

MDM/R Measurement Canada 2011 Solution

Mississauga Living Arts Centre
4141 Living Arts Drive, Mississauga (Square One)
Date: April 14, 2011 (8:30 am to 1:00 pm)



Purpose of Today's Meeting

- Review the Measurement Canada 2011 Solution
- Review High Level *EnergyIP* Release 7.2 Target Deployment Schedule
- Review summary of data transmitted to the MDM/R by each meter type and AMI technology to understand register read and interval data behavior
- Review early testing facility for the new Billing Service Standard XML Interface and pending modifications to the interface specifications

Agenda

- Measurement Canada 2011 Solution Review
 - Functions to Support Compliance with MC Regulations
 - Updates to *Measurement Canada 2011 Solution* Version 1.2
- *EnergyIP* R7.2 Target Deployment Schedule - Rev. 4
- Summary of meter read data transmitted to the MDM/R by meter type and AMI Technology
- Early Testing of the Billing Service Standard XML Interface
 - Modifications and updates to the Billing Service Standard Request and Reply specifications - MDM/R TIS Version 3.2

Measurement Canada 2011 Solution Review



Measurement Canada 2011 Solution

Functions to Support Compliance with MC Regulations



Function	Status	2011	2012
1. Register Reads on Billing Invoice	EIP R7.2 In Test	ü	ü
2. Midnight-to-Midnight Billing Period	In Production	ü	ü
3. Register Read Calculator ^{1.}	Delivery in June	ü	ü
4. Register Read to Register Read Billing Period ^{2.}			ü
5. Partial Day Framing	EIP R7.2 In Test	ü	ü
6.a RR to Σ TOU Check Tolerance (0.099/0.99 kWh)	EIP R7.2 In Test	ü	ü
6.b RR to Σ TOU Check Tolerance (0 kWh) ^{3.}			ü
7. Prorating Usage for Rex 1 Register Reads ^{2.}			ü
8. Bill-to-Bill Reconciliation ^{3.}		Post Billing	ü
9. External input of Estimated Register Reads			ü

1. Register Read Calculator and Data Change Monitor - design and coding nearing completion.

2. To be provided by modification of billing processor - requirements definition complete.

3. To be provided by a new Equality Check function - requirements definition complete.

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1. Register Reads on Billing Invoice (1 of 2)

- Delivery of register reads enabled by the new MDM/R Billing Service Standard XML Interface
 - MDM/R TIS V3.1 updates provide Request/Reply specifications for functional gap solutions delivered with *EnergyIP* Release 7.2 SP3
 - Universal SDP ID included in Reply `<ServicePoint>/<idType>`
 - Validation of SDP to Billing Agent Relationship
 - Support for external request file identifier provided in Request and Reply
- Start and End register reads aligned with billing period start and end date/time transmitted through the new billing XML Reply
 - Actual register reads will be transmitted when aligned with the requested billing period start and end date/time
 - Estimated register reads will be calculated from the nearest actual register read and available interval data
- Interval based billing quantities will align with registered consumption within a small Billing Validation Sum Check tolerance
 - Billing quantities exceeding tolerance will be flagged for correction by LDC billing processes by Reply `<Reading>/<validationCode> = "6"`

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1. Register Reads on Billing Invoice (2 of 2)



- Register Reads available for Web Presentment
 - Meter Reads Retrieval Web Services interface will be extended to provide all register reads transmitted to the MDM/R
 - Existing request/reply interface provided hourly data and daily TOU data for each requested period
 - Extended measurements will provide all register reads stored in the MDM/R within each requested period
- Many existing LDC Web Presentment Portals are able to display register reads in addition to existing presentment of TOU and interval data
 - LDCs providing register reads via web presentment will enable customer verification of actual or estimated register readings presented on the billing invoice to all register readings transmitted by their meter.
 - LDC customer service representatives will also be able to view all register readings for billing verification and customer support.

