Smart Metering Start-Up Guide

Smart Metering System Implementation Program

Revised: September 8, 2009

Smart Metering Start-Up Guide

AN IESO PUBLICATION

We have prepared this guide to assist in our training of MDM/R service recipients. We remind users of this guide that they are responsible for complying with all of their obligations under the MDM/R Terms of Service and associated policies, standards and procedures relating to the subject matter of this guide, even if such obligations are not specifically referred to in this guide. While we have made every effort to ensure the provisions of this guide are accurate and up-to-date, users must be aware that the specific provisions of the MDM/R Terms of Service or particular document govern.

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1. Introduction

Welcome to Ontario's smart metering program!

This guide is an introduction to smart metering for local distribution companies (LDCs). It explains what you need to do to participate in the IESO's Smart Metering System Implementation Program (SMSIP). We will assign an account manager to help as you follow the stages and complete the required documents.

We wrote this document to assist local distribution companies who have not yet ventured very far into their smart metering projects.

Contrary to some popular misconceptions, we believe that deferring work on integrating with the MDM/R until your AMI technology is substantially deployed is a bad idea. The MDM/R integration effort, which includes the necessary modifications to your Customer Information System, has its own challenges and deserves the same care in planning and execution as your AMI deployment. If you tackle these efforts sequentially, you'll likely fall short of making your contribution to meeting the Minister's TOU rollout targets.

We have been piloting smart metering with the early LDCs since early 2007. As a result of this experience, and with the help of the initial LDC participants, we have been able to identify the important activities as well as the pitfalls for new LDC participants. We wish to thank the teams at Newmarket Hydro, Milton Hydro and Chatham-Kent Hydro for their valuable assistance. In particular, we wish acknowledge the direct contribution to this guide by Olameter, who gained tremendous experience as a service provider to Newmarket Hydro. Finally, we wish to express our appreciation to both Veridian Connections Inc. and Sky Energy Consulting. They have given us permission to share with you the list of business processes Sky Energy Consulting developed to integrate the MDM/R into Veridian's business.

Note: In this document, 'we', 'us' and 'our' refer to the IESO (the smart metering entity, or SME). 'You' refers to the LDC. Also, we use the terms 'smart metering project' and 'MDM/R project' interchangeably.

What's New

In addition to some minor corrections and clarifications, we've added the following elements to this document:

- Noted the addition of Phase 4 to the project (See Section 2.1)
- Indicated the need to limit the meter read data being sent to the MDM/R to only those meters synchronized with the MDM/R (See Section 3.2(F)
- In response to your requests, added a sample list of business processes that might have to be integrated with the MDM/R (See Section 3.2(K)

- Noted the addition of our Project Plan Template and Activity Descriptions material to the SMSIP website (See Section 4 – Stage 2 Activities: Your project plan – and enrollment waves)
- Clarified the main driver in assigning an LDC to an enrollment wave (See Section 4 – Stage 2 Activities: Your project plan – and enrollment waves)
- Changed our classification of Unit Testing from an 'optional' to a 'strongly recommended' activity (See Section 4 – Stage 3 Activities: Testing your CIS interfaces)
- Noted the OEB's institution of required quarterly smart metering information reporting by all LDCs (See Section 4 – Stage 3 Activities: Update us on the status of your activities)

How this Document is Organized

Section 2 - Overview

The Overview introduces you to the Meter Data Management and Repository (MDM/R), and explains:

- The role of the MDM/R – what it provides and what it does not do
- The scope of the work involved in re-engineering your business processes to integrate with the MDM/R
- Basic MDM/R terminology
- The technology you need to interface with the MDM/R
- The MDM/R registration and enrollment process

Section 3 - Business Process Considerations

In this section we highlight issues you should consider as you develop your daily business processes. We have drawn on our experience enrolling the initial LDC participants, and greatly appreciate their valuable assistance in preparing this guide.

We offer suggestions on what you need to consider when planning your new business processes, and we recommend enhancements you may wish to make to your existing systems. Although you will not be performing all these functions at the start of your project, we have included the detail so that you can see where you are headed as you plan for your new technology and business processes.

Section 4 - Stages of Your Smart Metering Project

In this section we explain the steps you need to follow to complete enrollment and begin using the MDM/R.

Section 5 - Production

In this section we describe life with the MDM/R. We include what to do if you encounter problems, how to contact our help desk, service levels, and reference documents.

Section 6 - Additional Information

In this section we list MDM/R documents and publications. Most are available on our web site. You will need to contact us to obtain copies of documents that are not publicly available due to their confidential content.

If you have any questions as you follow this guide, please contact us at market.entry@ieso.ca.

Acronyms

AMCC	Advanced Metering Control Computer
AMCD ID	Advanced Metering Communication Device Identification Number
AMI	Advanced Metering Infrastructure
AS2	Applicability Statement 2 Protocol
CA	Certification Authority (for digital certificates)
CIS	Customer Information System
FTS	File Transfer Service
GUI	Graphical User Interface
IVR	Interactive Voice Response
LDC	Local Distribution Company
MDM/R	Meter Data Management and Repository
MMD	MDM/R Master Directory[1]
NVE	Needs Verify/Edit
OEB	Ontario Energy Board
QT	Qualification Testing
SDP	Service Delivery Point
SIT	System Integration Testing
SME	Smart Metering Entity
SMI	Smart Metering Initiative
SMSIP	Smart Metering System Implementation Program
SSL	Secure Sockets Layer
TOU	Time of Use
USDP ID	Universal Service Delivery Point ID
VEE	Validation, Estimation, and Editing

[1] In practice, the MDM/R Master Directory is also referred to as the 'MDM/R Master Data' or the 'MDM/R Master Directory Data'.

2. Overview

This overview section explains:

- The background of the Smart Metering Initiative
- Why you will need to re-engineer many of your business processes
- The scope of the work involved with this re-engineering
- Basic MDM/R terminology – it is important to use correct MDM/R terms as you develop your processes
- The technology you need to interface with the MDM/R
- An introduction to the MDM/R enrollment process

In this section, we:

- Describe how using smart meters differs from using conventional meters
- Describe the role that the MDM/R plays in smart metering
- Provide a brief overview of the technology used to interface with the MDM/R

2.1 Smart Metering Background

As an LDC, you are probably familiar with the Ontario government's smart metering goals. For those who are new to the Smart Metering Initiative, here is the Cook's tour.

In 2006, Bill 21 (*Energy Conservation Leadership Act, 2006*) established the smart metering entity (SME) and its authority over the provincial Meter Data Management/Repository (MDM/R). The decision to support the deployment of smart meters through a single provincial database was based on a number of reasons:

- Economies of scale, by centralizing the delivery and operation of meter data management and processing
- A unified way for distributors, retailers and other parties to access meter data across the province
- A central database of data that can be used to support province-wide demand response initiatives

Provincial regulation designated the IESO as the interim SME. Following a competitive procurement, we contracted with IBM Canada to deliver and operate the MDM/R for an initial period of four years.

Originally, the IESO split the MDM/R effort into three phases:

- Phase 1 was procurement – it completed on December 31, 2006.
- Phase 2 is the delivery and testing of the MDM/R software. Phase 2 changed from its anticipated single delivery in summer 2007 to a series of deliveries. Each delivery adds to functionality previously delivered by fixing problems and introducing new features. Phase 2 continues today.

- Phase 3 is steady state operation for the duration of the contract. It started in February 2008, when Newmarket Hydro registered with the MDM/R and enrolled a small pilot group of smart meters. As of August 2009, seven LDCs are using the MDM/R in production. The full rollout of smart meters in Ontario continues, and we continue to add functionality to the MDM/R.
- Recently we've added a Phase 4 to the MDM/R effort. Phase 4 focuses on assuring that the MDM/R will support the Ministry of Energy and Infrastructure's accelerated timetable for rolling out Time-of-Use (TOU) rates to Ontario consumers. Our Phase 4 work extends from the spring of 2009 until the winter of 2011.

