

MDM/R Advanced Metering Infrastructure (AMI) Elster Workshop

Date: June 1, 2010

Toronto Airport Marriott Hotel



Agenda

- Sequences and Timelines
- File Transfer Services
- Characteristics
- Business Rules
- File Format Specifications
- MDM/R Position Statement
- Data Collection Reports
- FAQs
- Lessons Learned

Purpose

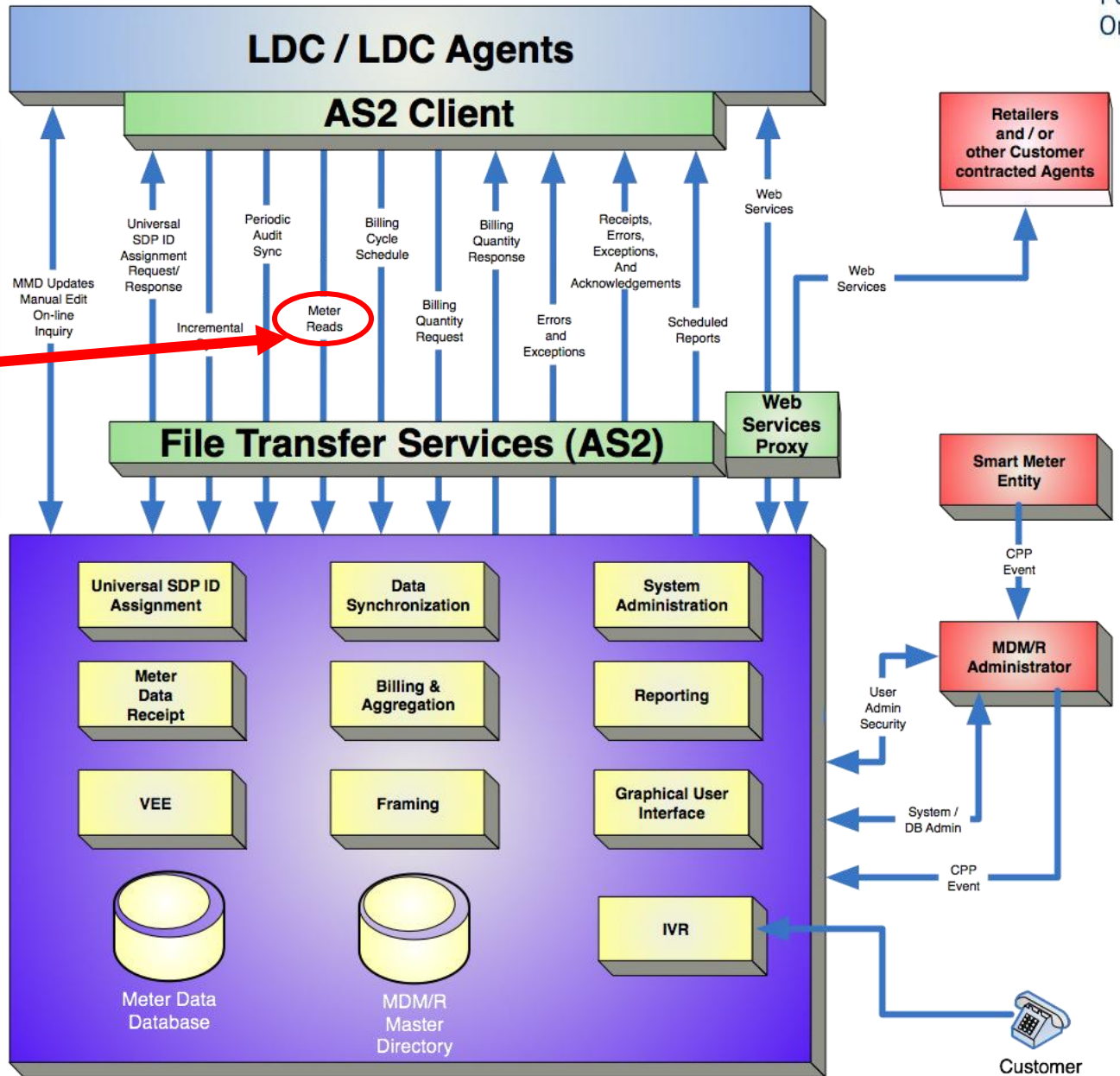
- The purpose of this session is to provide a detailed walkthrough of the pertinent technical issues of the meter read data interface from the province's Advanced Metering Infrastructure (AMI) systems to the Meter Data Management Repository (MDM/R)
- This session also notes issues that are relevant to specific types of AMI technologies

Objectives

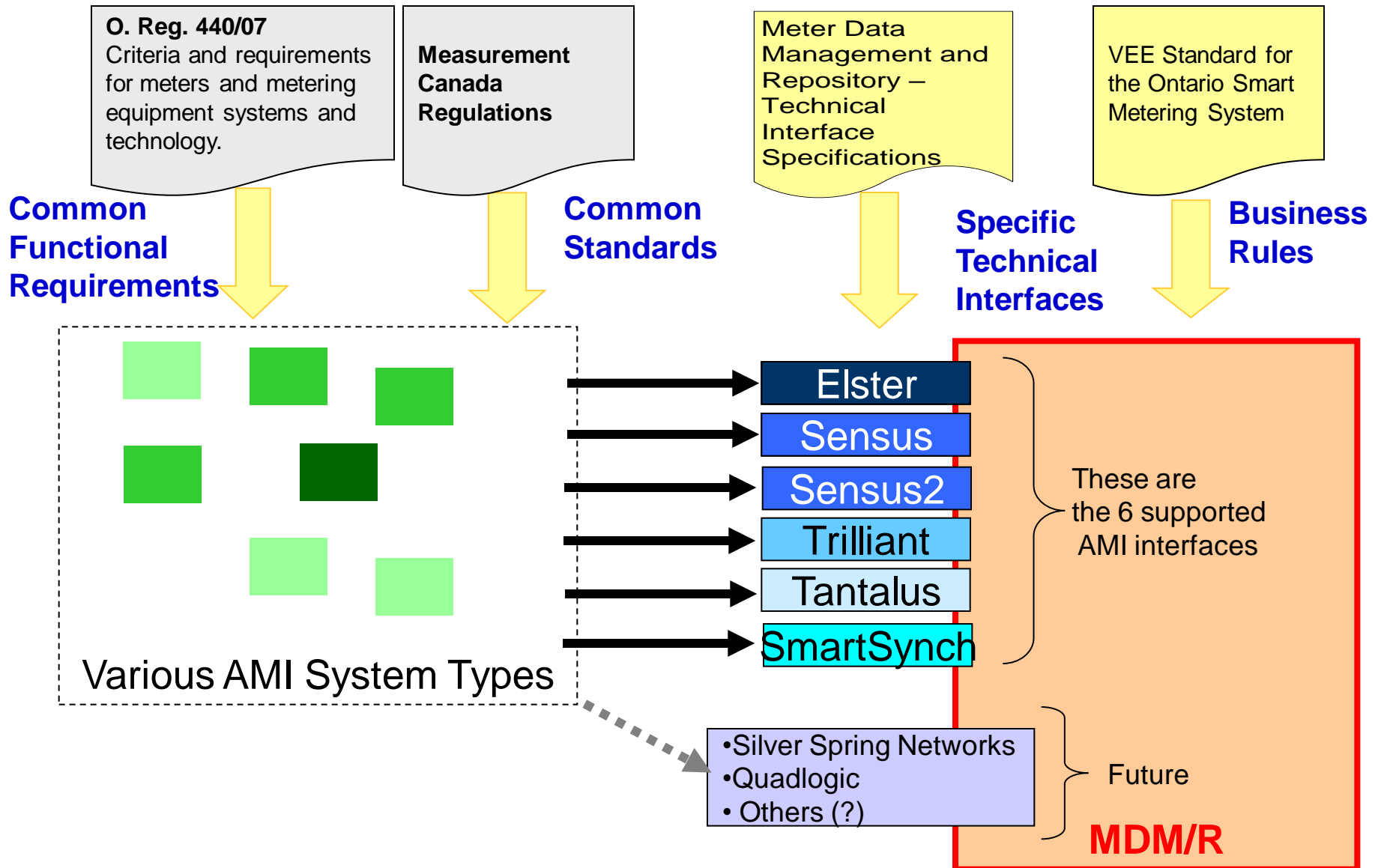
1. Overall knowledge of the technical components of the MDM/R meter read interface
2. Introduce specific areas of technical consideration from a systems integration standpoint
3. Note issues that are specific to AMI technology types
4. Direct you to further sources of detailed information.