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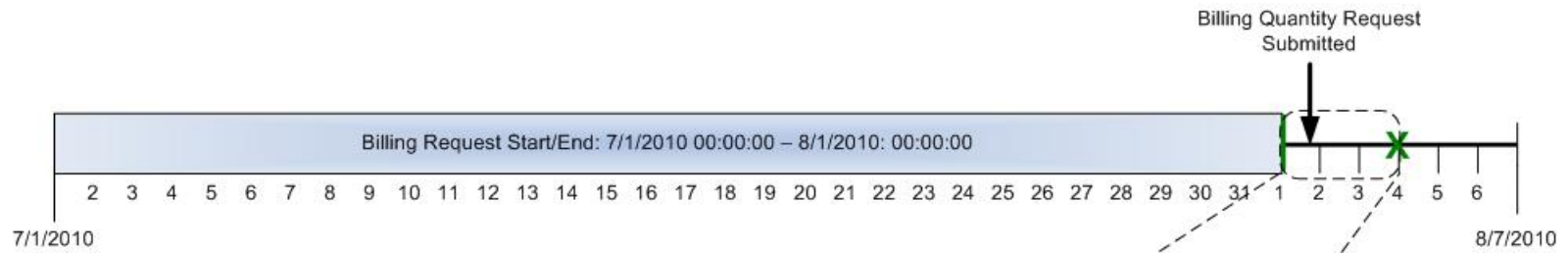
2. Midnight-to-Midnight Billing Period



- Core billing process will remain midnight-to-midnight
 - Request can specify midnight hour or any other interval-aligned time
- Register Read Billing Window and Execution Window will provide different configuration for On Cycle and Off Cycle requests
 - Data Delivery Service parameters will be configured for a “zero” Billing Window for both On Cycle and Off Cycle requests
 - On Cycle configuration will provide an Execution Window ending 30 minutes before the end of the third business day with exception processing extended and triggered one hour earlier
 - Off Cycle configuration will provide prompt execution and exception processing
- Data Delivery Service configuration will provide ManualRead exception handling only, or ODEST and ManualRead exception handling
 - ManualRead exception handling will provide register read calculation
 - ODEST exception handling provides interval data estimation

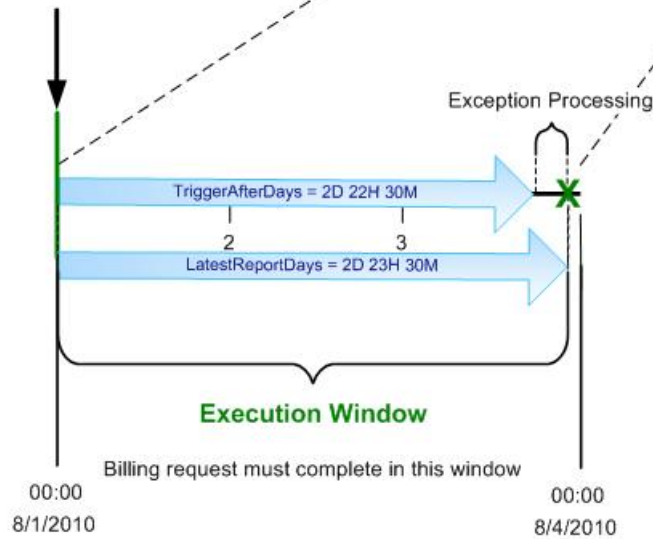
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On Cycle Register Read Billing Window and Execution Window



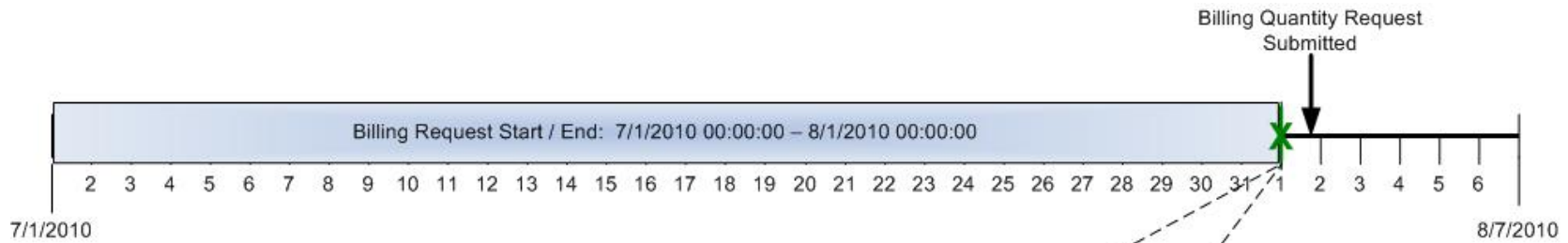
“Zero” Register Read Billing Window

AllowableReadAge = 0D(ays)
 Read Window – Max = 0D(ays)
 End register read at request 'endTime'