The meat of the start-up guide begins here. We have tried to organize the text in the best way, so you don't have to skip around too much. Unfortunately, the tasks in your smart metering project are not linear, so any sequential representation has to be a compromise.

2.2 Smart Meters vs. Conventional Meters

By measuring when electricity is used, smart meters provide the information consumers need to understand their usage patterns, and they also allow 'time of use' (TOU) pricing.

Providing this information and TOU billing to consumers will involve significant changes to the information managed through your systems, the technology your systems use, and your supporting business processes.

Information collected from the meters

Conventional meters:

- Collect information from the meter periodically
- The information is typically a single register reading collected manually once per billing period

Smart meters:

- Record both interval and register read data
- Interval data is typically in hourly increments, but the increments could be as small as five minutes
- Register reads are recorded at least once a day
- Information is collected daily
- Provide data on meter performance and the quality of measurement data

Customer invoices

Conventional meters

Conventional meters are not able to show metered consumption at specific times of the day. They capture only a single register reading that is constantly accumulating electricity consumption. Billing quantities are, therefore, measured as the difference

between the current reading and the previous one. The billed consumption is the loss-adjusted difference between the two reads.

Smart meters

For a 30-day billing period, smart meters provide at least 720 interval values and at least 30 register reads – much more information than the single register read a conventional meter provides for a billing period.

With smart meters, the consumption in each time of use period is not calculated from the register reads. Instead, the meter captures the customer's electricity consumption on an interval basis and bills based on TOU rates approved by the province of Ontario. The register reads are used for meter data validation and estimation.

Technology and Systems

Your smart metering project and the integration of smart meters into your operations requires changes to your internal metering, billing, communications and customer support systems. You may also need to introduce new technology to facilitate this transition.

Areas and systems to consider include:

Metering infrastructure

The transition from conventional to smart meters involves replacing mechanical-based meters with solid state, electronic meters. The smart meter's capability to capture interval data instead of just a single register read at the end of a billing cycle means that you will have to change the way you operate and run your business processes.

Communications infrastructure

You will need to develop and operate a communications infrastructure that supports smart meters, with the capability to download data on a 24/7 basis.

Advanced Metering Infrastructure

Together, the 'metering infrastructure' and, 'communications infrastructure' components are often referred to under the common term, 'Advanced Metering Infrastructure' or, 'AMI' – a term which you will see frequently throughout this guide.

Billing and settlement systems

Your billing systems will need modifications to handle the billing quantity data required to provide billing at time of use rates. You will also need to modify your billing system so that it integrates with the MDM/R. Depending upon your processes, you may need to include your settlement systems in these modifications.

Customer relations management

As the technology empowers your customers to choose the timing of their daily consumption levels, you should be ready to provide an effective and efficient customer support team. You may need to change your customer support systems to provide your team with the ability to respond to your customers' inquiries in a timely manner.

Field force management systems

As the entire 'meter-to-bill' process needs review and potential modifications, many LDCs have chosen this time to introduce automation into their field force management systems. The actual time that field work is completed is as important as the date it was completed, and automating your work order or service order systems should allow you to collect this date and time information.

Business Processes

Properly documenting your current business processes will greatly help in re-engineering them. In Section 3, we offer suggestions for your business process re-engineering, based on the experience of other LDCs.

2.3 Role of the MDM/R

Currently, your billing processes are probably self-contained within your organization. You probably carry out your own processes for meter reads, validation checks, data storage and management, and preparation of customer invoices.

When you participate in smart metering, there will be several changes:

- You will still read meters yourself, but you will send the meter read data to a central data storage and management system (the MDM/R).
- Where you previously dealt with a single register read per meter in a billing period, you will now be dealing with much more information on a daily basis.
- The MDM/R is able to validate these large quantities of data, estimate missing meter reads, and flag data that requires editing. You will need new processes for checking and validating the information the MDM/R provides to you each day.
- The MDM/R will integrate into your billing process, essentially splitting processing between you and the MDM/R.

The MDM/R provides three key functions in support of your billing process. It:

- Receives your raw meter read data and performs validation and estimation
- Acts as the central repository for all the meter read data provided by your smart meters
- Provides billing quantity data to you so that you can create your customers' bills

A number of interactions are required between the MDM/R and your systems. We summarize these interactions below.

Master Data

You must provide the MDM/R with basic information about your customers, as well as information that links your customers to their meters. You will need to ensure that this information, referred to as MDM/R Master Data, remains consistent with your systems by 'synchronizing' your data with us. You can synchronize the current state of all your data periodically, or you can incrementally update information for individual meters as needed. In your day-to-day operations you will update information incrementally.

Meter Read Data

- You will transmit your meter read data from your advanced metering control computer (AMCC) system to the MDM/R. You should do this at least once a day – the meter read data for any one day should be transmitted by 0500 EST of the following day. This allows us to process your data, validate it, and have it ready for billing later that day.
- We accept meter read data only from smart meters – we will not accept meter read data from conventional meters.
- The MDM/R communicates with different metering technologies through 'adaptors' that allow us to receive the meter read data and convert it into a common format used throughout our system.
- Our *Technical Interface Specifications* document lists the metering technologies supported by the MDM/R. Your advanced metering infrastructure's interface to the MDM/R must comply with our interface specifications.
- If you choose a metering technology that is new to us, we will have to work with your metering vendor to develop the interface specification and corresponding MDM/R adaptor. It will take at least six months for us to develop a new adaptor if you choose to do this, so please let us know as soon as possible.

Validation, Estimation and Editing (VEE)

We have developed and published a VEE standard for use with your smart meters:

- Validation and estimation are automated processes that the MDM/R performs, as specified in the *VEE Standard*.
- Editing is a manual process that is your responsibility to perform. You can perform these manual edits either through our MDM/R graphical user interface (GUI) or by re-submitting the data files.
- The *VEE Standard* offers a number of validation options, referred to as 'VEE services'. You can select the service that best suits your needs.

Billing Quantities Data

We have the following three framing structures for your use:

- **Periodic**: This framing structure is equivalent to the information provided by your conventional meters. With a periodic framing structure, all the intervals in your requested billing period are summed, and we return a single consumption value to you. Please note, we do not return a register reading, just the total consumption used in the billing period.
- **TOU**: This framing structure supports time of use billing. When you select this framing structure, we return three values to you – an 'on-peak' value, an 'off-peak' value and a 'mid-peak' value, each accumulated over the entire billing period.
- **Hourly**: If you select this framing structure, we return hourly interval data to you for billing.

In addition to the functionality listed above, we provide ancillary services to help you provide your customers with the information they may request to understand their usage patterns.

- We will provide an interactive voice response (IVR) functionality that gives your customers access to their daily usage information.
- We also offer a web service that you can use to provide customer usage information to your own web presentment tool. This does not provide information directly to your customers – instead it supports your web presentment tool by providing it with data when requested.

2.4 Technology

This section provides a brief overview of the technology you need to interact with us.

Interacting with the MDM/R

There are three categories of interaction with the MDM/R:

- AS2 file transfers
- Web services interface
- Graphical user interface (GUI)

FTS/AS2 file transfers

Your systems exchange files with the MDM/R file transfer service (FTS) using the Applicability Statement 2 (AS2) protocol.

You will need to select, purchase and install AS2 client communications software for your side of the file. A website maintained by the Drummond Group lists all of the AS2 client products that you may choose from. FTS file transfers are secured using digital certificates. The *MDM/R File Transfer Services and Web Services Configuration Workbook* provides details on our file transfer services and the AS2 protocol.