MDM/R Solution Footprint

Today's session will primarily focus on Meter Read Data from AMCC systems through the specific Adaptors



Framework of the AMI to MDM/R Interface



Sequences and Timelines

Processing Sequence

MDM/R Meter Read Data Processing Sequence

- Syntactic, Semantic and Pre-VEE check are performed by the MDM/R on the files received from the AMCC and stored in the MDM/R.
- The Meter Read Data is validated and estimated as per the VEE Service assigned to the Service Delivery Point.
- Data Collection and VEE reports are provided back to the LDC and/or AMI Operator.
- LDC and/or AMI Operator to investigate and resolve reported exceptions.

Sequences and Timelines

- The following diagram depicts the typical processes involved in the daily receipt of Meter Read Data, MDM/R Master Data updates and the daily production of Billing Quantities.
- This presentation only focuses on the Meter Read Data Processing Timeline.
- MDM/R processing of Synchronization, Billing Quantities, File Transfer Services, etc. are covered in additional MDM/R workshop materials that are posted on the smi-ieso.ca website.

| Day N - 1 | | | | | | | | | | | | | | | | | | | | | | | | Daily Read Period N | | | | | | | | | | | | | | | | | | | | | | | | Day N + 1 | | | | | | | | | | | | | | | | | | | | | | | | Day N + 2 | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Hour Ending | | | | | | | | | | | | | | | | | | | | | | | | Hour Ending | | | | | | | | | | | | | | | | | | | | | | | | Hour Ending | | | | | | | | | | | | | | | | | | | | | | | | Hour Ending | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |

Meter Readings for Daily Read Period "N"
 Transferred from AMCC to MDM/R
 by 5 AM on Day N + 1

Meter Readings for Daily Read Period "N"
 Checked (Syntactic, Semantic and Pre-VEE)
 and Stored in MDM/R

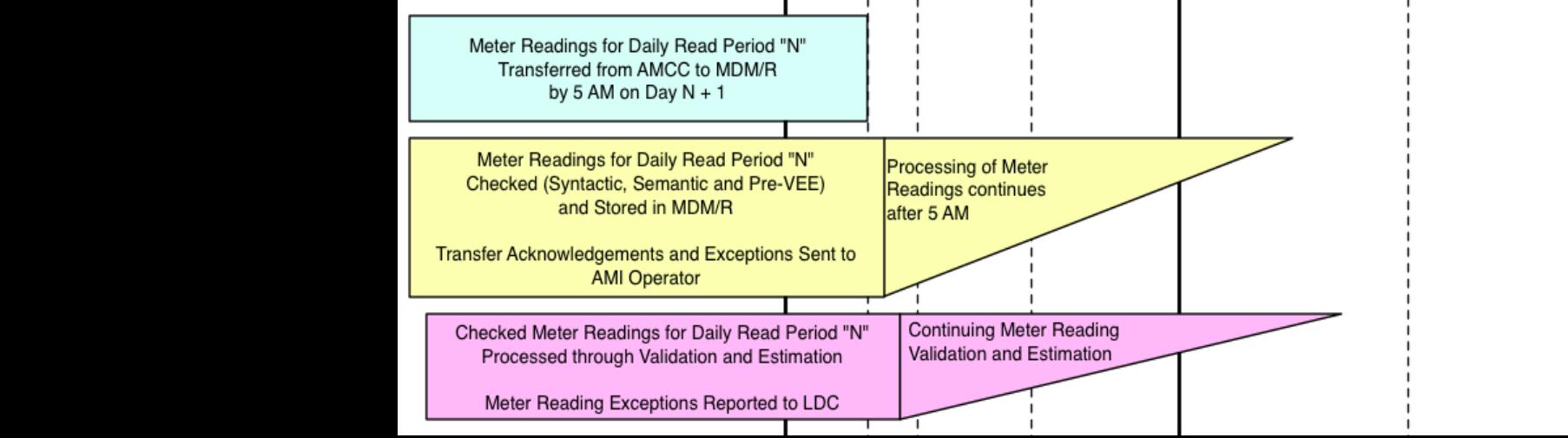
Transfer Acknowledgements and Exceptions Sent to
 AMI Operator

Checked Meter Readings for Daily Read Period "N"
 Processed through Validation and Estimation

Meter Reading Exceptions Reported to LDC

Processing of Meter
 Readings continues
 after 5 AM

Continuing Meter Reading
 Validation and Estimation



The Meter Read Data Processing

- For Meter Reads collected during Daily Read Period N that are received and receipted up to 05:00 EST on Day N+1 by the MDM/R
 - Syntactic checks, semantic checks and pre-VEE data checks will be completed by 06:00 EST on Day N+1 for 100% of these Meter Reads
 - Validation and estimation processing will be completed and exceptions will be reported to the LDC and/or AMI Operator by 07:10 EST on Day N+1 for 100% of these Meter Reads