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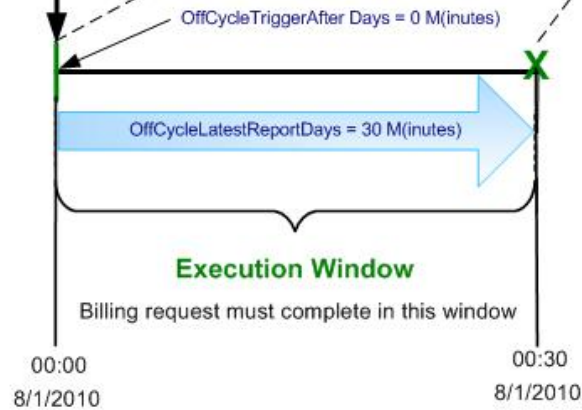
Off Cycle Register Read Billing Window and Execution Window



“Zero” Register Read Billing Window

OffCycleAllowableReadAge = 0 D(ays)
OffCycle Read Window - Max = 0 D(ays)

End register read at request 'endTime'
(Exception Processing if Required)



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3. Register Read Calculator and Data Change Monitor (1 of 2)

- Register Read Calculator
 - Will calculate missing register reads at the start and/or end of interval-aligned billing period when actual register read at requested time is not available
 - Calculation will be based on “closest” actual register reading and available valid or estimated interval data
 - Will not overwrite actual register reads received through the existing Meter Reads Interfaces
- Calculated Read Data Change Monitor
 - Will monitor changes to register read data and interval data that is used as the basis of a calculated register reading and initiate re-calculation
 - Replacement of a calculated register read by an actual register read will cause read data change monitoring to end
 - Changes to register read data, interval data, or usage data that affects consumption already billed will be reported in the existing BR03: Re-Billing Report

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3. Register Read Calculator and Data Change Monitor (2 of 2)

- The *Measurement Canada 2011 Solution* requirements document describes:
 - The billing process flow using the core *EnergyIP* billing application
 - Processing steps for both the Register Read Calculator and Calculated Read Data Change Monitor applications
 - Detailed functional requirements for the Register Read Calculator and Calculated Read Data Change Monitor applications
- Version 1.2 of the *Measurement Canada 2011 Solution* provides updates for consistency with detailed level design development, and to incorporate design modifications identified during test case and test data preparation. Changes include:
 - Greater specificity in establishing the SDP to Meter Relationship window to support logical meter changes, excluded intervals, and CT/PT multiplier changes without meter change
 - Use of maximum version time for register reads and interval data monitoring, and continued monitoring after failed re-calculation of calculated register reads

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4. Register Read to Register Read Billing Period

- Billing period start and end date-time determined by the date-time of available actual register readings will be deployed in *EnergyIP* in the future
 - This functionality will address exception conditions for register readings collected at any hour or minute of the day
 - Such exceptions are experienced by all AMI systems during meter change
 - Some early generation smart meters predominantly provide register readings at any hour or minute of the day (i.e. intermediate register readings)
 - The Measurement Canada 2011 Solution will calculate end of interval register readings for all intermediate register reading exceptions

The IESO is actively engaged in discussions with eMeter to have this 2012 functionality moved into the *EnergyIP* Release 7.x code base.

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5. Partial Day Framing



- Partial day framing is core *EnergyIP* billing functionality accessed by the use of the Billing Service Standard XML Interface
 - The Standard Billing Request may specify any interval-aligned request start date-time and/or end date-time
 - Interval-based usage for any request that is not midnight-aligned is calculated on-the-fly for each partial day and added to available daily usage data - Partial day usage is not stored
 - Start and end register readings for partial days will be actual if available or calculated if required
- Global rate changes, account changes, and framing structure changes must be synchronized at midnight
- Meter and CT/PT Multiplier changes will utilize partial day framing
 - Automatic Meter Change event segmentation will not be enabled
 - The start and end times of requests to support meter and CT/PT Multiplier changes must have a one-interval gap between requests to allow separate old meter end reading and new meter start reading

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6.a RR to Interval Data and TOU Usage Check Tolerance



- Real-time check of register reads and interval data will use the existing Message Sum Check validation set to 'Estimate'
 - Tolerance will be set to a kWh value based on expected precision differences between interval data and register read data
 - Tighter tolerances will be used for VEE Services supporting higher precision meter types (e.g. Transformer Type installations, etc.)
- Post-processing check of estimated interval data will be performed by the new VEE Post Processor to assure register read scaling
 - The VEE Post Processor will also operate in 'billing_estimation' mode to re-estimate and re-scale estimated interval data if Billing Validation Sum Check fails on tolerance
- Billing Validation Sum Check will be re-configured to a 'Value' based check with a maximum threshold based on expected precision differences between interval data and register data