Web services interface

The web services interface uses Simple Object Access Protocol (SOAP) to exchange XML-based messages. This interface does not use the AS2 protocol.

With web services, you can present information from our web server in your own web application. As with the file transfer interface, you will use a digital certificate for security.

Graphical user interface

The graphical user interface (GUI) is a tool for LDCs and their authorized agents. It allows you to:

- View and edit master data
- View metering information
- Edit meter read data
- View some MDM/R reports

For GUI access, each individual authorized user will need a user ID and password, an internet connection and Microsoft Internet Explorer.

2.5 Registration and Enrollment: A Brief Introduction

We refer to the process of registering your organization and integrating your systems with the MDM/R as your MDM/R project. There are three main activities that you must complete: preparation, registration, and enrollment. Each activity requires planning, development, and submitting MDM/R registration forms. Information that is exchanged between the IESO, you and your agents during registration allows participation in the smart metering program by:

- Identifying organizations
- Identifying relationships and responsibilities
- Providing system configuration and security parameters
- Arranging system access through individual user accounts
- Establishing readiness

Once you submit a registration application, we will assign a project manager from our Market Entry group to oversee the activities required before you can connect to the production MDM/R.

Early Considerations

You are responsible for coordinating all registration and enrollment activities for both you and your agent organizations. We will ask you to assign a primary contact person who will be responsible for day-to-day MDM/R registration and enrollment activities. This person will work closely with your assigned IESO project manager throughout the enrollment process.

We realize that the information you provide during enrollment may be temporary and may change after you cut over to production. This is normal and you should re-submit the relevant registration form with updates whenever your information changes.

Timelines

Your complete smart metering project from procurement through enrollment with the MDM/R could take a year or more. We realize that your schedule will be complex and ask that you keep us updated on your progress.

Testing

Throughout your enrollment process, you will be required to demonstrate the readiness of your systems and business processes by conducting integrated testing between your systems and the MDM/R. Each new phase of tests builds on the successes of the previous phases. You will test the communication paths and interfaces between the MDM/R and your source systems – your CIS and AMCC. You will also be able to test your own systems and rehearse and refine your new business processes.

The testing helps ensure that:

- The MDM/R can receive and process your files
- You can receive and process files from the MDM/R
- The files follow the required technical specifications
- Network protocols and security are in place
- Your ORG ID and relationships with your billing agent or AMI operator are correctly set up
- Your staff and agent organizations can respond to errors, exceptions and acknowledgements in the MDM/R reports or files
- You have the necessary business processes to operate in the production environment

Training

We offer several training workshops:

- An introductory workshop that includes an overview of the smart meter system, the MDM/R, interfaces, registration, enrollment, and communications. It describes a 'meter-to-bill' walkthrough, training, documents, and the project plan.
- We also offer a hands-on GUI training session – you can schedule this session during your registration and enrollment process when you are ready to use the GUI for your testing.

We also offer several training guides, available on our smart metering web site.

Cutover

Cutover is the transition from testing to bringing the first smart meters into production operations.

We expect that most LDCs will initially register a small number of smart meters with the MDM/R and then build up the numbers gradually. How you use the data in production after cutover is up to the individual LDC. Many LDCs will choose to accumulate historical data in the MDM/R before they start TOU billing – you can do this by submitting meter read data for a couple of months while you are running your customer smart meter education program.

- Cutover occurs after you have completed qualification testing.
- You should allow one to two weeks for cutover.
- All system components are used in cutover. Therefore, your IT technical support, application support, metering support, and business support staff will all be involved. You will also need a cutover coordinator and a cutover strategy.
- You will have successfully completed cutover once you have completed loading historical meter reads and are operating in the production environment.

Our training guide *Smart Metering and the MDM/R: Guide to Testing and Cutover* contains detailed information regarding preparation, execution and support for enrollment testing and cutover.

3. Business Process Considerations

This section is based heavily on actual LDC experience. We have included this level of detail to help you make decisions regarding your business processes, systems and staffing. Although you will not be performing all these tasks at the early stages of the project, this section gives you a clearer picture of where you are headed.

You will also find this information useful when you are in production.

This section:

- Guides you through the initial preparations you need to consider before making changes to your internal interfaces and business processes
- Describes the MDM/R, to help as you modify your existing business processes and develop new ones

3.1 Preparing for the project

When preparing for your smart metering project, you need to:

- Review the smart metering design and technical documents listed in the *Additional Information* section at the end of this guide. Your CIS and AMI vendors will also need to review the technical documents to ensure that their systems comply with the specifications.
- Assess your current business processes, resources and systems.
- Review the LDC project plan template and the *MDM/R Preparation, Registration and Enrollment Manual* to gain an understanding of the stages, required activities (connectivity testing, system integration testing, etc.) and key milestones for registration and enrollment.
- Develop a plan for MDM/R registration and enrollment, including objectives and timelines.
- Consider the time your vendors will need to build the interfaces and to modify your existing systems, such as your workforce management systems or meter exchange programs.
- Determine the timeline and cost for the design, development and testing of key internal systems (AMI, CIS, etc.) that will interface with the MDM/R.
- Determine how you will maintain your current meter-to-bill processes and systems in parallel with preparing staff and testing for life with smart meters and the MDM/R.

Documenting existing business processes

Documenting your existing business processes is important for a number of reasons. It:

- Provides a reference for staff
- Enables staff training

- Ensures accountability
- Enables continuity as staff and management changes occur
- Makes it easier to adapt processes for the new MDM/R requirements
- Helps identify areas for improving efficiency and cost savings

Identify project resources

We encourage you to set up an MDM/R resource structure that will define the project team lead, key decision makers, and various staff members. This will identify who is responsible for the internal design, development and testing of systems.

To develop a resource structure, you should assess key staff that will fulfill each of the roles. You may have an initial project team and an enduring team. You should identify the project and the enduring staff members, and decide the timing and approach for transferring skills and knowledge.

Roles & responsibilities

The chart below provides details on the roles, responsibilities and activities of key staff in the main areas (metering, billing, and information technology).

If you are a:	You are responsible for:
Project Lead	• Primary contact for the IESO • Ensuring staff availability • Project plan development • *LDC Information and Progress Report* form completion • Providing IESO project plan status updates • Overseeing completion of MDM/R registration documents (registration application, GUI user access forms, etc.) by senior staff within the organization – and submitting these documents • Overseeing completion of self-certification and cutover documents
Meter Supervisor	• Reviewing meter change processes, recommending changes or developing new processes • Reviewing other metering specific interfaces, such as work force management systems

If you are a:	You are responsible for:
IT Supervisor	• Supporting the AS2 client requirements through testing and into production • Supporting all MDM/R testing (connectivity, qualification testing, etc.)
Billing Supervisor	• Reviewing billing processes, recommending changes or developing new processes • Testing the billing interface
Metering Technologist	• Ensuring meter read data files conform to the *Technical Interface Specifications* • Providing support throughout testing by delivering meter read data files to the MDM/R based on your test schedule

Analyzing your resources – is there a gap?

After reviewing the chart above, you should decide if you have sufficient resources to fulfill registration, enrollment and day-to-day activities required for production operations, given the size and expected frequency of transactions.

- You need to ensure availability of staff with appropriate experience who can be dedicated to each activity.
- Some LDCs currently enrolled with the MDM/R have outsourced certain functions (e.g., billing, AMI operation) to agents or third parties. We can provide a list of agents that are registered with the MDM/R.

3.2 Re-engineering your business processes

To interface with the MDM/R, you will need to modify your existing business procedures and processes, and also develop new ones. You should do this work before entering enrollment testing. As you perform qualification testing, you should be "dry running" your new and revised business processes and making adjustments based on the results of your testing.

