SOUTHWESTERN ELECTRIC POWER COMPANY'S
REVISED ADVANCED METERING SYSTEM DEPLOYMENT PLAN

1. Purpose. The purpose of this document is to present the Southwestern Electric Power Company (SWEPCO or Company) plan for deploying an advanced metering system (AMS) in its service area (AMS Deployment Plan).[1] The information required by 16 Tex. Admin. Code (TAC) § 25.130(d)(4) is contained in this document.

2. Advanced Meter Technology. The advanced meter technology that the Company plans to deploy will provide or support the system features identified in 16 TAC § 25.130(g)(1) adopted by the Public Utility Commission of Texas (Commission), with the exception of the variance(s) described in Attachment B. The significant features of the proposed advanced metering technology are described in the following subsections (a) through (k).

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

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

(c) 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 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.

(d) The Company's planned 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 and can be time (hour, minute, and second) and date stamped.

(e) The Company's planned advanced meters have the ability to measure, store display, and report "Out-flow" and "In-flow" energy consumption. In addition, all of the advanced meters to be deployed have the ability to support fixed block or rolling demand intervals for demand measurement and the capability to monitor voltage and report voltage sags or swells. The Company's planned advanced meters also contain a threshold value (duration) that is programmable for detecting power outages.

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[1] SWEPCO is an operating utility subsidiary of the American Electric Power Company, Inc. (AEP) system.

(f) Customer interval data will be available to customers and customer-authorized third parties through the web portal on at least a day-after basis. Entities authorized by the customer will have access to AMS usage data on a day-after basis via a Green Button Connect My Data solution. On-demand reads will be available to customers and customer-authorized third parties through the web portal, subject to network traffic such as interval data collection, market orders if applicable, and planned and unplanned outages.

(g) The residential and non-residential advanced meters to be deployed have the capability of recording multiple channels of consumption data and storing that data in the ANSI C12.19 tables within the advanced meter. The usage data length will be a 15-minute interval or shorter.

(h) The Company's single phase advanced meters will have load profile storage capability that will provide 382 days of single channel 15 minute interval data storage on board the advanced meter. The three-phase advanced meters will store 438 days of single channel 15 minute interval data storage on board the advanced meter.

(i) The advanced meters the Company plans to deploy will comply with non-proprietary open standards and protocols.

(j) The Company's planned AMS will transmit interval data to the Company's web portal on a day-after basis. The timeline for development of the Company's web portal is described in Section 5 below.

(k) The AMS installed by the Company will have the capability to reconfigure and upgrade the advanced meters over the communication network, as technology advances, and in the Company's determination, the upgrade becomes economically feasible.

For more information on the associated meter technology, see the Company's Statement of AMS Functionality, Attachment B to application.

3. Communication Technologies.

(a) The Company plans to implement a communications network capable of providing access to all advanced meters within its service area.

(b) As shown in Figure 1 attached hereto, the planned RF mesh technology will use a 900 MHz communication module in the advanced meter that communicates with a neighboring advanced meter, micro-access point, relay, or access point (which collects and communicates data from up to 7,000 advanced meters) to create a mesh network. This mesh network has the ability to selfheal as the environment changes (*e.g.*, trees grow leaves, another obstruction blocks the preferred communication path or other equipment fails). That is, if an advanced meter on an RF mesh network cannot communicate with an access point along one path in the mesh network, it finds another path in that mesh network through which to communicate with the access point.

The advanced meter transmits time-differentiated energy usage to the collection system on a predetermined schedule. That usage data is transmitted on a regular basis through an RF network to an access point, which is often located on a distribution pole. From the access point the data is transmitted back to the RF operating system through various communication paths, including a primary RF mesh network, data quality land lines (copper or fiber), satellite circuits or cellular circuits for incorporation into the Company's meter data management system (MDMS). Since the RF mesh communication network is a two-way communication system, data can be retrieved from an advanced meter upon request by the back-office operating system. Data or commands can also be sent from the Company's AMS web portal or back-office systems to the advanced meter via the RF mesh network. This technology gives the Company the ability to retrieve all available usage data stored in the advanced meter via the communication network.