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6.b RR to Interval Data and TOU Usage Check Tolerance



- Billing Determinants Equality Check and Adjustment functions will be deployed in *EnergyIP* in the future
 - This new functionality will check the summation of interval based usage against total register consumption for equality and adjust the usage determinants by any variance so that the total of the usage determinants equals the register read difference
 - This new functionality will provide a “zero” check tolerance
 - This new functionality will also provide Bill-to-Bill reconciliation by assuring that the total registered consumption used for billing is based on the cumulative values provided by the meter register

The IESO is actively engaged in discussions with eMeter to have this 2012 functionality moved into the *EnergyIP* Release 7.x code base.

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7. Prorating Usage for Intermediate Register Reads

- Some smart meters currently deployed cannot provide register readings at interval boundaries
 - Meter change start and end register readings generally also will not be interval boundary aligned
- Prorating TOU usage based on the date-time of actual register readings collected at any hour or minute will be deployed as part of *EnergyIP* in the future
 - This functionality will provide prorated usage based on register readings collected at any hour or minute of the day
 - The Measurement Canada 2011 Solution will calculate end of interval register readings for all meters providing intermediate register readings, and will provide interval aligned TOU usage using partial day framing when required

The IESO is actively engaged in discussions with eMeter to have this 2012 functionality moved into the *EnergyIP* Release 7.x code base.

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8. Bill-to-Bill Reconciliation



- Measurement Canada General Bulletin GEN-31 (rev. 1) Section 5.7 requirements will be met
 - Section 5.7.3 requires equality between register read quantities and the summation of TOU or other rate applied interval measurement values
- Bill-to-bill reconciliation will be accomplished using Post-Billing processes
- Smart Metering Entity will provide support for reconciliation and dispute resolution
 - Support will be provided to both LDCs and Measurement Canada
 - Administrative processes will support requests for data required for either reconciliation or dispute resolution purposes

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9. External input of Estimated Register Reads

- Manually collected register readings are actual reads and should be transmitted via the existing MDM/R Meter Reads Interfaces
 - All register readings transmitted via the existing Meter Read Interfaces if used as a billing determinant will be delivered in the Billing Service Standard XML Reply with a `<Quality>/<validationStatus>` = “VAL”
 - Calculated register readings used as billing determinants will be delivered in the Billing Service Standard XML Reply with a `<Quality>/<validationStatus>` = “EST”
- Processing of data quality flags indicating register reads estimated externally to the MDM/R will be deployed as part of *EnergyIP* in the future

The IESO is actively engaged in discussions with eMeter to have this 2012 functionality moved into the *EnergyIP* Release 7.x code base. Development is a lower priority given the planned deployment of the Register Read Calculator.

EnergyIP R7.2 Target Deployment Schedule - Rev. 4



EnergyIP R7.2 Target Deployment Schedule



- Please refer to “High Level R7.2 Target Deployment Schedule – Revision 4 – April 14, 2011”
- This revised schedule reflects changes to delivery dates and activities made since the previous schedule “High Level R7.2 Target Deployment Schedule – Revision 3 – January 31, 2011”

Summary Review of Meter Read Data Transmitted to the MDM/R



Summary Review of Meter Read Data Transmitted to the MDM/R by Meter Type and AMI



Background

- In early 2010 the Cumulative Register Read Working Group (CRRWG) was formed to work through issues and arrive at a solution that would be acceptable to Measurement Canada.
- Part of this work included the review of the meter read data that would be transmitted to the MDM/R by the various Smart Meters and associated Advance Metering Infrastructure systems deployed in the province.
- The result of this work has been used to support proposed tolerance settings for the “Message Sum Check” and “Billing Validation Sum Check” performed by the MDM/R.

Register Read and Interval Data Transmitted Elster to MDM/R



- **REX 1 and REX 2 meters**

- Register Read precision of 1 kWh, while Interval Data precision at 2 or 3 digits to the right of the decimal.
- A sample of a REX 2 meter with the “End of Interval Snapshot” was provided and found the RR Difference Minus LP Data Sum deviation fluctuated between -0.95 to +0.82 kWh.

- **A3_ILN Meters**

- Register Read precision of 1 kWh, while Interval Data precision at 3, 4 and 5 digits to the right of the decimal.
- Register Read Difference Minus Interval Data Sum deviation over +/- 1 kWh.

