

Northwestern Water and Sewer District

Request for Proposal:

Water Fixed Network (Installed) Advanced Metering Infrastructure System

February 10, 2010

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1 Introduction

1.1 Overview

Northwestern Water and Sewer District provides water to its water customers in Wood County Ohio.

We are requesting your proposal for a water fixed network AMI system to read meters in an automated and cost effective manner. We also seek to conduct advanced data analysis through this system based upon the data it provides.

This RFP requests your proposal for purchase of the following:

- Radio endpoints to encode, store, and transmit register data, time-synchronized interval (data logging) data, leak data, and tamper data.
- A fixed network data collection system to collect register data, time-synchronized interval (data logging) data, leak data, and tamper data from up to 6,000 endpoints currently billed by the District and potentially another 4,500 currently billed by the City of Toledo at the time the District installs a master meter on the Toledo System, reliably process this data, and pass this data to the customer information (CIS) or meter data management (MDM) system.
- An endpoint programming system with the capability to initialize endpoints upon installation and pass pertinent installation data to the system.
- An architecture which allows for full two-way communication between the user and each endpoint in the system for the purposes of interrogation and synchronization network-wide as well as programming of a single endpoint or a group of selected endpoints.
- A Web-browser based user interface for all value-added functionality which is simple to use, ubiquitous in nature, and allows access from all appropriate departments across the utility including customer service, billing and finance, conservation, the meter shop, and engineering.
- Customer support services including assistance with software operation, troubleshooting and reconciling failed devices, network growth and the addition of new devices, training needs, recurrent software upgrades, and other activities to sustain proper operation of the system.
- Installation of the above.

Any systems and services proposed must cover the meter requirements stated above, and must be extensible to cover other meters as well as the potential for other applications in the future.

Northwestern Water and Sewer District seeks to acquire a meter reading system that meets the following objectives:

- Fully automated meter reading data collection for the purposes of increased meter reading efficiency and workforce safety throughout the service territory.
- Two-way communication to each endpoint in the system for the purposes of conducting on-demand reads to open and close accounts in lieu of dispatching work crews to take manual reads.
- Ability to obtain daily register reads as well as time-synchronized hourly and 15-minute interval (data logging) information, and the ability to store or archive this data for up to 10 years and conduct advanced analyses on the collected data.
- Enhanced service to our customers with the ability to conduct more timely bill complaint investigation and resolution using detailed data collected by the AMI system that can be used by the customer support team as well as shared directly with the customer.
- Improved utility operations and enhanced revenue protection through the application of leak detection algorithms and acoustic technologies on the utility's water distribution system for the purposes of monitoring and locating leaks both within the distribution system as well as the end user customer premises.
- Describe how your system could use data analysis to include single and compound meter right-sizing, flow pattern analysis, reverse flow detection, and hydraulic model calibration based upon the data provided by the AMI system.
- Support for voluntary or mandated conservation programs anticipated by the utility.
- The District currently reads and bills approximately 6,000 accounts while the City of Toledo reads and bills approximately 3,500 accounts on behalf of the District and are not included at this time. The District's system is made up of discrete areas and these areas will be converted to fixed base meter read over a multi-year process. The first year will include a small area of approximately 20-30 accounts. Starting with the 2nd year, the District anticipates converting approximately 1,000 accounts each year until complete.
- The District's billing system for interface is InHance, a division of Harris, version 5.0.11.0.

1.2 Bidder's Responsibilities

Responses to this RFP shall be received by Northwestern Water and Sewer District no later than March 10, 2010.

Bidder shall read and understand the circumstances and procedures under which this bid is let.

All quotations are to be firm offers for no less than ninety <90> days.

Northwestern Water and Sewer District reserves the right to refuse any or all proposals and to provide to each participating bidder their award status only, without further explanation of evaluation.

1.3 General Instructions

This RFP outlines the requirements for an AMI system to be purchased, owned and operated by Northwestern Water and Sewer District.

