

REMOTE METER READING METHODS OF RETRIEVING DATA BY USE OF REMOTE DEVICES

Arun Sehgal

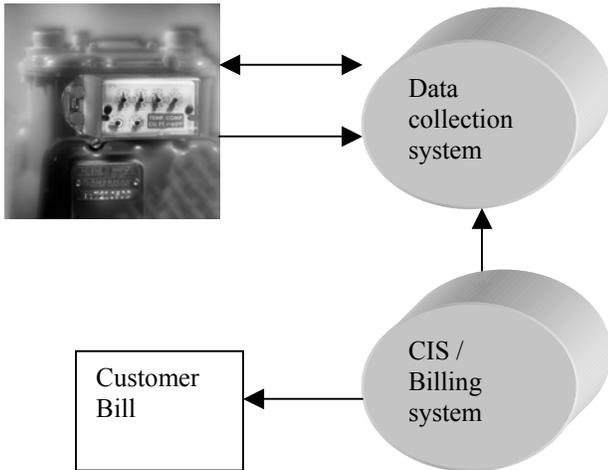
Itron Inc.
2818 North Sullivan Road
Spokane, Washington 99216

INTRODUCTION

Remote meter reading is a fast growing trend in Natural Gas industry. As per industry estimates, close to 14 million gas meters in the United States are read remotely. This paper presents the advantages of remote meter reading and explains the various technologies in use.

What is remote meter reading?

Remote meter reading implies the use of a communication device to automate gas meters, that sends out the meter readings and other crucial meter information to a data collection system, thus eliminating the need to physically visit the gas meters.



Data Retrieval

Residential Customers

Most Natural Gas customers are billed monthly and, thus, a monthly consumption read is sufficient for these customers. However, some residential Natural Gas customers in fully deregulated markets may need to be read more frequently, and some even daily. This may be a growing trend, especially when the potential benefits of deregulation are made available to more residential customers. Utilities also need to monitor whether the gas meter has been tampered with in any way – resulting in a potential loss of revenue.

Commercial and Industrial customers

Small commercial customers' gas meters are usually read monthly for consumption. However, large commercial and industrial customers have advanced metering system-like volume correctors, which are read – usually daily at the gas day time. These remote-monitoring devices attached to gas meters and correctors store hourly gas consumption profiles.

Communication Technologies for Retrieving Data

RF (Radio Frequency) Communications

RF is the most commonly used method of communication between a remote device and data collection system. A gas meter is mounted with a small module, usually under the index, where it converts the movement of wriggler into pulse counts and stores them, taking into account the count rate and other factors. These modules are essentially encoders and RF transmitters, put together as a single unit.

These RF devices are activated by a “wake up” signal from the data collection system and the device sends back the latest meter read and other information, like tamper status, to the data collection system. As these devices are battery powered, using this wake technique helps conserve battery life.

In some cases, RF devices are regularly transmitting the readings and the data collection system does not “wake up” the device.

RF-based remote meter reading devices are easily deployable and offer a very reliable means of data collection. These devices are used mostly for residential and some commercial remote meter reading.

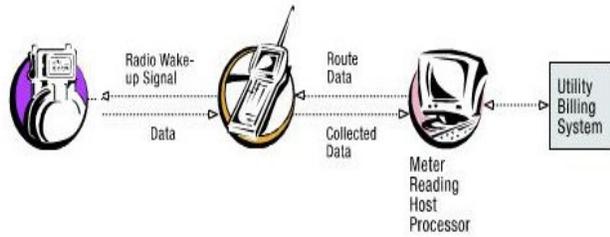
Data collection system for RF devices

There are three most popular ways to “read” these RF devices.

Radio Equipped Handheld Computer

A meter reader carrying a rugged handheld computer equipped with a radio receiver walks by homes, without

actually entering the premises. The devices radio their reads to the handheld computer, the meter reader accepts the read and keeps moving on its route.

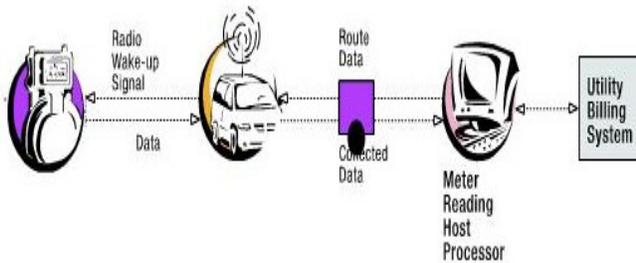


The meter reader thus does not enter the readings manually, hence eliminating any manual entry errors. This system is normally used to read those accounts within the utility service territory that have high-cost or hazardous-to-read meters. These meters may be situated in a basement, in a back yard with a dangerous dog or locked gate, or with an angry customer who doesn't want the meter reader on the property. The meter readers can collect anywhere from 600 to 1000 meter reads on a typical day using a Radio equipped handheld computer.

“Drive By” or Mobile Data collection system

“Drive by” or mobile data collection is a very popular method of data collection from radio equipped remote devices.

Mobile data collection uses vehicles equipped with radio units to read RF module-equipped gas meters via radio without the need to access the meter. This reading system dramatically improves meter reading efficiency.