- **A3_Collector Meters**

- Register Read precision of 4 or 5 digits to the right of the decimal, while Interval Data precision at 3 or 4 digits to the right of the decimal.
- Register Read Difference Minus Interval Data Sum deviation over +/- 1 kWh (possibly due to the time the register read is recorded and the interval consumption in the interval)

Register Read and Interval Data Transmitted Sensus to MDM/R



- **ICON Meters**

- Register Read precision of 2 digits to the right of the decimal, the Interval Data precision at 2 digits to the right of the decimal.
- Register Read Difference Minus Interval Data Sum deviation of 0.00 kWh.

- **Elster A3D Meters**

- Register Read precision of 2 digits to the right of the decimal, the Interval Data precision at 2 digits to the right of the decimal.
- Register Read Difference Minus Interval Data Sum deviation of 0.00 kWh

Register Read and Interval Data Transmitted Trilliant to MDM/R



- **All Meters (L&G, Itron and GE)**
 - Meter configurations where the Register Read precision was 3, 4 and 5 digits to the right of the decimal, the meter was recording the Interval Data at the same precision 3,4 and 5 digits to the right of the decimal.
 - Register Read Difference Minus Interval Data Sum deviation of 0.00 kWh.
- **Itron Model SS1S3L**
 - Register Read precision of 5 digits to the right of the decimal, while Interval Data precision at 3 digits to the right of the decimal.
 - Register Read Difference Minus Interval Data Sum deviation fluctuated between -0.0672 and +0.997 kWh.

Register Read and Interval Data Transmitted Tantalus to MDM/R



- **GE, Westinghouse ABB and Itron**
 - Register Read precision of 3 digits to the right of the decimal, while Interval Data precision at 3 digits to the right of the decimal.
 - Register Read Difference Minus Interval Data Sum deviation fluctuated between -0.003 and +0.004 kWh.

Register Read and Interval Data Transmitted Silver Springs and SmartSynch to MDM/R



Silver Springs

- GE I210 and GE KV2c
 - Register Read precision of 4 digits to the right of the decimal, while Interval Data precision at 4 digits to the right of the decimal.
 - Register Read Difference Minus Interval Data Sum deviation fluctuated between -0.0206 and +0.0285 kWh.

SmartSynch

- C1SI and C1SX-2S
 - Register Read precision of 3 digits to the right of the decimal, while Interval Data precision at 3 digits to the right of the decimal.
 - Register Read Difference Minus Interval Data Sum deviation of 0.00 kWh.