- 1.3.1 The system shall be comprised of all new equipment. Components shall be produced by established manufacturers.
- 1.3.2 Vendor supplying a proposal response must provide local service and provide documentation that vendor has been in business for more than 10 years.
- 1.3.3 Specify freight on board (FOB) point and conditions.
- 1.3.4 Vendor will provide a listing of all clients. References shall include the name and phone number of the utility contact.

1.4 Contacts

All questions shall be directed to: Simon Gundy, 419-354-9344(fax), 419-354-9090 x172, sgundy@nwwsd.org.

2 Instructions to Vendors

2.1 Proposal Preparation

Northwestern Water and Sewer District does not pay for any cost or expense in the preparation or submission of your proposal or for any other reasons in response to the RFP.

2.2 Proposal Format Instructions

Each vendor's response shall be organized in a fashion similar to that outlined below:

- Section 1: Executive Summary
- Section 2: Technology Solution Overview
- Section 3: Project Overview
- Section 4: Compliance Table for RFP requirement headers numbered 3 through 8:

Answers are to be in the form:

- Comply
- Alternate - include explanation
- Exception - include explanation

- Does Not Comply
- Section 5: System Pricing
- Section 6: Bidder's Information
- Bidder's financial information
 - Bidder's experience in the AMI business
 - Detailed company ownership – last 10 years (include any bankruptcy information)
 - Company size – number of employees and location(s)
 - Location where company's products are manufactured that are offered in this proposal
 - Subcontractors intended to be used in the manufacture of any of the components, service or support requested in this RFP and their manufacturing location if applicable.

Appendix A Client Reference List

2.3 Proposal Submission

Five (5) copies of the proposal and other information are to be submitted to:

Simon Gundy, Assistant Superintendent, Northwestern Water and Sewer District,
12560 Middleton Pike, Bowling Green, OH 43402

All copies shall be received no later than March 10, 2010. No proposals will be accepted after that time.

Your proposal shall be in effect for at least 90 days from the submission date.

3 Technical Requirements

3.1 Technical Requirements

The vendor's system shall meet the following technical requirements:

- 3.1.1 Your response shall contain an explicit comply/exception assessment of whether your system meets each requirement and, whenever necessary, a description of compliance to each point. If your system or any part of the system fails to meet any of the following requirements, explain the reasoning that substantiates that the variation from these requirements is not critical.
- 3.1.2 Please note that all answers must reflect current capabilities. Any future capabilities must be stated as such and outlined with a development schedule.

3.2 System Description

- 3.2.1 Briefly describe the data flow in the system, listing each component and how they interface. Detail the proposed system configuration. Describe the interface to the company's communication network.
- 3.2.2 The processing computers in the system shall run in a network configuration. Please describe processing computer(s) specifications to be able to support your reading system
- 3.2.3 The system must provide two-way capability from the system software all the way to the endpoint.
- 3.2.4 The system and all of the endpoints shall be time-synchronized to ensure timestamps for all readings are accurate +/- 1 second and synchronized to a known time reference standard. Due to its precision, GPS is the preferred time reference standard.
- 3.2.5 The system shall provide a Web-browser user interface that supports multiple users across the enterprise for the purposes of accessing value-added features such as viewing consumption patterns, detecting leaks, supporting conservation programs, etc.
- 3.2.6 The system shall provide a rich-client or Web-browser user interface for the purposes of accessing the system to conduct system administrative tasks such as diagnostics, troubleshooting, reconfigurations, etc. Describe how a customer service representative, conservation officer, meter technician, or other utility personnel would use this feature.
- 3.2.7 The system shall be capable of detecting and quantifying potential customer-premise leaks (i.e. "behind the meter" leaks). Describe how a customer service representative, conservation officer, meter technician, or other utility personnel would use this feature to detect and visualize metered leaks within the system.
- 3.2.8 The system shall be capable of supporting acoustic leak detection to identify potential leaks in the Northwestern Water and Sewer District's water distribution system. Describe how the user could detect each of these situations.
- 3.2.9 The system shall be capable of detecting reverse flow events occurring at the meter. These events can include reversed meter, faulty register, as well as a bona fide reverse flow condition. Describe how the user could detect each of these situations.
- 3.2.10 The system shall provide notification when tampering has occurred, including cut cables, register communication failures, and endpoint reprogramming attempts. Describe how a customer service representative, conservation officer, meter technician, or other utility personnel would use this feature
- 3.2.11 Describe the level of training provided to the system administrator, billing staff, field staff and management.