(c) American Electric Power Company Service Corporation (AEPSC) will manage the Company's AMS operating systems with managed security access to the application at the user level. The AMS will use a secure, dedicated communication path to transmit encrypted data to and from the access point to the back-office operating system. Within the RF mesh network, the data communication payload is symmetrically encrypted using the 256-bit Advanced Encryption Standard (AES) algorithm. This encrypted data communications channel is accomplished between the Headend System and all meters. Communications from the Headend System to access points and Headend System to relays is also encrypted using 256-bit AES encryption. As this is a mesh network, all network-node-to-network-node communications are also encrypted using AES. Although not specifically a security mechanism, the RF mesh network uses what is known as frequency-hopping/spread spectrum technology that reduces susceptibility to attacks on the AMS system. Also, all devices within the RF Mesh network will utilize unique, individual identification, tying that identification to an AEPSC specified network address. AEPSC is proactively working with the vendor community and various security organizations on an ongoing basis to ensure cyber security requirements are met as threats develop and vulnerabilities are discovered.

(d) AMS Network Technical Capabilities. Specific technical capabilities and limitations of the RF mesh communications network are listed below.

(i) The 2-way communications RF Mesh network includes three main components:

(A) AMS Meters (with appropriate RF mesh network interface components), with capability to participate in the node to node routing of network traffic. There may be some limited instances where, due to the remote location of the meter or meters, the meter will include a cellular radio that will be used to directly access the backhaul network.

(B) Relays (repeaters) - network devices whose purpose is to move data rapidly across long distances and to increase the effective utilization rate of the network between the AMS Meters and the access points. Relays (repeaters) also act as network packet buffers between the AMS Meters and the access points by providing message consolidation capabilities. These devices are

typically mounted on light poles, power poles, or other structures below the primary conductor.

(C) Access points - network devices that serve as the interface between the AMS RF mesh network and the IP network that connects across the Backhaul network from the access point to the AMS Headend System. These devices are typically mounted on poles below the primary conductor. Access points are fed periodically by data from relays (repeaters) and AMS Meters. For outgoing messages that originate from the AMS Headend System to the AMS Meters these messages are dispatched using definitions of outbound links based on last known good incoming links to the access points. The actual outbound routing is initially defined during auto–registration of the AMS Meters and periodically updated via routine communications.

(ii) Self Healing and Dynamic Routing – redirection of message traffic occurs automatically between the AMS network nodes upon detection of a failed node or a better RF mesh network route path.

(iii) Auto–registration – AMS Meters automatically self–discover and self-register on the network.

(iv) Bandwidth and Scalability – packet–switching, asynchronous, multi–channel capability allows for data throughput far and above the raw speed of the individual RF mesh node radios. The raw radio speeds are 100-2400 kbps between all AMS mesh devices.

(v) Flexibility – configuration and firmware downloads can be issued remotely to all endpoints and infrastructure elements of the system.

(vi) RF Radio – power output for all mesh nodes is no greater than 1 watt.

(vii) Backhaul Network Technical Requirements.

(A) Provides an IP network between the aggregation point and the AEP Data Center.

(B) Network traffic is secured using a SSL protocol session encryption between the aggregation points and the AMS Headend System.

(C) Backhaul network connection sized for minimum 56 kbps data rate will use a mix of backhaul network design approaches that best satisfy the: network traffic needs, network availability (public or private) in the Company’s service territories, and acceptable cost points.

(D) AMS Network through-put requirements are typically addressed by changing the deployed quantity of aggregation/backhaul points (along with the required backhaul network connections).

4. Systems Developed During the Deployment Period.

(a) The metering technology described in Sections 2 and 3 requires communication networks that will need to be installed or acquired in connection with the AMS deployment. The communication networks include the collector systems discussed previously. Each communication network also has its own Headend software system located in a vendor-hosted system that supports the two-way data flow between the advanced meters and the other information technology (IT) infrastructure systems. These systems perform several functions, including producing schedules for reading, connecting and disconnecting meters, and the Company performing ODRs. These systems monitor the operations of the associated communication networks to monitor the network for proper operations.

(b) The Company's existing IT systems may require upgrades or modifications to support additional expansion or new offerings and programs. Existing systems potentially impacted would be the MDMS, the Metering Data System (MDS) that stores meter asset information, and the Customer Information System (CIS) that stores customer related information like billing data and premise numbers.

