AMR / AMI network deployment basics

January 19, 2009 at 4:18 AM by Doug Berman

Automatic Meter Reading or AMR is the ability to read utility meters on residential and commercial buildings remotely, that is, without the need for a person to drive up and read them. Automatic Meter Infrastructure or AMI goes one step further: a utility company can send instructions to a meter or manage it remotely. AMI meters are typically referred to as “smart meters”.

Why are utilities installing AMR and AMI? Efficiency, cost savings, better management of scarce energy and water resources. Today we have different groups of people who are responsible for reading gas, water and electric meters every month. In many cases, these people are from different companies performing the same tasks for their own individual meters. Given the availability and affordability of wired and wireless technology to perform these tasks, more municipalities and public utilities are automating the meter reading process.

What solutions are out there today?

Today’s AMR solutions include touch, mobile and fixed technologies. In this article I will speak about some of the basic technical elements required to deploy fixed technologies.

Utility meters installed in houses and businesses are for all practical purposes “the client” or end device. For the purpose of this discussion, I’ll focus on the energy or electric meter. This is not to say that one can’t read multiple meters simultaneously. One can, and the discussion below applies to all utility meters.

Most if not all electric meter vendors have (or are very close to having) a 900MHz (ISM) RF enabled meter (in other words, a meter with a radio built in). The meter is installed in a house or commercial property. In my experience it’s similar in size and shape to what is currently installed in the field. There is one distinction though: it now transmits meter usage in intervals. These intervals are typically decided upon by the customer and can be every minute, hour or every day.

Once the meters are transmitting, the trick is to listen to or hear the transmission. The same vendors that sell the residential and commercial meters also have what are called collectors or gateways. These collectors listen to the meters and either record and store the data, or pass it along to the application/billing server.

Collectors are typically deployed on light poles where they can be easily powered and installed. The number of collectors depends on many variables. For example, what does the terrain look like, where are the street lights, is the foliage heavy, and is it a rural or urban area. The answers to these questions will determine how many collectors to install per square mile.

Collectors may be connected to fixed wireless assets installed throughout the city. These wireless assets can be outdoor mesh nodes or point-to-multipoint base stations. There are compelling

reasons to use outdoor 2.4GHz (Wi-Fi) mesh solutions. Using Wi-Fi allows a city or utility to offer other services besides meter reading. For example, Ponca City in Oklahoma has built an AMR network using Wi-Fi mesh nodes for meter reading and in addition, offers free Wi-Fi service to residents. Other cities such as Rock Hill, South Carolina, use the Wi-Fi network for AMR, free Wi-Fi service and wireless video surveillance.

AMR/AMI is no doubt the wave of the future because it eliminates the need for manual meter reading. Some of the immediate benefits from electric meter reading are usage profiling, demand forecasting, finding out about tampering events, accurate meter reading with no more estimates, less financial burden correcting mistakes, remote shutoff, etc. Water meters can inform the utility about leaks, rate of flow, trend analysis, flow monitoring. Having such accurate information allows a public utility to offer more flexible billing cycles and ultimately, lower rates to its customers.

With the pressure growing on states to reduce water (and electricity) consumption, AMR/AMI will play a critical role not only in allowing utilities to monitor the use of those resources and to cut down on waste, but also in getting residents and businesses to know on a real-time basis how much water and electricity they are consuming. Getting people to monitor their energy and water use, and to cut down on wasteful activities, will go a long way in helping states conserve these resources.