3.3 Operating System

- 3.3.1 AMI system will use a standard operating system (OS) which fully supports a WAN-based system.
- 3.3.2 The bidder shall identify on which OS each component of their AMI package is available. If any component of the bidder's package is planned for future availability on a platform, that platform, the component availability, the timetable for the availability of each component shall be specified.

3.4 Endpoint

- 3.4.1 The endpoint must be capable of operating in harsh environments. List the environmental specifications of your endpoint and describe its ability to withstand extreme high and low temperature conditions as well as its resistance to water intrusion. As a minimum, the endpoint shall function accurately and not be damaged over an operating temperature range of -40 deg C to +70 deg C.
- 3.4.2 The endpoint must be designed to last in the field without need for servicing for a minimum of 20 years. Indicate the expected product life of your endpoint and provide any engineering data to support the claim.
- 3.4.3 Bidder's solution must provide the same functionality for both indoor water meters and those located in pit settings.
- 3.4.4 Endpoints proposed for pit settings must be able to withstand the harsh pit environment and have no exposed electrical connections.
- 3.4.5 Pit endpoints must offer an inline connector that enables removal of the meter for periodic testing while allowing the module to stay in the field.
- 3.4.6 Pit endpoints must function accurately and not be damaged under conditions of submersion in polluted or non-polluted environments for a period of at least 6 months.
- 3.4.7 Indoor or remotely mounted endpoints must function accurately and not be damaged within humidity environments of 0% to 95% relative humidity.
- 3.4.8 The endpoint must function accurately and not be damaged when installed outdoors in a full sun environment for 20 years.
- 3.4.9 The endpoint must be factory installable at the meter manufacturer. List all available options for the installation of your endpoint into new or existing meters.
- 3.4.10 Meter manufacturers must have the ability to provide AMI provider's inline connector.
- 3.4.11 The endpoint must utilize an accurate and reliable encoding technology to capture readings. Describe the encoding technology utilized in your endpoint.

- 3.4.12 Describe the power supply utilized by your endpoint. Battery operated endpoints must have a battery design life of 20 years with engineering data to support the claim.
- 3.4.13 The endpoint must be capable of detecting and reporting potential theft. Describe all tamper reports available with your endpoint. At a minimum, the endpoint must report cut cable tampers, register communication errors, and reprogramming attempts.
- 3.4.14 The system must be capable of detecting and reporting potential reverse flow events. Describe how the system detects and reports reverse flow.
- 3.4.15 The endpoint must meet and be approved by all applicable regulatory agencies and meet all applicable regulatory requirements. Define all applicable regulatory requirements associated with your endpoint and applicable approvals on the device.
- 3.4.16 Describe any FCC licensing requirements for use of the endpoint. If assistance in obtaining necessary licensing is provided, please explain.
- 3.4.17 AMI vendor must have sold a minimum of 1 million water RF endpoints to the utility market to assure familiarity with the water market.
- 3.4.18 The endpoints shall have the option of interfacing with acoustic leak sensors. Please list acoustic leak sensors compatible with these meter modules.
- 3.4.19 A dual input endpoint must be available for connecting to two close-proximity meters, meters with two registers (i.e. compound meters), or for the connection of an external acoustic leak sensor, all using just one dual-input endpoint.
- 3.4.20 The system shall allow the addition of endpoints at any time without the need for system reconfiguration. Describe the process for adding additional modules to the network.
- 3.4.21 Endpoints shall have the option of having through-the-lid mounting or having a remote pit antenna that can be installed through the lid for those instances where the endpoint may be under water for long periods of time.
- 3.4.22 On demand read – The endpoint shall allow for full two-way communication from the user interface to the endpoint for interrogation when requested.
- 3.4.23 Data logging – The endpoint shall be capable of storing at least hourly interval data (15-minute is preferred), and must be capable of storing at least 30 days of hourly reads.
- 3.4.24 Data retrieval – The endpoint must be capable of providing a minimum of 30 days of stored historical data to the system through the use of two-way communication when requested by the user.