5. Timeline for Web Portal Development, Deployment and Web Portal Functionalities.

SWEPCO plans to use Oracle's OPower web portal for residential customers, which provides a suite of home energy management (HEM) functionality. That functionally includes paper Home Energy Reports (HERs), electronic Home Energy Reports (eHERs), device control, an Omni-channel customer engagement solution, online audit, and high bill alerts. Some features of the Omni-channel customer engagement solution include: bill compare with explanation of differences, data browser with integrated weather data showing 13 months of historical usage, next best action, rate engagement, savings tips, calendar view, as well as the ability to personalize the experience to a household based on survey answers. The web portal will also feature Green Button Download My Data functionality.

SWEPCO plans to use Uplight's FirstFuel web portal for non-residential customers, which provides similar capabilities as OPower. OPower will be deployed by the end of 2021, and FirstFuel will be deployed by the end of 2022.

Customer on-demand reads will be available through the web portal by June 2023.

For customer-authorized third parties, SWEPCO plans to use the Opower-UtilityAPI Green Button Connect My Data Solution detailed in the attached Appendix A-1, which will be available within fifteen months of final Commission approval of this deployment plan.

On-demand reads for customer-authorized third-parties will be available through the web portal within 15 months after final Commission approval.

In sum, SWEPCO's schedule for deployment of web portal functionalities is as follows.

Rule Subsection	Language	Timeframe
25.130(g)(1)(E)	Access to customer usage data by the customer, the customer's REP of record, and entities authorized by the customer provided that 15-minute interval or shorter data from the electric utility's AMS must be transmitted to the electric utility's or group of electric utilities' web portal on a day-after basis.	Residential Customers: December 2021 Non-Residential Customers: December 2022 Third-Parties: Available within 15 months of final Commission approval
25.130(g)(1)(F)	Capability to provide on-demand reads of a customer's advanced meter through the graphical user interface of an electric utility's or a group of electric utilities' web portal when requested by a customer, the customer's REP of record, or entities authorized by the customer subject to network traffic such as interval data collection, market orders if applicable, and planned and unplanned outages.	Residential and Non-Residential Customers: Available June 2023 Third-Parties: Available within 15 months of final Commission approval

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

(a) The first step of the AMS Deployment Plan is the installation of approximately 10,000 meters using RF mesh network communication in the City of Texarkana as a pilot program pursuant to 16 TAC § 25.130(f). The initial deployment will utilize fully functional meters in order to provide the opportunity to identify and resolve any problems or issues with hardware, software, or processes before beginning full-scale commercial deployment. This process will ensure that the AMS systems at SWEPCO provide all the benefits and improved functionality to end use customers specified in the Commission's rule. Full-scale commercial

deployment of AMS will then commence in the second quarter 2022 for SWEPCO in the City of Texarkana. After completion of the initial full deployment in Texarkana in 2022, the Company plan to continue full deployment of the AMS meters in a sequence that will enable them to eliminate manual readings in an entire meter reading area.

(b) SWEPCO plans to install approximately 10,000 meters in 2021 as part of a pilot program pursuant to 16 TAC § 25.130(f), 156,690 meters in 2022, and 29,186 meters in 2023 for a total of 195,876 meters.

(c) Figure 2 attached hereto provides a detailed listing of the areas and the quarters in which the Company 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, the Company will report on any significant delays or deviations to this proposed schedule and sequence in its monthly progress reports that will be filed pursuant to 16 TAC § 25.130(d)(9).

7. Reports.

(a) Commencing in January 2022, a monthly status report meeting the requirements of 16 TAC § 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.

(b) The Company will, within a year after providing access to meter data via its web portal, engage an independent security auditor to conduct an audit of the Company's web portal security consistent with 16 TAC § 25.130(j)(3).

(c) The Company will provide annual reports to the Commission consistent with 16 TAC § 25.130(k)(5), which will include actual costs spent to date in deploying the AMS, the actual net operation cost savings, and the variances from projections, to determine the surcharge authorized by the Commission.

