

MDM/R AMI Interfaces Workshop

Elster Meter Read Interface

Holiday Inn Oakville @ Bronte
2525 Wycroft Road, Oakville
October 19, 2010



Purpose

- § The MDM/R Meter Read interfaces generally involve the transmission of meter read data between the LDC's Advanced Metering Control Computer (AMCC) and the MDM/R utilizing File Transfer Services (FTS).

- § The purpose of this session is to provide:
 - A technical overview of the MDM/R operations supporting transmission of Meter Read Data between the LDC's Advanced Metering Infrastructure (AMI) to the Meter Data Management / Repository (MDM/R).
 - A discussion of frequently asked questions and lessons learned in integrating the various AMI systems and the MDM/R.

Objectives

- § After this session, you will be able to:
- Describe the use of the File Transfer Services (FTS) in supporting the meter read data transmission processes
 - Describe a Meter Transfer Block, Meter Read data characteristics, and the master data that must accompany each transmission of Meter Read data to the MDM/R
 - Describe the Data Collection reports associated with the transmission of Meter Read data to the MDM/R
 - Assess technical issues pertinent to the AMI specific Meter Read Interfaces

Agenda

- § Governing Regulatory Structure
- § FTS Specifics
 - File name elements for Data Files and Reports
 - Data Files and Reports related to Meter Read Transmission
- § Meter Read Data Transmission
 - Master data
 - Meter Data Characteristics
- § Meter Read Interface Specification
 - Key Business Rules
 - Key File Format Elements
- § Meter Read Data Transformation
- § Data Collection Reports
- § FAQs and Lessons Learned

Governing Regulatory Framework



Ontario Smart Metering System

Regulatory Structure - Overview



- § The regulatory structure governing the Ontario Smart Metering System is tiered framework consisting of:
- **Federal Policy** governing the verification and approval of legal units of measurement and metering functions established to address the advent of electronic meters
 - **Ontario Provincial Regulation** specifying the technical requirements for Advanced Metering Infrastructure system deployments in the Province of Ontario
 - **Ontario Provincial Regulation** defining exclusive authorities of the Ontario Smart Metering Entity in defining interfaces and functions provided by the MDM/R

Ontario Smart Metering System

Regulation and Policy (1 of 2)



Federal Regulation:

- *Electricity and Gas Inspection Act*
 - Act in force January 25, 1986, SI/86-20
- *Electricity and Gas Inspection Regulations*
 - SOR/86-131 effective January 25, 1986
- *Policy on the Approval, Initial Verification, and Re-verification for Electricity and Gas Meters: Legal Units of Measurement and Functions used for Billing*
 - Measurement Canada General Bulletin: GEN-25-E, Date: 2000-06-26
- *Policy on Multi-rate Register Metering*
 - Measurement Canada General Bulletin: GEN-31-E, Date: 2004-07-08

Ontario Smart Metering System

Regulations and Policy (2 of 2)

Ontario Provincial Regulation:

- *Electricity Act, 1998*
 - S.O. 1998, Chapter 15 Schedule A, Part IV.2 - Smart Metering Entity
- *Criteria and Requirements for Meters and Metering Equipment, Systems and Technology*
 - Ontario Regulation 440/07, Regulation in force August 1, 2007
 - Functional Specification for an Advanced Metering Infrastructure, Date: July 5, 2007
- *Designation of the Smart Metering Entity*
 - Ontario Regulation 393/07, Regulation in force July 26, 2007
 - Ontario Regulation 233/08, Regulation in force June 25, 2008

Ontario Smart Metering System

Ontario Regulatory Impact (1 of 2)

Ontario Provincial Regulation:

- Regulation 440/07
 - For residential and small general service customers sets out the prescribed criteria and requirements for meters, metering equipment, systems and technology and any associated equipment, specified in the *Functional Specification for an Advanced Metering Infrastructure*.
- *Functional Specification for an Advanced Metering Infrastructure* (aka the AMI Functional Specification)
 - Specifies the minimum level of functionality for an AMI in the Province of Ontario for residential and small general service consumers where the metering of demand is not required.

The AMI Functional Specification defines the time accuracy and outage detection requirements for all AMI systems deployed in Ontario.

- Time functions are deemed by Measurement Canada to be outside their responsibility.

Ontario Smart Metering System

Ontario Regulatory Impact (2 of 2)