- 3.4.25 Leak detection – The solution must provide leak detection data including an internal algorithm built into the device and programmable leak detection periods.

3.5 Radio Frequencies

Northwestern Water and Sewer District is seeking a solution with high power and high-throughput data handling characteristics.

- 3.5.1 What radio frequency is used for your endpoints? Explain why you selected it for your system as well as any benefits associated with utilization of this band.
- 3.5.2 Describe the bandwidth capacity of your system and expected data loads which will be carried.

3.6 Meter Compatibility

- 3.6.1 AMI vendor must be compatible with multiple meter vendors to allow for complete freedom of meter choice. Provide a listing of meter manufacturers and meter model numbers with which your AMI endpoints are compatible. State whether your system gives Northwestern Water and Sewer District the flexibility to purchase meters from multiple vendors. Meter compatibility listings for endpoints must be provided.
- 3.6.2 Pit endpoints must offer an inline connector that enables removal of the meter for periodic testing while allowing the endpoint to stay in the field. Connector must be a proven device with three or more years of use in the field.
- 3.6.3 Bidder's solution must be able to connect to absolute encoder-type registers. AMI vendor must be able to provide one part number for all meter types for single-input endpoints, and one part number for all meter types for dual-input endpoints. This single part number for each endpoint type must have the ability to work with pulse-type or encoder-type meters.

3.7 Retrofit Hardware Requirements

- 3.7.1 Describe the equipment needed to perform retrofit installations of endpoints in the field.

3.8 Fixed Network Collector

- 3.8.1 The fixed network collector must be capable of operating in harsh environments. List the environmental specifications of your collector.
- 3.8.2 All of the collector's electronics must be electrically isolated and protected against static discharge and indirect lightning strikes. Describe how your collector is protected against lightning strikes.

- 3.8.3 List all possible network backhaul options that your collector can support. At a minimum, GPRS must be supported, as well as an external Ethernet connection to support additional backhaul options.
- 3.8.4 The collector must meet all applicable regulatory requirements for such devices. Define all applicable regulatory requirements and approvals associated with your collector.
- 3.8.5 Define the performance characteristics of your collector (read rate, accuracy, etc.).
- 3.8.6 Indicate the capacity of readings obtained by your collector in an eight hour day.
- 3.8.7 Describe how your collector's call-in schedule is programmed and managed.
- 3.8.8 The system must verify data integrity in every message.
- 3.8.9 Define any applicable warranties associated with your collector.
- 3.8.10 The collector must be easy to install. Describe installation procedures.
- 3.8.11 The collector must store 10 days of hourly data logging for 10,000 endpoints (if 60 minute intervals are selected).
- 3.8.12 The collector must have the capability to receive software upgrades via the network.
- 3.8.13 The collector must provide diagnostics capability to allow troubleshooting via the network.
- 3.8.14 The system shall allow the addition of collectors at any time without the need for system reconfiguration
- 3.8.15 The collectors must be able to communicate to the head end computer without the need of adding phone lines or the need of modems at the head end computer.
- 3.8.16 The collector must provide two-way communication to each endpoint in the network for the purposes of user interrogation and time-synchronization.
- 3.8.17 Explain how your collector keeps time and what standard time keeping mechanism/system it uses to ensure accuracy.
- 3.8.18 Describe how frequently your collector synchronizes each endpoint in the system.
- 3.8.19 Does your collector have an option for solar power?
- 3.8.20 Northwestern Water and Sewer District requires a battery backup for the collection device in the event of a power failure. Please provide information on how long the device can run on battery before a recharge, and its expected battery life. A minimum run time of eight (8) hours while on battery backup is required.

