METER DATA MANAGEMENT SYSTEMS

THE HOT NEW APPLICATION FOR UTILITIES CONSIDERING AMI

By Edmund P. Finamore, P.E.

A growing debate exists in the US over the need for, and timing of, meter data management systems used to manage large volumes of meter data generated from Advanced Metering Infrastructure (AMI) systems. While some utilities are rushing to implement AMI, others are thinking first about the need for an application to collect, store and process data for billing and other uses.

A utility manager recently called me with a question that is being asked much more frequently these days: "We're planning to implement AMI soon and are concerned about managing the data. What do you suggest we do to handle all of that data?"

I responded by first asking three basic questions:

1) Will you be implementing more than one AMI technology solution?
2) Are you planning to implement demand response and time-of-use rates? and
3) Will you be integrating your AMI system with other applications such as outage management, enterprise asset management and distribution planning?

Upon hearing 'yes' to each of these questions, I responded, "my friend, you need a meter data management system."

Increasingly, utilities have come to realise that generating and collecting AMI data is only half the battle. Managing large quantities of interval data and incoming alarms for delivery to several different systems and applications in a seamless manner has become a significant challenge. Many utilities involved in AMI projects now believe that support for time differentiated rates, outage and demand response systems, and an ability to provide these applications with clean, reliable meter data, are best achieved through use of a meter data management (MDM) system.

In addition to cleaning, parsing and exporting data to other systems, meter data management systems also serve as a repository for large volumes of historical data used for network monitoring, load research and other purposes. With the increasing use of interval data, it is no longer practical to perform manual edits and estimates of missing data intervals or analyse unusual usage patterns for a growing customer base that uses time differentiated rates and purchases energy from off system sources. MDMs typically address this problem by employing advanced analytics that routinely perform these functions to ensure that data is clean and bills are accurately rendered. Such validating, estimating and editing (VEE) functions are a core capability of most MDM systems.

TIMING OF MDM IMPLEMENTATION

As meter data management systems continue to gain more prominence, a difference of opinion has emerged among industry experts concerning the preferred timing and installation sequence for MDM implementation. The meter data management system's role as central meter data repository places it at the core of the AMI installation process, yet many applications requiring MDM supplied source data are implemented in the later stages of AMI deployment.

Two critical dimensions required of most MDMs are their ability to store and manage meter data for future use and their need to deliver near real time events and alarms to other systems through multiple delivery mechanisms such as flat file transfers, messaging, XML or database queries. Because many functions are typically required in later stages of AMI implementation, some believe that MDM installation can be delayed until a later date in the implementation timetable. However, the early benefits of having MDM available to support AMI installation are of significant value, and are compelling reasons to pursue a two phase installation process.

I advised my utility friend that important benefits can be derived from implementing MDM at the front end of an AMI project, and can actually produce implementation savings down the line as meter installations ramp up and customer/meter data synchronisation becomes more critical and problematic. As the volume of AMI-related meter change-outs increases, timely synchronisation of meter changes with customer account data becomes essential to help a utility avoid large numbers of billing system rejections caused by incorrect meter assignments. MDM will therefore help to minimise the number of incorrect and estimated bills that result from the change-out process. And meter reader routing changes can be accomplished more efficiently by utility staff through timely installation updates as growing numbers of utility meters become AMI-ready and are then removed from the manual meter reading routes.

Among the important issues that must be addressed in the early stages of MDM implementation include the overall MDM system architecture, database and operating platform to be used. While point-to-point custom integration design is still used by many utilities, open standards-based solutions using Service Oriented Architecture (SOA) and application