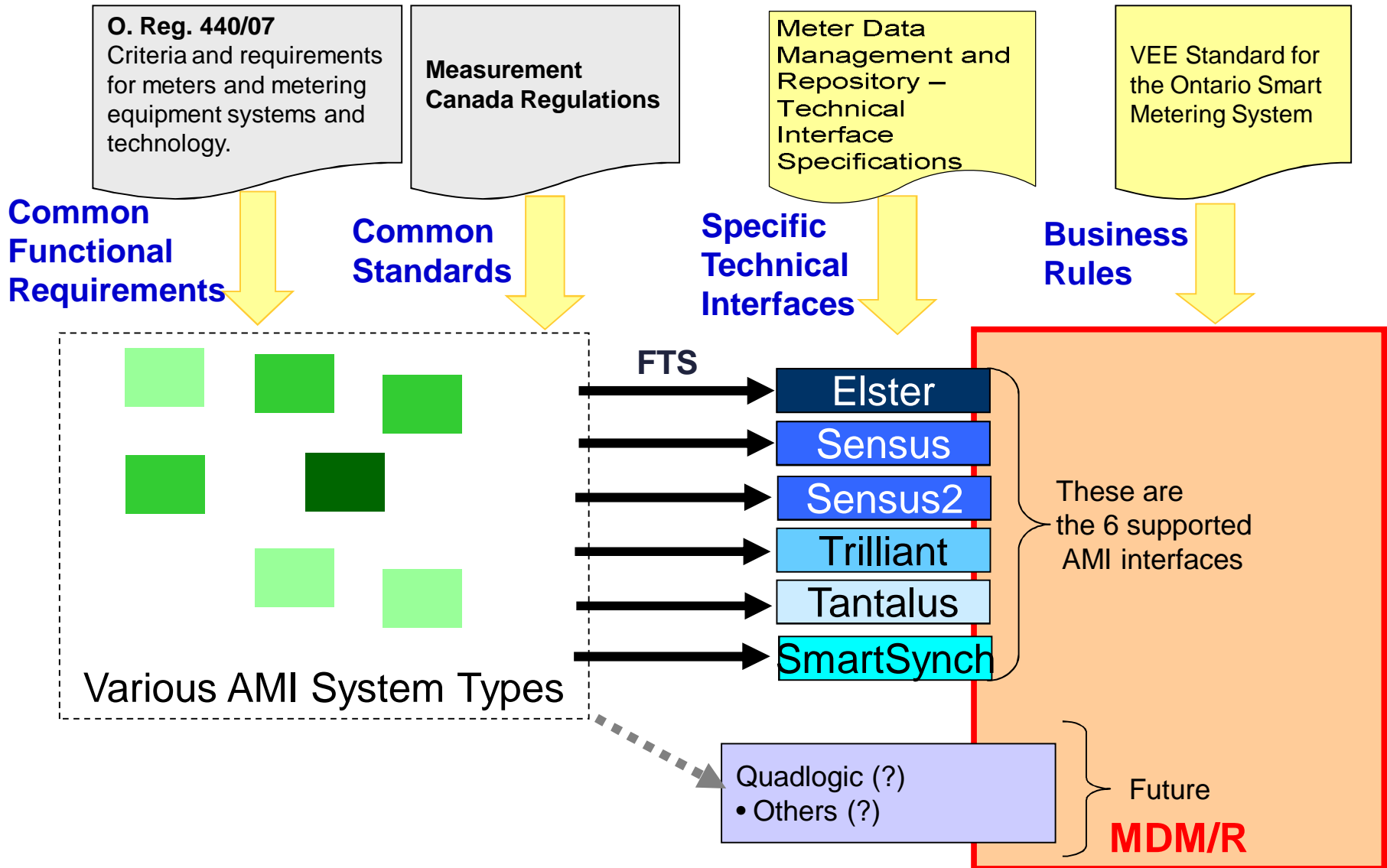


Ontario Provincial Regulation:

- Regulations 393/07 and 233/08
 - Establishes the IESO as the Smart Metering Entity
 - Establishes the exclusive authority of the Smart Metering Entity to:
 - Specify the MDM/R database and system interface requirements and information and data transfer requirements
 - Specify what services constitute validation, estimating and editing services that are performed on metering data to identify and account for missed or inaccurate metering data
 - Specify and provide all services performed on smart metering data to produce billing quantity data, including validation, estimating and editing services

Governing Regulatory Framework

AMI - MDM/R Integration



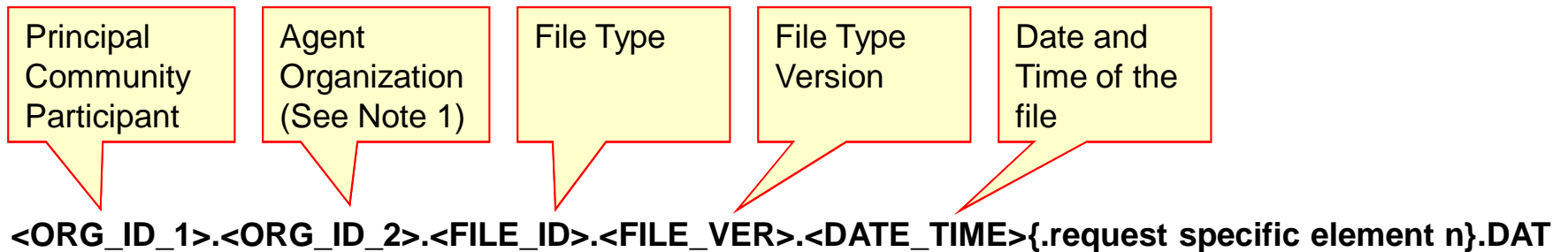
FTS Specifics



File Transfer Services

File Name Elements - Data Files

§ All data files sent to and from the MDM/R follow a specific file name structure:



This specific file name element is optional and can be applied to all Meter Read Interface Files:

- File Type: 7000 - Meter Read Interface (Sensus)**
- File Type: 7001 - Meter Read Interface (Sensus2)**
- File Type: 7100 - Meter Read Interface (Elster)**
- File Type: 7200 - Meter Read Interface (Trilliant)**
- File Type: 7300 - Meter Read Interface (Tantalus)**
- File Type: 7400 - Meter Read Interface (SmartSynch)**

