

# MDM/R AMI Interfaces Workshop

## CMEP Meter Read Interfaces

Holiday Inn Oakville @ Bronte  
2525 Wyecroft 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)

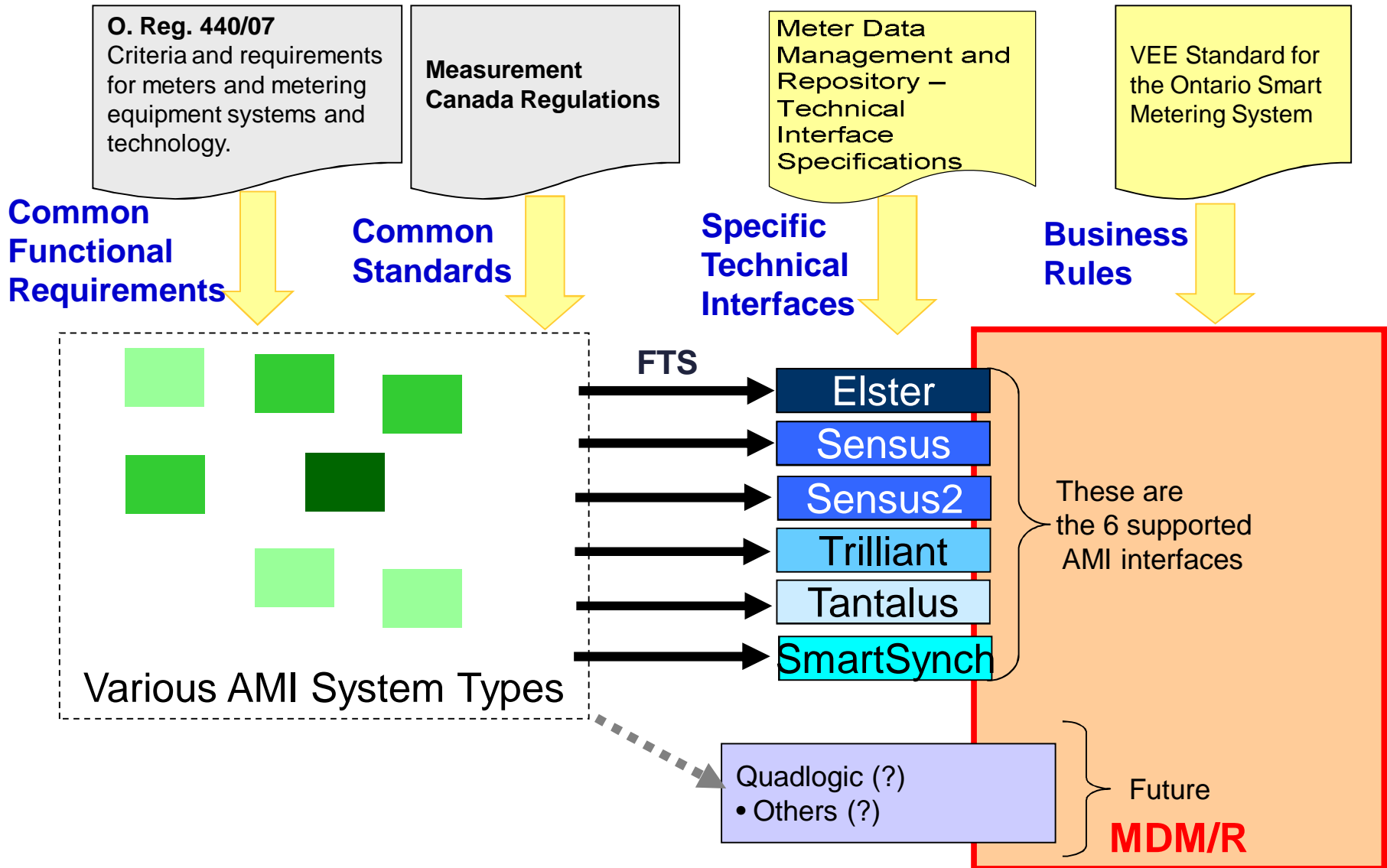


### Ontario Provincial Regulation:

- 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



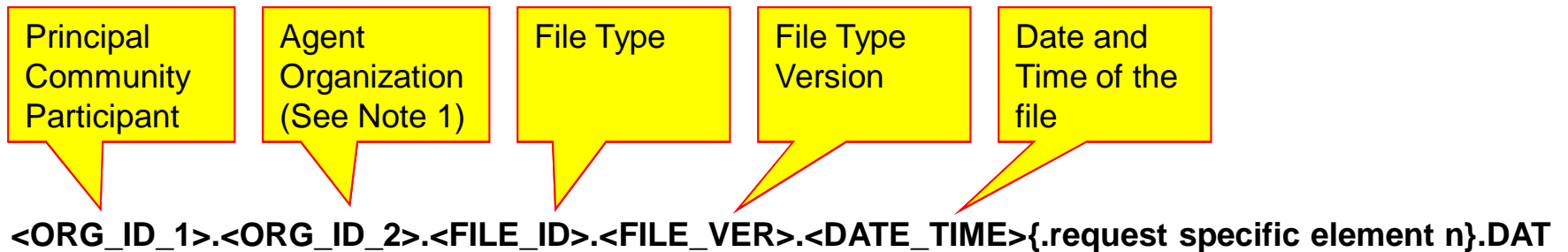
# FTS Specifics



# 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)**

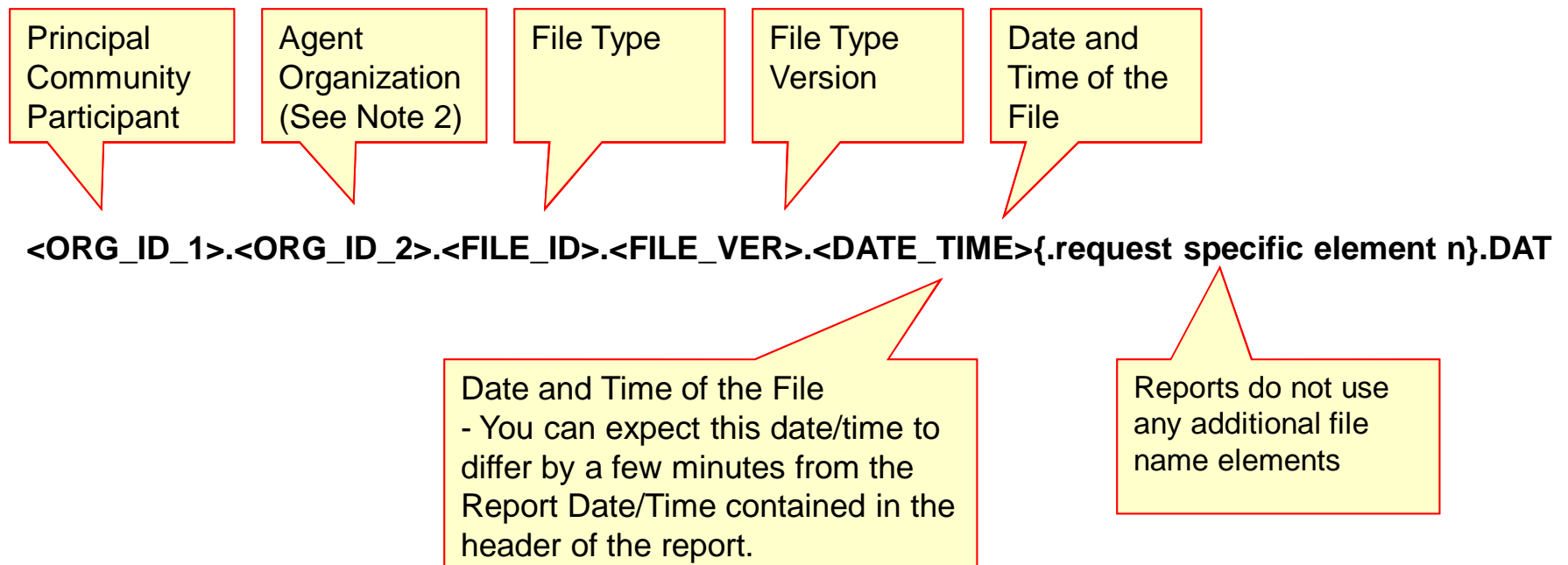
**SEGMENT\_NO:** This optional element is a Varchar(10) value that represents a file segment number. The purpose of this element is to allow an LDC to break down a large Meter Read data transmission for the same DATE\_TIME into multiple Meter Read data files. The segment numbers for multiple files for 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

