test year was from April 2007 to March 2008). Second, there will be some savings associated with move-ins where existing service has already been installed, move-outs, reconnects, and disconnects. Improved outage restoration information and power quality monitoring will be useful for proving better service, but are not likely to significantly reduce costs. The meter reading and cost savings do not equal the increase in costs resulting from the AMS capital investment recovery and new operations and maintenance (O&M) expenses necessary to operate the new system. That is why a surcharge is necessary for TNMP to continue with this investment. The largest beneficiaries of the new AMS system will be REPs and end-use customers for the reasons that were discussed previously. Additional cost savings for end-use customers will be realized through reduced discretionary fees for connects, disconnect/reconnect for non-pay, and special read orders.

Q. WHAT ARE THE ESTIMATED COST SAVINGS AS A RESULT OF THE DEPLOYMENT OF ADVANCED METERS?

A. One of the areas where TNMP expects to save costs is in elimination of the meter reader position. As of the date of this submittal, the Company has twenty-four (24) full-time regular meter readers and eleven (11) temporary meter readers throughout its territories. The chart showing the number and timing of the reductions follows:

City	Full-Time / Temp	Number	Reduction (#-Year)
League City	Temp	9	4-2011, 5-2012
League City	FT	3	2-2012, 1-2013
West Columbia	FT	4	2013
Lewisville	Temp	2	1-2013, 1-2014
Lewisville	FT	2	2014
Pilot Point	FT	1	2014
Leonard	FT	2	2014
Bogota	FT	1	2014
Nocona	FT	1	2015
Olney	FT	1	2015
Gatesville	FT	1	2015
Clifton	FT	3	2015
Glen Rose	FT	1	2015
Fort Stockton	FT	1	2015
Pecos	FT	2	2015
Kermit	FT	1	2015
	TOTAL	**35**	

[1] Please see the Schedules supporting the Stipulation from Docket No. 36025.

Current estimated yearly cost savings as a result of headcount reductions is as follows:

Position	Count	Average Salary	Total
Meter Reader	24	[2]$44,699	$1,072,776
Meter Reader – Temp	11	[3]$35,000	$385,000
Total	35		$1,457,776

Additional savings will result from the reduction in items such as fleet, fuel charges, and maintenance costs. These savings are quantified in the McKinsey model.

Q. WHEN WILL THE COST REDUCTION RELATED TO METER READING BE ACHIEVED?

A. The deployment schedule will permit TNMP to achieve savings related to meter reading in the Gulf Coast and North Texas regions first, followed by subsequent savings in the remaining regions of Central and West Texas. As a result of headcount reduction, savings will be achieved as early as 4Q-2011. Said savings will continue as the Company rolls out the Advanced Meters throughout its territories, thereby reducing headcount in accordance with deployment. As such, TNMP is expected to achieve savings in 2011 – 2015 respectively. These savings will be realized as sufficient meters are installed in specific areas. Meter reader positions will be eliminated within 30-90 days after the appropriate amounts of meters are replaced.

Q. WILL THERE BE SEVERANCE COSTS ASSOCIATED WITH TNMP'S AMS DEPLOYMENT PLAN?

A. Yes. There will be severance costs associated with the Company's AMS deployment plan, specifically in the aforementioned reduction of all full-time regular meter reader positions. Impacted employees will be eligible to receive severance in accordance with the Company's severance plan which includes four (4) months salary; six (6) months benefit coverage, an added modifier based on full years of service, and any other company standard benefits.

Q. PLEASE EXPLAIN WHY SOME OFFICES WILL NOT SEE A REDUCTION IN METER READING EXPENSES.

[2] Includes Health and Welfare benefits costs

Because of TNMP's diverse and non-contiguous service territory, many smaller offices are not using, and do not require, fully dedicated meter reading resources. These offices are Emory and Whitewright in North Texas, Strawn and Whitney in Central Texas, and Sanderson in West Texas. Meters are read in these areas by Meter Readers from other nearby locations so that the smaller office Energy Technicians (ETs), who provide a multitude of other services, can continue to maintain reliability and response times.

Q. DOES TNMP EXPECT TO INCUR ANY ADDITIONAL COSTS AS A RESULT OF THE IMPLEMENTATION OF THE AMS DEPLOYMENT PLAN?

A. Yes. TNMP is expected to increase headcount, an additional nine (9) employees, in some areas due to the new accountabilities, systems, and implementation of new technology. The majority of these additions will be at a professional/exempt level and a higher salary and benefit cost. These factors should compound annually, therefore increasing the operations and maintenance budget significantly over the years. Furthermore, severance (see above) will be an additional cost as a result of the AMS implementation, as well as costs associated with unemployment wages for those employees who are laid-off and subsequently file an unemployment claim. As such, the Company expects to see an increase in unemployment claims, which will result in increased employer paid taxes in accordance with the Texas Unemployment Compensation Act and the Texas Workforce Commission.

Q. PLEASE DETAIL THE INCREASE IN HEADCOUNT FROM ABOVE AND DESCRIBE THE DUTIES FOR EACH NEW POSITION.

A. Due to the increase in information received from the AMR meters, TNMP will need to add 9 new employees:

- AMS Program Manager – (1)
- Fraud Coordinator – (1)
- Meter Shop Manager – (1)
- Outage Management System Operators – (4)
- Cost Accountant – (1)

[3] Includes temporary markup costs

- Meter Shop Technician – (1)

The AMS Program Manager is needed to serve as a primary coordination position for this major project. Primary job requirements for this position include:

- Provides leadership on statistical, modeling, and business analytics for assigned project teams
- Monitors project progress, status and risk using conventional project management methods appropriate for scale and complexity
- Provides consolidated view of analytics for operations within a business unit to facilitate information-based strategic planning, process improvement, and metrics development

The Fraud Coordinator is a new position needed by TNMP in order to gain a better understanding of all the new meter tamper data that will be created. TNMP does not currently have any position like this since tampering is handled by the Service Technicians on a one off investigation, as needed. Primary job requirements for this position include:

- Compliance with new PUCT meter tampering rule
- Revenue Protection
- Coordinate gathering data to work with Legal Department to prosecute offenders
- Single Point of Contact (PH/PR)

The Meter Shop Manager will be needed to coordinate with current meter shop staff all new incoming AMR meters will be tested in accordance with TNMPs current test policy. This position is also needed due to the vast increase in the amount of incoming inventory. Other job requirements for this position include:

- Oversees problem solving for meter issues for Load Department
- Assist Power Operations with Meter Audits for System Metering
- Assists System Engineering and the Meter departments with meter issues

The four (4) Outage Management System (OMS) Operators will be needed to provide full-time, 24 hour a day monitoring of TNMP's new OMS system. The new AMR meters will provide real

time outage and tampering information which will need to be analyzed with the OMS system. Other job requirements for this position include:

- Controls and operates the Company's transmission resources (voltage levels 46kV and above) and monitors the generation resources from a reliability perspective
- Coordinates and directs switching operation and maintenance of the transmission system
- Operates the system on a minute-by-minute basis to match firm and interruptible resources to obligations, balance generation and transmission shares between utility companies/market entities

The Cost Accountant will be needed to provide full financial reporting to the Program Manager. This position is warranted due to the magnitude of the cost of this project. Other job requirements for this position include:

- Acts as a liaison across functional and accounting groups to develop appropriate accounting treatment for project transactions
- Accesses emerging reporting needs on behalf of management and coordinates changes in reporting systems and formats to accommodate management decision processes

The Meter Shop Technician will be needed to provide start up project help for the new AMR meters as well as providing some additional help to the current Meter Shop personnel. Other job requirements for this position include:

- Meter programming and validation
- Old meter disposal by inspection
- Power quality

V. TNMP'S DEPLOYMENT PLAN

Q. WHAT HAVE BEEN THE FIRST STEPS OF THE AMS DEPLOYMENT PLAN?

A. TNMP initiated the first Pilot Program in December 2007 installing approximately 100 Elster A-3 meters in Clifton, Texas. This location was chosen in order to test the SmartSynch communication capabilities in a non-metropolitan area. These meters were successfully used to obtain remote, on-demand, and monthly billing reads on single-

family residential and small commercial premises. Following the Clifton Pilot, TNMP then deployed approximately 500 Echelon meters in various locations in the Gulf Coast territory and Lewisville on multi-family residential premises in June 2008. The Echelon meters were not only used to obtain on-demand and monthly meter readings, but also were used to successfully initiate on-demand turn-on and turn-off of meters for Disconnect for Non-Pay and Move-in/Move-out requests. TNMP then initiated the final Pilot Program in April 2009 and recently completed the installation of approximately 10,000 GE I210+C meters (8,000 meters in the Gulf Coast and 2,000 meters in Lewisville), in March 2010. The vast majority of these meters were installed on multi-family residential dwellings to expedite installation and reduce costs. This Pilot Program allowed TNMP and SmartSynch (SSI)[4] to test the functionality of the meters as prescribed in the Commission's rule. It provided the opportunity to identify and resolve problems with hardware, software, and communication issues. Please refer to witness Kessler's testimony for a more technical discussion of the three Pilot Programs.

Q. PLEASE DESCRIBE TNMP'S NEXT STEPS FOR AMS DEPLOYMENT.

A. TNMP's non-contiguous, diverse service territory will provide many challenges. The Company plans to deploy meters beginning in January 2011 in the densely populated Gulf Coast area first, followed by the densely populated area of Lewisville, then the rest of North Texas, followed by Central Texas, and finally West Texas, ending in December 2015. The plan will ensure the meters are deployed to the largest population of end-use customers in the most efficient and effective manner. Postponing implementation in the more rural areas of North, Central, and West Texas will allow cell phone technology, or other cost effective communication technologies to become more readily available. TNMP believes this strategy will allow the largest number of end-use customers and REP's the advantage of AMS benefits in the timeliest manner.

Q. WHY WERE THE CITIES IN THE GULF COAST AREA AND LEWISVILLE SELECTED FOR THE INITIAL FULL SCALE AMS DEPLOYMENT?

A. The deployment plan to install advanced meters in more populated, contiguous areas first allows TNMP to obtain efficiencies of meter readings and field operational costs as quickly as possible. Having the largest number of meters closest to existing field offices will allow TNMP quick and easy access to correct meter problems. Larger, more

[4] Please reference Mr. Kessler's testimony for more information about SmartSynch.

densely populated areas will greatly reduce the chance of poor communication issues. Also, deploying in higher populated areas first allowed the largest number of end-use customers and REP's the chance to gain advantages of AMR meters as quickly as possible by allowing quicker service order request times. These locations also provided the largest number of multi-family dwellings. This will also allow customer education efforts, as described in witness Whitehurst's testimony, to be focused in a smaller area to obtain the greatest understanding.

Q. HOW WILL THE AMS DEPLOYMENT CONTINUE AFTER THE INITIAL DEPLOYMENT?

A. After completion of implementation to the highly populated areas of the Gulf Coast service territory and Lewisville, TNMP will continue to deploy meters in the more rural North Texas areas. This is a more efficient use of resources since installation crews will already be in the Lewisville area. After the North Texas deployment is complete, installation crews will be directed to the Central Texas areas, including the cities of Clifton, Meridian, and Gatesville. Upon completion of all towns and rural areas in Central Texas, implementation crews will go to West Texas, including the towns of Pecos and Fort Stockton to complete installation of all TNMP service areas.

Q. IS IT THE EXPECTATION OF TNMP THAT THE AMS SYSTEM WILL PROVIDE FULL FUNCTIONALITY AND CUSTOMER BENEFITS IMMEDIATELY AFTER DEPLOYMENT?

A. Yes. Meters become fully functional within a few hours of installation. TNMP should have access to the automation of the newly installed meters within one to two business days after installation. TNMP plans to transmit 15 minute interval to the Smart Meter Texas Web Portal within one year after deployment begins.

Q. WILL THE INITIAL DEPLOYMENT INCLUDE THE FUNCTIONALITIES ASSOCIATED WITH THE JOINT WEB PORTAL UNDER DEVELOPMENT IN PROJECT NO. 34610?

A. As Mr. Kessler discusses in his direct testimony, TNMP expects Joint Web Portal (Smart Meter Texas) functionality within one year after deployment begins.

Q. WHEN DOES THE COMPANY PROPOSE TO COMMENCE MONTHLY STATUS REPORTS?

A. TNMP will file monthly progress reports within 15 days following the appropriate month end and semi-annual status reports commensurate with approved market procedures following the approval of the AMS Deployment plan by the Commission as required by PUC Substantive Rule 25.130 (d)(9). Assuming deployment begins on January 1, 2011, the first monthly status report should be filed on or about February 15, 2011.

Q. PLEASE PROVIDE EXAMPLES OF ANY REP RETAIL ENERGY PRODUCTS THAT ARE DEPENDENT ON AMS DEPLOYMENT THAT HAVE BEEN OFFERED TO RESIDENTIAL AND SMALL COMMERCIAL CUSTOMERS IN TNMP'S SERVICE AREAS WITHIN ERCOT.

A. I am not aware of any specific products being offered by REPs in TNMP's service territory as of the current time, although TNMP has been contacted by two companies to begin testing Home Area Network (HAN) devices once the TNMP filing has been approved.

Q. PLEASE PROVIDE THE ESTIMATED ACCURACY OF EXISTING STANDARD METERS ON THE TNMP SYSTEM.

A. Per the ANSI Meter Standards (C12.20), all accuracy class 0.5 meters (which are used by TNMP) must be within +/- .2% accurate under normal conditions. TNMP has been using a combination of Landis and Gyr single-phase and poly-phase residential and Elster commercial meters for the several years. In 2009, TNMP tested 3,929 single-phase meters with 56 failing these standards (1.43%), and 382 poly-phase meters with 2 failing (0.52%). All testing was done in accordance with ANSI C12.20 standards.

Q. PLEASE PROVIDE THE ESTIMATED ACCURACY OF NEW ADVANCED METERS WHICH TNMP PLANS TO DEPLOY ON ITS SYSTEM.

A. The complete meter accuracy process is described below. For the 10,000 meter Pilot Project, in 2009, TNMP tested 605 GE I210+C meters with 0 failing these standards (0%). TNMP has also dual metered 10 meters (8 Residential and 2 Light Commercial) in the Clifton pilot with no discernable differences between usage on the Elster A-3 meters and the previously installed meters. There are also plans to dual meter approximately 20 additional meters in the Gulf Coast and Lewisville areas in the near future.

Q. PLEASE DESCRIBE THE PROCESS TNMP PLANS TO IMPLEMENT IN ORDER TO ENSURE ACCURACY OF NEW ADVANCED METERS WHICH WILL BE DEPLOYED.

A. The new General Electric (GE) I210+C meters are also ANSI C12.20 class 0.5 meters and, therefore will have the same standards. All meters are tested in the GE factory before being shipped to TNMP. For the 10,000 meter Pilot Project, as well as meters to be deployed in the future, GE tests all meters prior to shipment to SSI. After SSI installs its communication module into the meter, SSI then retests the meters to ensure accuracy has not been compromised. See witness Kessler's testimony for more detailed description of the communication module installation process. A copy of an SSI test sheet is attached in Exhibit FAB-2. In addition to factory and SSI testing, TNMP tests one box in each pallet (approximately 4.2%) of meters prior to installation. If any meter in that box fails the accuracy test, TNMP then tests another box from the same pallet. If any meter from the second box fails the accuracy test, the entire pallet is rejected and returned to SmartSynch, which in turn would be returned to GE. If the second box passes the accuracy test, any inaccurate meter from the test would be returned.