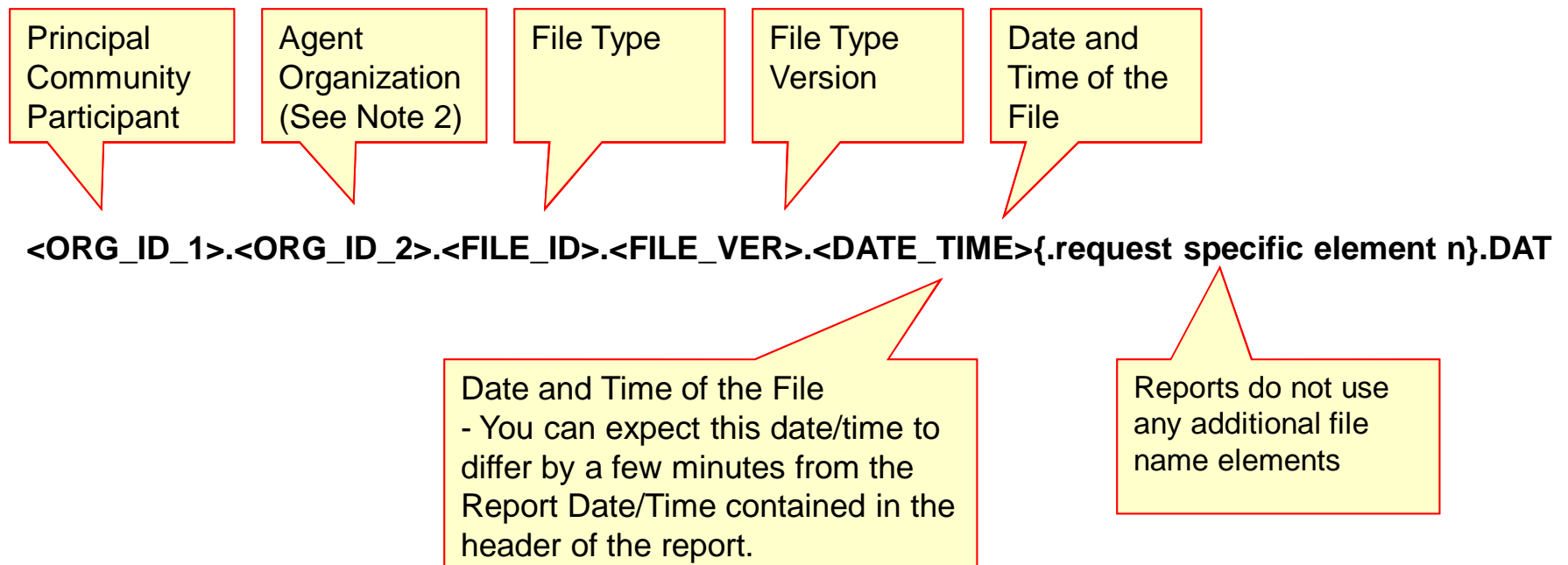
SEGMENT_NO: This optional element is a Varchar(10) value that represents a file segment number. The purpose of this element is to allow an LDC to break down a large Meter Read data transmission for the same DATE_TIME into multiple Meter Read data files. The segment numbers for multiple files for the same DATE_TIME may take any alphanumeric value without relationship to each other.

Note 1: Use SME_FORM_0006 to authorized your agent(s) to submit/receive data files by type.

File Transfer Services

File Name Elements - Reports

§ All report files sent from the MDM/R follow a specific file name structure:



Note 2: Use SME_FORM_0006 to authorized your agent(s) to receive report files by type.

File Transfer Services

Meter Read Data Files and Reports (1 of 3)

Meter Read Data Transmission

§ Data Files

FILE_ID: 7000 - Meter Read Interface (Sensus)

Example file name: ORG11111.ORG22222.**7000**.00.200906082210.DAT

FILE_ID: 7001 - Meter Read Interface (Sensus2)

Example file name: ORG11111.ORG22222.**7001**.00.200906082220.DAT

FILE_ID: 7100 - Meter Read Interface (Elster)

Example file name: ORG11111.ORG22222.**7100**.00.200906082220.DAT

FILE_ID: 7200 - Meter Read Interface (Trilliant)

Example file name: ORG11111.ORG22222.**7200**.00.200906082220.DAT

FILE_ID: 7300 - Meter Read Interface (Tantalus)

Example file name: ORG11111.ORG22222.**7300**.00.200906082220.DAT

FILE_ID: 7400 - Meter Read Interface (SmartSynch)

Example file name: ORG11111.ORG22222.**7400**.00.200906082220.DAT

You must register with the MDM/R to submit each FTS File Type.

- If you use an AMI Operator you must authorize the MDM/R to process meter read files on your behalf.
- You may register with the MDM/R to transmit more than one FTS File Type.