Early Testing Facility for the Billing Service Standard XML Interface



Early Testing Facility for the Billing Service Standard XML Interface

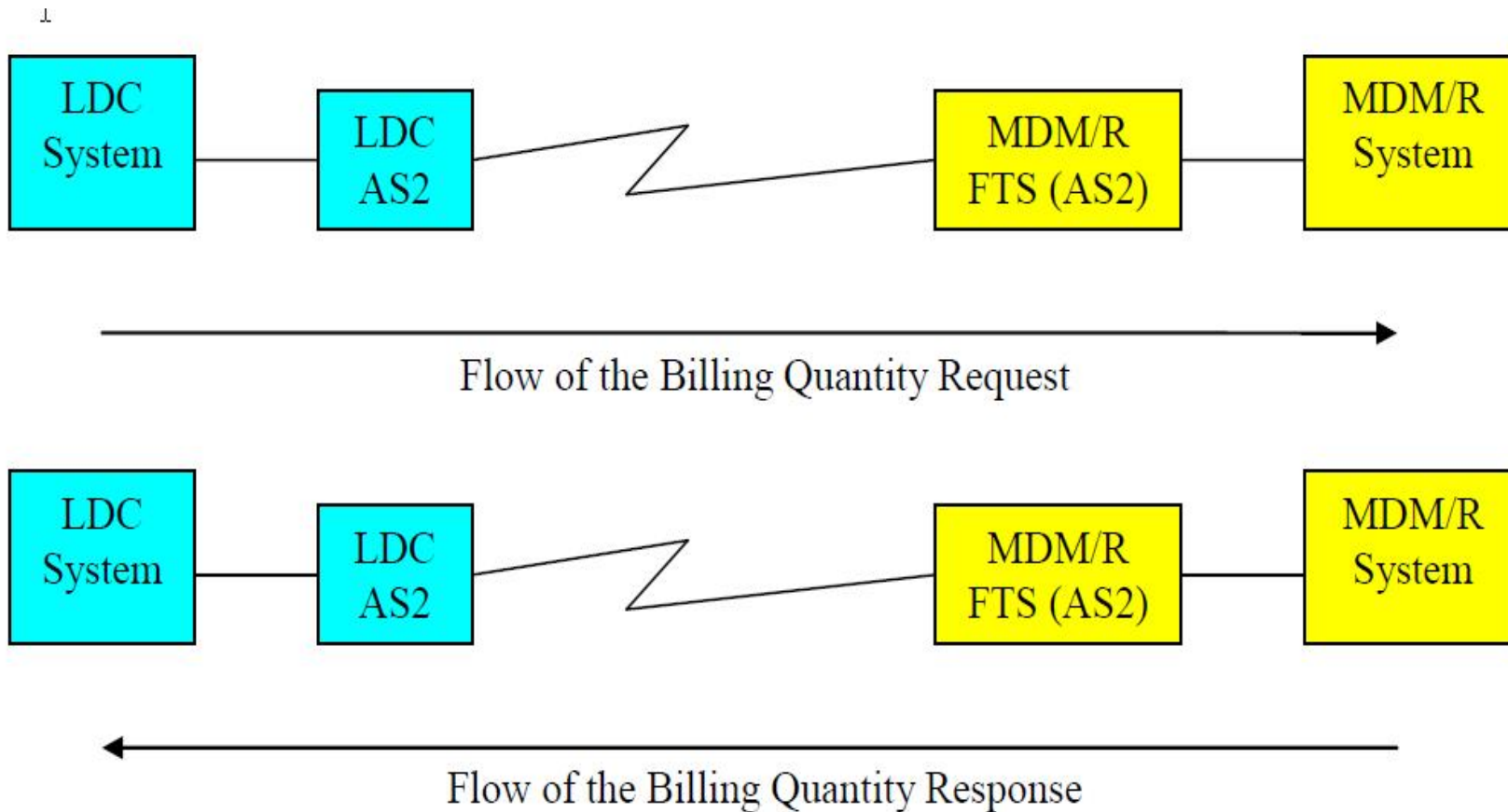
Background

- The MDM/R Billing Quantity Interface (BQI) architected in 2007 is a custom design that does not support transmission of register reads.
- eMeter has developed an *EnergyIP* Billing Service Standard XML Interface which supports transmission of TOU, Periodic, and Hourly billing determinants together with start register read and end register read determinants.
- The decision to move to the eMeter's file-based Billing Service Standard XML Interface requires LDCs to modify their CIS billing quantity request and reply interface.
- Traditionally new functionality is fully tested and deemed functioning by the IESO before releasing the functionality to the LDCs to test.
- Under this traditional approach, LDCs would need to wait until June when *EnergyIP* R7.2 is to be deployed to the MDM/R Sandbox.