Q. PLEASE PROVIDE SUPPORTING DETAILS FOR THE FIELD EMPLOYEES AND RELATED LABOR COSTS INCLUDED IN THE AMS DEPLOYMENT COST ESTIMATES FOR TNMP AND INDICATE WHETHER THESE ARE EXPECTED TO BE NEW EMPLOYEES.

A. TNMP will not hire any new employees to install the new advanced meters. As part of its bid, in addition to purchase of meters, SmartSynch also proposed acting as the primary contractor for installation of the AMR meters. SmartSynch will use Utility Partners of America (UPA), a third party meter installation company that has been in business since 1997, and has installed over six million gas and electric meters.

Q. PLEASE DESCRIBE THE MAJOR ASPECTS OF THE METER INSTALLATION PROCESS UPA WILL USE.

A. Prior to removal of the old meter, UPA will obtain the current meter reading and enter it into a handheld data collection device. UPA then takes a digital photograph of the old meter that will be used to re-verify the accuracy of the final read. All final meter readings will be 100% audited for validation. UPA then performs a voltage check on the meter base to ensure proper thresholds. UPA will then take a picture of the new meter. Both pictures of the old and the new meter will be stored electronically for future use and validation. After the new meter is installed, UPA will leave a door hanger at the customer premise notifying them of their new advanced meter. A copy of the wording of this door hanger is referenced in witness Whitehurst's testimony.

Q. HOW WILL TNMP NOTIFY CUSTOMERS OF THEIR UPCOMING ADVANCED METER INSTALLATION?

A. TNMP will send customers a postcard notifying them of their upcoming advanced meter installation approximately 2 weeks in advance of the anticipated installation date. The cost of customer notification is included in the Customer Education program.

VI. TNMP'S AMS COSTS

Q. HOW MUCH DOES TNMP EXPECT TO SPEND FOR THE AMS PROJECT FROM THE START OF THE PILOT PROJECT THRU DECEMBER 2010?

A. The chart below details all actual costs incurred to date and budgeted costs through December 31, 2010.

Description of Expenses	Total	Disposition of Dollar Spend
Elster A-3 Meter Project	65,502	Already Spent
Echelon Meter Project	74,303	Already Spent
GE I210+C Meter Project	3,478,306	Already Spent
Total Meter Project Expenses	**$ 3,618,111**	
AMS Case Expenses	1,012	Already Spent
AMS Surcharge	27,171	Already Spent
Advanced Metering Meetings and Meter Communication / Support Expense	121,599	Already Spent
Smart Grid Project Planning	436,521	Already Spent
TX AMS Business Study	143,477	Already Spent
Plexus - AMR Business Case Study	89,964	Already Spent
Solutions Cube Group - AMIT Meeting Facilitator	4,200	Already Spent
Travel	85,000	Ongoing
Meter Communication / Support Costs	78,600	Ongoing
Surcharge Proceeding Expense	350,000	To be Spent
Product Maintenance - OMS	60,000	To be Spent
Customer Education	298,808	To be Spent
New Employee Salaries	87,500	To be Spent
Corporate Overhead	38,518	To be Spent
Tax on 2010 Items to be Spent	18,447	To be Spent
Total IT Capital Spend	3,078,628	To be Spent
Total Pre-2011 Costs	**$ 8,537,556**	

Q. DO ALL OF THE COSTS DISCUSSED IN YOUR TESTIMONY TIE OUT DIRECTLY WITH THE COSTS INCLUDED IN THE MCKINSEY MODEL?

A. No. As set forth in the testimony of witness Michael Montgomery, while all of these costs are initially included in the McKinsey Model, these costs are adjusted after application of TNMP's loads and applicable taxes so as to develop the specific inputs into the Model.

Q. PLEASE DISCUSS THE COSTS OF THE METERS THAT WERE CHOSEN BY TNMP FOR THE AMR INSTALLATION.

A. TNMP has chosen to use the GE I210+C meter for single-phase residential installations and the GE KV2C for poly-phase commercial installations. A small number of poly-phase meters will be equipped with Reactive Power and Power Quality software for future use. The specific costs of these meters and the software can be found in the McKinsey model. Please refer to witness Kessler's testimony for more information on the GE I210+C meter.

Q. PLEASE DISCUSS THE COST OF METER INSTALLATION THAT WILL BE INCURRED DURING THE DEPLOYMENT OF AMR METERS.

A. As discussed previously, SmartSynch will act as the primary contractor for meter installation. SmartSynch will use UPA for the actual meter installation. Due to TNMP's diverse service territory, UPA bid its meter installation for single and poly-phase installations into three tiers: Suburban, Rural, and Desolate. Cities in each tier were determined using meter population and distance away from the nearest TNMP construction center (warehouse facility). The classification tier of each TNMP city can be found in the deployment plan (Exhibit FAB-1). The specific costs of the meter installation price, by phase and tier, can be found in the McKinsey model.

Q. PLEASE DISCUSS THE CREDIT FOR METER SALVAGE THAT TNMP WILL RECEIVE.

A. TNMP will receive $0.22 per pound from Utility Recycling Services (URS) as salvage value for each meter. Assuming an average meter weight of 3.5 pounds, TNMP is using a $0.77 per meter credit for salvage reimbursement.

Q. PLEASE DISCUSS ANY AMOUNT PAID TO THE METER VENDOR FOR PROJECT MANAGEMENT SUPPORT.

A. TNMP has agreed to pay SmartSynch for "Project and Deployment Management" on a per meter basis. The support provided from SSI includes:

- Project & Budgetary management
- Deployment design
- Front-End System Implementation training and support to include Transaction Management System (TMS) training, Meter Shop Training, and TMS Installation and Support
- Field Engineering Suport
- Site Validation
- RMA Management

The specific costs of the SmartSynch Project and Deployment Management can be found in the McKinsey model.

Q. PLEASE DISCUSS THE AMOUNTS INCLUDED IN ONGOING O&M EXPENDITURES FOR THE AMR DEPLOYMENT.

A. TNMP has agreed to pay SmartSynch for "Hosted Solution / Managed Services" on a per meter per month basis. These services include:

- Data Hosting, Collection, and monthly secured data delivery
- Airtime for data communication with meters
- Monthly Secured Data Collection and Delivery and Support
- Daily Export File via FTP or as needed
- Periodic on-call data
- Provide and operate the server and the communications connection to the wireless network
- Coordinate technical operations to manage meter and meter data
- Manage secure transfer or access to daily billing data and error reports generated by the server
- Perform daily backup of database and files

The specific costs of the SmartSynch Hosted Solution / Managed Services fees can be found in the McKinsey model.

VII. CONCLUSION

Q. WHAT ACTION DO YOU PROPOSE THAT THE COMMISSION TAKE IN THIS PROCEEDING?

A. As per PUCT Substantive Rule 25.130, electric utilities are authorized to assess a non-bypassable surcharge to recover costs for deploying an advanced metering system. TNMP is seeking approval of the deployment plan and the related surcharge in order to recover cash flow required for a project of this magnitude.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared F. Allan Burke, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is F. Allan Burke. I am of legal age, a resident of the State of Texas, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

F. Allan Burke

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 25th day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

TARRA L. STAUFFER
Notary Public, State of Texas
My Commission Expires
June 10, 2012

NOTARY PUBLIC in and for the
State of Texas

My Commission expires 6/10/12

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		Active			Inactive						Pilot Project Meters											
REGION	CITY	Single	Poly	Total	Single	Poly	Total	Sub-Total	Blank	SUB-GRAND TOTAL	Previously Installed Single	To Be Installed Single	Pilot Project Total	GRAND TOTAL	Const Ctr	Sub/Rural/ Des	Miles to CC	Sub-Seq	Master-Seq	Q1	Q2	Q3
GULF COAST	LEAGUE CITY	31,517	1,147	32,664	456	56	512	33,176		33,176	(4,698)	(1,500)	(6,198)	26,978	League City	S		1	1	10,000	11,000	5,978
GULF COAST	DICKINSON	8,731	435	9,166	339	17	356	9,522		9,522	(240)		(240)	9,282	League City	S		2	2			6,000
GULF COAST	TEXAS CITY	17,975	1,229	19,204	678	74	752	19,956		19,956	(2,238)	(500)	(2,738)	17,218	League City	S		3	3			
GULF COAST	LA MARQUE	5,895	468	6,363	282	20	302	6,665		6,665	(45)		(45)	6,620	League City	S		4	4			
GULF COAST	GALVESTON COUNTY	329	6	335	6		6	341		341			0	341	League City	R		5	5			
GULF COAST	FRIENDSWOOD	9,665	451	10,116	57	15	72	10,188		10,188	(81)	(300)	(381)	9,807	Friendswood	S		1	6			
GULF COAST	PEARLAND	401	1	402	4		4	406		406			0	406	Friendswood	S		2	7			
GULF COAST	ALVIN	13,493	826	14,319	599	26	625	14,944		14,944	(735)	(406)	(1,141)	13,803	Friendswood	S		3	8			
GULF COAST	WEST COLUMBIA	3,094	165	3,259	108	5	113	3,372		3,372			0	3,372	West Columbia	S	0	1	9			
GULF COAST	OLD OCEAN	12	1	13	1		1	14		14			0	14	West Columbia	R	8	2	10			
GULF COAST	MATAGORDA COUNTY	17		17			0	17		17			0	17	West Columbia	R		3	11			
GULF COAST	SWEENY	2,938	111	3,049	144	1	145	3,194		3,194			0	3,194	West Columbia	R	9	4	12			
GULF COAST	BRAZORIA	4,867	92	4,959	133	7	140	5,099		5,099	(61)		(61)	5,038	West Columbia	R	10	5	13			
GULF COAST	BRAZORIA COUNTY	916	60	976	30	5	35	1,011		1,011			0	1,011	West Columbia	R		6	14			
GULF COAST	HILLCREST VILLAGE	1		1			0	1		1			0	1	West Columbia	R		7	15			
GULF COAST	BAILEY'S PRAIRIE	353	11	364	10		10	374		374			0	374	West Columbia	R	9	8	16			
GULF COAST	ANGLETON	10,198	556	10,754	388	29	417	11,171		11,171			0	11,171	West Columbia	R	14	9	17			
GULF COAST	HOLIDAY LAKES	374	1	375	33		33	408		408			0	408	West Columbia	R	16	10	18			
LEWISVILLE	LEWISVILLE	37,850	2,218	40,068	439	64	503	40,571		40,571	(1,901)	(300)	(2,201)	38,370	Lewisville	S		1	19			
LEWISVILLE	DENTON COUNTY	1		1			0	1		1			0	1	Lewisville	S		2	20			
LEWISVILLE	COPPELL	1	19	20			0	20		20			0	20	Lewisville	S		3	21			
NORTH TEXAS	PILOT POINT	1,892	141	2,033	62	6	68	2,101		2,101			0	2,101	Pilot Point	R	0	1	22			
NORTH TEXAS	TIOGA	541	29	570	30		30	600		600			0	600	Pilot Point	R	6	2	23			
NORTH TEXAS	AUBREY	1,233	37	1,270	37	1	38	1,308		1,308			0	1,308	Pilot Point	R	7	3	24			
NORTH TEXAS	KRUGERVILLE	54		54	1		1	55		55			0	55	Pilot Point	R	9	4	25			
NORTH TEXAS	LEONARD	1,046	48	1,094	65	1	66	1,160		1,160			0	1,160	Leonard	R	0	1	26			
NORTH TEXAS	BAILEY	142	5	147	16		16	163		163			0	163	Leonard	R	6	2	27			
NORTH TEXAS	CELESTE	461	19	480	28	1	29	509		509			0	509	Leonard	R	7	3	28			
NORTH TEXAS	TRENTON	398	40	438	22	4	26	464		464			0	464	Leonard	R	7	4	29			
NORTH TEXAS	RANDOLPH	165	2	167	18		18	185		185			0	185	Leonard	R	8	5	30			
NORTH TEXAS	WHITEWRIGHT	1,213	74	1,287	56	1	57	1,344		1,344			0	1,344	Leonard	R	14	6	31			
NORTH TEXAS	WESTMINSTER	355	4	359	19		19	378		378			0	378	Leonard	R	15	7	32			
NORTH TEXAS	BLUE RIDGE	453	22	475	27	1	28	503		503			0	503	Leonard	R	15	8	33			
NORTH TEXAS	TOM BEAN	403	24	427	22		22	449		449			0	449	Leonard	R	18	9	34			
NORTH TEXAS	BELLS	533	18	551	28	3	31	582		582			0	582	Leonard	R	20	10	35			
NORTH TEXAS	ANNA	68	2	70	1		1	71		71			0	71	Leonard	R	21	11	36			
NORTH TEXAS	FARMERSVILLE	434	19	453	18	7	25	478		478			0	478	Leonard	R	25	12	37			
NORTH TEXAS	PRINCETON	2,595	96	2,691	133	4	137	2,828		2,828			0	2,828	Leonard	R	30	13	38			
NORTH TEXAS	GRAYSON COUNTY	1		1			0	1		1			0	1	Leonard	D		14	39			
NORTH TEXAS	BOGATA	868	22	890	58	1	59	949		949			0	949	Bogota	S	0	1	40			
NORTH TEXAS	ROSALIE	87		87	11		11	98		98			0	98	Bogota	R	2	2	41			
NORTH TEXAS	RUGBY	10		10			0	10		10			0	10	Bogota	R	4	3	42			
NORTH TEXAS	JOHNTOWN	141	15	156	13		13	169		169			0	169	Bogota	R	4	4	43			
NORTH TEXAS	DEPORT	414	14	428	29	1	30	458		458			0	458	Bogota	R	7	5	44			
NORTH TEXAS	FULBRIGHT	34	1	35	2		2	37		37			0	37	Bogota	R	8	6	45			
NORTH TEXAS	TALCO	416	39	455	50	6	56	511		511			0	511	Bogota	R	10	7	46			
NORTH TEXAS	MILTON	20		20	1		1	21		21			0	21	Bogota	R	11	8	47			
NORTH TEXAS	PATTONVILLE	159	5	164	5	1	6	170		170			0	170	Bogota	R	13	9	48			
NORTH TEXAS	CUNNINGHAM	106	2	108	6		6	114		114			0	114	Bogota	R	14	10	49			
NORTH TEXAS	MINTER	20		20	2		2	22		22			0	22	Bogota	R	16	11	50			
NORTH TEXAS	DETROIT	491	18	509	52		52	561		561			0	561	Bogota	R	16	12	51			
NORTH TEXAS	BLOSSOM	673	20	693	29	6	35	728		728			0	728	Bogota	R	19	13	52			
NORTH TEXAS	BAGWELL	138	1	139	12		12	151		151			0	151	Bogota	R	22	14	53			
NORTH TEXAS	SYLVAN	43		43			0	43		43			0	43	Bogota	R	23	15	54			
NORTH TEXAS	SUN VALLEY	2		2			0	2		2			0	2	Bogota	R	24	16	55			
NORTH TEXAS	LAMAR COUNTY	2		2			0	2		2			0	2	Bogota	D		17	56			
NORTH TEXAS	EMORY	843	57	900	60	4	64	964		964	(1)		(1)	963	Emory	R	0	1	57			
NORTH TEXAS	POINT	449	15	464	42		42	506		506			0	506	Emory	R	8	2	58			
NORTH TEXAS	LONE OAK	350	22	372	33		33	405		405			0	405	Emory	R	14	3	59			
NORTH TEXAS	EDGEWOOD	33		33			0	33		33			0	33	Emory	R	16	4	60			
NORTH TEXAS	RAINS COUNTY	11	1	12	1		1	13		13			0	13	Emory	D		5	61			