File Transfer Services

Meter Read Data Files and Reports (2 of 3)



Meter Read Data Collection Reports

§ Summary Reports

FILE_ID: DC01 - Daily Read Status Report

Example file name: ORG11111.ORG22222.**DC01**.00.200906082222.DAT

FILE_ID: DC05 - Daily Data Collection Report

Example file name: ORG11111.ORG22222.**DC05**.00.200906082222.DAT

FILE_ID: DC06 - Interim AMCC Data Collection Summary Exception Report

Example file name: ORG11111.ORG22222.**DC06**.00.200906082222.DAT

FILE_ID: DC16 - Final AMCC Data Collection Summary Exception Report

Example file name: ORG11111.ORG22222.**DC16**.00.200906082222.DAT

File Transfer Services

Meter Read Data Files and Reports (3 of 3)

Meter Read Data Collection Reports

§ Detail Reports

FILE_ID: DC02 - Excessive Missing Reads Report, Version 01

Example file name: ORG11111.ORG22222.**DC02.01**.200906082222.DAT

FILE_ID: DC03 - Interim Read Validation Failure Report

Example file name: ORG11111.ORG22222.**DC03.00**.200906082222.DAT

FILE_ID: DC04 - Missing Reads Detail Report, Version 01

Example file name: ORG11111.ORG22222.**DC04.01**.200906082222.DAT

FILE_ID: DC07 - Interim AMCC Data Collection Detailed Exception Report

Example file name: ORG11111.ORG22222.**DC07.00**.200906082222.DAT

FILE_ID: DC08 - Zero Consumption Report

Example file name: ORG11111.ORG22222.**DC08.00**.200906082222.DAT

FILE_ID: DC13 - Final Read Validation Failure Report

Example file name: ORG11111.ORG22222.**DC13.00**.200906082222.DAT

FILE_ID: DC17 - Final AMCC Data Collection Detailed Exception Report

Example file name: ORG11111.ORG22222.**DC17.00**.200906082222.DAT

Meter Read Data Transmission



Master Data

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 database element in the MDM/R Master Directory to which attributes, relationships and services are associated using the synchronization processes.
 - SDPs are related to Meters.
 - Meters are related to Communication Modules identified by an AMCD ID.

Master Data Synchronization Requirements

- § Meter Read data received from an AMCC for each meter that is associated to an SDP must:
- Have been assigned a Universal SDP ID
 - Have been included in an Incremental Synchronization or Periodic Audit Synchronization
 - Have all mandatory attributes associated with the SDP, Meter, Communication Module, and Data Delivery Service

A Data Delivery Service is established by the assignment of a VEE Service code to the SDP as an SDP Parameter in the Parameter Data File Detail Record using the MDM/R synchronization processes.

Master Data

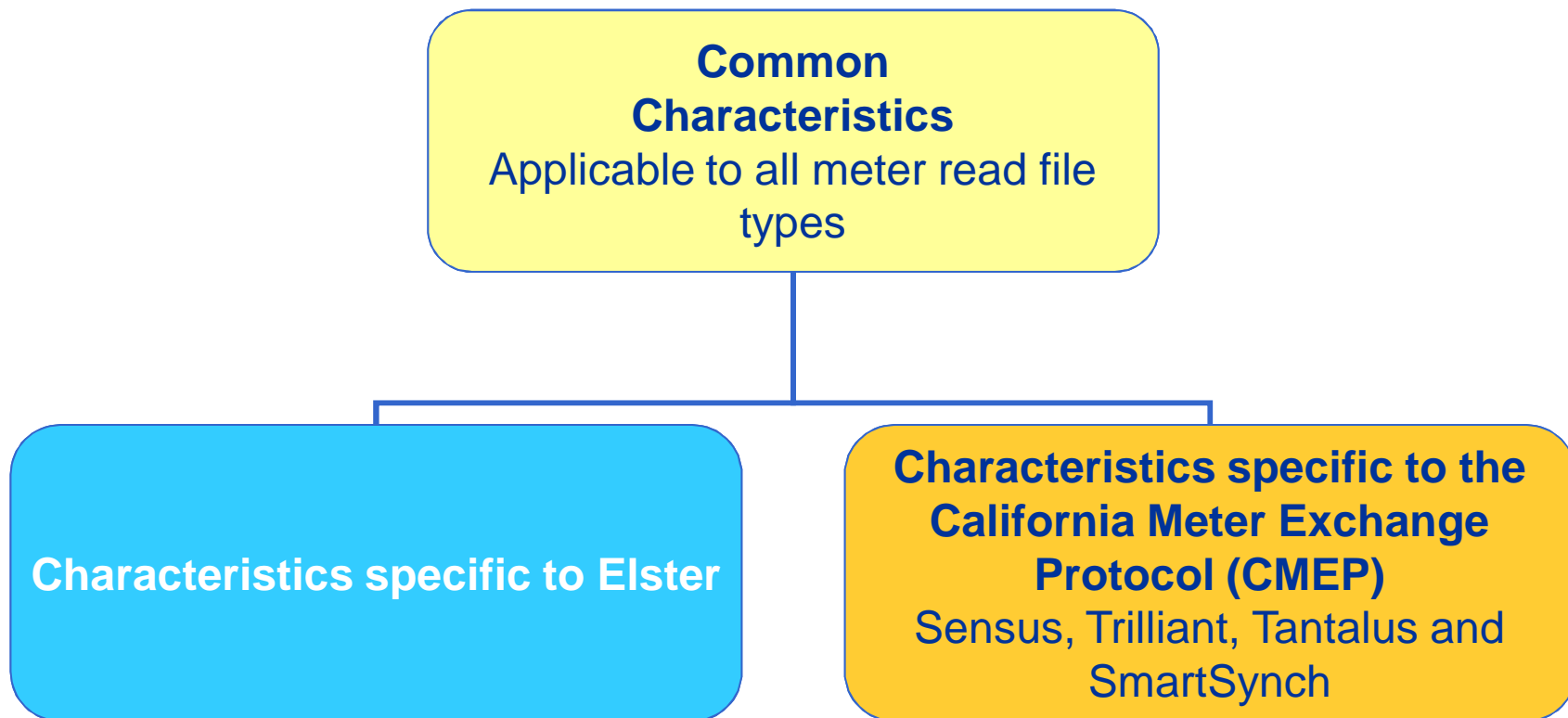
Why is an AMCD ID needed?