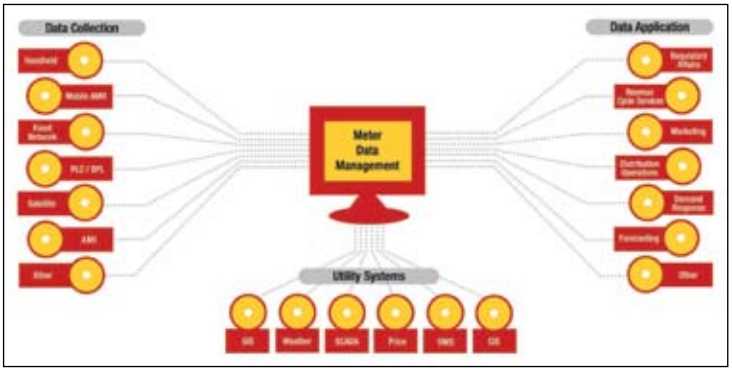

Figure 1 - Meter data management architecture (Courtesy Itron)

programming interfaces (APIs) can provide maximum flexibility when establishing the timing and sequence of utility applications that will be receiving data from the MDM.

A typical connectivity model patterned after Itron's Enterprise Edition MDM software is shown in Figure 1, and depicts how a utility can develop early interfaces to critical systems such as billing, CIS and initial AMI networks (or pilots) in a timely manner without designing later stage interfaces or adversely affecting other systems already in commercial operation. For hybrid AMI networks where more than one AMI solution will be implemented, a utility can time the implementation of multiple AMI interfaces much more efficiently using SOA to coincide with the introduction of later stage AMI technologies.

For many utilities, maintaining older legacy systems that continue to require meter data during implementation of new system architecture will present some interesting challenges. Older technology platforms may not support some of the more recent design standards used by meter data management systems that promote interoperability and may use different business logic. In these situations, it is best to select an MDM solution that has maximum flexibility built into its design logic and is capable of co-existing with older systems as well as meeting the unique but changing business needs of internal user groups requiring access to meter data.

MULTI-PHASE IMPLEMENTATION PROCESS

Using a flexible design and implementation model, utilities are generally advised to take a phased approach to MDM implementation to accomplish their overall meter data management objectives. Phase I implementation should target a limited set of functional requirements that include the initial installation of the MDM software and operating platform, establish connectivity with current mission critical systems that require meter data, build internal familiarity with the system design logic and prepare critical systems for AMI implementation.

Some advantages of beginning with a more limited initial Phase I MDM installation are:

- Phase I implementation can occur much more quickly to support AMI deployment with reduced risk that critical systems such as billing will be adversely affected.
- A limited number of utility interfaces will initially be required as the utility copes with the difficulties of managing the installation of new meters and modules, inventory tracking systems and the automated meter change out processes.
- Fewer initial interfaces permit more in-depth testing and clean up of new data streams that could involve new data elements and formats not previously used by the utility.
- Establishing and maintaining parallel systems for handling both manual and automated meter reading functions can be more easily managed.
- Development of user interfaces, new screens and employee training modules can be addressed before large volume meter change outs begin to occur.
- Call centre and field services personnel can become more familiar with new MDM system capabilities before call volume begins to significantly ramp up.
- New load control programmes and time differentiated rates can be piloted and evaluated at low take up rates to determine optimum rate design and verify performance.

Once the initial Phase I implementation has been completed and AMI deployment is underway, a utility can then proceed with Phase II after it has reached a certain comfort level that initial AMI device installations are being read properly and data is being stored and transmitted to destination processes in a reliable manner. In many cases, utilities have already installed pilot AMI networks or are reading advanced meters through dial-up systems and MV-90. These situations provide good opportunities for utilities to test MDM interfaces using operational AMI data and validate new MDM functionality against existing processes before new data streams are brought on line. Then, as new AMI technologies are deployed, a suitable test environment will already exist, and overall MDM performance can be monitored as the number of AMI applications and associated data volume increase.

For optimum performance of AMI supported applications such as tamper or leak detection and processing of on demand and off cycle reads, utilities should integrate MDM with utility functions carried out in CIS, billing and other systems such as load control. Customer service personnel, for example, should have access to daily and interval read information provided by AMI in order to respond to billing inquiries, process service cancellations and perform other functions. This will require development of new screens for integrating and displaying data and can be time consuming to develop and test. Phase II MDM implementation can provide additional time to further integrate and test these features as the AMI deployment process begins to accelerate.