FIGURE 1

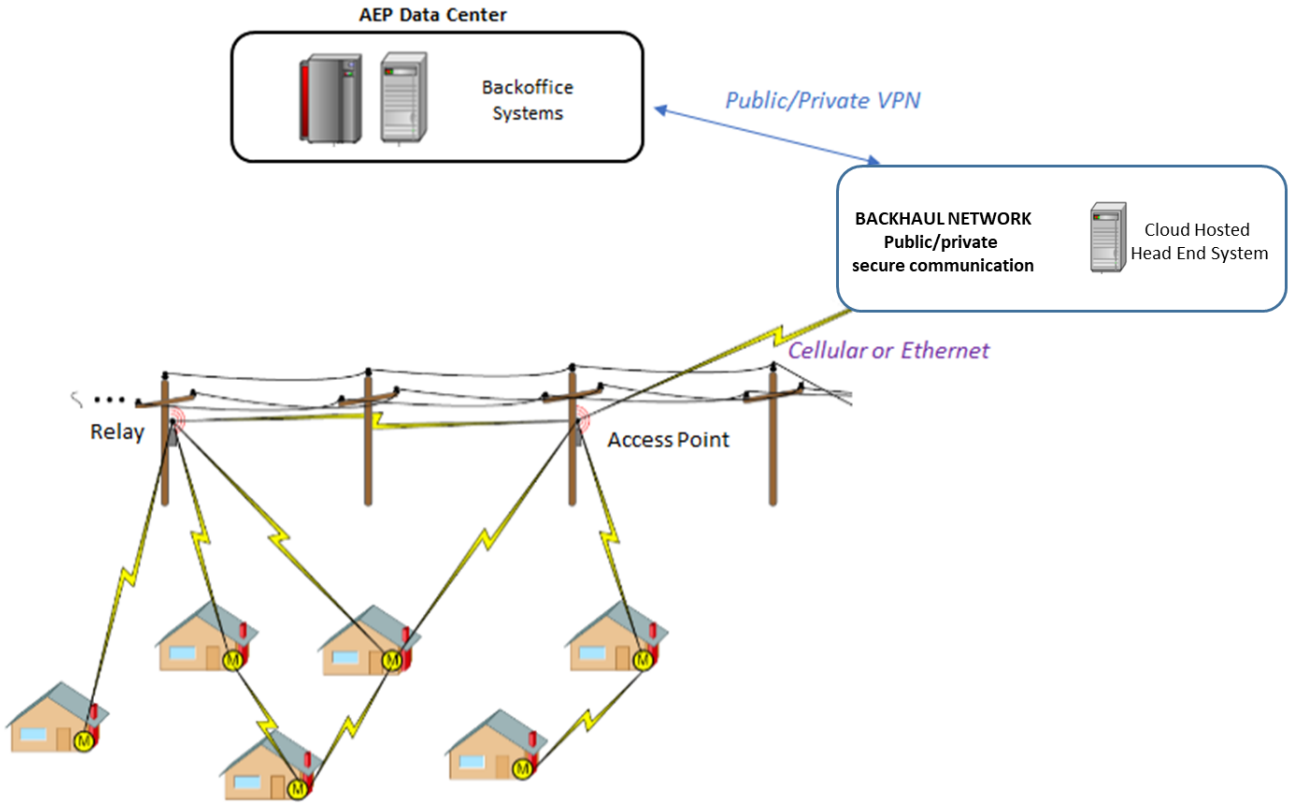
AEP Data Center
Backoffice Systems
Public/Private VPN
BACKHAUL NETWORK
Public/private
secure communication
Cloud Hosted
Head End System
Cellular or Ethernet
Relay
Access Point

FIGURE 2

SWEPCO Texas Deployment Plan by Sub Area														
	Texarkana,TX	Mcleod	Marshall	Waskom	Carthage	Henderson	Kilgore	Longview	Gladewater	Gilmore	Mt. Pleasant	Mineola	Memphis	Total
	40556	**505**	**18652**	**1977**	**10667**	**10085**	**10294**	**53944**	**8767**	**3285**	**23035**	**6995**	**7114**	**195876**
2021														
Qtr 4	10,000													10,000
2021 Total														10,000
2022														
Qtr 1														-
Qtr 2	30,556	505	18,652	1,977										51,690
Qtr 3					10,667	10,085	10,294	21,454						52,500
Qtr 4								32,490	8,767	3,285	7,958			52,500
2022 Total														156,690
2023														
Qtr 1											15,077	6,995	7,114	29,186
2023 Total														
Total	40,556	505	18,652	1,977	10,667	10,085	10,294	53,944	8,767	3,285	23,035	6,995	7,114	195,876