- § An Advanced Metering Communication Device Identifier (AMCD ID) must accompany the transmission of each Meter Transfer Block to the MDM/R.
- § The AMCD ID is the key identifier used for integration between the AMCC and the MDM/R Meter Read interfaces.
 - The AMCD ID sent with meter data transmissions must be the same value as populated in the Communication Module Meter asset record in the Asset Data File Detail Record sent using the MDM/R synchronization processes.

If the AMCD ID is unknown to the MDM/R, or is not associated with the Communication Module asset using the MDM/R synchronization processes, the meter read data will not be accepted by the Meter Read Interface.

Meter Data 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.



Meter Data Characteristics

Meter Transfer Block



- § 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
- § The Meter Read data described above constitutes a Meter Transfer Block.
 - This data will be sent in a single data transmission to enable validation and estimation services.
- § Register read data may be transmitted without associated interval data for the purpose of recording first and last register readings.
 - Register readings transmitted to the MDM/R must be cumulative values as registered by the meter and assigned engineering units and date/time values by the AMCC.
 - Register readings are not validated by the MDM/R and are processed as valid actual readings.

Meter Data Characteristics

Meter Transfer Block - what is it?

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



- § Interval sizes supported by the MDM/R:
 - 5,10,15,30, and 60 minutes
- § Provincially regulated requirement for smart meters for residential and small general service customers: 60 minutes

Meter Data Characteristics

Elster Data Quality Indicators (1 of 3)



- § Certain data quality indicators associated with interval data are common to all Elster meter types
 - These data quality flags are transmitted in the Elster AMRDEF xml file as <IntervalData.QualityFlags>
- § Elster also communicates data quality at the meter transfer block level using Meter Health reading quality indicators sent as <MeterReadings.Statuses>.
 - These Meter Health Statuses vary by Elster meter type, specifically:
 - A3 ALPHA Meter
 - A3 ALPHA Node
 - REX - including REX1 (R1S) and REX2 (R2S)
 - Status indicators for Elster meter types are defined as part of the Elster Meter Read Interface specification in the *MDM/R Technical Interface Specifications* and are listed the Appendix to this presentation.
 - As confirmed by Elster these Status codes indicate that “... data collected is likely be invalid for billing” and thus are processed by the MDM/R with a validation status of ‘NVE’ - such interval data must be verified or edited by the LDC.

Meter Data Characteristics

Elster Data Quality Indicators (2 of 3)

Flags that are recognized and stored by the MDM/R for Validation and Estimation are:	Other data quality flags that are recognized and stored by the MDM/R are:
<ul style="list-style-type: none">– test mode– pulse overflow– time change– diagnostic error– reverse energy– data collection estimation– power outage– power restore– AMI Error	<ul style="list-style-type: none">– partial data– short interval– long interval

Please refer to the *MDM/R Technical Interface Specifications* for the specific Elster <IntervalData.QualityFlags> that set the *EnergyIP* Data Quality flags identified above.

Meter Data Characteristics

Elster Data Quality Indicators (3 of 3)



<InvalidTime> 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.
- § 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” interval data records are processed as Missing Intervals and will be estimated by the MDM/R.
 - The raw interval data will be stored setting the *EnergyIP* ‘No_Data’ flag.
- § In the future the MDM/R processing of the AMI Error flag will set the *EnergyIP* ‘AMI Error’ flag.
 - The ‘AMI Error’ flag action will be configured to Estimate these “Invalid Time” intervals.
 - The raw interval data will be stored setting the *EnergyIP* ‘AMI_Error’ flag indicating that the “Invalid Time” data quality flag was received.

Meter Data Characteristics

Elster File Structure



XML Data File Format

- § Elster transmits Meter Read Data to the MDM/R in the Elster AMR Data Exchange Format (AMRDEF) using an eXtensible Markup Language (XML) format.
- § Meter Read Data files can be transmitted 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 associated register readings.
- § The MDM/R Meter Read Interface for Elster reads the AMRDEF XML files to process the register read data, interval data, data quality flags, and Meter Health Status indicators.
 - With the deployment of *EnergyIP* Release 7.0 the MDM/R Meter Read Interface for Elster will read AMRDEF Export files as defined in the EnergyAxis Management System *AMRDEF Reference Release 7.0*

Meter Data Characteristics

Elster File Structure



Identification of the AMCD ID

- § Use of the <AMRDEF.MeterReadings.Meter.SerialNumber> as the AMCD ID identifier does not provide a unique identifier across the three meter types deployed by Elster in Ontario (i.e. REX, A3 ALPHA Meter, and A3 ALPHA node).
 - Elster cannot guarantee that a serial number used for one meter type will not be duplicated in any other meter type.