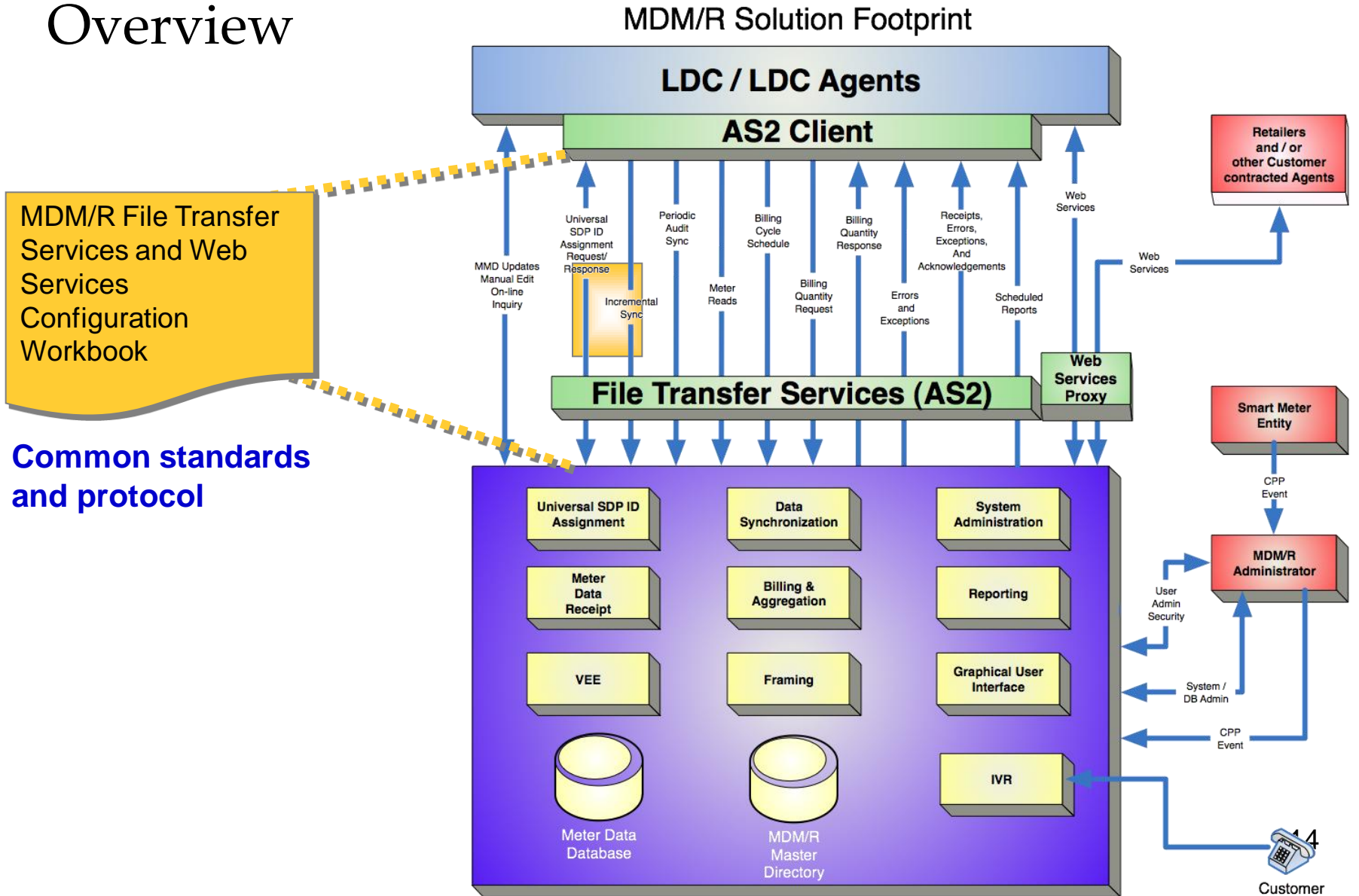
The Meter Read Data Processing

- For Meter Reads received and receipted after 05:00 EST on Day N+1:
 - Syntactic checks, semantic checks and pre-VEE data checks will be completed within **six hours** after such data is received
 - Validation and estimation processing will be completed within **six hours** after such data is received
 - Exceptions will be reported after processing of the data has completed
- To meet these processing objectives, the feeding of meter read data from all the LDCs' AMI systems to the MDM/R cannot all occur at the last minute. Some reasonable distribution is needed.

File Transfer Services

File Transfer Services

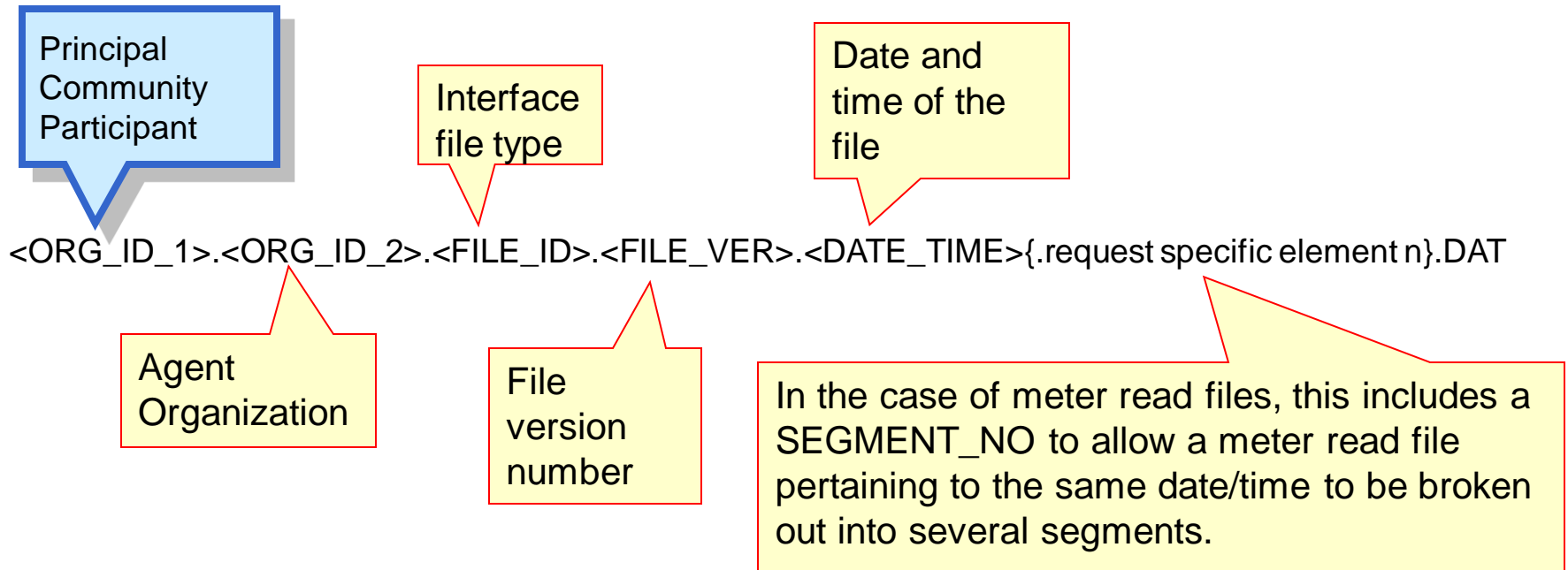
Overview



File Transfer Services (cont'd)

File Nomenclature:

- All interface files sent to and from the MDM/R follow a specific naming convention:



Applicability Standard 2 (AS2) Terminology:

Within the realm of File Transfer Services and the attendant AS2 Protocol, each registered MDM/R Organization is referred to as a “Community Participant”.