- 3.8.21 Northwestern Water and Sewer District requires guaranteed reliability to ensure a register read is received from each endpoint under the network on a daily basis. What means are in place in your solution to ensure at least 98% probability of daily read? Describe your response if daily read reliability is less than 98%.
- 3.8.22 Describe your guarantee on the number of collectors recommended and remediation and responsibility if number recommended is deficient.

3.9 Network Administrator Software

3.9.1 Platform

- Describe the hardware needed to run your system software.

3.9.2 Data transfer to and from the CIS system to the proposed system will be handled by a LAN/WAN connection

- Northwestern Water and Sewer District shall have the ability to set parameters to have data transfers automatically occur one or more times per day.
- Northwestern Water and Sewer District must be able to synchronize customer data (name, address) between the system and Northwestern Water and Sewer District's CIS via a standard file format such as XML (for access and search options in the user interface).

3.9.3 Meter Reading Storage and Processing

- AMI system will use a standard OS and database which fully supports a WAN-based system. The vendor will specify the manufacturer, product name and product version of the OS and database that their system operates on.
- The network administrator software must provide the ability to store a minimum of 40 days of meter reading data including hourly data logging information for up to 20,000 endpoints.

3.9.4 Network Administrator User Interface

- The proposed system must have a user interface that gives utility personnel access to the features and functions needed to successfully manage and operate the fixed network system.
- The proposed system must be capable of presenting status of different components in a map format.
- Describe all graphic displays that assist the user in understanding how the network is operating. Include screenshots to illustrate visual displays.

3.9.5 Data collection must be automatic based on a pre-configured read schedule.

3.9.6 Describe your ability to integrate map layers into a GIS system.

3.9.6 Grouping Functions

To support advanced data delivery applications to Northwestern Water and Sewer District customers, the solution must have the capability to gather and deliver data in pre-established groups for analysis and data aggregation purposes. These groups shall be defined and created by Northwestern Water and Sewer District on an ongoing basis without any required involvement of the vendor.

- The solution must support the grouping of register data.
 - The solution must support grouping of interval (data logging) data
 - The solution must support grouping of leak data.
 - It must be possible for an endpoint to belong to more than one group
 - Describe how end user would use solution.
- 3.9.7 Northwestern Water and Sewer District requires guaranteed read reliability. Please state the read reliability of your system and describe what processes are in place to ensure reads are received on a daily basis.
- 3.9.8 The system must provide two-way capability from the user interface of the administrative software to the endpoint in order to reprogram the endpoint's interval data bucket size. Specify smallest bucket size.
- 3.9.9 The system must provide two-way capability in order to download new software versions to collectors over the network.
- 3.9.10 Specify management reports available with your system.
- 3.9.11 Automatic Scheduled Processing
- The proposed system must support appropriate functions for automated processing (no operator required) to allow routine operations to be scheduled in an unattended mode. Describe this option and the functions supported in this way.
 - Describe process to transfer data from Inhance billing system to administrator software.

3.10 Requirements for Reads

3.10.1 Scheduled Reads

Daily register reads must be time stamped, collected, and available to Northwestern Water and Sewer District for all water customers daily. The time must be provided by the endpoint using a real time clock and must be synchronized daily to an accepted time reference standard +/- 1 second. The endpoints must provide the following types of readings:

- Register Data
 - At least twelve (12) register reads per day with a battery life of 20 years
- Interval Data (Data Logging)
 - Data logging time slots must be time synchronized and programmable for at least 30 minutes, 60 minutes. At least twenty

five (25) hourly intervals must be available from each endpoint each day.

- Leak Detection Data
 - A leak detection value must be transmitted each time the endpoint transmits a signal to the collector.
 - This value must be the minimum amount of water usage over the previous 24 hour period.

3.10.2 On-Demand Reads

Northwestern Water and Sewer District must be able to send commands over the network to a single endpoint or a selected group of endpoints to retrieve register reads, interval data (data logging) reads and device data. The data must be returned to the user in no more than five minutes and these commands must be available via the user interface as well as an API.