- § The MDM/R Meter Read Interface for Elster interrogates the Elster MAS tag <AMRDEF.MeterReadings.Meter.**MeterName**>.
 - While the LDC cannot modify the <SerialNumber> tag, the <MeterName> tag can be populated by the LDC with an identifier used for the AMCD ID.
 - Use of the 'Meter Name' allows each LDC to assure that the 'AMCD ID' is unique as required by the *MDM/R Technical Interface Specifications*.

Meter Data Characteristics

Register Read and Interval Data Collection



Elster “Ontario Standard” Data Collection Schedules

- § The Elster AMI system collects register data and interval data from REX meters on separate schedules:
 - Interval data is collected at 00:30 and 06:30, 12:30, and 18:30 hours.
 - Register reading data is collected at 04:00, 10:00, 16:00, 22:00 hours.
- § These separate collection schedules result in two data conditions:
 - Register readings are most often collected at any hour and minute.
 - Register readings are dissociated with the six hour blocks of interval data and may precede or follow the end of the interval data blocks.
- § This dissociation of register read and interval data can affect MDM/R validation and estimation processes.
 - For example, register readings following an interval data block are not available for scaling if estimation is required.

Meter Data Characteristics

Register Read and Interval Data Collection



Elster Register Reading Precision

- § All smart metering deployed in Ontario display register readings to a precision of 1 kWh, and transmit these register readings to a higher precision.
- § Elster metering types both display and record register readings to a 1 kWh precision.
- § Register readings for all meter types (REX, A3 ALPHA) are collected and transmitted by the Elster AMI to a precision of 1 kWh.
 - Interval data for REX meters is transmitted to (2) decimal places.
 - Interval data for A3 ALPHA meters is transmitted to (4) decimal places.
- § The MDM/R processes register read data and interval data at the precision received.
 - This difference in precision between Elster register reading data and interval data can affect MDM/R validation processes.

Meter Data Characteristics

Register Read and Interval Data Collection

‘End Of Interval Snapshot’ Functionality

- § Elster meters that support the ‘End Of Interval Snapshot’ provide a register reading at the end of each interval data block collected as part of the interval data collection schedule.
 - This results in a register reading at the end of the last interval of each 6 hour block of interval data.
- § The ‘End Of Interval Snapshot’ functionality was first made available in Elster MAS Release 6.2.
 - REX1 meters with Firmware version 4.1 and all REX2 meters provide the ‘End of Interval Snapshot’ register reading.
 - A3 ALPHA Meters may need upgrade of the EA_NIC firmware 4.0 to provide the ‘End of Interval Snapshot’ register reading.
- § Transmission of ‘End Of Interval’ register readings and associated interval data fully support the MDM/R Meter Transfer Block requirements.
 - This provides optimal use of the validation and estimation services.

Meter Data Characteristics

Register Read and Interval Data Collection

‘End Of Interval Snapshot’ Functionality

The MRM/R Meter Read Interface for Elster has been modified to process the ‘End Of Interval Snapshot’.

- This modification will be available with the deployment of *EnergyIP* Release 7.0

You must configure your MAS system to transmit the ‘End Of Interval Snapshot’ register reads as part of the AMRDEF Export.

- You may want to consider configuration of the register collection schedule to suppress collection of <ConsumptionData> - register reads collected at any hour or minute.

Meter Read Interface Specification



Meter Read Interface Specification

Key Business Rules



Residential Meters

- § Elster meters may be deployed that have the technical capability to record both energy delivered and energy received.
- § For residential meters not used for net metering meter data can be transmitted to the MDM/R from meters that:
 - May be programmed to provide energy Delivered, or
 - May be programmed to provide the sum the absolute values of the energy Delivered and energy Received.
 - This will apply to both interval data and register read data.
- § The MDM/R currently only supports processing of energy consumed.
 - Interval data or register data representing energy Received will not be processed by the MDM/R.

Meter Read Interface Specification

Key Business Rules



Meters Used for Determination of Demand

§ kWh Data

- Meters will be programmed such that the sum of the absolute values of the energy delivered and the energy received will be transmitted as the total delivered energy.

§ kVARh Data

- If programmed to record kilovolt-ampere-reactive hours, meters will be programmed to measure active kVARh quantities delivered, Power Factor lagging (inductive), transmitted as positive quantities.

§ kVAh Data

- If programmed to record kilovolt-ampere hours, meters will be programmed such that the sum of the values of the kilovolt-ampere hours delivered and the kilovolt-ampere hours received will be transmitted as the total delivered kilovolt-ampere hours.

§ The MDM/R currently only supports processing of energy consumed.

- Interval data or register data representing energy Received will not be processed by the MDM/R.

Current testing of the MDM/R demand functionality has not been successful.