File Transfer Services (cont'd)

- <File ID>
 - Each meter read interface file has a mandatory four digit identifier
 - Sensus – 7000
 - Sensus2 – 7001
 - Elster – 7100
 - Trilliant – 7200
 - Tantalus – 7300
 - SmartSynch – 7400
 - Future: other AMI types (File ID to be determined)

File Transfer Services (cont'd)

- <SEGMENT_NO>
 - Meter Read files can be split into small files to make delivery to the MDM/R easier
 - Files must be grouped according to their date/time in the file name
 - Files are identified using a 10 character identifier in the file name
 - Identifier not required if meter read files are not being split

Who can submit Meter Read Files

- Meter Read files can be submitted by either an LDC and/or an AMI Operator
 - The organization must be registered with the MDM/R
 - The AMI Operator must be associated with each SDP as the organization specified in the SDP to AMI Operator Relationship using the MDM/R Synchronization processes

Characteristics

Terminology:

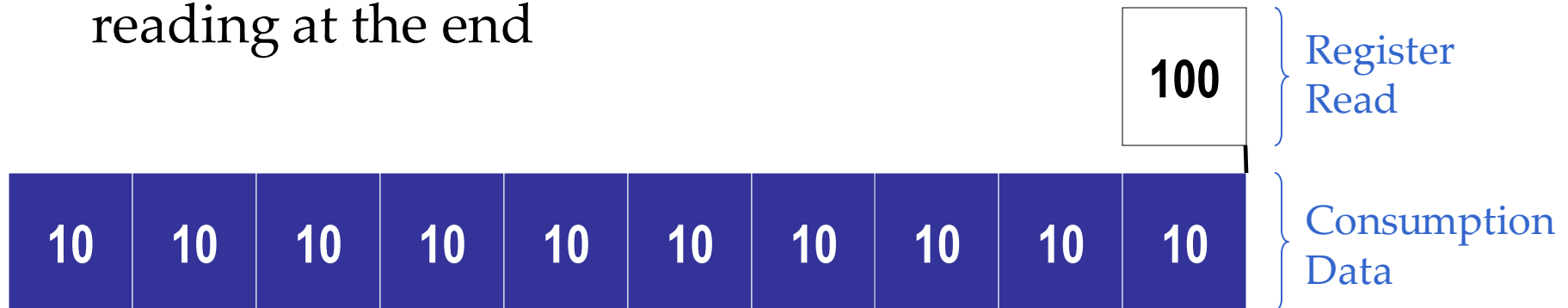
What is a Service Delivery Point (SDP)

- A Service Delivery Point (SDP) is:
 - The point at which energy is deemed to be delivered to the customer
 - Physical SDPs are metered
 - Virtual SDPs allow two or more physical SDPs to be aggregated
 - The point at which billing occurs based on input from one or more smart meters
 - The common element to which master data and MDM/R services are associated within the MDM/R Master Directory (MMD)

Terminology:

What is a Meter Transfer Block?

- The MDM/R accepts meter read data from an Advance Metering Control Computer (AMCC) and stores it as a “Meter Transfer Block”
 - A set of interval consumption data with a register reading at the end



- Available interval sizes:
 - 5/10/15/30/60 minutes
 - Provincially regulated requirement for smart meters for residential and small general service customers: 60 minutes

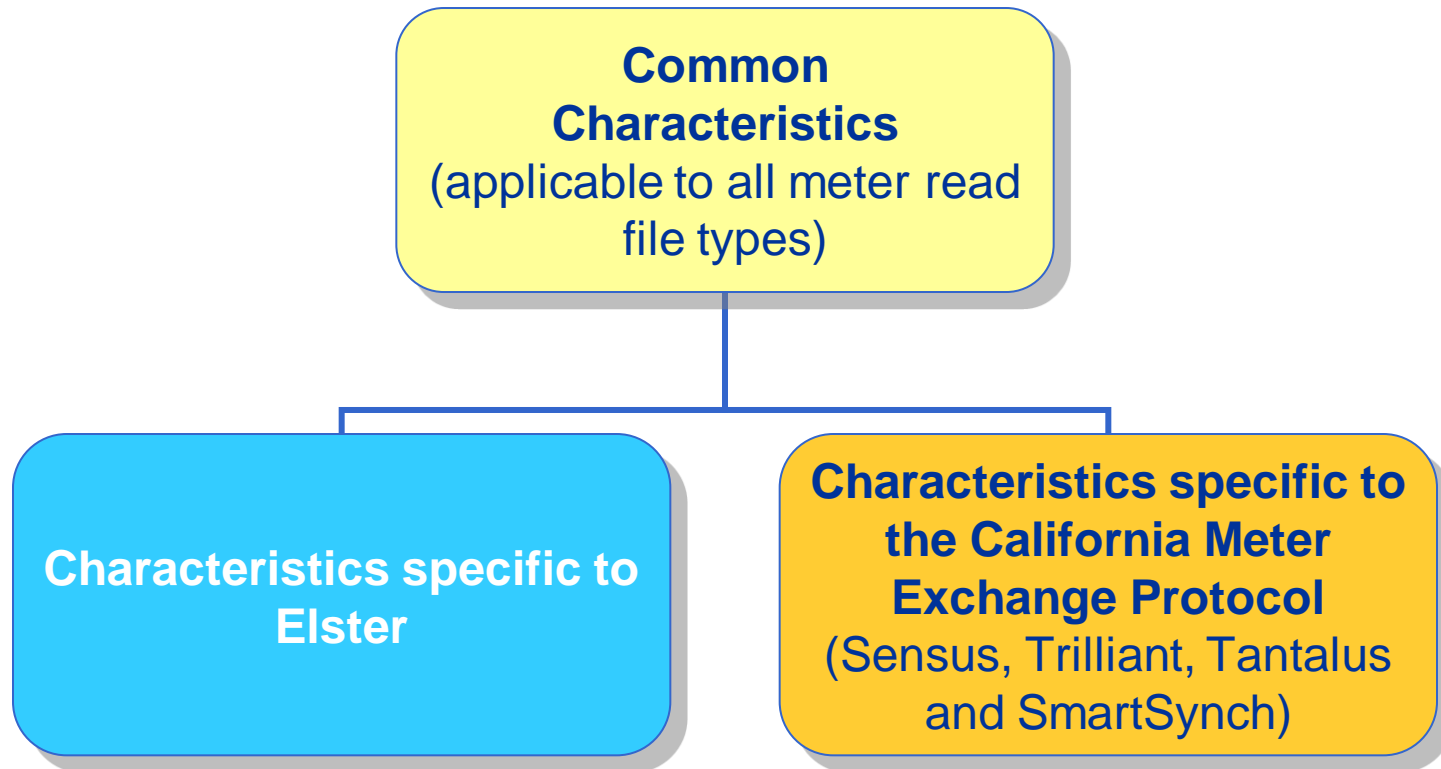
Terminology:

What is an AMCD ID?