The interfaces we describe in this section will affect your day-to-day operations and back office processes. The information is based on actual LDC experience, and should help you plan and complete your project.

We provide detail in this section to help you determine your staffing and business process needs.

Your processes should include handling MDM/R reports as they are received. Some reports are sent to you on a pre-determined schedule, while others are triggered by requests that you send to the MDM/R. This section does not contain exhaustive report lists or detailed descriptions of every report you will receive. For additional details on MDM/R reports, please see the *Report Technical Specifications* and the *Guide to Reports* training document.

A. USDP ID Request and Response

The MDM/R uses two different identifiers for cataloging data about your customers:

- **SDP ID (Service Delivery Point ID)**
  - The SDP ID is a unique number you assign to a premise/service address. This number should never change.
  - The number can be a combination of static premise information or you might wish to use an incremental numbering scheme.
  - SDPs are set via synchronization and have attributes such as location, associated meter and communications information, meter data, associated authority (LDC, AMI operator, etc), validation, estimation and framing structures.
- **USDP ID (Universal Service Delivery Point ID)**
  - The USDP ID is a unique-within-Ontario randomly generated number that is assigned by the MDM/R to the SDP ID. This SDP/USDP relationship is enduring.
  - Depending on your service territory and the rate of new developments, you may request USDP IDs at any time.
  - Keep in mind that you should immediately request USDP IDs for all SDPs where smart meters have been installed before you send the synchronization file and daily meter reads.
  - If the MDM/R receives meter reads not associated with a USDP ID, the meter reads will be dropped.

Requesting a USDP ID from the MDM/R

To request a USDP ID from the MDM/R, you need to generate a USDP ID request file and export the file via file transfer service (FTS) to the MDM/R production environment. The request file must include the SDP ID for each service delivery point that you need a USDP ID for. Once the file is received and processed by the MDM/R, a response file is returned that includes the SDP and USDP ID. The response file is then loaded into your CIS to complete the process.

USDP ID Exceptions and Reports

The MDM/R will not be able to provide a USDP ID for an SDP ID if it encounters problems such as:

- Duplicate SDP ID
- Mandatory field missing
- Incorrect LDC identifier

In these cases you will receive an event-triggered exception report, and the MDM/R will not create USDP IDs for the problem SDP IDs. You will need to correct the problem and re-issue a USDP ID request for the SDP IDs.

Once the USDP ID is created, you can assign attributes through a process called synchronization. A minimum set of attributes is required to make an SDP active so that the MDM/R can carry out all steps, from loading meter data to producing billing quantities.

B. MDM/R Master Directory (MMD) Data Synchronization

MMD data synchronization is the primary means to create and maintain SDPs and their attributes. You use synchronization to ensure that the MDM/R accurately reflects the current state of, or changes you make to every USDP ID in your CIS.

We suggest that you export the synchronization files after you have completed all your daily processes. This should allow enough time to resolve failures in exporting and any synchronization exceptions before the MDM/R receives and processes the next meter read data file.

Another option is to consult with your IT department to see if they can set up an automated job on the client side to generate and export the synchronization files at the end of each day.

There are two types of synchronizations available to you. Your business requirements will determine the frequency and schedule for each one.

- **Periodic Audit Synchronization (PSync)**
  - PSync is a batch load to the MDM/R of the current state of all SDPs in your CIS systems. It is used to initially populate your starting set of SDPs into the MDM/R and then occasionally to validate and update all SDPs.
  - PSync overwrites all existing information. An SDP that previously existed in the MDM/R will be automatically inactivated if there is no record provided in a subsequent periodic audit synchronization.
  - PSync is not intended to support daily updates.

- **Incremental Synchronization (ISync)**
  - ISync files are similar to the PSync files – they provide the MDM/R with changes made to the SDP and its attributes. However, unlike PSync where you send your complete set of SDPs, with the ISync, you need to send only the SDPs where you have made changes to the attributes and relationships. Unlike PSyncs, when an SDP is excluded in an ISync, it is not automatically inactivated.
  - You can send the ISync to the MDM/R whenever you have made changes to the SDP and related attributes and relationships, or you can send it once a day, containing the changes completed throughout the day.
  - You can add new SDPs using the ISync process

C. Graphical User Interface (GUI)

Authorized users can edit meter data, view MDM/R data, view reports and make changes to master data using the GUI. We **do not recommend** using the GUI to update master data, since you must remember to also make the change in your corresponding LDC system.

If you fail to update your LDC system after updating the master data using the GUI, you risk having the MDM/R data out of sync with your LDC system data. We recommend that you only update master data via the synchronization files.

MMD Synchronization Exceptions and Reports

The MDM/R returns multiple reports via FTS regarding the synchronization request. Interface reports (IR reports) such as IR06 simply provide a list of all the records that were updated. Other reports such as IR07, IR10, IR14 and IR17 are created when there are problems.

If the MDM/R does not receive a complete set of synchronization files within a predefined time, it will not make any changes and will send back the partial file set. Other problems include files received out of sequence and problems with header details in the synchronization file set.

It is extremely important to review the exception reports, identify and correct problems, and re-submit your synchronization file set before submitting meter read data. If you do not do this, the meter reads will not be properly processed.

D. Meter Read Data

The MDM/R accepts and stores interval consumption data and register reads from an AMCC via FTS. (Please note that the MDM/R operates on Eastern Standard Time (EST) year-round, and all AMCC data is also reported using EST – there is no change for Daylight Saving Time.)

Data should be sent daily by 0500 EST for the previous day. Initial validation exception reports will be ready by 0710 EST.

Data Collection Exceptions Report

- Status and exceptions are identified in the data collection reports (DC reports).
- SDPs that failed the incoming validation process are reported in the interim and/or final validation failure report.
- You will also receive exceptions for data collection errors, when an SDP is missing register reads for over five days or when a meter has been reporting zero consumption for over five days.
- You can check the reports daily, identify and correct problems and re-submit the meter read file, or you can contract out these functions to your AMI operator.

E. Billing Quantity Request/Response

The process of generating a billing quantity request (BQ request) and loading the billing quantities response (BQ response) is very much like the existing DCI/DCO process. You can use the same billing cycle schedule for the MDM/R billing process. You will need to consider:

- Identifying cycles/SDPs that require a BQ request file
- Identifying the BQ Request/BQ Response relationship within your CIS
- Handling any exceptions that may occur

For example, the MDM/R requires you to assign a Request File Identifier in each BQ request. The identifier will be 'played back' by the MDM/R in the detail record of the BQ response. You may want to consider using a field in your CIS to store this value when you generate the BQ request. You would then only store BQ responses in your CIS if they have a matching Request File Identifier.

BQ Request/Response Exceptions and Reports

The MDM/R will not be able to produce a BQ response if:

- There was no meter associated with the SDP in the required period
- There were intervals missing in the requested period
- The SDP is not active during any part of the billing period
- One or more intervals have the VEE outcome of 'NVE' (needs verify/edit)

The MDM/R will send multiple reports via FTS regarding the status of the BQ request. They include interface reports (IR reports) such as IR08, which provides a list of all exceptions encountered during the processing of the BQ request. In addition, a number of billing reports (BR reports) provide summary, status and exception details. Some of the common problems encountered while processing the BQ request include:

- Meters reporting usage when usage is not expected. This may be because the utility has reconnected service but the MDM/R has not been updated.
- Meters where changes in interval data and associated framed usage data have occurred after billing quantities have been delivered. This affects billing – if the original BQ response file has already been processed, then you may need to cancel the customer invoice and re-bill with a new BQ response file.