Early Testing Facility for the Billing Service Standard XML Interface

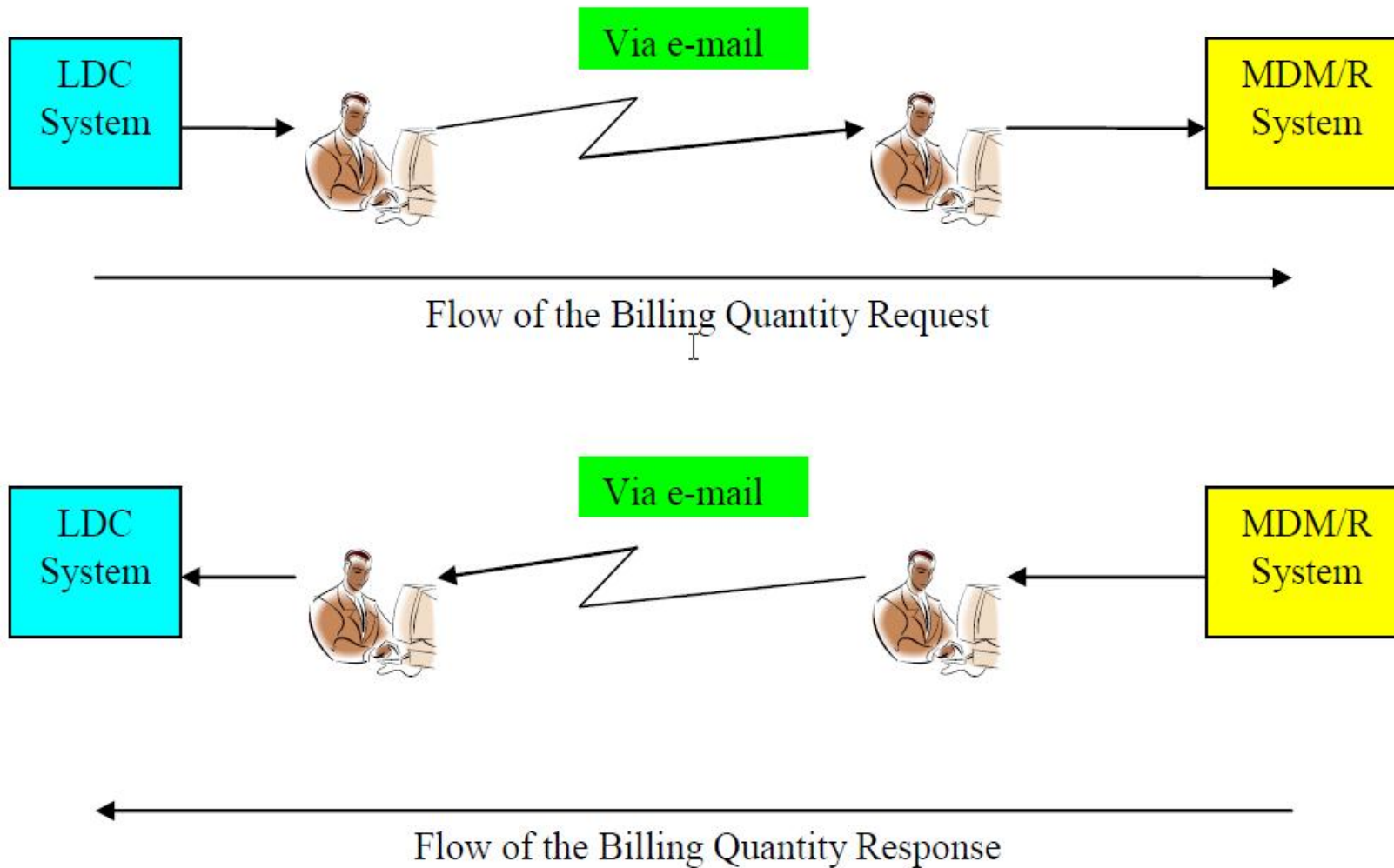


Enduring Billing Quantity Transaction Handling



Early Testing Facility for the Billing Service Standard XML Interface

Early XML Billing Quantity Transaction Testing Approach



Early Testing Facility for the Billing Service Standard XML Interface - Data Structures