A radio transceiver is installed in a utility vehicle. Route information is downloaded from the utility billing system and loaded into this radio transceiver. While driving along a meter-reading route, the transceiver broadcasts a radio “wake-up” signal to all RF meter modules within range and receives the meter readings when they respond. Completed reads are uploaded to the billing system for bill generation.

Mobile data collection system is used in saturated areas where there may be large populations, difficult-to-access, or hazardous-to-read meters. As a result of this level of saturation, meter reading efficiency is dramatically improved. A single transceiver can read an average of 10-12,000 meters in an 8-hour shift, and can read up to 24,000 meters per day, depending on meter density and system use.

Fixed Network Data collection system

Some utilities, especially those who read both gas and electric meters, are considering deploying a fixed network for remote meter reading.

Fixed network deployment is usually done as a migration from the mobile data collection system. The Fixed Network is usually installed over saturated areas where advanced metering data, variable reads; unscheduled reads or operational improvements are required. This saturated deployment spreads the cost of the network components over multiple meters.

Other considerations for RF remote monitoring devices

While deciding on the choice of remote metering devices, utilities often take into account the following:

- ❑ **Compatibility with gas meters:** Utilities often look for those remote-metering devices, which can be directly mounted on most of their installed base of gas meters. This minimizes the need to change the gas meters just to suit the design of remote metering device and helps by reducing the cost of implementing a remote metering system.
- ❑ **Battery Life:** Utilities like long battery life-ideally that lasts as long as the useful life of the remote monitoring device itself. This eliminates the need to do battery change outs. Current designs of some remote metering devices have battery life of 17-20 years.
- ❑ **Safety:** Safety is an important attribute and these devices should be intrinsically safe and certified to be used in natural gas environments.
- ❑ **Migration Path:** One of the factors that utilities have often considered is the availability of a migration path for reading technologies. Many utilities have started with the handheld walk-by solution and as their deployment base grew, they have migrated to a mobile data collection solution, without any impact on the meter modules or need to revisit them.

RF-based systems: Implementation Successes

Radio based Remote Meter Reading systems have been installed by gas utilities for nearly a decade. The earliest installations at Minnegasco, Keyspan energy,

Philadelphia Gas Works, Atlanta Gas and at several others are more than 15 years old, and these utilities moved towards saturation several years back. This is a testimony to the success of RF technology in the field. Several hundred utilities around North America have implemented RF based systems and are reaping the benefits.

Communications Using Telephone

Large commercial and industrial gas customers consume a large amount of gas that needs to be measured and reported –often at daily or even hourly basis. These readings are usually required at the Gas Day time. In such cases, using a telephone line provides an easy way to communicate with these remote metering devices.

Telephone based remote metering devices are of two types based upon their mode of communication, inbound or outbound.

Inbound systems: In this type of remote meter reading system, the modules call a Central Master Data Collection Computer at prescheduled times, usually at Gas day time daily, and provide the hourly gas consumption data. Inbound phone systems have been very successful in efficiently sending consumption and other data in a given time window.

Outbound systems: In this type of communication, the Master Station calls the remote meter module and collects the data. This is useful where on-demand reads may be required as well.

The telephone-based remote metering modules may either be direct mount or remote mount. The direct mounted modules encode and store the hourly consumption and communicate using telephone line.

The remote mounted modules take multiple pulse inputs from gas meters, electronic volume correctors, count and store this data and use a telephone line to send this data to the collection software.

The utilities, especially those who run in a deregulated environment, need to report the consumption profiles of their large commercial and industrial consumers to several third party systems which communicate information to customers, gas marketers, system planners etc. These utilities are now looking at ways to improve their data collection methodologies and how they can improve the dissemination of the metering data, using enterprise-wide deployment of newer data management and analysis software.

Other Communication Methods

In places where it is difficult to make a regular phone line available, cellular transreceivers are currently being evaluated at some sites around North America as a communication medium.

While cellular offers a reduction in installation costs, experience regarding the network availability, cost of service and battery life, etc. is being evaluated. Currently only few hundred cellular-based devices are in field.

Besides the above, various other communication medium like satellite, powerline carrier (in conjunction with electric meters) etc have been experimented in small numbers.

Conclusion

Benefits of Remote Meter Reading

Traditionally, Remote Meter Reading has been thought of as a means to improve meter-reading operations and to reduce costs. But that's just the beginning. By deploying advanced data collection and management solutions, utilities are already achieving a variety of benefits throughout their companies every day. In addition to reducing costs, other benefits include:

- Revenue cycle improvements and cost reductions
- Increased billing accuracy and resulting revenue
- Revenue assurance and protection
- Reductions in theft of service

Today, gas utilities are beginning to realize that Remote Meter Reading technologies deliver operational improvements and cost savings throughout a utility's core service processes. In addition to meter reading services, the benefits of advanced data collection extend throughout a utility's operations to deliver quantifiable improvements and savings in revenue assurance, customer service, field service operations, distribution system reliability and efficiency, marketing and business development, and regulatory compliance. The economic value of remote meter reading technology doesn't end at the meter shop. That's where it begins.

Remote Meter Reading is a growing at a fast pace and more and more utilities will be employing its benefits in the future.