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REGION	CITY	Active Single	Active Poly	Active Total	Inactive Single	Inactive Poly	Inactive Total	Sub-Total	Blank	SUB-GRAND TOTAL	Pilot Project Meters Previously Installed Single	Pilot Project Meters To Be Installed Single	Pilot Project Total	GRAND TOTAL	Const Ctr	Sub/Rural/ Des	Miles to CC	Sub-Seq	Master-Seq	Q1	Q2	Q3
NORTH TEXAS	VAN ZANDT COUNTY	4		4			0	4		4			0	4	Emory	D		6	62			
NORTH TEXAS	NOCONA	1,861	208	2,069	146	12	158	2,227		2,227			0	2,227	Nocona	R	0	1	63			
NORTH TEXAS	BELCHERVILLE	4		4			0	4		4			0	4	Nocona	R	7	2	64			
NORTH TEXAS	MONTAGUE	266	46	312	16		16	328		328			0	328	Nocona	R	9	3	65			
NORTH TEXAS	RINGGOLD	120	3	123	11		11	134		134			0	134	Nocona	R	13	4	66			
NORTH TEXAS	SAINT JO	561	56	617	51	3	54	671		671			0	671	Nocona	R	14	5	67			
NORTH TEXAS	HENRIETTA	1		1			0	1		1			0	1	Nocona	R	28	6	68			
NORTH TEXAS	PETROLIA	528	42	570	45		45	615		615			0	615	Nocona	R	42	7	69			
NORTH TEXAS	DEAN	8		8			0	8		8			0	8	Nocona	R	43	8	70			
NORTH TEXAS	BYERS	274	20	294	18	1	19	313		313			0	313	Nocona	R	47	9	71			
NORTH TEXAS	WICHITA FALLS	13		13	1		1	14		14			0	14	Nocona	R	48	10	72			
NORTH TEXAS	CLAY COUNTY	3		3			0	3		3			0	3	Nocona	D		11	73			
NORTH TEXAS	MONTAGUE COUNTY	50	1	51	2	2	4	55		55			0	55	Nocona	D		12	74			
NORTH TEXAS	OLNEY	1,153	143	1,296	108	8	116	1,412		1,412			0	1,412	Olney	R	0	1	75			
NORTH TEXAS	JEAN	26	2	28	5	3	8	36		36			0	36	Olney	R	10	2	76			
NORTH TEXAS	MEGARGEL	144	55	199	17	7	24	223		223			0	223	Olney	R	12	3	77			
NORTH TEXAS	NEWCASTLE	134	5	139	14	1	15	154		154			0	154	Olney	R	13	4	78			
NORTH TEXAS	LOVING	85	30	115	9	2	11	126		126			0	126	Olney	R	17	5	79			
NORTH TEXAS	GRAHAM	17	3	20	2		2	22		22			0	22	Olney	R	23	6	80			
NORTH TEXAS	JERMYN	82	23	105	5	2	7	112		112			0	112	Olney	R	24	7	81			
NORTH TEXAS	BRYSON	418	93	511	34	9	43	554		554			0	554	Olney	R	32	8	82			
NORTH TEXAS	ELIASVILLE	108	52	160	2	2	4	164		164			0	164	Olney	R	40	9	83			
CENTRAL TEXAS	GATESVILLE	3,742	247	3,989	176	10	186	4,175		4,175			0	4,175	Gatesville	R	0	1	84			
CENTRAL TEXAS	JONESBORO	26		26	1		1	27		27			0	27	Gatesville	R	16	2	85			
CENTRAL TEXAS	MCGREGOR	1		1			0	1		1			0	1	Gatesville	R	20	3	86			
CENTRAL TEXAS	CLIFTON	3,263	183	3,446	146	9	155	3,601		3,601	(94)		(94)	3,507	Clifton	R	0	1	87			
CENTRAL TEXAS	VALLEY MILLS	1,093	45	1,138	52	2	54	1,192		1,192			0	1,192	Clifton	R	11	2	88			
CENTRAL TEXAS	MERIDIAN	892	83	975	57	1	58	1,033		1,033			0	1,033	Clifton	R	12	3	89			
CENTRAL TEXAS	MORGAN	453	18	471	31		31	502		502			0	502	Clifton	R	20	4	90			
CENTRAL TEXAS	CRAWFORD	528	23	551	35		35	586		586			0	586	Clifton	R	20	5	91			
CENTRAL TEXAS	WALNUT SPRINGS	492	21	513	25	1	26	539		539			0	539	Clifton	R	23	6	92			
CENTRAL TEXAS	KOPPERL	488	7	495	20	1	21	516		516			0	516	Clifton	R	28	7	93			
CENTRAL TEXAS	BOSQUE COUNTY	2		2			0	2		2			0	2	Clifton	D		8	94			
CENTRAL TEXAS	GLEN ROSE	2,949	204	3,153	150	5	155	3,308		3,308			0	3,308	Glen Rose	R	0	1	95			
CENTRAL TEXAS	RAINBOW	25		25			0	25		25			0	25	Glen Rose	R	5	2	96			
CENTRAL TEXAS	TOLAR	404	25	429	15		15	444		444			0	444	Glen Rose	R	17	3	97			
CENTRAL TEXAS	GRANBURY	280	8	288	28		28	316		316			0	316	Glen Rose	R	17	4	98			
CENTRAL TEXAS	BLUFF DALE	87	3	90	4		4	94		94			0	94	Glen Rose	R	24	5	99			
CENTRAL TEXAS	HAMILTON	1,965	113	2,078	78	6	84	2,162		2,162			0	2,162	Hamilton	R	0	1	100			
CENTRAL TEXAS	CARLTON	102	4	106	6		6	112		112			0	112	Hamilton	R	17	2	101			
CENTRAL TEXAS	GUSTINE	308	27	335	30	1	31	366		366			0	366	Hamilton	R	21	3	102			
CENTRAL TEXAS	HICO	960	58	1,018	58	3	61	1,079		1,079			0	1,079	Hamilton	R	21	4	103			
CENTRAL TEXAS	IREDELL	278	15	293	16	1	17	310		310			0	310	Hamilton	R	31	5	104			
CENTRAL TEXAS	COMANCHE COUNTY	2	8	10			0	10		10			0	10	Hamilton	D		6	105			
CENTRAL TEXAS	HAMILTON COUNTY	1		1			0	1		1			0	1	Hamilton	D		7	106			
CENTRAL TEXAS	WHITNEY	1,697	95	1,792	152	11	163	1,955		1,955			0	1,955	Whitney	R	0	1	107			
CENTRAL TEXAS	BLUM	292	19	311	20		20	331		331			0	331	Whitney	R	15	2	108			
CENTRAL TEXAS	OSCEOLA	24	2	26	4		4	30		30			0	30	Whitney	R	21	3	109			
CENTRAL TEXAS	RIO VISTA	417	33	450	29	4	33	483		483			0	483	Whitney	R	22	4	110			
CENTRAL TEXAS	COVINGTON	354	25	379	25		25	404		404			0	404	Whitney	R	23	5	111			
CENTRAL TEXAS	ITASCA	27	1	28	3		3	31		31			0	31	Whitney	R	23	6	112			
CENTRAL TEXAS	PARKER	29	1	30	5		5	35		35			0	35	Whitney	R	28	7	113			
CENTRAL TEXAS	GRANDVIEW	116	4	120	11		11	131		131			0	131	Whitney	R	33	8	114			
CENTRAL TEXAS	STRAWN	498	55	553	31		31	584		584			0	584	Strawn	R	0	1	115			
CENTRAL TEXAS	MINGUS	251	16	267	12		12	279		279			0	279	Strawn	R	5	2	116			
CENTRAL TEXAS	GORDON	542	18	560	14	5	19	579		579			0	579	Strawn	R	8	3	117			
CENTRAL TEXAS	PALO PINTO	9		9			0	9		9			0	9	Strawn	R	21	4	118			
CENTRAL TEXAS	SANTO	305	17	322	13	1	14	336		336			0	336	Strawn	R	26	5	119			
CENTRAL TEXAS	ERATH COUNTY	2		2			0	2		2			0	2	Strawn	D		6	120			
CENTRAL TEXAS	PALO PINTO LAKE	103		103	3		3	106		106			0	106	Strawn	R		7	121			
WEST TEXAS	FORT STOCKTON	5,123	542	5,665	139	30	169	5,834		5,834			0	5,834	Fort Stockton	S	0	1	122			241

Meter Barcode	WECO Owner	WECO Meter No	Date_Time	Step	Test Type	Element	Volt	Amp	Phase Angle	Upper Limit	Lower Limit	Std_mode	Servie Type	Optic Source	Revs	Notes	Freq	Pause	AF	AL
40201961	0	01961	12/11/2009 9:26	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8694	99.8694
40201962	0	01962	12/11/2009 9:21	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9213	99.9213
40201963	0	01963	12/11/2009 9:24	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8677	99.8677
40201964	0	01964	12/11/2009 9:22	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9146	99.9146
40201965	0	01965	12/11/2009 8:41	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8816	99.8816
40201966	0	01966	12/11/2009 8:37	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9018	99.9018
40201967	0	01967	12/11/2009 8:39	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9458	99.9458
40201968	0	01968	12/11/2009 8:40	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8829	99.8829
40201969	0	01969	12/11/2009 9:31	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9021	99.9021
40201970	0	01970	12/11/2009 9:28	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8383	99.8383
40201971	0	01971	12/11/2009 9:32	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9088	99.9088
40201972	0	01972	12/11/2009 9:30	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8991	99.8991
40201973	0	01973	12/11/2009 8:02	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9705	99.9705
40201974	0	01974	12/11/2009 7:19	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8535	99.8535
40201975	0	01975	12/11/2009 7:58	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8966	99.8966
40201976	0	01976	12/11/2009 7:56	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8592	99.8592
40201977	0	01977	12/11/2009 8:04	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.963	99.963
40201978	0	01978	12/11/2009 8:01	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9248	99.9248
40201979	0	01979	12/11/2009 8:03	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8555	99.8555
40201980	0	01980	12/11/2009 8:07	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9221	99.9221
40201981	0	01981	12/11/2009 9:13	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8707	99.8707
40201982	0	01982	12/11/2009 9:09	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8944	99.8944
40201983	0	01983	12/11/2009 9:11	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9008	99.9008
40201984	0	01984	12/11/2009 9:10	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8689	99.8689
40201985	0	01985	12/11/2009 8:32	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8609	99.8609
40201986	0	01986	12/11/2009 8:40	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8816	99.8816
40201987	0	01987	12/11/2009 8:37	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9071	99.9071
40201988	0	01988	12/11/2009 8:34	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.936	99.936
40201989	0	01989	12/11/2009 8:18	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9363	99.9363
40201990	0	01990	12/11/2009 8:11	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9633	99.9633
40201991	0	01991	12/11/2009 8:14	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9043	99.9043
40201992	0	01992	12/11/2009 8:15	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9256	99.9256
40201993	0	01993	12/11/2009 9:24	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8979	99.8979
40201994	0	01994	12/11/2009 9:23	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9423	99.9423
40201995	0	01995	12/11/2009 9:21	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8345	99.8345
40201996	0	01996	12/11/2009 9:22	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8794	99.8794
40201997	0	01997	12/11/2009 9:10	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9216	99.9216
40201998	0	01998	12/11/2009 9:13	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9218	99.9218
40201999	0	01999	12/11/2009 9:12	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8881	99.8881
40202000	0	02000	12/11/2009 9:11	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9071	99.9071
40202001	0	02001	12/11/2009 8:42	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8694	99.8694
40202002	0	02002	12/11/2009 8:47	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8475	99.8475
40202003	0	02003	12/11/2009 8:46	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9253	99.9253
40202004	0	02004	12/11/2009 8:44	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9116	99.9116
40202005	0	02005	12/11/2009 9:00	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9056	99.9056
40202006	0	02006	12/11/2009 9:02	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8674	99.8674
40202007	0	02007	12/11/2009 8:55	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8694	99.8694
40202008	0	02008	12/11/2009 8:58	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8946	99.8946
40202009	0	02009	12/11/2009 9:00	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9313	99.9313
40202011	0	02011	12/11/2009 8:54	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9208	99.9208
40202012	0	02012	12/11/2009 8:55	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9915	99.9915
40202013	0	02013	12/11/2009 8:34	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8786	99.8786
40202014	0	02014	12/11/2009 8:32	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9693	99.9693
40202015	0	02015	12/11/2009 8:34	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9221	99.9221
40202016	0	02016	12/11/2009 8:35	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8757	99.8757
40202017	0	02017	12/11/2009 8:53	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8599	99.8599
40202018	0	02018	12/11/2009 8:49	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9425	99.9425
40202019	0	02019	12/11/2009 8:52	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9006	99.9006
40202020	0	02020	12/11/2009 8:50	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9048	99.9048
40202021	0	02021	12/11/2009 8:13	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8482	99.8482
40202022	0	02022	12/11/2009 8:19	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8378	99.8378