F. Meter Exchange

Meter exchanges require a significant change to your internal processes.

- For some utilities, a meter exchange is updated in your CIS only after the current billing has been completed.
- In the MDM/R, the timing of meter exchanges with respect to meter read files and BQ request/BQ response is important. You should inform the MDM/R of all meter changes in your next synchronization file set and before the meter read is sent.
- If your CIS can store meter exchange data, then all that is required is the means to extract all meter exchanges and send them in the next synchronization file. If not, then you and your CIS vendor will need to develop a process to store the meter exchange data until it is updated on the account level.

You should be aware that once a smart meter is 'plugged in', it will start communicating with your AMI systems:

- It is expected that the daily meter read data file sent by your AMI operator to the MDM/R will contain reads for only installed meters on the AMI network that are synchronized with the MDM/R. You may have a situation where there is a large discrepancy between the number of installed meters on the AMI network and the number of meters synchronized with the MDM/R. In this case we require that you filter the meter read data to those meters synchronized with the MDM/R before sending it to us.
- Once the MDM/R receives the meter read data file, it will process only those records where it can establish a relationship between the ORG ID and Meter ID. This means that you could have missing interval and register read data for specific meters if the MDM/R is unaware of any meter changes. If this happens, you need to provide the MDM/R with a synchronization file that identifies the relationship between the ORG ID and Meter ID. You also need to re-send the missing interval and register read data to the MDM/R. It is important to ensure that only the missing data is sent.

Where possible, you should only update MDM/R-related fields within your CIS through the automated processes. If these fields cannot be 'locked', then we recommend that you implement a function to log changes identifying who changed the data and when it was changed. Although this will not eliminate exceptions, it may identify gaps in your processes or training.

G. Meter Identification in AMCC and CIS

The way your AMCC stores the meter number may not be the same as the way your CIS stores it. The MDM/R will validate that the AMCD ID in your synchronization files matches the information being transmitted in the meter read data files and will create an exception for any discrepancies. You should be able to extract the meter number your AMCC has provided to the MDM/R through the synchronization interface or your CIS.

H. Framing Structure

The framing structure is the method you use to bill your customers.

Available framing structures are:

- Periodic: Total usage during the billing period.
- Time of use (TOU), Eastern and Central time zones: Daily summing of interval consumption data into rate 'bins' according to the energy purchase service mapped to the SDP.
- Hourly: Each hour of every day throughout the billing period.

You should have a strategy and plan as to how you will transition your customers from periodic to TOU billing. Several LDCs chose to transition one billing cycle at a time. Once you've developed your plan make sure you have a way to change the framing structure from periodic to TOU for each customer at the appropriate time.

You communicate changes to the framing structure to the MDM/R via synchronization. Note that any changes made to the framing structure that have not been sent to the MDM/R will produce a billing quantity response file using the previous framing structure.

I. Validation, estimation, and editing (VEE)

VEE ensures that valid meter read data is available to produce billing quantity data. You will select one VEE service for each SDP by assigning the corresponding VEE attribute through synchronization. You may wish to use a default VEE service – either by bill code or by type of customer (category).

- The MDM/R will send multiple VEE processing reports (VE reports) via FTS regarding the VEE services.
- Your VEE process should include daily verification of all VE reports. The VE reports provide details on:
  - SDPs with validation failures requiring immediate attention
  - SDPs that could not be estimated and the reasons for the failures
  - SDPs that have not reported interval data within the previous three days
- If there are cases where estimation was unsuccessful, you will need to manually edit intervals using the MDM/R GUI. Therefore, ensure that you have developed and documented a method to identify problems and to estimate intervals and manually edit meter data using the MDM/R GUI.

J. AMI deployment

Once you have chosen your AMI system, you should review its stability and functionality, as well as its scale, and ensure that it meets the needs of your processes and service territory.

The AMI operator is expected to transmit meter read data from the previous day by 0500 EST. Many AMCC systems can only send meter read data files containing your entire population. We recommend that you ensure that your AMCC can provide ad-hoc meter reads to resolve exceptions and can filter meter read data down to only those meters synchronized with the MDM/R.

You should also be able to view and monitor the health of your network. You can use this feature to identify potential meter issues and data collection issues. This capability will help resolve issues – if possible, before you send the next meter read data file to the MDM/R.

K. Exemplary list of new and revised business processes

We often stress the importance of examining what changes you need to make to your business processes to integrate with the MDM/R. You have asked us to provide a sample list of affected and potential new business processes. We've responded with the list below, but caution that this is just one example set. Some of the identified processes will likely differ from your own.

1. New service set-up
2. Universal SDP ID request/response
3. Service address change
4. Service removal
5. Periodic audit synchronization
6. Incremental synchronization
7. Issues and exceptions assignment
8. Synchronization exception handling (MDM/R IR07 Report)
9. Synchronization exception handling (MDM/R IR14 Report)
10. Synchronization quality assurance
11. Meter read interface
12. Pre-Validation, Estimation and Editing
13. Pre-Validation, Estimation and Editing processing reports
14. MDM/R standard and exception reports
15. Meter exchange (connections)
16. Meter exchange (metering)
17. Validation, Estimation and Editing (VEE) processing reports
18. Validation, Estimation and Editing (VEE) validation standards report
19. Billing quantity request/response

20. Billing delivery summary (MDM/R BR04 report)
21. Billing delivery detail (MDM/R BR01 report)
22. Billing no reads (MDM/R BR06 report)
23. Re-billing (MDM/R BR03 report)
24. Adjustments
25. Final bills
26. Billing on-cycle
27. Disconnections/Reconnections
28. Unauthorized usage (MDM/R BR02 report)

3.3 Planning CIS System Modifications

The *Technical Interface Specifications* (TIS) specifies the interfaces required by the MDM/R, and is your guide for modifying your CIS. However, you may wish to consider additional CIS modifications to facilitate the MDM/R requirements and to gain efficiencies in your day-to-day business operations. (These are suggestions, not an MDM/R requirement.) As a rule, each interface should at least be able to notify you if one or more files failed to create.

(a) **SDP ID assignment**

- Determine how you will assign SDP IDs. A simple approach is to use an incremental numbering scheme.

(b) **USDP ID Request**

- When creating new accounts in the CIS, automate the process of adding an SDP ID.
- When meters are removed (with no replacement) the system should ask the user if the SDP/USDP relationship has ended, thereby deleting it from the system.

(c) **Synchronization**

- You may be able to use existing fields to store the SDP and USDP IDs.
- Design an area within the CIS to maintain SDP attributes, including changes to account numbers, meter numbers and meter attributes, framing, VEE service and organizations. Also, consider start and end dates.

(d) **Billing Request Identifier**

- Identify SDPs by cycle or individually, and let your staff know when to generate a BQ request.

(e) **Billing Quantities Request**

- Users should have the ability to load by cycle/route, account/SDP ID and service type.
- The user should be informed if there is a pending final on a specific account/SDP ID.

(f) **Billing Quantities Response**

- The user should be informed if there is no match between the Request File Identifier and the cycles you are expecting to bill.
- The user should be informed if there are any exceptions within the BQ response file that require immediate attention.

(g) **Security**

- Access to fields or tables related to the MDM/R should be limited to specific users, and should not be available to all CIS users – this will help you avoid unauthorized changes that can affect the data in the MDM/R.

Other considerations

When preparing your MDM/R enrollment project plan, consider the amount of time your CIS vendor will need to build the interfaces within your CIS, as well as whether you plan modifications to handle other items, such as reporting.

You will find that reporting, or having the ability to audit data before releasing it to the MDM/R will reduce exceptions. You can incorporate exception reports in the following areas:

(a) **USDP ID Request**

- Identify multiple requests by service address and/or meter number.