- An Advanced Metering Communication Device Identifier (AMCD ID) is used to specifically identify a component of a smart meter.
- If the AMCD ID is unknown to the MDM/R, or not associated with an SDP, the meter read data will not be accepted.

Characteristics

- Generally speaking, the characteristics of meter read files include both common characteristics and those that are specific to the Advanced Metering Infrastructure technology being employed



Characteristics

Master Data Requirements

- Meter Read Data received from the AMCC for all meters that are associated to SDP's must:
 - Have been assigned a Universal SDP ID;
 - Have been included in the Periodic Audit Synchronization or Incremental Synchronization; and,
 - Have all of the attributes associated with the Data Collection Service populated.

Characteristics

Meter Read Data Requirements

- All Meter Read Data received from the AMCC shall contain:
 - A register read for the end of the Meter Transfer Block
 - A series of interval data
 - Interval Data quality indicators

Characteristics

Data Quality Indicators (1 of 3)

- Data Quality Indicators that are associated with Elster meters will vary by meter type.
- The Data Quality and Status Indicators per Elster metering type are depicted in the Appendix at the end of this presentation.

- Data quality indicators that are recognized and used by the MDM/R for Validation and Estimation are:
 - test mode
 - pulse overflow
 - time change
 - diagnostic error
 - reverse energy
 - data collection estimation
 - power outage
 - power restore
 - AMI error (set by the Elster MAS Invalid Time data quality flag)
- Other data quality flags that are recognized and stored by the MDM/R are:
 - partial data
 - short interval
 - long interval

Characteristics

Data Quality Indicators (3 of 3)

Invalid Time Data Quality Flag

- Elster marks interval data with an “Invalid Time” data quality flag when the MAS system does not have enough information to assign a reliable time stamp
- Currently the MDM/R Meter Read Interface for Elster will reject interval data records for which the Invalid Time flag is set
 - Such rejected Invalid Time records will be treated as Missing Intervals and will be estimated by the MDM/R
- Future modification of the MDM/R Elster Meter Read interface will allow the Invalid Time flag to set the *EnergyIP* AMI Error flag
 - Based on input of the Elster Users Group facilitated by Halton Hills Hydro the AMI Error Flag will be configured to estimate interval data flagged with the Invalid Time data quality flag

- Elster transmits Meter Read Data to the MDM/R in an AMR Data Exchange Format (AMRDEF) using eXtensible Markup Language (XML) format
- Meter Read Data files are provided to the MDM/R on a per collector basis or in one single meter read file.
- All scheduled and on request transmissions to the MDM/R will include interval data and an associated register reading

Characteristics

Register Reads

- Elster has adopted an “Ontario Standard” schedule for collection of interval data from first generation REX meters at 00:30 and 06:30, 12:30, and 18:30 hours, and for collection of reading registers at 04:00, 10:00, 06:00, 22:00 hours
 - Register readings transmitted to the MDM/R will be cumulative values established from meter readings approved and verified by Measurement Canada
 - Estimated register readings in terms of altered quantity value or altered date/time will not be transmitted to the MDM/R
- Meter Transfer Blocks no longer than 24 hours for each Daily Read Period is expected to be made mandatory in support of Measurement Canada requirements

Characteristics

End Of Interval Snapshot

- The End Of Interval Snapshot functionality first made available in Elster MAS Release 6.2 provides a register reading at the end of each interval data set
 - REX1 meters with Firmware version 4.1 and all REX2 meters support the End of Interval Snap function
- The End Of Interval Snapshot register reading is stored by the Collector when it reads interval data from each REX meter
 - this results in a register reading at the end of the last interval of each 6 hour block of interval data
- The MRM/R Elster Meter Read interface has been modified to process the End Of Interval Snapshot
 - This modified interface will be introduced into the MDM/R Production system currently running *EnergyIP* 6.3

Business Rules

- Meter Read Data will be stored in the Meter Data Database and related to the applicable Universal SDP ID and AMCD ID pair if:
 - The LDC's Organization ID, Universal SDP ID and AMCD ID are all associated with the same Service Delivery Point; and,
 - The AMCD ID is associated with the SDP for the Daily Read Period being reported
- If there is no Meter Read data in the record, no value is recorded.

Business Rules (cont'd)

- The MDM/R detects the following exceptions
 - Invalid file format and data types;
 - An Organization ID is not known by the system;
 - An Organization is not the currently in effect AMI Operator;
 - An AMCD ID is not known by the system;
 - Extraneous interval data is received from the AMCC

Business Rules (cont'd)

- Residential smart meters that have the technical capability to record both energy delivered and energy received:
 - Shall be programmed such that they will sum the absolute values of the energy delivered and energy received for each interval; and
 - The sum of those absolute values will be transmitted as “total delivered energy” (i.e. as energy consumed by the customer).
- This will apply to both interval consumption and register read data.
- This methodology will apply to all units of measurement.

- The SDP must be assigned a Channel Configuration Set through the synchronization processes.
- A “Channel Configuration Set” establishes the data channels for each applicable unit of measurement and type necessary to support the receipt and processing of register read and interval consumption data.

File Format Specifications

File Format Specifications

Valid Meter Types

- Meter Types - The following Elster metering types are recognized by the MDM/R
 - “A3” – A3 ALPHA Meter
 - “A3_ILN” – A3 ALPHA Node
 - “A3_Collector” – A3 ALPHA Meter with option board
 - “REX” – REX Meter

File Format Specifications

“MeterName” – Field Description

- The MeterName field shall be populated with the AMCD ID of the smart meter.