Meter Barcode	WECO Owner	WECO Meter No	Date_Time	Step	Test Type	Element	Volt	Amp	Phase Angle	Upper Limit	Lower Limit	Std_mode	Servie Type	Optic Source	Revs	Notes	Freq	Pause	AF	AL
40202023	0	02023	12/11/2009 8:17	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9201	99.9201
40202024	0	02024	12/11/2009 8:14	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8864	99.8864
40202025	0	02025	12/11/2009 9:18	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9118	99.9118
40202026	0	02026	12/11/2009 9:16	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9068	99.9068
40202027	0	02027	12/11/2009 9:19	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.957	99.957
40202028	0	02028	12/11/2009 9:15	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8178	99.8178
40202029	0	02029	12/11/2009 8:11	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8946	99.8946
40202030	0	02030	12/11/2009 8:06	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.93	99.93
40202031	0	02031	12/11/2009 8:09	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9181	99.9181
40202032	0	02032	12/11/2009 8:08	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.962	99.962
40202033	0	02033	12/11/2009 8:21	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9096	99.9096
40202035	0	02035	12/11/2009 8:29	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9713	99.9713
40202036	0	02036	12/11/2009 8:23	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8971	99.8971
40202037	0	02037	12/11/2009 9:17	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8904	99.8904
40202038	0	02038	12/11/2009 9:14	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9226	99.9226
40202039	0	02039	12/11/2009 9:19	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9061	99.9061
40202040	0	02040	12/11/2009 9:16	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9268	99.9268
40202041	0	02041	12/11/2009 8:44	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8786	99.8786
40202042	0	02042	12/11/2009 8:45	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.83	99.83
40202043	0	02043	12/11/2009 8:48	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.933	99.933
40202044	0	02044	12/11/2009 8:47	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8799	99.8799
40202045	0	02045	12/11/2009 9:04	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8709	99.8709
40202046	0	02046	12/11/2009 9:06	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8393	99.8393
40202047	0	02047	12/11/2009 8:58	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9093	99.9093
40202048	0	02048	12/11/2009 9:05	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9623	99.9623
40202049	0	02049	12/11/2009 8:23	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8961	99.8961
40202050	0	02050	12/11/2009 8:20	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9183	99.9183
40202051	0	02051	12/11/2009 8:28	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9161	99.9161
40202052	0	02052	12/11/2009 8:26	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9161	99.9161
40202053	0	02053	12/11/2009 9:08	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9101	99.9101
40202054	0	02054	12/11/2009 9:05	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8318	99.8318
40202055	0	02055	12/11/2009 9:07	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9293	99.9293
40202056	0	02056	12/11/2009 9:06	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9116	99.9116
40202057	0	02057	12/11/2009 9:55	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.949	99.949
40202058	0	02058	12/11/2009 9:58	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8604	99.8604
40202059	0	02059	12/11/2009 9:52	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9615	99.9615
40202060	0	02060	12/11/2009 9:54	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.837	99.837
40202061	0	02061	12/11/2009 10:37	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9098	99.9098
40202062	0	02062	12/11/2009 10:35	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.7932	99.7932
40202063	0	02063	12/13/2009 4:35	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9353	99.9353
40202064	0	02064	12/11/2009 10:34	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8989	99.8989
40202065	0	02065	12/11/2009 10:43	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9415	99.9415
40202066	0	02066	12/11/2009 10:39	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9141	99.9141
40202067	0	02067	12/11/2009 10:41	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9093	99.9093
40202068	0	02068	12/11/2009 10:40	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9298	99.9298
40202069	0	02069	12/11/2009 10:06	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9146	99.9146
40202070	0	02070	12/11/2009 10:02	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9083	99.9083
40202071	0	02071	12/11/2009 10:05	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9036	99.9036
40202072	0	02072	12/11/2009 10:04	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9763	99.9763
40202073	0	02073	12/11/2009 9:46	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8971	99.8971
40202074	0	02074	12/11/2009 9:42	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8994	99.8994
40202075	0	02075	12/11/2009 9:48	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8929	99.8929
40202076	0	02076	12/11/2009 9:43	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9068	99.9068
40202077	0	02077	12/11/2009 10:00	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9146	99.9146
40202078	0	02078	12/11/2009 9:56	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8919	99.8919
40202079	0	02079	12/11/2009 9:59	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8834	99.8834
40202080	0	02080	12/11/2009 9:57	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.8525	99.8525
40202081	0	02081	12/11/2009 10:52	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9698	99.9698
40202082	0	02082	12/11/2009 10:49	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9298	99.9298
40202083	0	02083	12/11/2009 10:51	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9091	99.9091
40202084	0	02084	12/11/2009 10:50	1	FL	S	240	30	0	100.25	99.7	W	SN	0	2	Passed	60	F	99.9313	99.9313

PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY
REQUEST FOR APPROVAL
OF AN ADVANCE METERING SYSTEM (AMS)
DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS
OF
KIMBERLY K. MORRIS

ON BEHALF OF
TEXAS-NEW MEXICO POWER COMPANY

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EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE

EXHIBIT KKM -2
BUDGET

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is Kimberly Morris, and I am employed by PNMR Services Company ("PNMR Services"), a wholly owned subsidiary of PNM Resources, Inc. ("PNM Resources"). My business address is 225 E. John Carpenter Freeway, Irving, Texas 75062. My current title is Director – Architecture, within the Business Technology Services (BTS) department.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company ("TNMP" or "Company").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. Exhibit KKM-1 describes my background and experience.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS OR BEFORE ANY OTHER REGULATORY BODY?

A. No.

Q. PLEASE BRIEFLY DESCRIBE THE BTS DEPARTMENT AND ITS ROLE TO TNMP.

A. Business Technology Services (BTS), a department within PNMR Services, is responsible for developing, operating, and maintaining the information and communications systems and networks used by PNM Resources operating companies. The BTS function manages all hardware, software, and telecommunication resources that the business units use, as well as the applications that serve multiple business units. The BTS function also has the responsibility for overall policy and standards, technology architecture, information security, and strategic planning.

Q. WHAT ARE THE PRIMARY RESPONSIBILITIES OF YOUR CURRENT POSITION?

A. My primary responsibilities are to direct a team of individuals who have responsibilities which include a) strategy, definition, and enforcement of the software development and infrastructure standards and tools for PNMR; and b) information security policy and compliance. My organization includes a group of Enterprise Architects and certified

information security specialists who are responsible for the overall enterprise architecture and security decisions for PNMR.

Q. HAVE YOU PREPARED ANY EXHIBITS?

A. Yes. I am sponsoring Exhibits KKM-1 through KKM-2, which are attached to my testimony. Each of these exhibits was prepared by me or under my direction and control. The information contained in these exhibits is true and correct to the best of my knowledge and belief.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony will be to:

- provide the associated development and integration costs for TNMP back-office IT systems required to support wide-scale advanced meter system (AMS) deployment;
- provide the Operation & Maintenance savings that will occur through the implementation on new systems.

Q. PLEASE SUMMARIZE THE ESTIMATED COSTS THAT YOU HAVE PREPARED FOR THE MODIFICATIONS AND ENHANCEMENTS TO THE BACK-OFFICE SYSTEMS AND WEB PORTAL WHICH YOU SPONSOR.

A. Exhibit KKM-2 sets forth the estimated costs for the modifications and enhancements to the back-office systems and web portal that support TNMP's AMS deployment. Because TNMP is a part of a larger family of companies sharing several of the back-office systems, the Company typically receives the full benefit of enhancements to these shared systems while only paying an allocated share of the costs. The web portal, on the other hand, is an application that will be used only by TNMP, so 100 percent of its development costs are allocated to TNMP.

As shown on Exhibit KKM-2, and as described further in my testimony, I estimate that $10.8 million in IT capital costs will be incurred. I also estimate that $15.6 million of operations and maintenance (O&M) expense will be incurred in connection with the IT modifications and enhancements over the requested surcharge period; this amount includes yearly security audits. Exhibit KKM-2 lists the various back-office system and

web portal enhancements necessary to support TNMP's AMS deployment along with the resulting costs provided by me to Applicants' witness Michael Montgomery for inclusion in TNMP's surcharge models.

III. CAPITAL AND O&M COSTS

Q. WHAT NEW APPLICATIONS ARE BEING ADDED TO TNMP'S BACK-OFFICE SYSTEMS TO SUPPORT THE PROPOSED AMS?

A. As discussed in more detail by Mr. Kessler, the new back-office systems necessary to support TNMP's deployment of AMS will include an Advanced Metering Infrastructure (AMI) head-end system and a new Web Portal. The AMI head-end system is the centralized back-office software application that is used to communicate messages between the back-office systems and the advanced meters.

Q. WHAT MODIFICATIONS TO THE EXISTING BACK-OFFICE SYSTEMS ARE NECESSARY TO SUPPORT THE PROPOSED AMS?

A. As described in detail by Mr. Kessler, the following must occur to support the proposed AMS solution:

1. Purchase and install a new Meter Data Management System (MDMS).

2. Purchase and install a new Complex Billing System to support interval data billing.

3. Purchase and install new Outage Management System (OMS) to support reading, routing, and management of AMS Meter alarms.

4. Integration of new systems with TNMP's existing systems. This will require extensive work to allow the new systems to share data with, Banner (CIS), GIS, the Meter Head-End System (TMS), Texas Common Portal, Meter Inventory System, EDI Transaction management system and TIBCO Enterprise Data Transport.

5. Modifications to TNMP's EDI Gateway and Banner (Customer Information System) will be required so that these systems can handle messages and information required by new AMS market rules associated with EDI transactions to ERCOT.

Q. WHAT SYSTEMS RELATED TO THE TEXAS MARKET TRANSACTIONS WILL NEED MODIFICATIONS TO SUPPORT THE PROPOSED AMS?

A. Modifications to TNMP's EDI gateway, Banner, Meter Head-End System (TMS) and Integration application (TIBCO ESB) are required to support the Texas Market Transaction.

Q. WHAT INFORMATION SYSTEMS RELATED TO THE EXISTING DISTRIBUTION OPERATIONS WILL NEED MODIFICATIONS TO SUPPORT THE PROPOSED AMS? ARE THERE ASPECTS OF THE CURRENT IT HARDWARE AND SOFTWARE INFRASTRUCTURE THAT WILL NEED TO CHANGE TO SUPPORT THE PROPOSED AMS?

A. Yes; new acquisition of Hardware and Software is needed to support TNMP's AMS program. All new systems listed above will require both hardware servers and software purchases. Legacy support software and databases, such as Oracle, will also require potential license negotiation as the MDMS and OMS will utilize these packages, therefore requiring more licenses.

Q. HAS TNMP ENTERED INTO ANY CONTRACTS TO PURCHASE THESE SYSTEMS?

A. No contracts have been established to purchase any systems. The vendors for the new systems have provided quotations only, and have not been contracted to provide goods and services. This will occur after the approval of this filing. Based on my experience, the quotes from vendors, and the input of my team, I support the costs detailed in KKM-2 with regard to TNMP's AMS efforts.

IV. O&M SAVINGS

Q. HAS BTS IDENTIFIED ANY BACK-OFFICE O&M SAVINGS THAT CAN BE PASSED ON TO CUSTOMERS?

A. Yes. These are identified in KKM-2. When determining whether to implement a MDMS system or upgrade the LodeStar requirements to support TNMP's AMS, the analysis shows that implementing a MDMS is less expensive than the upgrades for Lodestar. Therefore, the ongoing maintenance agreements for LodeStar that are in currently in TNMP's rates will be passed back to customers as a savings. These savings will not occur until the entire MDMS system is installed and all data is transferred from LodeStar.

Q. DOES IMPLEMENTING A MDMS ALLOW FOR ANY OTHER O&M SAVINGS?

A. Yes. TNMP will no longer need the licensing for Itron's MV90i and Field Data Collection System (FCS). Over the course of the deployment of AMS, TNMP will eliminate all residential "drive-by"-read meters from the service territory. Once that is complete, the back-office systems supporting them, i.e. FCS, will be retired. Itron's MV90 system licensing will be significantly reduced as TNMP will eliminate the majority of the C&I meters and IDR meters using MV90 today. The savings in yearly maintenance fees will be passed on to the consumers.

V. CONCLUSION

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE MODIFICATIONS AND ENHANCEMENTS TO THE BACK-OFFICE SYSTEMS, THE CHANGES TO EXISTING IT INFRASTRUCTURE, AND THE WEB PORTAL.

A. Based on my experience and knowledge, the modifications and enhancements to the IT systems that I have described are required to support the proposed AMS and the estimated costs that I sponsor for these activities are reasonable and necessary.

Q. IS THIS THE CONCLUSION OF YOUR TESTIMONY?

A. Yes, it does.

AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared Kimberly K. Morris, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is Kimberly K. Morris. I am of legal age, a resident of the State of Texas, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

Kimberly K. Morris

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 25 day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

NOTARY PUBLIC in and for the
State of Texas

KENDALL ANN EVANS
Notary Public, State of Texas
My Commission Expires
November 13, 2013

My Commission expires 11·13·2013

KIMBERLY K. MORRIS

Education Background and Business Experience

Kimberly K. Morris is Director, Architecture and leads the Enterprise Architecture and Information Security practices at PNM Resources, a holding company of energy and energy-related businesses based in Albuquerque, NM.

Ms. Morris has held senior IT management positions in energy, retail, finance and technology. With more than 17 years experience in Information Technology, she has established information security practices and compliance programs, architected global enterprise technology strategies and solutions, established IT operations for startup organizations and strategically outsourced operational services.

She holds a B. A. in Business Information Management from Southeastern Oklahoma State University, is a graduate of the Regional Leadership Forum (RLF) sponsored by the Society for Information Management (SIM) and has pursued graduate studies at Amberton University. Ms. Morris is a member of EEI security committee, ISACA, the SIM Dallas Chapter and serves on the board of directors for CAEAP.

Capital	2010	2011	2012	2013	2014	2015	Total
Software Systems Costs	303,500	125,000	1,225,000	150,000			1,803,500
MDMS Software	303,500						
MDM Software - Complex Billing System		125,000	125,000				
Outage Management Software			1,100,000	150,000			
MDM Server Hardware	140,000	25,000	25,000	25,000	25,000		240,000
Hardware	115,000						
Storage	25,000	25,000	25,000	25,000	25,000		
MDM Software Complex Billing System		140,000	25,000	25,000	25,000		215,000
Hardware		115,000					
Storage		25,000	25,000	25,000	25,000		
OMS Server Hardware			250,000	150,000			400,000
Infrastructure Software Licenses		250,000					250,000
Security Management and Monitoring Tool		250,000					
External labor for SW Implementation (MDM, Billing &OMS)	1,000,000	1,200,000	1,250,000	250,000			3,700,000
MDMS Back-Office Work	1,000,000	450,000	250,000				
Complex Billing Back-Office Work		750,000					
OMS Back-Office Work			1,000,000	250,000			
OMS Installation & Training			600,000	150,000			750,000
Labor (BTS internal)	500,000	1,000,000	1,000,000	250,000			2,750,000
Web Portal	700,000	0	0	0			700,000
WebPortal Software	700,000						
Sub-Total Costs	**2,643,500**	**2,740,000**	**4,375,000**	**1,000,000**	**50,000**		**10,808,500**

O & M	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Software Product Maintenance	60,000	135,000	380,000	410,000	410,000	410,000	410,000	410,000	410,000	410,000	410,000	410,000		4,265,000
Product Maintenance - MDMS	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000		
Product Maintenance - OMS			220,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000		
Product Maintenance - Complex Billing System		25,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000		
TMS Maintenance														
Secuity Management and Monitoring Tool Maintainance		50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000		
Web Portal	0	300,000	300,000	300,000	0	0	900,000							
Data hosting Services		300,000	300,000	300,000										
Labor (BTS internal)		450,000	600,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	8,550,000
Security Audits		250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000		2,750,000
Sub-Total Costs	**60,000**	**835,000**	**1,230,000**	**1,410,000**	**1,410,000**	**1,410,000**	**2,720,000**	**1,410,000**	**1,410,000**	**1,410,000**	**1,410,000**	**1,410,000**	**750,000**	**15,565,000**

O & M BENEFITS (SYSTEM RETIREMENT AND SUPPORT)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Software Product Maintenance (Reduction)			(71,000)	(71,000)	(71,000)	(71,000)	(128,000)	(128,000)	(128,000)	(128,000)	(128,000)	(128,000)		(1,052,000)
Product Maintenance - MV90XI			(24,000)	(24,000)	(24,000)	(24,000)	(24,000)	(24,000)	(24,000)	(24,000)	(24,000)	(24,000)		
Product Maintenance - FCS							(57,000)	(57,000)	(57,000)	(57,000)	(57,000)	(57,000)		
Product Maintenance - LODESTAR			(47,000)	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)	(47,000)		
Labor (BTS internal - Support Cost Reduction)			(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)		(3,000,000)
Sub-Total Costs			**(371,000)**	**(371,000)**	**(371,000)**	**(371,000)**	**(428,000)**	**(428,000)**	**(428,000)**	**(428,000)**	**(428,000)**	**(428,000)**		**(4,052,000)**

PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY
REQUEST FOR APPROVAL
OF AN ADVANCE METERING SYSTEM (AMS)
DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS
OF
MICHAEL D. MONTGOMERY

ON BEHALF OF
TEXAS-NEW MEXICO POWER COMPANY

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EXHIBIT MDM-6 SUMMARY OF COSTS AND SAVINGS

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is Michael D. Montgomery. I serve as Regulatory Project Manager in the Cost of Service and Pricing Group in the Regulatory Policy and Planning Department at PNMR Services Company ("PNMR Services"), a wholly owned subsidiary of PNM Resources, Inc. ("PNM Resources"). My business address is 225 East John Carpenter Freeway, Suite 1500, Irving, Texas 75062.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company ("TNMP" or "Company"), which is a wholly owned subsidiary of PNM Resources.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. Exhibit MDM-1 describes my background and experience, including AMS deployment experience and regulatory proceedings in which I provided testimony.