- On-Demand Consumption Reads
 - Return the most current register value in the database if that value is four hours old or less, or;
 - If the value in the database is more than four hours old, the system shall retrieve the most current register read stored in the endpoint.
- On-Demand Interval Data (Data Logging) Reads
 - Return up to 35 days of data for endpoints programmed for hourly intervals in order to fill gaps when prolonged communication outages occur.
- On-Demand Device Data Reads
 - Return register configuration data to a file from the endpoint including but not limited to meter manufacturer, model type, pipe size, unit of measure, and decode type and save it to a file in order to assist in troubleshooting.

3.10.3 Tamper Status

- The meter reading system must deliver current tamper status information for all water customers. This information must be delivered, along with the daily register and interval data reads.

3.11 Programming Via the Network

3.11.1 Manual Programming

The utility must be able to send programming commands over the network to a single endpoint or a group of endpoints. These commands must be available via the user interface and an API

- Interval Bucket Size
 - The user must be able to change how frequently the endpoint retrieves a reading from the register to at least 30, or 60 minute

intervals through the user interface, without the need to physically visit the endpoint.

- Transmitting Endpoint Reads to Collectors
 - The user must be able to change the rate interval at which data packets transmitted from the endpoint to the collector through the user interface without the need to physically visit the endpoint, with multiple options ranging from 2 to 4 hours.

The system must be able to automatically send select programming commands autonomously. These commands should not be accessible to operators through the UI or an API.

- Clock Synchronization
 - This command must be issued once per day to synchronize endpoint clocks to a known time reference standard such as GPS.
- Collector Assignment
 - The system must automatically assign endpoints to the collector that historically has the best communication to ensure for the most reliable two-way communication.

3.11.2 Network Efficiency

Explain how your system ensures that two-way commands do not interfere with regular data collection activities.

3.12 Customer Service/Support Software

3.12.1 The solution must provide a Web-browser based application for use in call centers and other support areas and allow for a high number of concurrent users. This application must help the users respond to high bill complaints with detailed information of usage over a period of time as follows.

- Request a fresh read from the network for a single endpoint
- Search for selected accounts by a variety of search terms including account number, name, address, etc.
- Request detailed usage data for a specified time period
 - Data shall be available for one endpoint or a group of endpoints, such as for all Starbucks locations.
 - Data shall be available for hour, day, week, month, or year.
 - Related flow data shall be available on minimum, average, and maximum flow rates.
- View usage and minimum flow data in an easy to understand graphical format.

3.12.2 The solution must provide the ability to compare current usage to usage from a previous period (last month, last year, etc.).

- 3.12.3 The solution must allow exporting selected data to Adobe Acrobat and Microsoft Excel and at least one widely used data interchange format such as DBF, CSV or tab delimited ASCII from within the user interface.
- 3.12.4 The solution shall include the ability to save reports for quick reference in the future. The application must also allow for ad-hoc or scheduled emails usage reports that can be made available to the consumer in the same graphical presentation that is on the screen allowing the support person and the consumer to review data together.
- 3.12.5 Trending Reports shall be provided that include:
- Usage trends for a number of endpoints
 - Multi-site comparative analysis
- 3.12.6 Northwestern Water and Sewer District may wish to optionally deploy a Web interface for consumers to get usage information directly. Please indicate if you have a mass market interface now or plan to have one available in the future and briefly describe the interface.
- The solution may be deployed to end users so a customer can view their own data by logging into a secure Website, and have access only to their own data.
 - The Web application can be customized with a company logo and customizable home page with custom messages and links to other portions of the utility's Website.
- 3.12.7 Describe how a CSR can perform a "soft disconnect" using the system.

3.13 Distribution System Management

- 3.13.1 The solution must provide an interface and access to collected interval data for the purposes of properly managing certain Northwestern Water and Sewer District assets as well as maintaining overall system integrity.
- 3.13.2 The solution shall offer views of flow analysis trended and aggregated over time which can be used to verify correct sizing of single and compound meters.
- 3.13.3 The solution shall allow grouping and aggregating of accounts into districts which can be compared to a metered source ("district metering").
- 3.13.4 Describe how your solution can provide granular interval data from every endpoint in the system which can be exported in industry standard format (such as XML) to third party hydraulic load analysis software for the purposes of validating and calibrating existing theoretical models within the software.