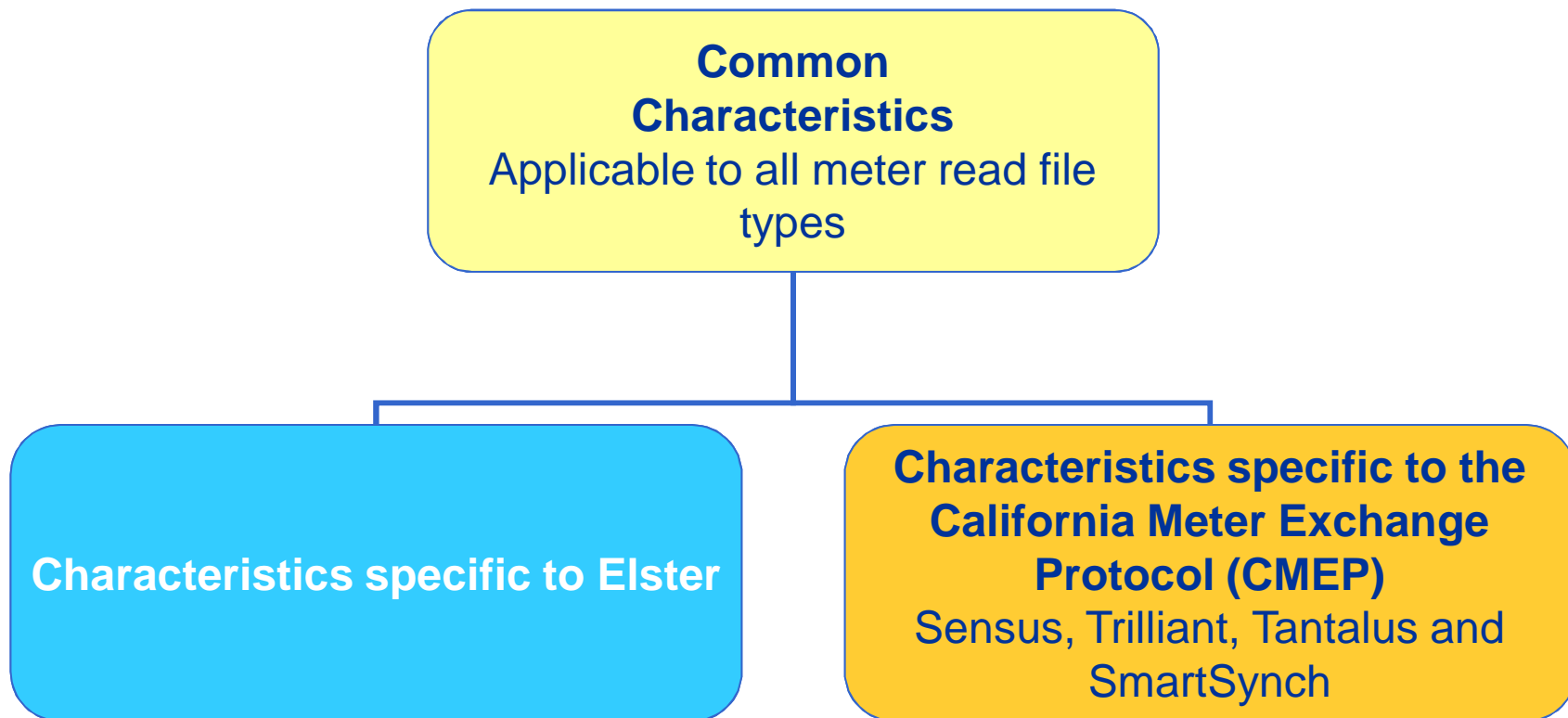
## Why is an AMCD ID needed?

- § 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

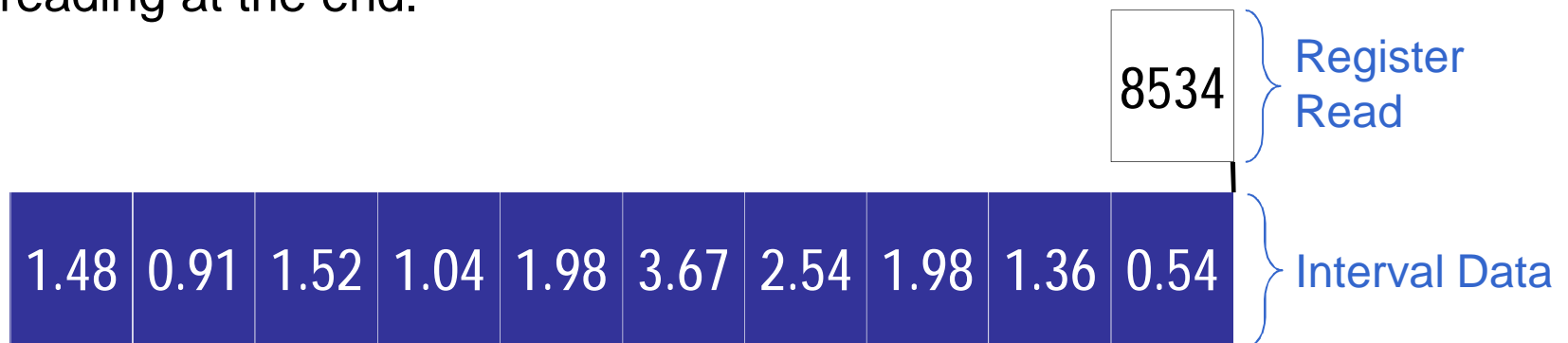


- § All Meter Read data received from the AMCC shall contain:
  - A register read for the end of the Meter Transfer Block
  - A series of interval data
  - Interval Data quality indicators
- § The Meter Read data described above constitutes a Meter Transfer Block.
  - This data will be sent in a single 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