File Format Specifications

“UOM” –Field Description

- The MDM/R will process interval and register read data where the unit of measurement is consistent with the interval data and register data channels supported by the Channel Configuration Set assigned to the SDP.
- Located in two sections of the AMRDEF file:
 - Interval data -
MeterReadings.IntervalData.IntervalSpec.UOM
 - Register Data -
MeterReadings.ConsumptionData.ConsumptionSpec.UOM

- Valid values are :
 - For energy valid values are: delivered “KWH” or “kWh”.
 - For VAR-hours valid values are: inductive (Power Factor lagging) delivered “KVARH” or “kVARh”
 - For VA-hours valid values are: delivered “KVAH” or “kVAh”

MDM/R Position Statement

Data Transformations to Meter Read Data outside of the AMI System

- It is recognized that in some cases, LDC's may act on Meter Read Data outside the scope of their AMI systems, and prior to the transmission of that data to the MDM/R.
 - These data transformations may take place in systems that fall outside the scope of the MDM/R Technical Interfaces Specifications document or the Ontario Regulation governing AMI systems (440/07)

Governance of the AMI to MDM/R interface:

Ontario Regulation 440/07: "Criteria and Requirements for meters and metering equipment systems and technology"

Electricity Gas and Inspection Act (R.S.C. 1985, c. E-4)

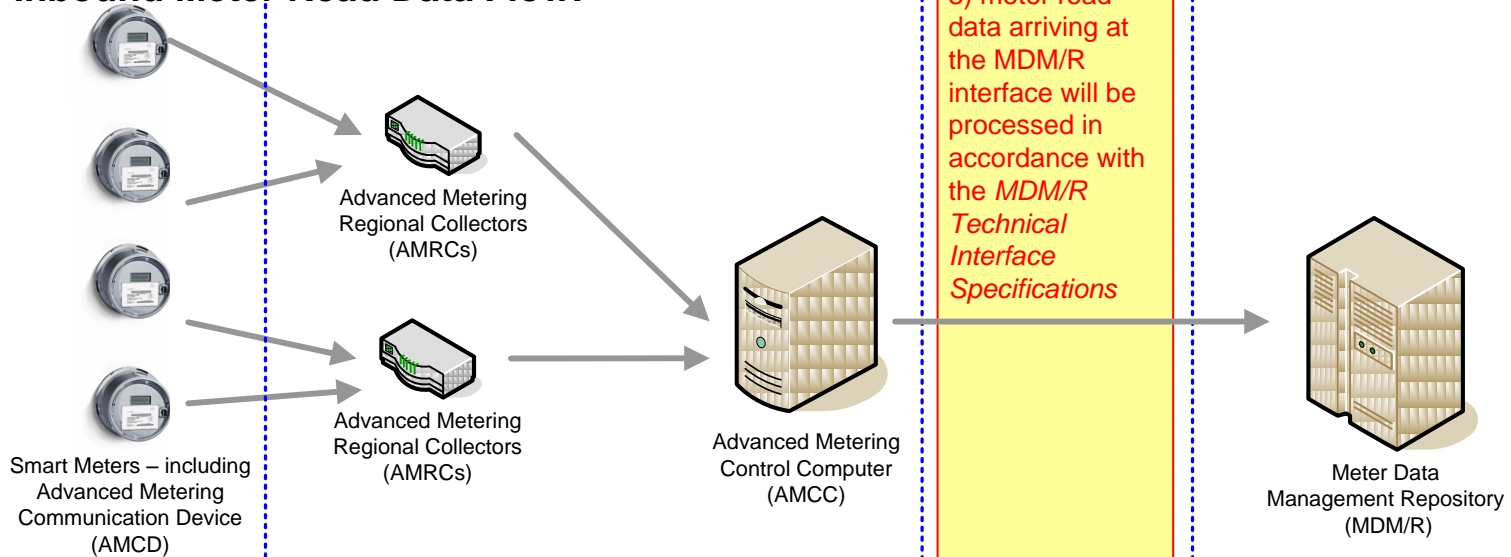
MDM/R Position Statement:

Meter read data transformations:
 1) are allowable;
 2) shall be in compliance with all applicable law; and,
 3) meter read data arriving at the MDM/R interface will be processed in accordance with the *MDM/R Technical Interface Specifications*

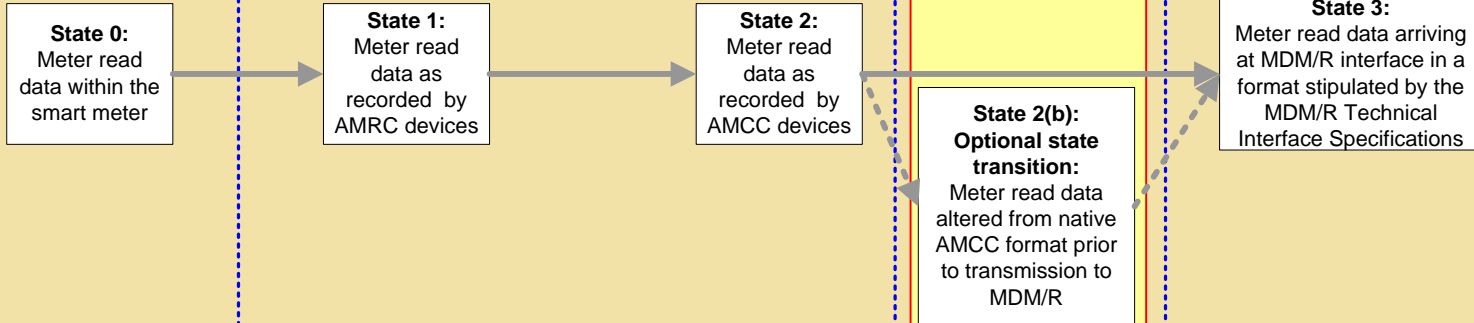
MDM/R V1.0 Technical Interface Specifications (IESO_SPEC_9027)

SO to Ontario mand.

Inbound Meter Read Data Flow:



Meter Read Data Transition States:



Data Collection Reports

Data Collection Reports

- The following is a listing of the Data Collection reports that are available in the MDM/R Graphical User Interface Reports Tab and delivered via File Transfer Services to the LDC and/or designated agents
 - DC01: Daily Read Status Report
 - DC02: Excessive Missing Reads Report
 - DC03: Interim Read Validation Failure Report
 - DC13: Final Read Validation Failure Report
 - DC04: Missing Reads Detail Report
 - DC05: Daily Data Collection Report
 - DC06: Interim AMCC Data Collection Summary Exception Report
 - DC16: Final AMCC Data Collection Summary Exception Report
 - DC07: Interim AMCC Data Collection Detailed Exception Report
 - DC17: Final AMCC Data Collection Detailed Exception Report
 - DC08: Zero Consumption Report

DC01: Daily Read Status Report

- Provides an overview of meter read data received with a Read Date of the previous day
- Segmented by AMCC type
- The report only advises as to the receipt of kWh Register Reads
- The report will run daily for completion no later than 07:10 EST.

DC02: Excessive Missing Reads Report

- Identifies meters that are missing register reads for at least five out of the last ten days.
 - This ratio of 5 and 10 days is configurable on a system-wide basis.
- The report returns:
 - Meter ID and SDP ID information
 - The percentage of days missing reads
 - The date of the last available read for each register channel
- For meters transmitting multiple registers (i.e. register data for kWh, kVAh and/or kVARh) the report will run such that the meter appears for each register channel.
- The report will run daily for completion no later than 07:10 EST.