3.14 Conservation Program Support

- 3.14.1 The solution must provide an interface and access to collected interval data for the purposes of effectively managing conservation programs and initiatives that Northwestern Water and Sewer District may commence.
- 3.14.2 The solution shall offer a Web-browser based user interface which can be easily accessed by the conservation team for the purposes of easily accessing and analyzing consumption patterns found in the meter data collected by the system.
- 3.14.3 The solution shall allow members of the conservation team to create groups of endpoints that represent areas undergoing conservation programs, and then conduct before-and-after analysis on the group to measure the effectiveness of the selected program or initiative.
- 3.14.4 The solution shall offer metered (“customer premise”) leak detection capabilities which allow the utility to identify and eliminate wasteful consumption of water caused by leaks.

3.15 Meter Data Management System

- 3.15.1 The solution must provide an MDM system for Northwestern Water and Sewer District to store multiple types of data for each individual endpoint including but not restricted to the following:
 - Rate information
 - Customer Information
 - Service Point Information
 - Meter data
 - Register data
 - Interval data
 - Minimum flow information
 - Leak information
 - Tamper data
 - Event data
- 3.15.2 MDM system must be able to store or archive up to ten (10) years worth of data.
- 3.15.3 MDM system must be accessible by a rich client or Web-browser based interface for the purposes of system administration and diagnostic troubleshooting.
- 3.15.4 MDM system must be able to export data to Northwestern Water and Sewer District billing system.
- 3.15.5 Describe all graphic displays that assist the user in understanding how the network is operating. Include screenshots to illustrate visual displays.

3.15.6 Describe MDM software/hardware requirements.

3.16 Acoustic Leak Detection (This is a desired function not a mandatory requirement. If your system has this capability, please respond to this section.)

3.16.1 Leak detection should be available in the system using acoustic sensor loggers. Describe loggers system is compatible with. These loggers should:

- Have a waterproof housing with integrated features that allow pipe mounting at a known orientation of the internal vibration sensor.
- Be fully submersible (IP-68 environmental protection).
- Have a unique electronic serial number for optional radio communication.
- Have a limited warranty of 10 years for parts and labor.
- When connected by 3-wire cable to an AMI endpoint: Have at least 15 years of normal operation.
- Have a self-calibrating real-time calendar clock for implementation of nighttime recording and power management.
- Record vibrations during the night at least 256 times over a 4-hour period in order to characterize nighttime vibrations in the environment of the sensor.
- Be able to perform a frequency analysis of vibrations and to store and transmit this information.
- When connected by 3-wire cable to an AMI endpoint: Be compatible with fixed network AMI endpoints utilizing an industry-standard ASCII binary-coded decimal 6-digit communication protocol.
- When connected by 3-wire cable to an AMI endpoint: Have a waterproof cable connection and internal software capable of communicating with an AMI device and a sensor testing unit.
- When integrated with fixed network AMI: Be able to send data to a host computer at least once every 24 hours so as to provide a rapid response to sudden new leakage.

3.16.2 An Internet-based software application for administration purposes should be provided that includes the following capabilities:

- Maintain a database with location, network and other information about the acoustic sensor loggers.
- Support an unlimited number of acoustic sensor loggers, an unlimited amount of information received from acoustic sensor loggers, and an unlimited number of different water distribution systems located anywhere in the world.

- Support remote login of an unlimited number of authorized users who are employees of the utility to the software.
- Support a user-maintained database of leakage information.