In the later stages of AMI deployment, utilities can begin to more fully integrate their MDM with other systems such as outage management and GIS so that information provided through AMI can be used to improve outage response and manage utility assets. More sophisticated applications such as enterprise resource planning and distribution automation can eventually be supported with MDM stored data to address specific utility operational metrics and equipment life cycle planning functions.

MDM ADDS SIGNIFICANT VALUE AT MODEST INCREMENTAL COST

In the larger scheme of things, MDM cost should remain a relatively minor cost of AMI implementation. By some estimates, MDM adds little marginal implementation cost when installed in connection with an AMI project. When one considers that MDM functions can streamline the handling of meter change data and produce significant installation savings through reduced data processing errors and fewer repeat site visits, it is apparent that the additional cost of MDM can be partially offset by even a modest reduction in AMI installation costs.

Figure 2 provides a composite breakdown of three large project estimates for AMI installation. Average MDM cost for these project estimates is predicted to be a relatively modest 6% of total project expenditures. AMI hardware continues

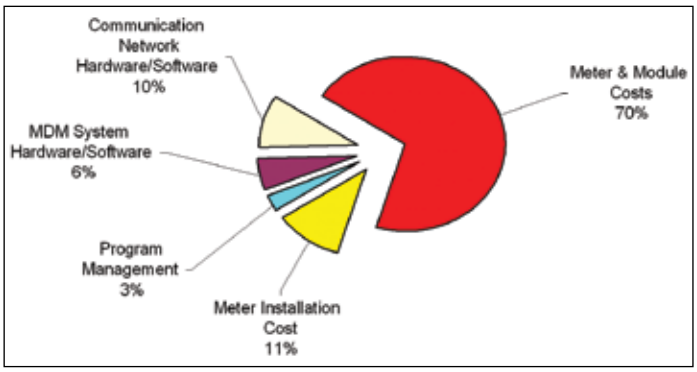

Figure 2 – Allocation of AMI implementation capital (Courtesy Gestalt LLC)

to be the largest expenditure category, and the benefits of MDM implementation can be even more positive if they help to produce a quicker return on a utility's large investment in meter related assets.

In addition to having a positive effect on direct AMI installation costs, there are other indirect savings from MDM implementation. Utility resources are typically stretched quite thin during AMI implementation and the additional impact of AMI related billing problems, increased site visits and customer inquiries can significantly stress already limited utility systems and resources. Having MDM available at project start can help a utility manage the increasing number of meter changes, route reassignments and multiple sources of incoming AMI data to prevent data flow from becoming a bottleneck to AMI installation that could potentially affect contractor installation milestones.

Figure 2 illustrates that MDM software is estimated to average less than 8% of the cost of AMI hardware and network communications. For this added cost, a utility receives important long term implementation and operational assistance, and full life cycle support for its time-of-use rates, billing data validation functions, demand response programmes, asset management and outage response systems. When analysed from this viewpoint, MDM becomes the enabling system that helps utilities capture the full potential of the benefits presented in their business case.

REGULATORS CONTROL THE SMART METERING LANDSCAPE

With the availability of improved advanced communications and smart metering technology and the 'encouragement' of federal and state regulators, US utilities are increasingly considering implementation of smart metering platforms that can provide interval data for all metered customers. The 2005 Energy Act has encouraged utility regulators and utilities to take a hard look at time differentiated rates and has endorsed demand response as a viable alternative to increasing energy supply. The table is therefore set for US utilities to rethink their supply side strategies and move towards more demand response oriented, environmentally sensitive alternatives built around use of smart metering technology for all classes of customers.

It remains to be seen if these alternatives will be further validated by utility regulators as utilities make future commitments to install residential advanced metering solutions and then seek appropriate rate recovery. If the early California returns are an indication of the direction of smart metering technology in the US, an increasing commitment can be expected on the part of utilities to residential time-of-use rates, and there will be a growing role for MDM systems to support these initiatives in the future. MI

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ABOUT THE COMPANY: ValuTech Solutions is a privately owned consulting firm specialising in utility automation and AMR, and widely recognised for its expertise in advanced AMR systems. From pre-project planning to technology selection and project implementation, ValuTech is a leader in smart metering project support.

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