Meter Read Interface Specification

Key File Format Elements



Valid 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, Including REX1 (R1S) and REX2 (R2S)

Measurement Period

- § The AMRDEF export distinguished the ‘End Of Interval Snapshot’ register readings from mid-interval register readings by the ‘Measurement Period’ attribute:
- **End Of Interval Snapshot:**
<MeterReadings.ConsumptionData.ConsumptionSpec.MeasurementPeriod> = “EndOfIntervalSnapshot”
 - **Mid-interval Register Reading:**
<MeterReadings.ConsumptionData.ConsumptionSpec.MeasurementPeriod> = “Current”

Meter Read Interface Specification

Key File Format Elements



Unit of Measurement (UOM)

- § 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.
- § UOM data is located in two sections of the AMRDEF file:
 - **Interval data:**
<MeterReadings.IntervalData.IntervalSpec.UOM>
 - **Register Read data:**
<MeterReadings.ConsumptionData.ConsumptionSpec.UOM>
- § Valid values:
 - **Energy:** delivered “KWH” or “kWh”.
 - **VAR-hours:** inductive (Power Factor lagging) delivered “KVARH” or “kVARh”
 - **VA-hours:** delivered “KVAH” or “kVAh”

Meter Read Data Transformation



Meter Read Data Transformation

Transmission via Trilliant CMEP Interface



Why transform meter read data?

- § LDCs may elect to transform Meter Read data as retrieved by the source Advanced Metering Control Computer (AMCC) to a CMEP format,
 - when correction of Meter Read data in the past is required, or
 - to utilize the interval data Data Collection Estimation data quality flag available only via the Trilliant Meter Read Interface.

- § LDCs electing to transform Meter Read data to a CMEP format must transmit such transformed data in the Trilliant CMEP format.

- § The use of a CMEP file format to transmit Meter Read data sourced from AMI systems other than the source AMI system is possible.
 - such data transformations may be used to process data on an exception basis for Meter Read data correction, or
 - may be used for daily production transmission of Meter Read data to the MDM/R for each Daily Read Period for an LDC's entire smart meter population.

Meter Read Data Transformation Transmission via Trilliant CMEP Interface



Transformation Specification

- § The specification for transformation of Meter Read data to the Trilliant CMEP format has been added to the *MDM/R Technical Interface Specifications, Version 3.0*, published on September 24, 2010.
 - Section 2.15 of this specification formalizes guidance provided to various LDCs developed during the initial operation of the MDM/R.
 - Section 2.15 defines the requirements for data transformations applied to Meter Read data collected by non-Trilliant AMI Advanced Metering Control Computers (AMCC).
- § In addition to the requirements of Section 2.15, LDCs electing to transform meter read data must adhere to the File Format specification for the MDM/R Meter Read Interface for Trilliant.
- § The following provides an overview of some key elements of the Meter Read Transformation specification.
 - Please reference Section 2.15 of the *MDM/R Technical Interface Specifications* for the complete specification.

Meter Read Data Transformation

Transmission via Trilliant CMEP Interface



Transmission of Register Readings

- § Register readings transmitted to the MDM/R will be cumulative values established from meter readings approved and verified by Measurement Canada as registered and transmitted by the meter and assigned engineering units and date/time values by the source Advanced Metering Control Computer (AMCC) that retrieves the register readings.
 - Quantity values and date/time stamps assigned by the AMCC to register readings will not be altered in any way when transmitted to the MDM/R.

- § Estimated register readings in terms of altered quantity value or altered date/time stamp will be not transmitted to the MDM/R using the Trilliant Meter Read Interface.
 - Such externally estimated register readings may be transmitted to the MDM/R indicating such register readings as estimated using the (future) Universal Meter Read Interface.

Meter Read Data Transformation

Transmission via Trilliant CMEP Interface



Midnight-to-Midnight Data Transmission

- § Meter Read data is supplied, at a minimum, once per day. The preference is for Meter Read data to be supplied in midnight-to-midnight Meter Transfer Blocks whenever possible to do so.
 - Quantity values and date/time stamps assigned by the AMCC to register readings will not be altered in any way when transmitted to the MDM/R.
- § Interval data will be transmitted in Meter Transfer Blocks for an entire day or days, with the Meter Transfer Block beginning and ending at midnight whenever possible to do so.
 - Transmission of partial day interval data should be avoided.
- § At least one register reading should be transmitted to the MDM/R for each Daily Read Period.
 - Interval data for an entire day may be transmitted without an associated register reading if an associated register reading has not been collected by the source AMCC.

Meter Read Data Transformation

Transmission via Trilliant CMEP Interface

Business Rules

§ In addition to the Business Rules specified for the Trilliant Meter Read Interface additional rules apply to data transformations.

– **Rules Affecting Synchronization**

When establishing each ‘Communication Module’ asset as part of the Asset Data File Detail Record the ‘AMCC Type’ will be specified as the actual AMI technology used for each meter.

– **Rules Affecting File Transfer Services**

For Meter Read data sourced from a non-Trilliant AMI system, the LDC or its AMI Operator must be registered to transmit FTS files of File Type 7200 – Meter Read Interface (Trilliant).

Meter Read data sourced from non-Trilliant meters and transmitted using a Trilliant CMEP format must be sent as a FILE ID “7200”.

– **Rules Affecting Meter Read Data sourced from the Elster AMCC**

Register readings included in each Meter Transfer Block should be sourced from the <End Of Interval Snapshot> if available and should be at the end of the Meter Transfer Block or as late as possible within the date/time range of the interval data set.