(b) USDP ID Response

- Identify USDPs that already exist in the CIS. This can occur during your internal testing. Ensure that the correct file is loaded into your CIS.

(c) Periodic/Incremental Synchronization

Identify SDPs with:

- No smart meter installed
- No service address
- No agent relationship
- Framing changes – for example, from TOU to periodic
- VEE service changes

(d) Billing Quantities Request

Identify SDPs:

- Where the bill period end date is before the start date
- That are final pending
- That were not included in the current BQ request

(e) **Billing Quantities Response**

- Identify SDPs that did not receive billing quantities

3.4 CIS Internal Testing

Testing your internal CIS interfaces can be as small or as large as you deem necessary. We suggest testing with one SDP to confirm that the output files are accurate. Internal testing of your systems should include creating these output files required by the MDM/R:

- USDP ID request
- Periodic synchronization
- Incremental synchronization
- BQ request

You should also test the files returned from the MDM/R. This means that response files will need to be produced to test the function of loading MDM/R files into your CIS – for example:

- USDP ID response
- BQ response

You need to compare each input and output file to the TIS, and you should confirm that the data in each field corresponds to the data in the MDM/R and your CIS:

- Do all the fields contain the expected data?
- Does the interface report exceptions?

We recommend that you also test all other functions that you have added to enhance your additional scenarios.

4. Stages of Your Smart Metering Project

In this section we describe the stages of your smart metering project. We explain the activities, timelines and resource commitments required for cutover to MDM/R production.

Stage 1: Preparation

Your major focus during Stage 1 will be on your AMI selection and initial smart meter deployment plan. We can help by offering general assistance, answering technical questions and providing information on the overall process.

Stage 1 activities:

- AMI selection
- Initial meter deployment
- Submitting your smart metering plan to the Ontario Energy Board (OEB)
- Submitting information and progress reports to us

Forms

In this first stage, we will ask you to provide as much information as possible using the *LDC Information and Progress Report.* This form keeps us up-to-date on the status of your activities, including your customer counts, technologies and vendors, system upgrades or replacements, and meter deployment plans.

Using your status information, we will be able to estimate a start date for your enrollment, help you develop your registration and enrollment plan, and inform you of issues relating to your specific technologies.

Things to consider in Stage 1

Items to consider in this stage include:

- Documenting your current business processes that support the meter-to-bill lifecycle. This activity is particularly important because when you interface with the MDM/R you will need to modify existing business processes and develop new ones.
- Determining timelines and costs required for the design, development and testing of key internal systems (AMI, CIS, etc.) that will interface with the MDM/R. You need to review MDM/R specifications and design documents with your system vendors.
- Reviewing the LDC project plan template and the *MDM/R Preparation, Registration and Enrollment Manual*.

Once you have completed Stage 1, you will be ready to begin the planning and development stage.

Stage 2: Planning and Development

Your major focus in Stage 2 will be on the planning and development of the internal systems and business processes you require for integration with the MDM/R. In addition, by the end of Stage 2 you will have officially registered as an MDM/R organization.

By the end of Stage 2, you will have submitted a *Registration Application*. You will also have let us know of any relationships you have with third party agents such as AMI operators or billing agents by submitting an *LDC Organizational Relationships and Authority Delegation Form.* We need this registration information to configure the MDM/R for your organization.

Stage 2 activities

- Conducting a detailed MDM/R design specification and interface review
- Completing your business process re-engineering
- Completing LDC systems modifications
- Attending Workshop 1
- Developing your MDM/R project plan
- Keeping us up-do-date by submitting *LDC Information and Progress Reports*
- Submitting your registration application
- Identifying relationships with third party agents
- Enrollment wave assignment

Detailed design and specification documents

Once your AMI deployment is underway, it is time to begin a detailed review of the MDM/R specification, design and interface requirements. Refer to the following documents on the smart metering web site when designing and developing your systems:

- *MDM/R Technical Interface Specifications* – Describes the format and content for each interface
- *MDM/R Reports Technical Specifications* – Describes the detail and content of each report
- *MDM/R File Transfer Services and Web Services Configuration Workbook* – Explains the requirements that enable the transfer of files between LDCs (or agents) and the MDM/R using the AS2 protocol. Also explains how to configure your systems to use the MDM/R's web services.
- *VEE Standards* – Provides the standards for validation, estimation and editing of meter read data

An additional document, the *MDM/R Detailed Design,* which explains the functional design, is available on request by contacting us at market.entry@ieso.ca.

LDC Introductory Workshop

After you have reviewed the technical documents, we will invite you to a two-day workshop, called the LDC Introductory Workshop, which provides both an overview of the MDM/R design and technical interfaces and more technical sessions on your AMI technology and the CIS interface to the MDM/R. At this workshop, we will also answer your specific technical questions. We encourage you to bring your agents or service providers to this workshop. During the session, we discuss:

- MDM/R functionality, as it is laid out in the detailed design
- The interfaces in the *Technical Interface Specifications*
- The reports in the *Reports Technical Specifications*
- Potential business process impacts
- File transfer services
- Typical project planning requirements and a project plan template

Your project plan – and enrollment waves

We will help you finalize your plan by assessing your resources, assigning your organization to an 'enrollment wave' and approving your plan. We have developed an "LDC Project Plan Template and Activity Descriptions" to help you develop your project plan. If you think this material would be helpful you can download it from our SMSIP website. It will also help you better understand the key deliverables that we require from each other over the course of the smart metering project.

An enrollment wave is a group of LDCs that will progress through Stages 3 and 4 together. We will assign you to an enrollment wave based on the information you provide us in your project plan. We do not assign you to an enrollment wave arbitrarily, expecting you to then run your project to match your assigned 'wave'. LDCs within an enrollment wave will share the same major target milestone dates and will move into the MDM/R production environment during the same window. The number of LDCs within an enrollment wave will vary, depending on factors such as LDC size, CIS system, and AMI technology.

Things to consider in Stage 2

- Identify MDM/R resources, including:
  - The project team lead
  - Key decision makers
  - Staff members responsible for the internal design, development and testing of systems through to production operations with the MDM/R.
    (Some LDCs have used a small project team throughout the initial stages of development and testing and then transitioned to their enduring staff at a later stage. If you plan to do this, you should identify the initial and enduring staff members, and plan the timing and approach for transferring skills and knowledge.)

- When you review and discuss the smart metering design and technical documents with your system vendors, you should set timelines for completing the design and testing of the systems, as well as the timeline for the internal integration testing among the different systems.
- These timelines are critical since MDM/R enrollment activities (e.g., system integration testing) depend on completing your internal system testing. The dates are also important so that you can complete your overall project plan for registration and enrollment.
- You need to decide how you will resolve issues that arise during enrollment, testing and production operations. We recommend that you document your approach, especially if third party service providers are interfacing with the MDM/R on your behalf. The approach should include details on accountability, responsibility, escalation procedures, reporting protocols, and timelines for resolution.

Once you have completed Stage 2, you will be ready to begin the registration and testing stage.

Stage 3: Registration, System Development, and Internal Testing

Your major focus in Stage 3 will be on completing your internal system development and testing. By the end of Stage 3, you should be ready to begin formal system integration testing (SIT).