Q. PLEASE DESCRIBE YOUR DUTIES AS THE REGULATORY PROJECT MANAGER FOR PNMR SERVICES.

A. As the Regulatory Project Manager, I am responsible for providing pricing, rate design, cost analysis and load research and analysis in support of PNM corporate, regulatory and marketing objectives.

Q. HAVE YOU PREPARED ANY EXHIBITS?

A. Yes. I am sponsoring Exhibits MDM-1 through MDM-6, which are attached to my testimony. Each of these exhibits was prepared by me or under my direction and control. The information contained in these exhibits and workpapers is true and correct to the best of my knowledge and belief.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my direct testimony is to support TNMP's request for approval of its Advanced Metering System (AMS) Deployment Plan and for approval of AMS surcharges. I describe the models that TNMP used in calculating the surcharges, the costs that were included in the models, the assumptions used in the models, the allocation methodologies, and the results of the models.

III. MODEL USED IN CALCULATING THE PROPOSED AMS SURCHARGES

Q. WHAT MODEL WAS USED TO CALCULATE THE SURCHARGES PROPOSED IN THIS FILING?

A. As a starting point, TNMP used the version of the American Electric Power Texas (AEP) modified Advanced Metering Infrastructure Example Project Valuation Model (McKinsey Model), which was adopted by the Commission in Project No. 33874 (Form for Transmission and Distribution Utility Advanced Metering Infrastructure Surcharge), this model was filed publically on the Commission's interchange. TNMP chose to base its surcharge development starting with the AEP modified and approved McKinsey model and made minor changes as needed. A complete copy of TNMP's Surcharge Model (Surcharge Model) is attached as Exhibit MDM-2. A summary of the annual revenue requirement generated in the TNMP's Surcharge Model is attached as Exhibit MDM-3. I will describe the changes TNMP made to the modified AEP McKinsey Model to derive the TNMP AMS Surcharge Model.

Q. WHAT WAS THE PRIMARY ADAPTATION THAT WAS MADE TO THE MCKINSEY MODEL BY AEP RESULTING IN A MODEL SUBSEQUENTLY USED AND GENERALLY ACCEPTED BY THE COMMISSION?

A. To calculate surcharges, AEP changed the McKinsey Model from a cost-benefit model to a revenue requirement model, which is more typically used for ratemaking purposes. The purpose of the AEP model is to determine the revenue requirement necessary to calculate a surcharge by customer class — not to compare the costs of the Deployment Plan to the potential benefits customers might receive from the deployment of an advanced metering system. Such a cost-benefit analysis is not necessary in this case because the Texas Legislature has already determined that there are benefits to deploying advanced metering.

A revenue requirement calculation was also added to the Surcharge Model for the calculation of the surcharges.

Q. WERE OTHER CHANGES MADE BY TNMP TO THE AEP MODIFIED MCKINSEY MODEL SO THAT IT COULD BE USED TO CALCULATE ADVANCED METERING SYSTEM SURCHARGES?

A. Yes. Other necessary changes included:

- TNMP did not include System Integration Agreement (SIA) refunds, as AEP did in the model, as it had none.
- TNMP revised the book depreciation calculation in the Surcharge Model to capture the capital costs associated with the pilot program[1] as well as the initial deployment of non-pilot program meters on January 2010 of the first year and used a half-year convention method for determining the other years, rather than the full-year convention assumed in the McKinsey Model. The change to the half-year convention is more consistent with how TNMP will be deploying advanced meters throughout the year.
- TNMP removed the net present value (NPV) calculation from the Surcharge Model. TNMP did not base determination of the surcharge on an analysis of NPV.
- TNMP expanded the portions of the model that tracked the deployment schedule, growth rates and calculation of meter and installation costs to differentiate between active and inactive ESIIDs, include counts for both poly and single phase meters, and to group ESIIDs into three geographical location types: Suburban, Rural, and Desolate. This enabled TNMP to more accurately calculate capital costs related to the deployment of AMS meters.
- TNMP removed the following sections/tabs from the Surcharge Model. These sections/tabs were not used in the TNMP model in determining the AMS surcharge amount:
    - WP-Rem. Costs & Neg Salvage
    - RevenueEnhancement

- DistOpsSavings
- AvoidedCapital

- TNMP adjusted the rate class level surcharge calculation to calculate a two tier surcharge by rate class. The first tier is 5 years, which is the length of the deployment period, and the second tier being 7 years. The revenue requirement for residential and secondary less than or equal to 5 kW rate classes are collected over both tiers, and capped at an increase of 130% over the existing metering charge that is included in base rates.[2]

Q. DID TNMP MAKE ANY MAJOR ADAPTATIONS TO THE MCKINSEY MODEL AS ADAPTED BY AEP THAT WAS ULTIMATELY APPROVED BY THE COMMISSION AS PART OF THE AEP SETTLEMENT?

A. No. No major adaptations were made to the McKinsey model as adapted by AEP and ultimately approved by the Commission.

Q. PLEASE SUMMARIZE HOW TNMP'S REQUESTED SURCHARGE MEETS THE REQUIREMENTS OF SUBST. R. 25.130.

A. The surcharges apply only to customers who are not required by ERCOT to have IDR meters or receive un-metered service,[3] and the allocation of the revenue requirements for the AMS among the customer classes and the design of the surcharges are reasonable and equitable and the surcharge design was developed to cap the impacts for all rate classes. I will discuss the design in more detail later in my testimony. A levelized revenue requirement over a multi-year period has been developed using the reasonable costs of the AMS supported by the testimony of Mr. Whitehurst, Mr. Burke, Ms. Morris, Mr. Kessler, and myself. Estimated cost savings have been included in developing the revenue requirements. The levelized revenue requirements by rate class are divided by the billing units in the rate class to derive the surcharge. Exhibit MDM-3 is a summary of the AMS Revenue Requirements, Exhibit MDM-4 is a summary of the AMS Surcharge per rate class, and Exhibit MDM-5 is a summary of the billing frequencies used in the calculation of the surcharge.

[1] PUC Substr R. 25.130(k) (1) – "…The costs of providing AMS services include those costs of AMS installed as part of a pilot program pursuant to this section." Additionally, the details of the pilot program are discussed in Mr. Allan Burke and Mr. Gary Kessler's testimony.
[2] Metered lighting does not have a separate base charge.

IV. CALCULATION OF AMS RECOVERY FACTORS

Q. WHICH TNMP RATE CLASSES WILL BE AFFECTED BY THE AMS SURCHARGE?

A. The following TNMP Tariff rate classes will be affected by the AMS Surcharge: 6.1.1.1.1 Residential, 6.1.1.1.2 Secondary Less Than or Equal to 5 kW, 6.1.1.1.3 Secondary Greater Than 5 kW Non-IDR, 6.1.1.1.4 Primary Non-IDR, and 6.1.1.1.6 Schedule VI - Metered Lighting.

Q. DO THE CLASSIFICATIONS FOR THE PROPOSED AMS CLASSES COINCIDE WITH THE AVAILABILITY FOR EACH RATE SCHEDULE INCLUDED IN TNMP'S TARIFF?

A. Yes.

Q. PLEASE DESCRIBE THE CALCULATION OF THE AMS COST RECOVERY FACTORS.

A. For the residential and secondary less than or equal to 5 kW Non-IDR customer classes, TNMP is proposing a two-step cost recovery factor. For the first five years of the AMS cost recovery period, TNMP is proposing the following monthly fixed factors:

Residential	$4.80
SEC <= 5 KW Non-IDR	$5.00
SEC > 5 KW Non-IDR	$16.70
PRIMARY Non-IDR	$20.13
Lighting-Metered	$11.04

The monthly fixed factors were evaluated and adjusted to maintain a relationship of an increase of no more than 130% over the monthly fixed metering charge in TNMP's current base rates. TNMP's decision to cap the increase was to achieve the needed revenue requirement and not unduly burden one class of customers when comparing the costs of the AMS surcharge to the metering charge in current base rates.

For the remaining seven years of the AMS cost recovery period, TNMP is proposing the following factors:

Residential	$4.17
SEC <= 5 KW Non-IDR	$5.00
SEC > 5 KW Non-IDR	$0.00
Primary Non-IDR	$0.00
Lighting-Metered	$0.00

[3] PUC SUBST R. 25.130(k) (1) – "… in deploying AMS to residential customers and nonresidential customers other than those required by the independent system operator to have an interval data recorder meter."

The proposed initial factors for the residential class is higher than the average factors for those classes over the entire recovery period but will allow TNMP to recover the sum of the annual revenue requirements incurred during the AMS deployment period over that period – the five years beginning January 2011. The estimated revenue to be received from the first five years of the recovery period is subtracted from the levelized total revenue requirement to determine the revenue requirement for the remaining seven years of the recovery period. The revenue requirement is divided by the customer billing units for the remaining months of the recovery period to arrive at the second-step cost recovery factor. TNMP estimated a regulation asset balance at the end of the surcharge period due to carrying charges being applied to revenue over/under collections. TNMP reduced the second tier residential rate to bring the estimated regulation asset balance at the end of the surcharge period to zero. The second-step factors are lower than the average factors over the entire cost recovery period. The averages for the entire recovery period are below:

Residential	$4.42
Sec <= 5 KW Non-IDR	$5.00
Sec > 5 KW Non-IDR	$6.91
Primary Non-IDR	$8.22
Lighting-Metered	$4.60

In his direct testimony, Mr. Whitehurst explains why the two-step factor is important to the Company's mitigation of negative cash flow.

Q. PLEASE EXPLAIN HOW TNMP'S RATE DESIGN IS NOT UNREASONABLY DISCRIMINATORY, PREJUDICIAL, PREFERENTIAL OR ANTI-COMPETITIVE.

A. While PUC Subst. R 25.130(k)(3) allows the commission to set the surcharge to reflect a deployment of advanced meters that is up to one-third of TNMP's total meters over each calendar year, regardless of the rate of actual AMS deployment, TNMP is requesting to collect the five year revenue requirement during the deployment period as the total amount collected through tier one of the surcharge, and capping the increase to any one customer class at 130%, even though the cost of the new advanced meters is actually over 200% higher than an existing mechanical meter.[4]

The Commission has already approved a surcharge for Centerpoint Energy, AEP Texas North Company, and AEP Texas Central Company that included a dual tier surcharge.

[4] The cost for each type of meter is as follows: (a) Residential meters - $15; (b) Single phase demand - @ $93.25 net each per unit; (c) poly phase demand - @ $133.00 net each per unit.

The difference between TNMP's tiered structure and the other utilities is that the other utilities adjusted the residential class only.

TNMP's rate design adjusts all customer classes and applies the same increase limit to all classes. When developing the rate class rates, TNMP compared the first tier to the current metering charge that is included in base rate and limited each classes increase to the lesser of the total revenue requirement or 130% of the existing metering charge in base rates.[5] The following table compares the rate classes for the proposed AMS surcharge with the existing base rate charge:

Description	AMS Surcharge	Base Rate Metering Charge	Percent Change
Residential	$4.80	$2.20	118%
Sec <= 5 KW Non-IDR	$5.00	$2.20	127%
Sec > 5 KW Non-IDR	$16.70	$13.30	26%
Primary Non-IDR	$20.13	$265.00	-92%
Lighting-Metered	$11.04	N/A	N/A

Since the other rate classes do not receive a 130% increase, the rate design for the second tier allows for a $0.00 surcharge. If any additional savings are achieved, these classes will receive a credit during the second tier.

V. COSTS INCLUDED IN THE AMS SURCHARGE MODEL

Q. WHAT COSTS CAN BE RECOVERED AS PART OF THE AMS SURCHARGE?

A. Pursuant to Rule 25.130(k)(1), costs subject to the AMS surcharge recovery process are those reasonable and necessary costs incurred in deploying AMS to residential customers and nonresidential customers other than those required by the independent system operator to have an internal data recorder meter. AMS costs consist of advanced metering devices and related investments, regulatory assets, and deferred taxes, the summation of which serves as the basis to calculate a return, based on the Company's respective approved weighted average cost of capital. The reasonable and necessary costs associated with the TNMP AMS Meter Deployment Plan include related operations and maintenance (O&M) expenses (net of cost savings), depreciation and amortization, and incremental federal and state and local taxes applicable to AMS investment (net of

property tax savings from the retirement of existing meters), return on the AMS capital investment, and interest expenses. The estimated amounts of each of these cost components are included in the TNMP Surcharge Model used to calculate the AMS surcharges. In Exhibit MDM-6, TNMP provides a summary of the costs included in the AMS Surcharge Model.

Q. WHAT ARE THE TOTAL ESTIMATED AMS CAPITAL COSTS INCLUDED IN THE AMS SURCHARGE MODEL?

A. The total estimated capital costs for TNMP'S AMS Deployment Plan included in the AMS Surcharge Model are approximately $72.3 million. Estimated capital expenditures are included in Exhibit MDM-6. These amounts include the total estimated investment for advanced meters, the associated communication networks, data processing systems, regulatory assets and the web portal to be deployed during the Company's AMS deployment. The individual components of this investment are described in more detail by witnesses Mr. Burke, Ms. Morris, and Mr. Kessler in their direct testimonies. None of the costs associated with this investment are currently included in TNMP's base rates, and none of these costs will be included in the Company's future base rates, unless directed by the Commission.