## CMEP Data Quality Indicators

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"> <li>– test mode</li> <li>– pulse overflow</li> <li>– time change</li> <li>– diagnostic error</li> <li>– reverse energy</li> <li>– data collection estimation</li> <li>– power outage</li> <li>– power restore</li> <li>– AMI Error</li> </ul>	<ul style="list-style-type: none"> <li>– partial data</li> <li>– short interval</li> <li>– long interval</li> </ul>

Please refer to the *MDM/R Technical Interface Specifications* for the specific CMEP Protocol Text flags for each AMI technology that set the *EnergyIP* Data Quality flags identified above.

# Meter Data Characteristics

## CMEP File Structure Requirements



### Identification of the AMCD ID

- § The MDM/R Meter Read Interfaces for CMEP interrogate the ‘**Meter ID**’ field of each interval and register read record to identify the ‘AMCD ID’.
- Each LDC must assure that the ‘AMCD ID’ is unique as required by the *MDM/R Technical Interface Specifications*.
  - The ‘Meter ID’ field must be populated with the same value as populated in the ‘AMCD ID’ field in the Communication Module asset record in the Asset Data File Detail Record in the MDM/R synchronization process.

# Meter Data Characteristics

## CMEP File Structure Requirements



### Register Read Data and Interval Data

- § Register and interval data records must be ordered in ascending date/time order within each file transmission.
- § The Register Read record(s) must precede the interval data records.
- § It is recommended that interval data be transmitted in Meter Transfer Blocks no longer than 24 hours long.
- § A Register Read Record should be provided within one hour (plus or minus) of midnight to assure that the Billing Validation Sum Check can be performed.
  - 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 Read Interface Specification



# Meter Read Interface Specification

## Key Business Rules



### Residential Meters

- § Smart 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 the sum the absolute values of the energy Delivered and energy Received as the total Delivered energy.
  - 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



### “Units” Field

§ The MDM/R will process interval and register read data where the unit of measurement is consistent with the interval and register data channels supported by the Channel Configuration Set assigned to the SDP.

A Channel Configuration Set is assigned to a Meter asset in the Asset Data File Detail Record using the MDM/R synchronization processes.

# Meter Read Interface Specification

## Key File Format Elements



### **“Units”- For energy**

§ Valid values are:

- “KWH”, for records containing interval consumption data in kWh delivered.
- ‘KWHREG” for records containing a delivered kWh register read taken at the end of the Meter Transfer Block.

# Meter Read Interface Specification

## Key File Format Elements



### **“Units”- For Volt Ampere hours**

§ Valid values are:

- “KVAH” for records containing interval data in total kVAh delivered.
- “KVAHREG” for records containing a delivered kVAh register read taken at the end of the Meter Transfer Block.

# Meter Read Interface Specification

## Key File Format Elements



### **“Units”- For Volt Ampere Reactive hours**

§ Valid values are:

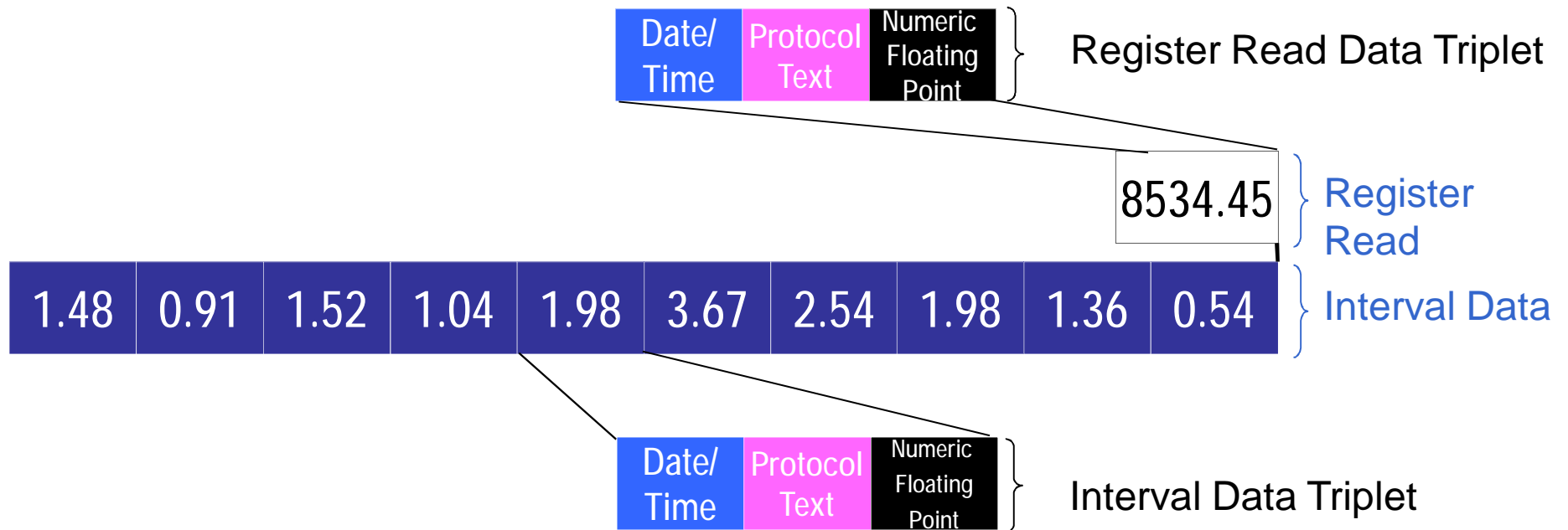
- “KVARH” for records containing interval data in kVARh inductive (Power Factor lagging) delivered.
- “KVARHREG” for records containing a register read for kVARh inductive (Power Factor lagging) delivered taken at the end of the Meter Transfer Block.

# Meter Read Interface Specification

## Key File Format Elements



### “Data Triplet”



- **Date/Time** - This is the date and time of the Numeric Floating Point
- **Protocol Text** - Data Quality information of the Numeric Floating Point
- **Numeric floating point** - Register Read or the Interval consumption value

# Meter Read Interface Specification

## Key File Format Elements



### Data Triplet - Register Reading Record

MEPMD01,19970819,Trilliant,ORG36912,ORG29738,76963988,200708080944,ABC99986,  
OK,E,KWHREG,1,00000100,1,**200708080000**,**R 00 00**,**331.41**

#### § **KWHREG** Register Reading for the end of the Meter Transfer Block

- Date/Time: **200708080000**
- Protocol Text: **R 00 00**
- Numeric floating point: **331.41**

§ Data Quality Flags are also applied to register read data. Only the Power Outage flag will be stored in the MDM/R data base. All other flags will be ignored.

# Meter Read Interface Specification

## Key File Format Elements



### Data Triplet - Interval Consumption (24 hour period)

MEPMD01,19970819,Trilliant,ORG36912,ORG29738,76963988,200708080944,ABC99986,OK,E,KWH,1,00  
000100,24, 200708070100,R 00 00,0.49,200708070200,N 00 20,0.00,200708070300,R 00  
00,0.44,200708070400,N 00 20,0.00,200708070500,N 00 20,0.00,200708070600,R 00  
00,0.58,200708070700,N 00 20,0.00,200708070800,N 00 20,0.00,200708070900,N 00  
20,0.00,200708071000,R 00 00,0.55,200708071100,R 00 00,0.55,200708071200,R 00  
00,0.73,200708071300,R 00 02,0.86,200708071400,R 00 04,1.12,200708071500,R 00  
04,0.85,200708071600,R 00 04,0.95,200708071700,R 00 00,2.28,200708071800,R 00  
02,0.00,200708071900,R 00 02,0.00,200708072000,R 00 02,0.00,200708072100,R 00  
02,0.00,200708072200,R 00 04,0.65,200708072300,R 00 00,0.43,200708080000,R 00 00,0.47

Ending **KWH** Interval Consumption

- **Date/Time**
- **Protocol Text: R 00 00**
- **Numeric floating point**

# Meter Read Interface Specification

## Key File Format Elements



### Date/Time

- Represents the date and time at the end of an interval
- Must be provided for each register read and interval
- Must be expressed in Eastern Standard Time
- For register reads, if the Units field:
  - is populated with ‘KWHREG’, ‘KVAHREG’, or ‘KVARHREG’, and
  - the value in the Numeric Floating Point field represents the ending register read of the Meter Transfer Block, then
  - the Date/Time must be the time at the end of the last interval of the Meter Transfer Block.