Stage 3 activities

- Completing internal LDC system development and testing
- Completing connectivity testing
- Attending GUI training
- Unit testing (strongly recommended)
- Keeping us up-to-date by submitting *LDC Information and Progress Reports*
- Self-certification of SIT readiness

Testing your internal CIS interfaces

Testing your internal CIS interfaces can be as complex or as simple as you deem necessary. We suggest first testing with one SDP to confirm that the output files are accurate before you test with larger groups of SDPs. Internal testing of your systems includes creating the following output files required by the MDM/R:

- USDP ID request
- Periodic synchronization
- Incremental synchronization
- Billing quantities request

You should also test the files returned from the MDM/R. This means that response files will need to be produced to test the process of loading MDM/R files into your CIS, such as:

- USDP ID response
- Billing quantities response

We can arrange for you to have access to our sandbox system prior to formal enrollment testing to support your internal unit testing activities. Previously we had indicated that unit testing was "optional". Based on the practical experience of LDCs that have been through the process, we now strongly recommend you take advantage of our sandbox system to do unit testing. Using the sandbox system, you will be able to send and receive files with a scaled down version of the production MDM/R. This will improve the amount of testing you can do before starting the final enrollment testing. However, our support of the sandbox system has to be on a best efforts basis – formal SIT activities and qualification testing have to take precedence over unit testing.

Planning for system integration testing (SIT) and qualification testing (QT)

We recommend that you start to plan for SIT and QT in Stage 3. Sample test scripts are available on the smart metering web site. You are welcome to propose changes to the standard tests that will make the tests better reflect your specific business processes.

AS2

- A telecommunication protocol called AS2 is at the heart of the connections between your systems and the MDM/R systems. You can find more information on this topic in the *MDM/R File Transfer Services and Web Services Configuration Workbook.*
- You will send us your confidential network addresses and ports using the *AS2 Configuration Form* and, in turn, we will send our confidential network addresses and ports to you.
- You must install your AS2 software and test the connections between your systems and the various MDM/R environments well before you start either unit testing or SIT. Experience has taught us that this is often more time-consuming than expected. A successful connection not only requires the installation of approved software, but also depends on the correct configuration of all related firewalls and other network components.

Access to the MDM/R Graphical User Interface (GUI)

The MDM/R GUI is an interactive tool that you can use to view meter data and reports online. Since your staff will use this tool during formal enrollment tests, you should arrange for some of your staff to attend one of our GUI training sessions before you enter Stage 4. Each person using the GUI must have an individual user ID and password. You can request user access by submitting an *MDM/R User Access Request Form.*

Updating us on the status of your activities

Up until this stage, you have been completing Part 1 of the *LDC Information and Progress Reports* to update us on the status of your activities. Now that you are starting your smart metering enrollment activities, you also need to complete Part 2 of the form.

Beginning in July 2009, the Ontario Energy Board (OEB) instituted a quarterly smart metering information report required from all LDCs in the province. We have revised our *LDC Information and Progress Report* to eliminate any duplication of information already being reported to the OEB. We will continue to coordinate our reporting requirements with those of the OEB to assure you don't have to report the same information twice.

Self-certification of SIT readiness

The final activity in Stage 3 is completing your *Self-Certification SIT Readiness* form. This is your verification that you have completed all the required activities and are ready to proceed into SIT.

Things to consider in Stage 3

- File transfer service (FTS) and web services both use Secure Sockets Layer (SSL) as the method of securing their communications. Therefore, they both require digital certificates. Your project manager will send you the digital certificates that you will need for AS2 digital signature and SSL server authentication of the MDM/R servers.
- You need to decide whether to use third-party Certification Authority issued or self-signed digital certificates, based on your own business and security standards.
- Determine whether you need to test any of your CIS modifications, and let us know before you begin SIT.

Once you have completed Stage 3, you will be ready to enter the enrollment and cutover stage.

Stage 4: Enrollment and Cutover

Before you enter Stage 4, we expect that you will have successfully deployed and tested your MDM/R interfaces within your CIS and will have completed and tested the first cut of your new and re-engineered business processes.

Your major focus in Stage 4 is to complete enrollment testing and cut over to operations with the production MDM/R. Activities in this stage are very labour-intensive and time-sensitive.

Stage 4 activities

- Carrying out system integration testing and qualification testing
- Submitting your cutover strategy (we will provide the template)

- Submitting *User Access Request Forms* for additional staff participating in QT or requiring production MDM/R access
- Submitting your *Self-Certification Cutover Readiness Self-Assessment Form* after QT is complete and you are ready to cut over
- Submitting *LDC Information and Progress Reports* weekly
- Carrying out cutover activities

Testing and cutover documents

Please refer to the training guide *Smart Metering and the MDM/R: Guide to Testing and Cutover*, available on our smart metering web site, for information regarding SIT and QT, as well as cutover. A more in-depth discussion of the enrollment tests is available in the *Preparation Registration and Enrollment Manual.*

System Integration Testing

SIT consists of a series of unit tests for a small number of SDPs, and typically takes five to ten days. In preparation for SIT, we will review your SIT self-certification and schedule a meeting to discuss the SIT plan with you, your AMI operator, and your billing agent. Executing the tests and reviewing the MDM/R reports within the allocated timeframe requires dedicated support of all your resources.

Qualification Testing

- QT requires a more rigorous and thorough review of the test scripts. The expected test period is twenty-one consecutive days – however, this could change based on tests that you deem necessary to be completed.
- The MDM/R needs at least five days of historical data to carry out VEE where needed.
- During QT, you can expect to complete multiple tests within a day.
- Before you begin testing, we will ask you to submit sample files of all MDM/R-related interface files, as well as a meter read data file. The files are reviewed for any inconsistencies in the file layout and the expected configuration.
- You are responsible for coordinating the involvement of your AMI operators and/or billing agents.
- If you've already modified your business processes and procedures to integrate with the MDM/R, QT provides the opportunity to "dry run" them and make adjustments prior to cutover to the production MDM/R.
- After you have successfully completed QT, you will be eligible to cutover to the production MDM/R. You must submit a cutover strategy and your *Self-Certification Cutover Readiness Self-Assessment Form*. We will review your self-assessment and, if approved, we will develop a detailed cutover schedule based on your cutover strategy. Cutover typically takes about one week unless you need to load historical data into the production system.

Things to consider in Stage 4

- When reviewing the test scripts, pay close attention to those scripts that require changes to attributes of the SDP being tested. For example, in some cases it may not be possible to complete changes to your services, meters and dates within your CIS, so you may need to manufacture some of your files.
- You will need to select a group of SDPs that you will use for testing. Your AMI operator will need to be aware of the USDP ID to Meter ID relationships in order to prepare meter read data files before testing. Early preparation of the meter read files as well as any manufactured files will avoid delays in the testing period.
- You must ensure that your AMI operator is available during QT, as there is a need for meter reads to flow daily into the MDM/R, as if you were in production. In addition, meter reads will need to be sent during the day to validate test results.
- You will need to configure your CIS systems with:
  - Agent relationships: billing and AMI operator
  - AMCC ID and associated attributes
  - VEE services on SDP level
  - Framing structure on SDP level

Once you have completed Stage 4, you will be ready to begin production.

5. Production

5.1 Daily Operations

The production of billing quantity data is the end result of a series of transactions between our organizations. To be successful, we need to be aware of our process interdependencies and ensure that we observe all timelines.

The production environment consists of several interdependent processes:

MDM/R Master Directory (MMD) data updates

- You will need to closely monitor the updates you make to the MMD data. The amount of effort required will depend on the volume and frequency of changes you make to the MMD. The MDM/R reports will let you know if the synchronization updates were successful. It is important to follow up and investigate any failures or exceptions identified in these reports.
- You must ensure that all changes made to the MMD (which include all service delivery points) are synchronized with the MDM/R using incremental synchronization.
- You also have the option of accommodating changes by doing a manual entry through the GUI – but we do not recommend this method.
- Your incremental synchronization file set must be transmitted by 1600 EST to ensure that the changes to the MMD are updated in the MDM/R before midnight. If you submit your incremental synchronization files after 1600 EST, the files will be processed, but there is no assurance that these updates to the MMD will be in place when the MDM/R performs the data validation on your next set of meter read data.
- You should use the periodic synchronization process when you want to compare and align the contents of the MMD data with the information in your CIS system to find and eliminate discrepancies. This process is often termed the periodic audit synchronization. It is normally run either when you suspect the data in your systems is no longer aligned or at a predetermined frequency just as a check. If you have a large number of smart meters the periodic audit synchronization is a lengthy process and you will need to schedule a run with us in advance. This is because it is checking data for all your meters rather than just the ones that have changed. We will work with you to determine your schedule for submitting your periodic audit synchronization files – please let us know as soon as you determine your scheduling needs.