Q. PLEASE DISCUSS THE INVESTMENT IN ADVANCED METERS INCLUDED IN THE AMS SURCHARGE MODEL.

A. The investment of approximately $58.1 million in advanced meters[6] included in TNMP'S AMS Surcharge Model represents the estimated costs to acquire and deploy approximately 240,000 (after growth) advanced meters as described in the Company's AMS Deployment Plan. Applicant witness Mr. Burke provides more detail on that deployment in his direct testimony. The costs used as inputs in the model are based on the proposals received from the vendors, adjusted with any company loads.[7]

Q. ARE THERE ANY COSTS IN THE AMS SURCHARGE MODEL FOR METERS THAT WILL BE INSTALLED AFTER THE PROJECTED DEPLOYMENT PERIOD?

A. No. Costs for meters installed after the deployment period will be addressed in future base rate case proceedings.

[5] Metered lighting does not have a separate base charge.
[6] This includes meter, network, and installation costs.
[7] TNMP witness Henry Monroy discusses the Company's loading policy and how the loads were applied.

Q. ARE THERE ANY COSTS IN TNMP'S AMS SURCHARGE MODEL FOR METERS THAT WERE PURCHASED PRIOR TO THE IMPLEMENTATION OF THE AMS DEPLOYMENT PLAN THAT CAN BE RECOVERED IN ACCORDANCE WITH PUC SUBST. R 25.130(K)(1)?

A. Yes. Costs of approximately $3.6 million for meters deployed as part of TNMP's pilot program for AMS meters are included in the surcharge. The costs of the meters, installation, project management, and network cellular costs associated with the deployment of the pilot program meters are included in TNMP's AMS surcharge. Mr. Burke provides additional details on the costs for meter deployment as part of the pilot program.

Q. PLEASE DISCUSS THE INVESTMENT IN BACK-OFFICE SYSTEMS INCLUDED IN THE TNMP'S AMS SURCHARGE MODEL.

A. The investment of approximately $12.5 million in advanced back-office systems included in the AMS Surcharge Model represents the cost of the Company's back-office systems, including the meter data management system (MDMS) used to store the data collected from the advanced meters. Ms. Morris and Mr. Kessler provide more detail on that investment in their direct testimonies. The costs used as inputs in the model are based on the estimates for software, hardware, and both internal and external labor, adjusted with the company loads.

Q. PLEASE DISCUSS THE INVESTMENT REQUIRED TO DEVELOP THE COMPANY'S WEB PORTAL THAT IS INCLUDED IN THE TNMP'S AMS SURCHARGE MODEL.

A. The investment for the web portal of $0.7 million represents the estimated costs to develop and deploy a web portal that meets the required functionality of Commission SUBST. R. 25.130 and the additional functionality developed in Project No. 34610. O&M costs total $0.9 million to maintain the web portal. Mr. Kessler provides more detail on that investment in his direct testimony.

Q. WHAT O&M COSTS ARE INCLUDED IN THE TNMP'S AMS SURCHARGE MODEL?

A. O&M costs of approximately $73.7 million have been included in the AMS Surcharge Model. These costs represent an estimate of the total O&M costs TNMP will incur during the surcharge period to operate and maintain its AMS. In particular, these estimated costs cover such things as salaries and benefits for new personnel, security

audits, network cellular costs, software maintenance and upgrades, and web portal data hosting fees. Mr. Burke and Mr. Kessler provide the details on the O&M costs included in the TNMP's AMS Surcharge Model in their direct testimonies. Exhibit MDM-6 TNMP provides a summary of the O&M costs included in the AMS Surcharge Model.

Q. ARE THERE ANY COST SAVINGS INCLUDED IN TNMP'S AMS SURCHARGE MODEL?

A. Yes. O&M savings of approximately $21.5 million related to meter reading and technical support cost savings are estimated over the surcharge period and have been included in the AMS Surcharge Model. Mr. Burke provides more detail on the estimated cost savings included in the Company's AMS Surcharge Model in his direct testimony.

In addition, there will be some distribution operational savings that are not included in the model. These savings are based on the lower O&M costs associated with performing a move-in, move-out, and off-cycle meter read, disconnection for non-pays, and the associated reconnections. TNMP has not included these savings in the model, but TNMP proposes to share with all customers who pay the impacted discretionary fees the cost reductions to the underlying discretionary fee activities resulting from the AMS deployment. The discretionary fees were applied as an offset to TNMP's revenue requirement in the last rate case. TNMP proposes to update the discretionary services fees in the rate case, and/or on January 1 of each year after year one of deployment and concluding with a final update after all meters have been deployed in West Texas.

Q. ARE ANY SEVERANCE COSTS INCLUDED IN THE AMS SURCHARGE MODEL?

A. Yes. Estimated severance costs of approximately $0.6 million have been included in the AMS Surcharge Model. This amount represents the estimated costs of reducing meter reading staff. Mr. Burke provides more detail on the estimated severance costs included in the Company's AMS Surcharge Model in his direct testimony.

Q. ARE ANY COSTS ASSOCIATED WITH CUSTOMER EDUCATION INCLUDED IN THE AMS SURCHARGE MODEL?

A. Yes. The Surcharge Model includes customer education costs of $1.9 million. Mr. Whitehurst provides the detail on these estimated costs in his direct testimony.

Q. DID TNMP INCLUDE ANY COSTS ASSOCIATED WITH HOME AREA MONITORS FOR LOW-INCOME CUSTOMERS IN THEIR AMS SURCHARGE MODEL?

A. Yes. Costs for 13,000 low income home monitors costing $130 each are included in the AMS surcharge model. Mr. Whitehurst provides further detail on the low income customers in his direct testimony.

Q. ARE THERE ANY OTHER COSTS INCLUDED IN THE TNMP'S AMS SURCHARGE MODEL?

A. Yes. TNMP's surcharge model includes costs associated with property taxes, Texas gross margin tax, federal income taxes, depreciation expense, interest expense and a return on equity.

Q. PLEASE DESCRIBE THE TAXES INCLUDED IN THE SURCHARGE MODEL.

A. In order for TNMP to collect all reasonable costs associate with deploying AMS, TNMP has constructed the model to calculate the state and local taxes that are required. In addition, TNMP's surcharge model applies the gross-up tax rate to calculate federal income taxes.

Q. PLEASE DESCRIBE THE DEPRECIATION EXPENSE INCLUDED IN THE SURCHARGE MODEL.

Q. The depreciation expense is based on the depreciation of the assets and regulatory assets using the amortization periods for the different assets as discussed by Mr. Monroy. For depreciation related to meters and installation, deferred taxes go from a positive to negative from 2009 to 2010 and then back to a positive in 2011. This is due to a combination of the depreciation assumptions used for the pilot program meters installed in 2009, "Bonus" MACRS assumption used for assets put into service in 2009, and the fact that no meters are budgeted to be deployed in 2010. Pilot meters were placed in service in TNMP's books in December 2009. Book depreciation starts in 2010 and a full year of depreciation is used, not the half year method which is used for all other depreciation on this tab. Even though book depreciation starts in 2010 for the pilot program meters, tax depreciation was counted in 2009. Because these meters cleared in 2009, they qualify for "Bonus Depreciation" which means that, for tax purposes, over half of the meters are depreciated in the year they were put into service. These factors cause high tax depreciation and no book depreciation in 2009 (positive deferred taxes) and

high book depreciation with low tax depreciation (negative deferred taxes) in 2010. Because of the half year depreciation convention used, about 7% of the assets placed in service in 2011 are depreciated in 2011 for book purposes and 10% of assets are depreciated for tax purposes in 2011. This causes the book tax depreciation to be greater than the book depreciation for 2011. The value of the assets put into service in 2011 offset the 2011 depreciation being counted for assets put into service in 2009.

The change in deferred taxes going from positive to negative in 2014 to 2015 and then back to positive in 2021 is a normal pattern due to the MACRS depreciation schedules being used, the half year convention used for book depreciation, and the fact that the depreciation for tax purposes takes place over a longer period of time than the book depreciation. Most tax depreciation occurs in the earlier years, causing tax depreciation to be higher than book depreciation and trails off in the later years causing book deprecation to be higher than tax depreciation until the book depreciation goes to zero with a few years of non zero MACRS depreciation in the final years.

Q. PLEASE DESCRIBE THE INTEREST EXPENSE AND THE RETURN ON EQUITY EXPENSE INCLUDED IN THE SURCHARGE MODEL.

A. The Stipulation in Docket No. 36025, TNMP's most recent rate case, Finding of Fact 23 states:

> TNMP's Weighted Average Cost of Capital (WACC) shall be 9.76% based upon a 9.43% Cost of Debt and a Return On Equity (ROE) of 10.25% with a 60/40 debt to equity capital structure. Until revised in TNMP's next general rate case, all PUCT proceedings or other filings at the PUCT requiring application of TNMP's Cost of Debt, WACC, or ROE will apply the foregoing WACC, Cost of Debt, and ROE.

TNMP included this information in determining the interest expense and return on equity.

VI. ASSUMPTIONS USED IN THE AMS SURCHARGE MODEL

Q. WHAT PERIOD OF TIME IS USED IN THE AMS SURCHARGES MODEL TO REPRESENT TNMP'S AMS DEPLOYMENT PERIOD?

A. TNMP's AMS Surcharge Model assumes a deployment period beginning January 2011 and continuing through the December 2015 as described by Mr. Burke in his direct testimony.

Q. WHAT IS THE PROPOSED AMS COST RECOVERY PERIOD?

A. The AMS cost recovery period is 12 years, beginning with the earlier of the 1st billing cycle following a final order, or November 1, 2010.

Q. WHICH CUSTOMERS ARE ASSIGNED THE COSTS ASSOCIATED WITH AMS DEPLOYMENT?

A. According to SUBST. R. 25.130(k)(1), the costs of providing AMS for a particular customer class are to be surcharged only to customers in that specific customer class. Therefore, the AMS revenue requirement is allocated to only those classes that are eligible to receive AMS services. Classes of customers that already have IDR meters, and customers within classes that are unmetered, have not been included in the development of the allocation factors used to allocate AMS costs and are therefore not allocated any costs associated with AMS.

Q. DID THE TNMP USE ANY ASSUMPTIONS CONCERNING ESCALATION RATES IN THE AMS SURCHARGE MODEL?

A. Yes. Recent inflation rate estimates have been estimated at 3% by TNMP. TNMP used an annual escalation rate of 3% for O&M costs and savings estimated to be incurred for the surcharge period that begins after the initial deployment is complete, January 2016 to December 2022. This escalation percentage is a reasonable escalation rate to use over the surcharge period.

Q. THE MCKINSEY MODEL INCLUDED OTHER CATEGORIES OF SAVINGS. WHAT ASSUMPTIONS DID TNMP MAKE WITH RESPECT TO THESE AREAS IN THE AMS SURCHARGE MODEL?

A. TNMP's Surcharge calculations did not include other categories of savings where the AMS program did not generate savings.

VII. AMS REVENUE REQUIREMENT AND ALLOCATION TO THE ELIGIBLE CUSTOMER CLASSES

Q. PLEASE DESCRIBE HOW THE LEVELIZED AMS REVENUE REQUIREMENT WAS DETERMINED.

A. The AMS levelized revenue requirement is based on TNMP's AMS Deployment Plan, described by Mr. Burke in his direct testimony. The levelized AMS revenue requirement I have calculated is based on the results of the Surcharge Model. The AMS revenue

requirement includes the estimated reasonable and necessary component costs for the AMS system, the costs of the AMS meter equipment, including the installation costs, back-office systems costs, additional O&M expenses and offset by any estimated operating cost savings for TNMP. In the model, the AMS revenue requirement was amortized and levelized over twelve years beginning with the revenue month of January 2011 and ending with the billing month of December 2022. My testimony describes the model and inputs to the model used to determine the total revenue requirement for AMS deployment for TNMP and the process for levelizing it.

Q. PLEASE DESCRIBE HOW THE LEVELIZED AMS REVENUE REQUIREMENT IS ALLOCATED TO THE ELIGIBLE CUSTOMER CLASSES.

A. The levelized AMS revenue requirement consists of two major components: (1) the projected installed costs of the AMS meters and (2) all other costs necessary to support the AMS meters. The installed costs of the AMS meters are allocated to the eligible customer classes based on each class' meter type composition and the installed costs of the AMS meter that will replace the current meter. The other costs necessary to support the AMS meters are allocated to all of the eligible classes based on the number of meters over the AMS cost recovery period associated with each AMS-eligible customer class.

Q. PLEASE DESCRIBE THE DEVELOPMENT OF THE AMS METER INVESTMENT ALLOCATOR.

A. The total meter investment for each class is based on the specific meter costs for each type of AMS meter replacing a current non-IDR meter and each class' composition of the meter types. The meter types and costs are identified in the testimony of Mr. Burke. After all the meter types are identified and counted for each class, total cost by class is calculated and directly assigned to the each class respectively. This allocation is shown in the Surcharge Model attached as Exhibit MDM-2.

Q. WHY IS THE PROPOSED ALLOCATION FACTOR APPROPRIATE?

A. The use of meter investment by class represents the measure of cost responsibility for the AMS meter deployment for each class. The total number of AMS meters for each class over the AMS cost recovery period represents the cost responsibility for the AMS infrastructure that will be used equally by all eligible customers receiving meter

equipment and services under AMS deployment. The class AMS revenue requirement is shown on the Surcharge Model.

Q. PLEASE DESCRIBE THE DEVELOPMENT OF THE ALLOCATOR FOR THE OTHER COSTS NECESSARY TO SUPPORT THE AMS METERS.

Because all AMS-eligible customers will be able to take advantage of the AMS infrastructure equally, the estimated total number of meters over the entire cost recovery period for each AMS-eligible rate class is used in the development of the allocator for the other costs necessary to support the AMS meters. A ratio of meters to be replaced for each AMS-eligible class to total meters to be replaced for all classes is calculated. These class ratios are then used to allocate the appropriate portion of costs to each rate class. The estimated number of total meters over the cost recovery period for each AMS class of customers is shown on the Surcharge Model.

Certain information technology costs are associated with complex billing of customers subject to power factor adjustments. These costs only apply to the secondary greater than 5 kW Non-IDR, and Primary Non-IDR rate classes. The costs associated with the complex billing of these rate classes were allocated to these two rate classes using a ratio of meters to be replaced for each class subject to complex billing costs to the two classes subject to complex billing.

Costs for low income home monitors were directly assigned to the residential rate class. Low income home monitors will only be distributed to members of the residential rate class.

Q. PLEASE DESCRIBE THE DETERMINATION OF THE AMS COST RECOVERY PERIOD BILLING UNITS USED IN THE DEVELOPMENT OF THE AMS COST RECOVERY FACTORS.

A. TNMP's load forecasting department provided growth rates for each rate class affected by the AMS surcharge for the projected AMS recovery period. These growth rates were applied to the most recent twelve months of customer count data for each eligible AMS customer class. The same growth factors that are used to determine meter count growth over the cost recovery period are used in the AMS model.

The customers included in each AMS-eligible rate class were determined based on customer rate code data in order to ensure that no IDR, unmetered or inactive customers were included in the determination of billing units.