# Meter Read Interface Specification

## Key File Format Elements



### Protocol Text

- § A 7-character field populated with the data quality information.
  - The first character is either:
    - ‘R’, a “raw” reading without validation, estimation or editing, or
    - ‘N’ indicating the interval will be treated as “Missing” by the MDM/R
  - The second character position is a space.
  - The third and fourth character positions are an 8-bit hexadecimal number from ‘00’ to ‘FF’.
  - The fifth character position is a space.
  - The sixth and seventh character positions are an 8-bit hexadecimal number from ‘00’ to ‘FF’.
  - The use of these two hexadecimal numbers is depicted in the Appendix at the end of this presentation.
  
- § Sensus2 Protocol Text flags have no spaces between the character positions

# Meter Read Interface Specification

## Key File Format Elements



### Data Quality Flags – Compound Codes

- § Data quality flags provided to the CMEP-based Meter Read interface adaptors can be transmitted as compound codes resulting from the combination or addition of hexadecimal codes (e.g. a power outage and power restore in the same interval).
- § For compound codes the following treatment applies:
  - Such compound hexadecimal codes will be parsed into their constituent simple codes.
- § The MDM/R CMEP Meter Read Interfaces are configured to process compound codes.
  - With this configuration simple codes are not validated against the defined list of codes specified for the 'Protocol Text' field of the CMEP interface.
  - Recognized constituent simple codes are processed, all others are ignored.

# Meter Read Interface Specification

## Key File Format Elements



### Numeric floating point Value

§ This field is populated with either the register read value or the interval consumption value.

§ Per the *MDM/R Technical Interface Specifications*:

- Register reads transmitted values exceeding 5 decimal places will be rounded and stored in the Meter Data Database to 5 decimal places
- Interval consumption transmitted values exceeding 5 decimal places will be rounded and stored in the Meter Data Database to 5 decimal places

Currently the MDM/R rounds and stores register read data to 2 decimal places, and rounds and stores interval data to 6 decimal places.

Future upgrades of *EnergyIP* are expected to store register read data and interval data to a precision of 6 decimal places.

# 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.

# 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](http://www.smi-ieso.ca)**

# Questions?

# Thank You

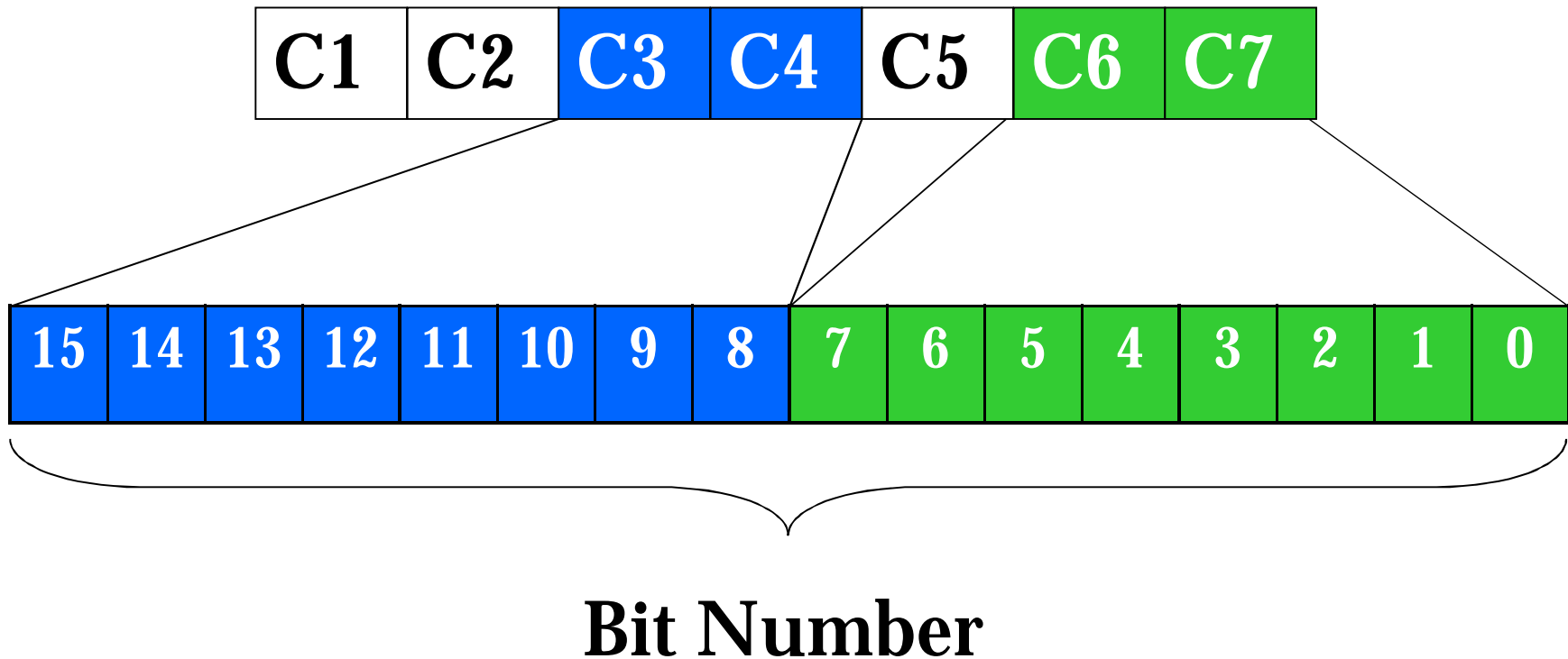
# Appendix:

## File Format Specification

### Data Quality Flags



# 7 Character Protocol Text Bit Number Mapping



# File Format Specification

## Data Quality Flags - Sensus



Bit	Bit Value	Sensus Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
	00 00	<i>Sensus – Indicates an error free interval</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 00	null
Bit 0	00 01	<i>Sensus – Communication failure (meter could not be read)</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 01	null
Bit 1	00 02	<i>Sensus – Power outage</i> <i>EnergyIP</i> PwrFail flag is set in GUI, Missing Interval Validation check NO_DATA flag is cleared, no estimation is done	R 00 02	POWER_OFF
Bit 2	00 04	<i>Sensus – Power restore</i> <i>EnergyIP</i> PwrOn flag is set in GUI, Missing Interval Check NO_DATA flag is cleared, validation/estimation resumes on subsequent interval data	R 00 04	POWER_ON
Bit 3	00 08	<i>Sensus – Voltage sag</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 08	null
Bit 4	00 10	<i>Sensus – Voltage swell</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 10	null
Bit 5	00 20	<i>Sensus – Missing data</i> <i>EnergyIP</i> NoData flag is set in GUI, data is subject to the Missing Intervals Validation check	N 00 20	NO_DATA
Bit 6	00 40	<i>Sensus – Daylight savings in effect</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 40	null
Bit 7	00 80	<i>Sensus – Meter was out of service</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 80	null

# File Format Specification

## Data Quality Flags – Sensus2



Bit	Bit Value	Sensus Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
	00 00	<i>Sensus – Indicates an error free interval</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R0	null
Bit 0	00 01	<i>Sensus – Communication failure (meter could not be read)</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R1	null
Bit 1	00 02	<i>Sensus – Power outage</i> <i>EnergyIP</i> PwrFail flag is set in GUI, Missing Interval Validation check NO_DATA flag is cleared, no estimation is done	R2	POWER_OFF
Bit 2	00 04	<i>Sensus – Power restoral</i> <i>EnergyIP</i> PwrOn flag is set in GUI, Missing Interval Check NO_DATA flag is cleared, validation/estimation resumes on subsequent interval data	R4	POWER_ON
Bit 3	00 08	<i>Sensus – Voltage sag</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R8	null
Bit 4	00 10	<i>Sensus – Voltage swell</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	Not used for interval data	null
Bit 5	00 20	<i>Sensus – Missing data</i> <i>EnergyIP</i> NoData flag is set in GUI, data is subject to the Missing Intervals Validation check	N32	NO_DATA
Bit 6	00 40	<i>Sensus – Daylight savings in effect</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R64	null
Bit 7	00 80	<i>Sensus – Meter was out of service</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	Not used	null

# File Format Specification

## Data Quality Flags – Sensus2 (cont'd)



Bit	Bit Value	<i>Sensus Data Quality Flag Description</i> <i>EnergyIP Action</i>	Required CMEP Flag	<i>EnergyIP Flag</i>
Bit 8	01 00	<i>Sensus – Time Adjustment (direction unspecified)</i> <i>EnergyIP</i> flag TimeChg is set in GUI, data is subject to the Time Change Validation check	R256	TIME_CHANGE
Bit 9	02 00	<i>Sensus – Overflow</i> <i>EnergyIP</i> Overflow flag is set in GUI, data is subject to Pulse Overflow Validation check	R512	PULSE_OVERFLOW
Bit 10	04 00	<i>Sensus – Long interval</i> <i>EnergyIP</i> LongInt flag is set in GUI, data will be treated as normal data	R1024	LONG_INTERVAL
Bit 11	08 00	<i>Sensus – Short interval</i> <i>EnergyIP</i> ShortInt flag is set in GUI, data will be treated as normal data	R2048	SHORT_INTERVAL
Bit 12	10 00	<i>Sensus – Test mode</i> <i>EnergyIP</i> TestMode flag is set in GUI, data is subject to Test Mode Validation check	R4096	TEST_MODE
Bit 13	20 00	<i>Sensus – Register rollover detected</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	Not used for interval data	null
Bit 14	40 00	<i>Sensus – Register reset detected</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	Not used for interval data	null
Bit 15	80 00	<i>Sensus – Clock out of sync</i> <i>EnergyIP</i> flag TimeChg is set in GUI, data is subject to the Time Change Validation check	R32768	TIME_CHANGE