Daily meter read data files submission

You will submit meter read data files daily. We will produce a number of reports to provide you with feedback regarding your meter read data. Some of these reports may overlap with reports provided by your AMI system. You need to understand the reports

we offer, how they compare with your AMI reports, and what you need to do each day with the information in the reports.

You should submit your daily meter read data file containing the meter read data for the previous day by 0500 EST. This allows us to receive and process the information, validate it and have the information ready for you and your customers by 0800 EST. You can use this information for your customer presentment and billing requirements.

Validation, estimation, and editing

Validation, estimation, and editing are performed on meter read data each time we receive it:

- Validation and estimation processes are automated.
- There may be some meter read data that requires manual editing – it is your responsibility to complete the editing. Editing meter read data from smart meters is much more involved than manually editing meter read information from conventional meters. You will need to understand the complexity involved in performing the edits. You will not do the manual editing in your CIS system – instead, you will use the MDM/R GUI.
- Each interval in the billing period must have successfully completed the VEE process for us to provide billing quantity data. It is important that you complete your manual edits so that we can provide your billing quantity data when it is required.

Billing quantity data

Using the MDM/R in the billing process is one of the most critical areas for you to focus on. You will request billing quantity data once per billing cycle for each SDP. Each billing quantity request has a specific 'window' during which we will try to fulfill the request.

- If the VEE processing has been completed before you submit the request, or while the request is in the billing window, we will provide you with billing quantity data.
- If the VEE process has not been completed before the end of the billing window, we will not be able to complete your billing quantity request. You will need to know which requests were not completed, then complete the manual editing and re-submit these requests.

The MDM/R attempts to fulfill every billing quantity request, but it does not:

- Check to ensure you have requested billing quantity data for all your SDPs
- Check your billing quantity request for overlaps or gaps with previous requests
- Check for duplicate requests

You need to manage these issues within your own systems.

Reports

We produce a number of reports on a daily basis. It is important to understand what information each of these reports provides to you. We suggest that you integrate the information provided from the MDM/R reports with the information received from your other systems, both CIS and AMI. By combining all of this information, you will be better able to analyze your complete operations.

5.2 Service Levels

We have established a number of service levels to monitor and measure the quality of service we are providing. The *SME-LDC Agreement* covers these service levels, so we are contractually obligated to meet these. Monitoring service levels will provide an indication of the overall performance of the system in areas that are critical in supporting your business needs. The measured services are:

- Automatic meter read processing
- Automatic billing quantity processing
- Automatic MDM/R master directory update processing
- Graphical user interface availability
- Public interactive voice response availability
- Availability of our help desk

Please refer to the *SME-LDC Agreement* for specific service levels**.**

5.3 Change Management

As with all systems, there will be times when we need to implement a change to the MDM/R. We have set up a change management process to accommodate this.

Scope of change management

Changes can include:

- Changes to specification documents
- Changes to functional design documents
- Software changes – both planned releases and patch fixes
- Configuration changes

Implementing the changes

- The baseline calendar and release schedule will provide the timelines for the steps required to support changes to documents and systems.
- We will stakeholder all requested changes to ensure that you have an opportunity to review and comment on them.
- Once approved, we will schedule the change for a future release.

- We will publish the release dates in advance, and you will have an opportunity to test the changes in a non-production environment before we promote the change to the production environment.

Who can request changes?

Any organization can initiate a request for a change. We will review and assess all requests, and we will publish the request and responses to the request.

5.4 Business Relationships – MDM/R Governance

Note: As of August 31, 2009, the SME-LDC Agreement and other aspects of MDM/R governance have not yet been formalized. This section describes the current proposal for the MDM/R governance framework – which may be subject to further change. Further changes in this regard may be posted on the IESO Regulatory Affairs web page and/or the Ontario Energy Board (OEB) web site.

SME–LDC Agreement

- The OEB distribution system code requires LDCs to enter into an agreement with us. The *SME-LDC Agreement* governs the relationship between our organizations regarding your use of the MDM/R. It defines our respective roles and responsibilities.
- Under the proposed framework, this agreement will be a standard agreement that each LDC needs to execute, and was developed with the help of LDCs.
- This agreement is subject to OEB regulatory approval and no changes can be made to this agreement unless approved by the OEB. You will not be able to request changes to the agreement to meet your individual needs.
- Only you, as an LDC, need to sign this agreement once it receives regulatory approval. Your agents do not have to sign agreements with us. However, the agreement does bind you to hold your agents to the terms of the agreement.

Terms of Service

The *SME-LDC Agreement* allows for the creation of a *Terms of Service* document. This provides the detailed ground rules that govern the actions of LDCs participating in the smart metering program and the interaction of their systems with the MDM/R. Some of the detailed subject matter that has potentially been identified for the Terms of Service includes:

- MDM/R governance
- Administration
- Preparation, registration and enrollment
- Operation of the MDM/R
- Settlement, invoicing and payment process

- Supervision and dispute resolution
- Interpretation
- MDM/R service levels

SME Steering Committee

One key concept introduced in the terms of service is the SME steering committee. We will create this forum to represent the interests of MDM/R stakeholders, LDCs, retailers, agents and others. The SME steering committee will assist in the ongoing management of the agreement, terms of service, and the MDM/R manuals and procedures. The precise duties, obligations and powers of the SME steering committee are still under review as of August 31, 2009.

5.5 Help Desk Services

There may be times when you need assistance or have questions relating to your use of the MDM/R. To assist you, we offer help desk services that you may use when you need to contact us.

You can use these services once you enter production operations with us. Before that, during your registration and enrollment phase, please refer to our Market Entry team for assistance. We will provide you with a contact within that group.

IESO Customer Relations will be available on a 24/7 basis and will:

- Act immediately if you have a high severity problem that is preventing you from performing a critical task
- Respond to lower severity problems or general questions as soon as possible, no later than the following business day

Our Customer Relations department has one phone number and email address for you to contact, regardless of the nature of your question or issue. We will provide you with this contact information during your registration and enrollment process.

If you need assistance at any time before you are in production, please contact us at market.entry@ieso.ca

6. Additional Information

Smart Metering Documents

These documents are available on the smart metering web pages:

Design and specification documents

- IESO_SPEC_9027: MDM/R *Technical Interface Specifications*
- SME_SPEC_0001: MDM/R *Reports Technical Specifications*
- IESO_STD_0078: MDM/R *VEE Standard*
- SME_MAN_0001: *Preparation Registration and Enrollment Manual*
- SME_MAN_0007: *MDM/R Incident Management Manual*

Training guides

- *Smart Metering and the MDM/R: Guide to Registration Forms*
- *Smart Metering and the MDM/R: Guide to Testing and Cutover*
- *Smart Metering and the MDM/R: Guide to Reports*

MDM/R Project Planning Aid

- *LDC Project Plan Template and Activity Descriptions*

Documents available by contacting Market Entry:

SME_DES_9001 – MDM/R *Detailed Design* document

Contacts

Before you enter production:

market.entry@ieso.ca

Once you are in production:

customer.relations@ieso.ca