VIII. RESULTS OF THE AMS SURCHARGE MODEL

Q. WHAT WERE THE RESULTS OF THE AMS SURCHARGE MODEL?

A. The TNMP AMS Surcharge Model produces a total levelized revenue requirement of approximately $158.0 million over the surcharge period.

Q. WHAT DID YOU DO WITH THOSE RESULTS?

A. The total revenue requirement calculated in the AMS Surcharge Model was used to calculate the surcharge for each of TNMP's rate classes.

Q. WHAT ARE THE RESULTS BY RATE CLASS?

A. The AMS Surcharge by rate class is the following:

Description	January 2011 through December 2015	January 2016 through December 2022
Residential Service	$4.80	$4.17
Secondary Service Less than or Equal to 5 kW Non-IDR	$5.00	$5.00
Secondary Service Greater than 5 kW Non-IDR	$16.70	$0.00
Primary Service	$20.13	$0.00
Metered Lighting	$11.04	$0.00

A. These Surcharge Rates were given to Mr. Whitehurst to include in TNMP's AMS rider.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

AFFIDAVIT

STATE OF TEXAS §
§
COUNTY OF DALLAS §

BEFORE ME, the undersigned authority, on this day personally appeared Michael D. Montgomery, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is Michael D. Montgomery. I am of legal age, a resident of the State of Texas, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

Michael D. Montgomery

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 21st day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

PATRICIA J. SMITH
Notary Public
STATE OF TEXAS
My Comm. Exp. Dec. 27, 2010

NOTARY PUBLIC in and for the
State of Texas

My Commission expires 12/27/10

Exhibit MDM-1

MICHAEL D. MONTGOMERY Experience and Qualifications

Education Background and Business Experience

Michael Montgomery is a Regulatory Project Manager with PNMR Services Company a subsidiary of PNM Resources, Inc. Mr. Montgomery has extensive experience in the utility industry, specifically rates and regulatory affairs, energy efficiency, strategic planning, and business / operational improvement. Prior to joining PNMR Mr. Montgomery provided consulting services to the utility industry through ScottMadden, a general management consulting firm, served as an Operations Director with Grande Communications, a Texas-based communications company, and served in a variety of positions with Central and South West (CSW), an electric utility holding company formerly based in Dallas. Mr. Montgomery holds a B.S. in Electrical Engineering and is a registered Professional Engineer in Texas and Oklahoma.

As a Regulatory Project Manager at PNMR (2010-Present) Mr. Montgomery provides cost-of-service, rate design, and internal project management support to a variety of regulatory-based projects at PNM and TNMP.

While a Director at Scottmadden, Inc. (2005-2010) Mr. Montgomery managed a number of diverse projects with electric utility clients including:

- Leading the identification, development, and documentation of business processes, system integration, and organizational strategies required to successfully deploy AMS at a large electric utility (2 million+ meters)
- Refocusing and reorganizing the environmental services organization for a large utility in the southeast
- Directing the identification and execution of customer service work process changes needed to improve new customer connection practices at a large utility

While an Operations Director at Grande Communications (2000-2005) Mr. Montgomery helped establish and manage back office customer and business support functions in the Corpus Christi and Midland-Odessa business markets

While at Central and South West, Inc. (1978 – 2000) held a variety of executive, management, and regulatory positions including:

- Director, Strategic Planning (CSW) 1999 – 2000
- Managing Director, EnerShop (CSW subsidiary) 1995 – 1999
- Director, Corporate Ventures (CSW) 1993 – 1995
- Director, Information Technology (PSO) 1991 – 1993
- Director, Rates and Regulatory Affairs (CPL) 1989 – 1991
- Manager, Cost-of-Service (CSW Services) 1986 – 1989
- Manager, Cost-of-Service (PSO) 1981 – 1986
- Engineer, T & D Planning (PSO) 1978 – 1981

PROCEEDINGS IN WHICH MICHAEL D. MONTGOMERY FILED TESTIMONY:

JURISDICTION	DOCKET NO.	DESCRIPTION
Texas	9561	Central Power and Light Company – Request for inclusion of South Texas Project Unit 2 in rate base; provided customer class cost-of-service testimony
Texas	6668 / 8646	Central Power and Light Company – Request for inclusion of South Texas Project Unit 1 in rate base; provided customer class cost-of-service testimony
Oklahoma		Public Service Company of Oklahoma (PSO) – Provided expert testimony and served as an expert witness on cost-of-service related matters in general rate proceedings in the early 80's

RECENT ARTICLES AND SPEECHES:

AMI Deployment Impacts on Customer Service Work Practices, AMRA Fall 2007

Exhibit MDM - 2

TNMP AMS SURCHARGE

McKINSEY MODEL
ALLOCATION MODEL
AND WORKPAPERS

FILED AS HIGHLY SENSITIVE AND HIGHLY CONFIDENTIAL MATERIALS

TNMP AMS SURCHARGES

SUMMARY OF AMS REVENUE REQUIREMENT

($000 unless otherwise noted)

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Revenue Requirement																
O&M Benefits		$0	$0	($8)	($48)	($740)	($1,045)	($1,345)	($1,815)	($2,189)	($2,243)	($2,298)	($2,355)	($2,415)	($2,476)	($2,539)
O&M Expense		$0	$0	$770	$3,743	$5,267	$5,797	$6,047	$5,934	$6,102	$6,286	$6,474	$6,668	$6,868	$6,776	$6,979
Depreciation Expense		$0	$0	$818	$2,354	$4,859	$7,170	$8,876	$10,011	$10,034	$8,693	$7,263	$5,465	$3,778	$2,211	$817
Interest Expense		$7	$195	$332	$1,015	$1,678	$1,965	$2,064	$2,056	$1,553	$1,127	$770	$491	$280	$135	$57
Property Taxes		$0	$0	$50	$81	$253	$425	$503	$527	$516	$379	$260	$161	$88	$37	$9
Federal Income Taxes		$3	$76	$130	$396	$655	$767	$805	$802	$606	$440	$301	$192	$109	$53	$22
Return On Equity (On Ending Rate Base)		$5	$141	$241	$736	$1,216	$1,424	$1,496	$1,490	$1,126	$817	$558	$356	$203	$98	$41
Texas Gross Margin Tax		$0	$3	$17	$59	$94	$117	$131	$135	$126	$110	$95	$78	$63	$49	$38
Total Surcharge	$157,981	$14	$415	$2,349	$8,336	$13,283	$16,620	$18,577	$19,142	$17,874	$15,608	$13,423	$11,056	$8,975	$6,883	$5,425

* The total revenue requirement is calculated in TNMP's Surcharge Model

TNMP AMS SURCHARGE

SUMMARY OF AMS SURCHARGE PER TARIFF

Surcharge Nov 2011 - Oct 2022

Tariff Class		Total Revenues	Total Bills	Surcharge
Residential	$	128,509,543	29,067,075	$4.42
SEC <= 5 KW NON-IDR	$	11,144,782	2,229,920	$5.00
SEC > 5 KW NON-IDR	$	17,359,259	2,513,570	$6.91
PRIMARY NON-IDR	$	231,361	28,133	$8.22
LIGHTING-METERED	$	419,364	91,152	$4.60
TOTAL	$	157,664,309	33,929,851	$4.65

Surcharge Nov 2010 - Oct 2015

Tariff Class		Total Revenues	Total Bills	Surcharge
Residential	$	56,134,674	11,698,670	$4.80
SEC <= 5 KW NON-IDR	$	4,591,682	918,733	$5.00
SEC > 5 KW NON-IDR	$	17,359,259	1,039,709	$16.70
PRIMARY NON-IDR	$	231,361	11,492	$20.13
LIGHTING-METERED	$	419,364	37,980	$11.04
TOTAL	$	78,736,340	13,706,584	$5.74

Surcharge Nov 2015 - Oct 2022

Tariff Class		Total Revenues	Total Bills	Surcharge
Residential	$	72,374,869	17,368,405	$4.17
SEC <= 5 KW NON-IDR	$	6,553,100	1,311,187	$5.00
SEC > 5 KW NON-IDR				$0.00
PRIMARY NON-IDR				$0.00
LIGHTING-METERED				$0.00
TOTAL	$	78,927,969	18,679,592	$4.23

* The total revenue requirement for each rate class is calculated in TNMP's Surcharge Model

TNMP AMS SURCHARGE

SUMMARY OF AMS BILL FREQUENCIES

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
AMS CLASS	Bills Per Year*													
RS	379,237	2,298,103	2,320,781	2,343,452	2,366,138	2,389,150	2,412,494	2,436,174	2,460,195	2,484,562	2,509,279	2,534,353	2,133,156	29,067,075
SEC <= 5 KW NON-IDR	30,348	182,675	183,258	183,846	184,428	185,015	185,606	186,201	186,801	187,404	188,012	188,625	157,701	2,229,920
SEC > 5 KW NON-IDR	34,454	207,156	207,584	208,013	208,441	208,872	209,305	209,741	210,179	210,620	211,063	211,509	176,631	2,513,570
PRIMARY NON-IDR	378	2,273	2,289	2,301	2,313	2,326	2,339	2,352	2,365	2,379	2,393	2,407	2,018	28,133
LIGHTING-METERED	1,266	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	6,330	91,152
TOTAL	445,683	2,697,803	2,721,508	2,745,207	2,768,917	2,792,960	2,817,341	2,842,065	2,867,137	2,892,561	2,918,344	2,944,490	2,475,836	33,929,851

* These numbers represent the number of active meters per rate class per year. Source is the general assumptions tab of TNMP's filed McKinsey Model.

Exhibit MDM - 6

TNMP AMS SURCHARGE

SUMMARY OF COSTS AND SAVINGS

($000 unless otherwise noted)

Cost/Savings*		Amount Included in AMS Surcharge	Cost Type
AMS Capital Costs	$	72,349	Capital
Advanced Meter Investment	$	58,083	Capital
Pilot Program Meter Investment	$	3,618	Capital
Back Office / IT Investment	$	12,458	Capital
Web Portal Investment	$	700	Capital
Web Portal Data Hosting	$	900	O&M
Web Portal Total	$	1,600	
O&M Costs	$	73,713	O&M
O&M Savings	$	(21,515)	O&M
Severance Costs	$	634	Reg Asset
Customer Education Costs	$	1,952	O&M
Low Income Home Area Monitors	$	1,690	O&M

* Data source: TNMP's AMS Surcharge Model

PUC DOCKET NO. _____

BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS

TEXAS-NEW MEXICO POWER COMPANY
REQUEST FOR APPROVAL
OF AN ADVANCE METERING SYSTEM (AMS)
DEPLOYMENT AND AMS SURCHARGE

PREPARED DIRECT TESTIMONY AND EXHIBITS

OF

HENRY E. MONROY

ON BEHALF OF

TEXAS-NEW MEXICO POWER COMPANY

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EXHIBIT HEM-1
EDUCATIONAL BACKGROUND AND BUSINESS EXPERIENCE

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND PLACE OF EMPLOYMENT.

A. My name is Henry E. Monroy. I serve as Director, Utility Accounting at PNMR Services Company ("PNMR Services"), a wholly owned subsidiary of PNM Resources, Inc. ("PNM Resources"). My business address is 414 Silver, Alvarado Square, Albuquerque, NM 87158.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of Texas-New Mexico Power Company ("TNMP" or "Company").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. Exhibit HEM-1 describes my background and experience.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS?

A. No.

Q. WHAT ARE THE PRIMARY RESPONSIBILITIES OF YOUR CURRENT POSITION?

A. As Director, Utility Accounting, I am responsible for the oversight and management of the accounting departments at TNMP and Public Service Company of New Mexico ("PNM"). In this role, I report directly to the Vice President Corporate Controller.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is as follows: 1) provide an overview of the accounting assumptions included in the AMS surcharge, 2) discuss the required tracking of AMS related revenues and expenses, 3) discuss the need for creation of regulatory assets and liabilities related to the recovery of the AMS deployment.

II. ACCOUNTING ASSUMPTIONS

Q. ARE THERE ANY COSTS IN THE AMS SURCHARGE MODELS FOR METERS THAT WILL BE INSTALLED AFTER THE PROJECTED DEPLOYMENT PERIOD?

A. No. The costs included in the AMS surcharge model only include the cost of the initial pilot program and the requested deployment of meters over a five-year period through

2015. AMS meters installed after the proposed deployment period will be recovered through base rates as determined in TNMP's general rate cases.

Q. PLEASE DESCRIBE THE PROPOSED DEPRECIATION AND AMORTIZATION ("DEPRECIATION") MODEL ASSUMPTIONS FOR AMS METERING DEVICES, INFRASTRUCTURE AND COMPUTERIZED BUSINESS SYSTEMS USED IN THE AMS SURCHARGE MODELS.

A. TNMP is requesting a depreciation period of 7 years for AMS meters and related infrastructure costs. TNMP is requesting a depreciation period of 5 years for Information Technology and software assets that provide support for the AMS project.

Q. WHEN WILL THE AMS METERING DEVICES AND INFRASTRUCTURE BEGIN DEPRECIATING?

A. Depreciation on the AMS metering devices and related capital infrastructure investments will begin in the month following the determination that the asset is used and useful and is placed into plant in service. TNMP has already started depreciation of its pilot program AMS assets prior to establishment of an AMS surcharge collection. As such, TNMP requests the Commission to allow the Company to defer, as a regulatory asset, the depreciation expense on the pilot program assets to match the expense with the collection and recognition of the AMS surcharge revenues as requested in this filing.

III. COST LOADINGS ASSUMPTIONS

Q. PLEASE PROVIDE AN OVERVIEW OF THE COST LOADING ASSUMPTIONS THAT HAVE BEEN PROVIDED FOR INPUT INTO THE AMS COST ESTIMATES USED IN TNMP' AMS SURCHARGE MODELS.

A. TNMP's AMS Surcharge model includes cost loading assumptions applied to capital as well as operating and maintenance ("O&M") costs. The types of loads included are administrative and general loads, purchasing loads as well as labor loads.

Q. PLEASE DESCRIBE THE ADMINISTRATIVE AND GENERAL ("A&G") LOAD USED IN TNMP'S AMS SURCHARGE MODEL.

A. The administrative and general load rate of 2.85% applied to capital costs is used to allocate the expenses of A&G personnel that cannot be readily assignable to the particular capital project, yet support the capital project through the work they perform. The rate has been applied to hardware, software, outside services, and other

miscellaneous expenses such as travel, which are capitalized in the TNMP AMS Surcharge Model.

Q. PLEASE DESCRIBE THE PURCHASING LOAD USED IN TNMP'S AMS SURCHARGE MODEL.

A. The purchasing load is used to allocate the costs of contracting for the goods and services needed to complete a project. These Supply Chain services are billed to projects via the purchasing load. This load, at a rate of .55%, has been applied to both capital and O&M costs in the TNMP AMS Surcharge model to hardware, software, outside services, and other miscellaneous expenses such as travel.

Q. WHAT ARE THE LABOR LOADINGS APPLIED TO AMS-RELATED EMPLOYEE LABOR FOR ESTIMATING BENEFIT COSTS AND PAYROLL TAXES (I.E. FRINGE LOADINGS)?