– Register readings included in each Meter Transfer Block sourced from <ConsumptionData> should be as late possible within the date/time range of the interval data set.

Meter Read Data Transformation

Transmission via Trilliant CMEP Interface



Translation of Data Quality Flags

- § Specification of the required translation of data quality information is provided for each non-Trilliant AMI system:
- § Translation of Elster <QualityFlags> and <Statuses> to Trilliant CMEP
 - Please see Table 2.15.1 - Mapping of Elster Quality Flags to Trilliant Protocol Text Codes
 - Particular attention should be taken in regard to Meter Diagnostics and Multiple Elster Data Quality Problems
- § Translation of Sensus CMEP to Trilliant CMEP
 - Please see Table 2.15.2 - Mapping of Sensus Protocol Text Codes to Trilliant Protocol Text Codes
- § Translation of Sensus2 CMEP to Trilliant CMEP
 - Please see Table 2.15.3 - Mapping of Sensus2 Protocol Text Codes to Trilliant Protocol Text Codes
- § Translation of Tantalus CMEP to Trilliant CMEP
 - Please see Table 2.15.4 - Mapping of Tantalus Protocol Text Codes to Trilliant Protocol Text Codes

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

Data Collection Reports

Report Types



Summary vs. Detail Reports

- Summary report shows a total count per category within the report, e.g. will indicate that you requested 10 Universal SDP ID's, received 8, and 2 encountered errors.
- Detail reports provide identifiers that indicate which Service Delivery Point, Meter, Universal SDP ID, etc. that experienced the error, update, estimation, etc.

Interim vs. Final Reports

- Interim reports are provided at 07:10 EST and reflect the results of MDM/R processing that occurred between Midnight EST and the time the report was run.
- Final reports are provided at 01:30 EST and reflect the results of MDM/R processing that occurred the previous day.
- All Data Collection reports are scheduled - these reports are generated by the MDM/R and delivered via FTS at specific times every day.

Data Collection Reports

Summary Reports (1 of 4)



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.

Data Collection Reports

Summary Reports (2 of 4)



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.

Data Collection Reports

Summary Reports (3 of 4)

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.

Data Collection Reports

Summary Reports (4 of 4)



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.

Data Collection Reports

Detail Reports (1 of 7)



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 (e.g. 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.

Data Collection Reports

Detail Reports (2 of 7)



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.

Data Collection Reports

Detail Reports (3 of 7)



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.

Data Collection Reports

Detail Reports (4 of 7)



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.

Data Collection Reports

Detail Reports (5 of 7)



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.

Data Collection Reports

Detail Reports (6 of 7)



DC17 - Final AMCC Data Collection Detailed Exception Report

- § 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.

Data Collection Reports

Detail Reports (7 of 7)



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

Data Collection Reports

Planned Report Scheduling Changes

§ To maximize the probability that the morning reports contain all the information for the meter read data received before 05:00 EST, these reports will be scheduled to start running after 08:00 EST.

<u>Current</u>	<u>Proposed</u>		
07:10	10:00	DC01	Daily Read Status Report
07:10	10:00	DC02	Excessive Missing Reads Report
06:10	10:00	DC03	Interim Read Validation Failure Report
07:10	10:00	DC04	Missing Reads Detail Report
07:10	10:00	DC06	Interim AMCC Data Collection Summary Exception Report
07:10	10:00	DC07	Interim AMCC Data Collection Detailed Exception Report
07:10	12:00	DC08	Zero Consumption Report
07:10	10:00	VE01	Interim Validation Failure Detail Report
07:10	10:00	VE03	Missing Interval Aging Report
07:10	10:00	VE02	Interim Estimation Failure Detail Report

§ Reports DC05, DC13, DC16, DC17, VE11, VE12 and VE04 may be re-scheduled to run for delivery no later than 06:00 EST for prior day meter read data.

§ Final scheduled times for all reports will be documented in the next update of the *MDM/R Reports Technical Specifications*.

- Version 3.1 is planned to be published at the time that EnergyIP Release 7.0 is promoted to the MDM/R Production environment.

FAQs and Lessons Learned



FAQs



§ 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.

§ Register readings may be submitted without associated interval data for the purpose of transmitting first and last register readings resulting from a meter change.

- Such register readings are available for 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

- § 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 failures in the Message Sum Check, Estimation Scaling, and Billing Validation Sum Check. 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 - i.e. The “Ontario Standard” data collection schedule.
 - 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 Check.
 - *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.

- § Deployment of the ‘End Of Interval Snapshot’ functionality is expected to resolve these problems.

Further Information: SMSIP Website



Smart Metering Entity

HOME ABOUT THE SME LIFECYCLE **THE MDM/R** TRAINING RESOURCES CONTACTS SEARCH

The MDM/R

Change Management
Outage Notifications
Incident Management
Design and Standards
Sample Reports and Files
Procurement
Document Amendments
The MDM/R Archives

Stay Informed
Stay up to date with our RSS feeds. What's RSS? Find out here
MDM/R Incident Management

In this section, you will find detailed information about the Meter Data Management and Repository (MDM/R), including its various user interfaces and the types of reports it generates. This section also includes MDM/R design and standards documents as well as updates about its production, quality assurance and sandbox environments.

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.