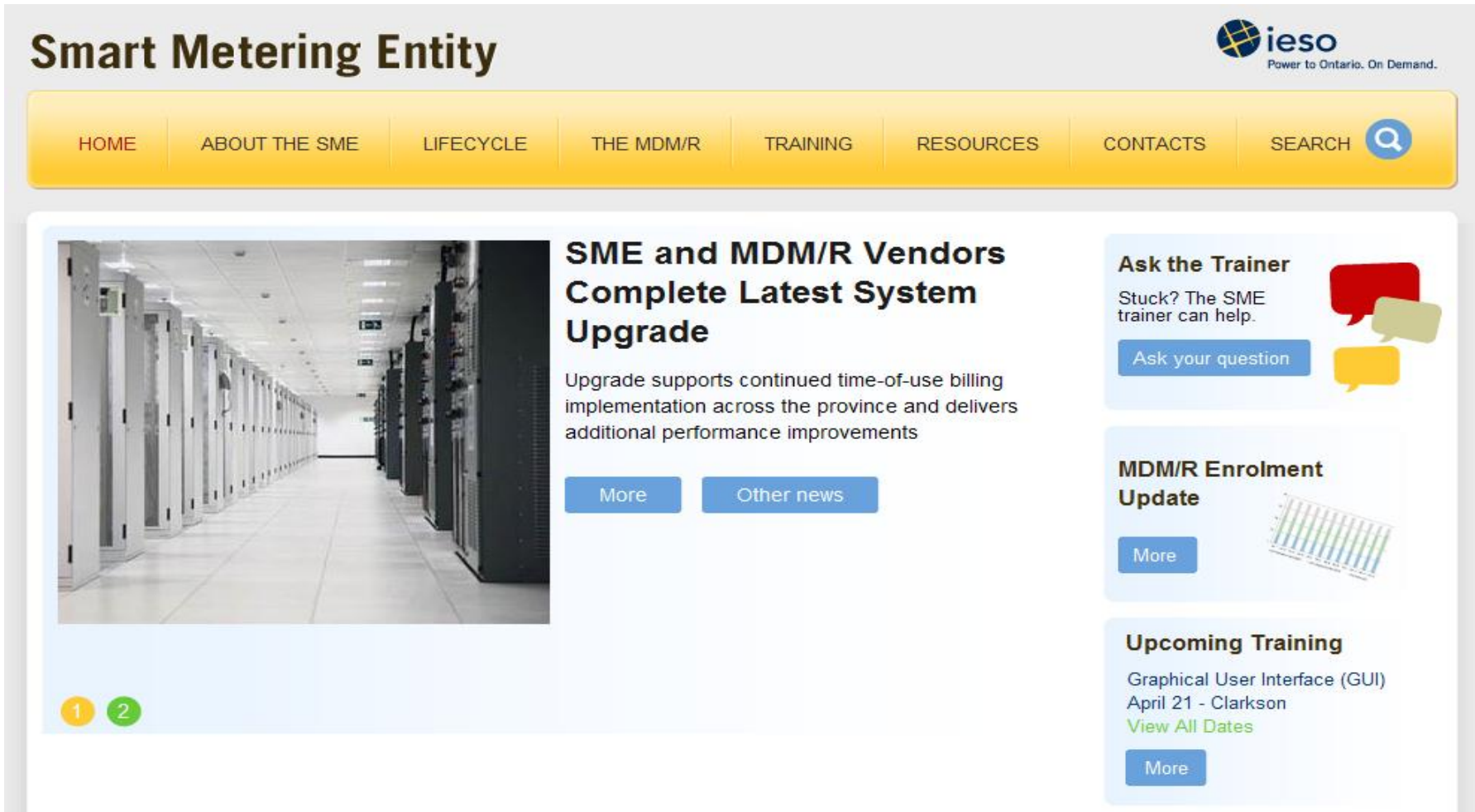
- LDC's will not be able to use their own ORGID or SDPs.
- Two test ORGs will be available
 - One ORG configured to process the current BQI request files and provide the file-based Billing Service Standard XML Reply.
 - The other ORG configured to process the file-based Billing Service Standard XML Request and provide a file-based XML Reply.
- Each test ORG will have the identical static set of SDPs (10-20) to emulate various business scenarios.
- XML Requests will be defined by the Universal SDP ID while the XML Reply returns the SDP ID if EIP R7.2 SP3 has not been deployed.
 - Delivery of SP3 in April will contain an enhancement that will return the Universal SDP ID in the XML Reply.
- Details of data structures available for this testing will be communicated to the LDCs in the near future.

Modifications and Updates to the Billing Service Standard Interface Specifications



- eMeter has delivered the file-based XML Request and Reply with the following changes:
 - The use of a defined namespace attribute prefix is now optional in the Billing Service Standard XML Request
 - The namespace binding for the Billing Service Standard XML Reply will use a schema of form 'DefaultAttName' = "xmlns" thus providing no attribute prefix
 - Thus the namespace attribute prefix "tns:" is eliminated
- A <Messages> element has been added to both the Billing Service Standard XML Request file and XML Reply file
 - This new 'Messages' element provides a defined opening and closing of both request and reply files consisting of one or multiple billing requests or responses
- These changes and other additions and clarifications are made available in an interim update of Sections 2.4 and 2.5 of the MDM/R Technical Interface Specifications Version 3.2

Further Information: SMSIP Website



The screenshot shows the homepage of the Smart Metering Entity (SME) website. At the top right is the IESO logo with the tagline "Power to Ontario. On Demand." Below the logo is a navigation menu with the following items: HOME, ABOUT THE SME, LIFECYCLE, THE MDM/R, TRAINING, RESOURCES, CONTACTS, and SEARCH. The main content area features a large image of a server room on the left. To the right of the image is a headline: "SME and MDM/R Vendors Complete Latest System Upgrade". Below the headline is a sub-headline: "Upgrade supports continued time-of-use billing implementation across the province and delivers additional performance improvements". There are two buttons: "More" and "Other news". To the right of the main content are three smaller sections: "Ask the Trainer" with a "Ask your question" button, "MDM/R Enrolment Update" with a "More" button, and "Upcoming Training" with a "More" button. At the bottom left of the screenshot, there are two small circular icons labeled "1" and "2".

SMSIP Website URL <http://www.smi-ieso.ca/>

Thank You