A. The labor loads applied to AMS related employee labor include loads for time off allowances, employer payroll taxes, pension and benefits, and injuries and damages. Time off allowance loads recognize additional overhead for vacation, illness, and holiday time and are applied as a percentage of straight time labor. For TNMP, the time off allowance rate is 17.36% and for PNMR Shared Services the rate is 14.39%. Employer payroll taxes are applied to straight time labor at 7.31% for TNMP and 7.43% for PNMR Shared Services. Pension and benefits loads recognize the expense related to providing pension and medical benefits to employees and are included in the model at 26.43% for TNMP and 16.55% for PNMR Shared Services. Injuries and Damages loads recognize the expense related to workers compensation premiums and are included in the model at 10.28% for TNMP and .81% for PNMR Shared Services. These labor loads are included in TNMP's AMS Surcharge model on internal labor used for the software development and deployment as well as the cost savings related to internal labor.

IV. OVERVIEW OF AMS COST TRACKING REQUIREMENTS

Q. WILL IT BE NECESSARY FOR TNMP TO SEPARATELY RECORD AND TRACK COSTS RELATED TO AMS DEPLOYMENT?

A. Yes. TNMP will segregate all costs associated with the AMS deployment, including capital expenditures, depreciation, property taxes, internal labor, and all applicable

loads. The tracking of these costs separately will facilitate the reconciliation between the collected AMS surcharge revenues and actual costs.

Q. HOW DOES THE COMPANY PROPOSE TO REPORT AMS THROUGH THE ANNUAL EARNINGS MONITORING REPORTS FILED WITH THE COMMISSION?

A. TNMP will include on its Annual Earnings Monitoring Report a reconciliation between AMS related revenues and expenses and all other operating information related to items recovered in TNMP's base rates.

V. EXCLUSION OF AMS REVENUES AND COSTS FROM OTHER T&D BASE RATE REVENUES AND COSTS

Q. HOW CAN THE COMMISSION BE ASSURED THAT TNMP WILL NOT RECOVER AMS DIRECT AND INDIRECT COSTS THROUGH THE AMS SURCHARGE REVENUES AND ALSO IN T&D BASE RATE REVENUES?

A. As discussed above, TNMP intends to segregate all AMS revenues and costs within its internal general ledger system. This will allow for the appropriate segregation between amounts collected through the AMS surcharge revenue and amounts recovered through TNMP base rate proceedings. This additional level of information reported will allow the Commission to validate that TNMP is not double recovering any of the costs sought under the AMS surcharge and will be necessary to facilitate the annual reconciliation of AMS surcharge revenues and expenses.

Q. SHOULD THE COSTS INCLUDABLE IN THE AMS REVENUE REQUIREMENT CONSIST ONLY OF DIRECT COSTS FOR THE DEPLOYMENT AND OPERATIONS OF THE AMS METERING DEVICES, INFRASTRUCTURE, COMPUTERIZED BUSINESS SYSTEM APPLICATIONS, AND HARDWARE?

A. Yes. Only the direct capital and installation costs and any associated overheads, as well as projected incremental O&M costs, depreciation, and taxes incurred directly in connection with the AMS pilot program and the AMS deployment plan is included in the AMS surcharge request.

Q. DOES TNMP HAVE ANY HISTORIC AMS-RELATED INVESTMENT INCLUDED IN THIS FILING?

A. Yes. As discussed in the testimony of Mr. Burke, TNMP has implemented a pilot program of approximately 10,000 AMS meters prior to the submittal of the AMS

deployment plan. TNMP has included the cost of these meters, including the associated depreciation and taxes in its calculation of the AMS surcharge. As discussed by Mr. Whitehurst, TNMP has incurred costs associated with the AMS initiative including travel expenses and outside service costs paid for development and implementation of an AMS solution, including outside services aided in TNMP's request for federal funding related to its AMS deployment. These costs are currently being deferred in a deferred debit account. These amounts have been reflected in the AMS model in rate base as regulatory assets.

VI. ACCOUNTING FOR AMS RATE BASE

Q. PLEASE DEFINE THE AMS RATE BASE THAT HAS BEEN ESTIMATED AND INCLUDED IN TNMP' SURCHARGE REQUESTS IN THIS CASE.

A. The AMS Rate Base consists of Electric Plant in Service, less Accumulated Depreciation, associated Accumulated Deferred Income Taxes and certain Regulatory Assets.

Q. PLEASE DEFINE "ELECTRIC PLANT IN SERVICE" AS USED IN THIS CASE.

A. Electric plant in service reflects the capital dollars recorded pursuant to the FERC Chart of Accounts, and reflects the capital costs incurred for the AMS meters, software, and infrastructure.

Q. HOW WILL TNMP TRACK THE AMS PLANT ASSETS AND RELATED INFRASTRUCTURE?

A. TNMP will maintain the investment in AMS metering assets and related back-office infrastructure through PNMR plant accounting system; this system will allow the Commission to fully review these costs. PNMR plant accounting system provides tracking through appropriate FERC accounts, sub-accounts, property unit numbers, and project tracking as necessary. This tracking will provide for the reporting of the book value of AMS metering assets and related infrastructure.

VII. ACCOUNTING FOR REGULATORY ASSETS AND LIABILITIES

Q. WHAT GIVES RISE TO REGULATORY ASSETS AND LIABILITIES?

A. Pursuant to Accounting Standards Codification Topic 980 Regulated Operations, rate actions of a regulator can allow a Company to defer or capitalize the recognition of

certain costs (regulatory assets) or certain obligations (regulatory liabilities) until such time that these deferred costs or obligations are matched up with revenues authorized by a regulatory body.

Q. PLEASE DESCRIBE THE REGULATORY ASSETS THAT ARE INCLUDED IN THE AMS SURCHARGE MODELS.

A. TNMP has incurred certain costs in the preparation and development of its AMS deployment plan and surcharge filing. These costs include travel related expenses, as well as fees paid to outsider services for development of the business models, and all such costs have been reflected in the AMS model. In addition, TNMP anticipates incurring legal and rate case expenses in this filing that have been included in the AMS surcharge filing. As discussed in Mr. Burke testimony, TNMP anticipates incurring severance costs as a result of O&M savings from the implementation of the AMS surcharge costs. In the McKinsey model, TNMP has deferred these costs and established these as regulatory assets. The intent of these deferrals is to levelize the costs incurred in the AMS deployment over the period of time the AMS revenues are collected. TNMP is seeking Commission approval for the establishment and recovery of these regulatory assets.

Q. WILL A REGULATORY ASSET OR REGULATORY LIABILITY BE CREATED TO ACCOUNT FOR TEMPORARY DIFFERENCES BETWEEN LEVELIZED AMS SURCHARGE REVENUES AND ACTUAL AMS COSTS INCURRED AND THE EFFECT ON ACTUAL RETURN ON INVESTED CAPITAL?

A. Yes. Due to the levelized approach requested in this filing, TNMP will defer the difference between the monthly collected AMS surcharge revenues and the actual incurred AMS costs, net of O&M calculated savings plus allowed return as a regulatory asset or regulatory liability on the accounting records of TNMP. This deferral reflects the timing difference between costs incurred to deploy the AMS meters and the levelized revenue stream set to recover these costs and is intended to be at zero at the end of the AMS surcharge period. This regulatory asset or liability represents the over or under recoveries of AMS costs compared to the revenues collected. Carrying charges at TNMP's weighted average cost of capital will be applied to either regulatory asset or liability. TNMP is seeking Commission approval for the establishment of this regulatory asset or liability.

Q. WILL A CARRYING CHARGE BE CALCULATED ON THE REQUESTED REGULATORY ASSET OR LIABILITY RELATED TO THE TIMING OF COLLECTION OF AMS REVENUES AND AMS COSTS?

A. Yes. TNMP will record carrying costs on the regulatory asset or liability based on the Company's pre-tax cost of capital and recognize a corresponding interest income or interest expense.

VIII. ACCOUNTING FOR AMS REVENUES AND EXPENSES

Q. HOW DOES TNMP PROPOSE TO ACCOUNT FOR THE RECOVERY OF AMS-RELATED INVESTMENT AND COSTS OVER THE LIFE OF THE AMS SURCHARGE?

A. As discussed above, TNMP will establish internal accounting structures to segregate and report on AMS related revenues and expenses. This includes the calculation and deferral on a monthly basis the difference between the collected AMS revenues and actual incurred AMS costs, net of O&M savings plus allowed return to a regulatory asset or liability. These costs will be deferred and amortized over the AMS surcharge period, with the intent of the regulatory asset or liability to be at zero at the end of the period.

Q. HOW WILL TNMP TRACK AND RECORD AMS SURCHARGE REVENUES?

A. As discussed by Mr. Michael Montgomery, TNMP is requesting the establishment of a new tariff to establish the AMS surcharge collections. The customer billing system employed by TNMP will track separately these AMS surcharge revenues and allow for segregation and reporting of collected AMS surcharge revenues.

Q. HOW WILL TNMP RECORD AND TRACK AMS SURCHARGE OPERATING COSTS?

A. TNMP intends to record AMS related operating costs, (depreciation, property taxes, etc.) to the appropriate FERC accounts. The AMS related operating costs will be assigned a specific internal tracking AMS project number to ensure the specific identification, tracking and reporting of AMS costs. The identification of these costs is critical to the calculation for the deferral or recognition of costs related to collection of AMS revenues as well as necessary to meet the AMS reconciliation and reporting requirements.

Q. HOW WILL O&M AND OTHER SAVINGS BE TRACKED OVER THE LIFE OF THE SURCHARGE?

A. As discussed by Mr. Burke, TNMP meter reading costs will gradually be reduced over the deployment period. As a normal course of business, TNMP will still record costs

associated with meter reading in the appropriate FERC accounts through the AMS surcharge period. Mr. Burke has identified the meter reading costs as of December 31, 2009. This comparison of meter reading costs for each surcharge year against year ending December 31, 2009 will measure meter reading cost reductions or cost savings realized through the deployment of AMS. The cost savings will be the difference between the current annual manual meter reading costs and the annual manual meter reading costs for year ending December 31, 2009.

Similarly for Business Technology expense savings, these savings will be identifiable when the software licensing agreements are cancelled, and TNMP is no longer being charged for items like LodeStar, MV90XI.

If, during the course of a rate case, these costs are removed from base rates, then an additional reconciliation on O&M and other savings will need to be performed.

Q. HOW WILL TNMP CALCULATE DEPRECIATION AND AMORTIZATION ON AMS ASSETS?

A. As discussed above, TNMP is requesting to depreciate the AMS meters and infrastructure over a 7 year period. TNMP is requesting to depreciate the software capital costs over a 5 year period. The requested regulatory asset for previously incurred costs related to the development of the AMS deployment plan and the pilot program are to be amortized over the 12 year surcharge period.

IX. ACCOUNTING FOR EXISTING METERS

Q. WHAT WILL HAPPEN TO EXISTING METERS?

A. As discussed by Mr. Burke, TNMP has a salvage agreement for the existing meters. TNMP will retire all of the existing meters. As a consequence of the AMS deployment plan, TNMP will have meters that are not fully depreciated.

Q. DOES ANY PUCT SUBSTANTIVE RULE ADDRESS RECOVERY OF NON-AMS METERS THAT ARE NOT FULLY DEPRECIATED?

A. Yes. Substantive Rule 25.130(k)(4) addresses the recovery of non-AMS meters that are not fully depreciated. Specifically, it permits a utility to have "reasonable recovery of any non-AMS metering equipment that has not been fully depreciated but has been replaced by the equipment installed under an approved Deployment plan." As discussed by Mr.

Whitehurst, TNMP seeks to accelerate the depreciation of these meters in the next rate case filed after the filing of this proceeding.

Q. HOW IS TNMP CURRENTLY RECOVERING COSTS RELATED TO NON-AMS METERING EQUIPMENT?

A. TNMP is currently recovering its costs related to non-AMS metering equipment through its base rates. The net book value of the metering equipment is included in rate base for which TNMP is earning a rate of return. In addition, TNMP is recovering the associated depreciation expense and property taxes associated with the non-AMS metering equipment in its base rates.

Q. HOW DOES TNMP PROPOSE TO RECOVER COSTS RELATED TO NON-AMS METERING EQUIPMENT THAT IS NOT FULLY DEPRECIATED AFTER THESE NON-AMS METERS ARE RETIRED?

A. TNMP is requesting to recover the non-AMS meters that are retired as a result of the AMS deployment plan as follows: 1) as non-AMS meters are retired as a result of the AMS deployment, transfer the net book value of the retired AMS meters into a regulatory asset account, 2) receive a rate of return on this regulatory asset, similar to the rate of return currently recognized on the net plant in service values, 3) amortize the regulatory asset account until the balance is equal to zero. TNMP intends to include this regulatory asset as well as the associated amortization expense of the regulatory asset in its base rates and will seek recovery for these costs in its general base rate requests.

X. CONCLUSION

Q. CAN YOU PLEASE SUMMARIZE YOUR TESTIMONY?

A. Yes. TNMP has outlined the appropriate accounting requirements to meet the tracking, recording, reporting, and reconciliation of AMS related revenues and expenses to meet the requirements of the PUCT. In addition, TNMP has requested Commission approval to establish certain regulatory assets and liabilities which allows TNMP to match the incurred costs, net of O&M savings and allowed rate of return to levelized AMS surcharge revenues. In addition, TNMP has outlined the requested recovery for existing non-AMS metering equipment as well as associated carrying costs on its requested AMS related regulatory assets and liabilities through its upcoming general base rate increase request.

Q. IS THIS THE CONCLUSION OF YOUR TESTIMONY?

A. Yes.

AFFIDAVIT

STATE OF NEW MEXICO §
§
COUNTY OF BERNALILLO §

BEFORE ME, the undersigned authority, on this day personally appeared Henry E. Monroy, who, upon proving his identity to me and by me being duly sworn, deposes and states the following:

"My name is Henry E. Monroy. I am of legal age, a resident of the State of New Mexico, and have never been convicted of a felony. I certify that the foregoing testimony, offered by me on behalf of Texas-New Mexico Power Company, are true and correct and based upon my personal knowledge and experience."

Henry E. Monroy

SWORN TO AND SUBSCRIBED before me, Notary Public, on this 21 day of May, 2010, to certify which witness my hand and seal of office.

SEAL:

Jacqueline L. Candelaria
NOTARY PUBLIC in and for the
State of New Mexico

My Commission expires 4-16-2013

HENRY E. MONROY
EDUCATIONAL AND PROFESSIONAL SUMMARY

Name: Henry E. Monroy

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Alvarado Square
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Position: Director, Utility Accounting

Education: Bachelor of Accountancy, New Mexico State University, 2001

Employment: Employed by Public Service Company of New Mexico since 2003.
Positions held within the Company include:

Director, Utility Accounting
Manager, Cost of Service
Senior Manager, Derivative Accounting
Manager, Energy Analysis and Accounting
Project Manager
Senior Accountant

Testimony Filed:

- In the matter of the application of Public Service Company of New Mexico for revision of its retail electric rates pursuant to advice Notice No. 352. – NMPRC – Case No. 08-00273-UT, Filed September 2008.