DC03: Interim Read Validation Failure Report

- Identifies those meter reads that have failed the incoming validation process
- At the meter level, a listing of all exceptions encountered during the processing of the Meter Read files delivered from the AMCC **between midnight and the time the report is run**
- As an example:
 - CHANNEL_ERROR -No VEE Rules defined for the SDP for which data was delivered
 - INVALID_RECORD - The format of a particular record in the file does not conform to the specification
 - The specified count does not match the total number of triplets provided
 - The count field has a value that exceeds the maximum allowed value of 48
 - The CMEP record submitted does not contain a data triple
- The report will be run daily for completion no later than 06:10 EST

DC13: Final Read Validation Failure Report

- The content of the DC13 report is identical to the DC03: Interim Read Validation Failure Report with the exception that it pertains to all meter reads received from the AMCC between midnight and 23:59:59 of the previous day.
- This report will run daily for completion no later than 01:30 EST of the following day.

DC04: Missing Reads Detail Report

- This report provides a listing for each LDC of its Universal SDP IDs that did not receive interval data in the most recent Daily Read Period.
- Meters transmitting multiple interval data channels (i.e. interval data for kWh, kVAh and/or kVARh) the meter will appear on the report once for each interval data channel not reporting during the period.
- The report will be run daily for completion no later than 07:10 EST.

DC05: Daily Data Collection Report

- This report provides a total count of meters, by AMCC type, that reported at least one register read during the most recent Daily Read Period.
- For meters transmitting multiple register and interval data channels the report will run based only on the receipt of kWh register reads.
- The report will be run daily for completion no later than 01:30 EST for all meter reads received by the MDM/R during the previous Daily Read Period.

DC06: Interim AMCC Data Collection Summary Exception Report

- At the Meter Transfer Block level this report provides a summary of all exceptions encountered during the processing of the Meter Read Data files delivered from the AMCC **between midnight and the time the report is run.**
- Report includes exceptions such as:
 - No Device_Found
 - No Timezone
 - Invalid Message
 - Mapping Error
 - Mandatory Field Missing
 - Empty Interval
- For meters transmitting multiple register and interval data channels the report will include the summary of exceptions for all register and interval data channels at the Meter Transfer Block level.
- The report will be run daily for completion no later than 07:10 EST.

DC16: Final AMCC Data Collection Summary Exception Report

- The content of this report is identical to that of DC06 with the exception that it pertains to all meter reads received from the AMCC **between midnight and 23:59:59 of the previous day**
- The report will be run daily for completion no later than 01:30 EST of the following day for all meter reads received from the AMCC of the previous day.

DC07: Interim AMCC Data Collection

Detailed Exception Report

- At the Meter Transfer Block level this report lists all exceptions encountered during the processing of the Meter Read files delivered from the AMCC **between midnight and the time the report is run.**
- Report includes exceptions such as:
 - No Device_Found
 - No Timezone
 - Invalid Message
 - Mapping Error
 - Mandatory Field Missing
 - Empty Interval
- For meters transmitting multiple register and interval data channels all exceptions will be reported for all interval and register data channels at the Meter Transfer Block level.
- The report will be run daily for completion no later than 07:10 EST

DC17: Final AMCC Data Collection Detailed Exception Report Description

- The content of this report is identical to that of DC07 with the exception that it pertains to all meter reads received from the AMCC **between midnight and 23:59:59 of the previous day.**
- The report will be run daily for completion no later than 01:30 EST of the following day.

DC08: Zero Consumption Report

- The Zero Consumption Report lists all meters reporting zero consumption in all the intervals over the previous five day period (based upon the report run date).
- The report will be run daily for completion no later than 07:10 EST

FAQ's

- What happens if Register Reads are not provided as part of the Meter Transfer Block?
 - The MDM/R will not be able to perform the Message Validation check on the Meter Transfer Block
 - If there are any missing intervals in the Meter Transfer Block, the MDM/R will not be able to scale any estimated intervals
 - The MDM/R may be unable to perform the Billing Validation Sum Check

- What organizations can submit meter read data?
 - For a particular SDP, both the LDC and the organization that is designated as the currently in effect AMI Operator can submit meter read data.
 - The LDC can act as its own AMI Operator
 - The AMI Operator is designated via Periodic Audit or Incremental Synchronization
 - The LDC and the currently in effect AMI Operator can submit meter read data for any period that the SDP was active