3.16.3 Analysis capabilities provided in the Web user interface should:

- Include computation of a leak status for every acoustic sensor logger. The leak status is derived from a leak index, which is a number between 0 and 100 that represents the relative likelihood of there being a leak(s) in the vicinity of the acoustic sensor logger.
- Include refreshing the leak status and leak index values at any time and automatically whenever new information is received from acoustic sensor loggers.
- Display a map superimposed on a map of the water distribution which shows the spatial variation of leak status (leak index) over a user-selected geographical area.
- Represent acoustic sensors using a symbol superimposed on a map of the water distribution where the symbols represent the locations and leak status of acoustic sensors.
- Display historical data for each acoustic sensor logger under user control. Historical data will include nighttime vibration levels, frequency-dependent (high, mid and low) levels, nighttime variability representations of vibration levels, and historical records of leak status and leak index.
- Use an intelligently-derived acoustic leak signature to detect the presence of leaks in the water distribution system from the information sent by the acoustic sensor loggers.
- Perform an intelligent network-wide analysis using a historical analysis whereby each acoustic sensor logger acts as its own historical reference to detect sudden, emerging, or pre-existing leakage.
- Perform an intelligent network-wide analysis using a comparative algorithm to compare information from some or all acoustic sensor loggers to detect leakage that is inaudible or not otherwise detectable.

3.16.4 Information display, import and export capabilities should:

- Support delivery of phone or email messages in response to a change to abnormal status of acoustic sensor loggers.
- Provide electronic reports delivered by email.
- Include the ability to display maps of a water distribution system in the form of digital images.
- Integrate information about the acoustic sensors with the display of the maps.

- Be capable of exporting information about the acoustic sensor loggers and leakage to a spreadsheet, database or GIS.

4 System Planning for Collector Location(s)

4.1 Flexibility in Mounting Options

- 4.1.1 Please list all available mounting options.
- 4.1.2 Describe the process for choosing data collector locations.
- 4.1.3 Describe what data is required from Northwestern Water and Sewer District to support the system design process.
- 4.1.4 Describe how the system planning process accounts for variation in the terrain caused by elevations or dense urban areas.
- 4.1.5 Any costs for system planning must be included in the proposal.
- 4.1.6 Describe the effect height above ground level (AGL) has on the coverage of your collector.
- 4.1.7 The system must offer redundancy of coverage from collectors. Describe typical system design redundancy and how this affects read reliability and data throughput capabilities of the system.

5 Implementation

5.1 Experienced Project Management

- 5.1.1 The vendor, and its representatives, shall have a proven program of professional project management to ensure successful system installation. Project managers shall be experienced in managing the design, installation and optimization of systems. Project management experience shall include system integration and training support.
- 5.1.2 Describe your experience in implementing systems such as those proposed here. Please include experience in implementing water systems.

5.2 Configuration and Set Up

- 5.2.1 Provide the expected cost for hardware configuration setup, operating system and software installation, parameter setups, definition of required reports, and the testing of input and output files.

5.3 Automated Installation Tools

- 5.3.1 The installation process shall include fully automated endpoint installation software that programs the endpoints.

- 5.3.2 The endpoint installation software should be expandable to other areas of the utility such as field service workforces. Please describe any capabilities in this area.

6 Warranty and Customer Support

6.1 Warranty

- 6.1.1 Specify the warranty period on all applicable products.

6.2 Existing AMI Solutions

- 6.2.1 State how long your company has supported existing AMI product lines.

6.3 Customer Support

- 6.3.1 Bidder must offer 24 hour per day customer support, 7 days a week. Specify details of the vendor's support package.

6.4 System Pricing

- 6.4.1 Please describe in detail the pricing for the systems proposed.
- 6.4.2 Please include any assumptions made in the proposed solution and pricing.

6.5 Ownership

- 6.5.1 The proposed business transaction shall be a purchase of the system by Northwestern Water and Sewer District.
- 6.5.2 Northwestern Water and Sewer District shall own all data collected by the system. Data collected by the system shall not be used for any purpose without the approval of Northwestern Water and Sewer District.

7 Company Stability and Market Standing

- 7.1.1 Company must have been in the business of providing AMR/AMI solutions for at least 15 years and have at least 1,000 utility AMR/AMI customers.
- 7.1.2 Provide detailed company financial and market standing information.