Lessons Learned

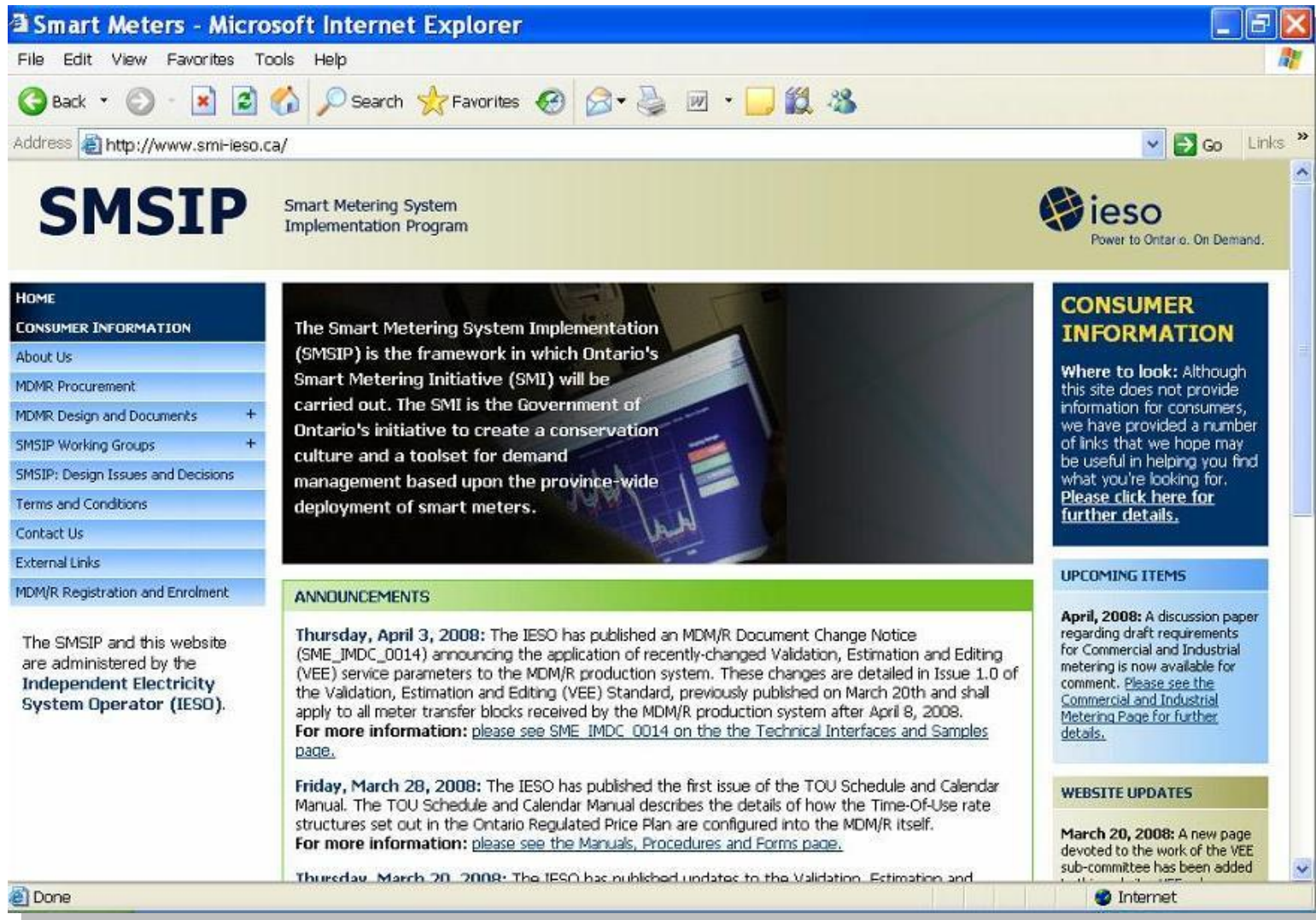
Lessons Learned

- Only send Meter Read Data for meters that have been synchronized with the MDM/R
 - Meter Read Data for unknown meters to the MDM/R are not processed into the MDM/R and are reported back to the LDC and/or AMI Operator in the Data Collection Exception Reports
 - If the Meter Read Data files contain a large population of meters not known by the MDM/R the Data Collection Exception Reports will become extremely large in size and will obscure the presence of real data collection exceptions

Lessons Learned

- The way Elster collects interval and register read data can result in register reads:
 - Falling outside the time range of the interval data in the Meter Transfer Block
 - Falling within, but not at the end of, the time range of the interval data in the Meter Transfer Block
- This can cause excessive failures in both the Message and Billing Validation Sum Checks. To address this:
 - Elster has modified the way they collect register read and interval data to reduce the frequency when register read data falls outside the time range of the interval data
 - 8 new VEE Services have been added to the MDM/R for use with Elster meters that expand the thresholds for both Message and Billing Validation Sum Checks
 - EnergyIP has been modified to process a register reading received within the block of interval data (referred to as an Intermediate Register Reading or IRR) and calculate an End Read to be used for Message Sum Check and estimation

Further Information: SMSIP Website



The screenshot shows a Microsoft Internet Explorer browser window displaying the SMSIP website. The address bar shows the URL <http://www.smi-ieso.ca/>. The website header includes the SMSIP logo and the text "Smart Metering System Implementation Program" on the left, and the IESO logo and tagline "Power to Ontario. On Demand." on the right. A left-hand navigation menu lists various sections such as "HOME", "CONSUMER INFORMATION", "About Us", "MDMR Procurement", "MDMR Design and Documents", "SMSIP Working Groups", "SMSIP: Design Issues and Decisions", "Terms and Conditions", "Contact Us", "External Links", and "MDM/R Registration and Enrolment". The main content area features a large image of a computer monitor displaying a graph, with text explaining the SMSIP framework. Below this is an "ANNOUNCEMENTS" section with three entries dated April 3, March 28, and March 20, 2008, detailing regulatory changes and manual updates. To the right, there are sections for "CONSUMER INFORMATION" (with a link for further details), "UPCOMING ITEMS" (listing a draft requirements discussion paper for April 2008), and "WEBSITE UPDATES" (listing a new page added in March 2008).

SMSIP Website URL: www.smi-ieso.ca

Questions?

Thank You

Appendix:

File Format Specification

Data Quality Flags and Statuses

File Format Specifications

A3 ALPHA Meter Statuses

| "ID" | "Category" | "Name" | EnergyIP Action |
|------|--------------|-----------------------------------|----------------------------------------------------------------------------------------------------------|
| 2 | Meter Health | Configuration error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 4 | Meter Health | RAM failure | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 6 | Meter Health | Registered memory error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 7 | Meter Health | Clock error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 15 | Meter Health | Crystal oscillator error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 21 | Meter Health | EEPROM access error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 22 | Meter Health | Internal Communication /IC2 error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |

File Format Specifications

A3 ALPHA Meter Statuses (cont'd)

| "ID" | "Category" | "Name" | EnergyIP Action |
|------|--------------|----------------------------------|----------------------------------------------------------------------------------------------------------|
| 23 | Meter Health | Tariff EE write error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 24 | Meter Health | Tariff EE read error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 25 | Meter Health | DSP download error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 26 | Meter Health | Table CRC Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 91 | Meter Health | Internal meter warning (latched) | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |

File Format Specifications

A3 ALPHA Node Statuses

| "ID" | "Category" | "Name" | EnergyIP Action |
|------|--------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 16 | Meter Health | ILC Configuration Error | <i>EnergyIP</i> MtrDiagError/METER_RESET is set, data is subject to the Meter Diagnostic Validation check. |
| 19 | Meter Health | Meter Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 20 | Meter Health | Configuration Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 21 | Meter Health | RAM Failure | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 22 | Meter Health | ROM Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 23 | Meter Health | Registered Memory Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 24 | Meter Health | Clock Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 28 | Meter Health | EEPROM Access Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 29 | Meter Health | Internal Communication /I2C Error | EnergyIP MtrDiagError/METER_RESET is set, data is subject to the Meter Diagnostic Validation check. |

File Format Specifications

A3 ALPHA Node Statuses (cont'd)

| "ID" | "Category" | "Name" | EnergyIP Action |
|------|--------------|--------------------------|----------------------------------------------------------------------------------------------------------|
| 30 | Meter Health | Tariff EE Write Error | EnergyIP MtrDiagError/METER_RESET is set, data is subject to the Meter Diagnostic Validation check. |
| 31 | Meter Health | Tariff EE Read Error | EnergyIP MtrDiagError/METER_RESET is set, data is subject to the Meter Diagnostic Validation check. |
| 32 | Meter Health | Crystal Oscillator Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 33 | Meter Health | Table CRC Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 34 | Meter Health | DSP Download Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 38 | Meter Health | Internal Meter Warning | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 40 | Meter Health | ILC Shared Memory Error | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 41 | Meter Health | ILC Power Fail Save Fail | EnergyIP MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |

File Format Specifications

REX Meter Statuses

| "ID" | "Category" | "Name" | EnergyIP Action |
|------|--------------|-------------------------|-----------------------------------------------------------------------------------------------------------------|
| 29 | Meter Health | ROM Checksum Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 30 | Meter Health | Registered Memory Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 31 | Meter Health | Configuration Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 32 | Meter Health | Table CRC Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 33 | Meter Health | EEPROM Access Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 34 | Meter Health | Meter Chip Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |
| 72 | Meter Health | Radio Config Error | <i>EnergyIP</i> MtrDiagError/METER_RESET Flag is set, data is subject to the Meter Diagnostic Validation check. |