# File Format Specification

## Data Quality Flags - Trilliant



Bit	Bit Value	Trilliant Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
	00 00	<i>Trilliant – No data quality problems</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 00	null
Bit 0	00 01	<i>Trilliant – Manually entered or modified</i> <i>EnergyIP</i> DCEstimated flag is set in GUI, Validation status set to 'EST', Change Method set to 'EXT'	R 00 01	DC_DATA_ESTIMATION
Bit 1	00 02	<i>Trilliant – Automatically estimated</i> <i>EnergyIP</i> DCEstimated flag is set in GUI, Validation status set to 'EST', Change Method set to 'EXT'	R 00 02	DC_DATA_ESTIMATION
Bit 2	00 04	<i>Trilliant – Missing data for this interval</i> <i>EnergyIP</i> NoData flag is set in GUI, data is subject to the Missing Intervals Validation check	N 00 04	NO_DATA
Bit 3	00 08	<i>Trilliant – Overflow: Consumption is more than the MeshReader can record</i> <i>EnergyIP</i> Overflow flag is set in GUI, data is subject to the Pulse Overflow Validation check	R 00 08	PULSE_OVERFLOW
Bit 4	00 10	<i>Trilliant – Partial interval is on: When set this status indicates the effective interval duration was shortened</i> <i>EnergyIP</i> ShortInt flag is set in GUI, data will be treated as normal data	R 00 10	SHORT_INTERVAL
Bit 5	00 20	<i>Trilliant – Too full: Indicates too much pulse content, happens when the clock is adjusted</i> <i>EnergyIP</i> LongInt flag is set in GUI, data is treated as normal data	R 00 20	LONG_INTERVAL <sup>75</sup>

# File Format Specification

## Data Triplet – Trilliant (cont'd)



Bit	Bit Value	Trilliant Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
Bit 6	00 40	<i>Trilliant – Power outage: Indicates start of power outage</i> EnergyIP PwrFail flag is set in GUI, Missing Interval Validation check NO_DATA flag is cleared, no estimation is done	R 00 40	POWER_OFF
Bit 7	00 80	<i>Trilliant – Power restore: Indicates power was restored</i> EnergyIP PwrOn flag is set in GUI, Missing Intervals validation check NO_DATA flag is cleared, validation/estimation resumes on subsequent interval data	R 00 80	POWER_ON
Bit 8	01 00	<i>Trilliant – Clock error: Clock time was messed up</i> EnergyIP TimeChg flag is set in GUI, data is subject to the Time Change Validation check	R 01 00	TIME_CHANGE
Bit 9	02 00	<i>Trilliant – Diagnostic error: RAM or memory error</i> EnergyIP MtrDiagError flag is set in GUI, data is subject to the Meter Diagnostic Validation check	R 02 00	METER_RESET

# File Format Specification

## Data Quality Flags - Tantalus



Bit	Bit Value	<i>Tantalus Data Quality Flag Description</i> <i>EnergyIP Action</i>	Required CMEP Flag	<i>EnergyIP Flag</i>
	00 00	<i>Tantalus – Normal raw data</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 00	null
Bit 0	00 01	<i>Tantalus – Communication failure within the meter</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 01	null
Bit 1	00 02	<i>Tantalus – Power was out for all or part of the interval</i> <i>EnergyIP</i> PwrFail flag is set in GUI, Missing Interval Validation check NO_DATA flag is cleared, no estimation is done	R 00 02	POWER_OFF
Bit 2	00 04	<i>Tantalus – Power was restored during this interval</i> <i>EnergyIP</i> PwrOn flag is set in GUI, Missing Interval Check NO_DATA flag is cleared, validation/estimation resumes on subsequent interval data	R 00 04	POWER_ON
Bit 3	00 08	<i>Tantalus – A voltage sag was in effect for all or part of the interval</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 08	null
Bit 4	00 10	<i>Tantalus – A voltage swell was in effect for all or part of the interval</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 10	null
Bit 5	00 20	<i>Tantalus – Consumption reading was missing for this interval</i> <i>EnergyIP</i> NoData flag is set in GUI, data is subject to the Missing Intervals Validation check	N 00 20	NO_DATA

# File Format Specification

## Data Quality Flags – Tantalus (cont'd)



Bit	Bit Value	Tantalus Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
Bit 6	00 40	<i>Tantalus – Daylight Savings Time was in effect</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 40	null
Bit 7	00 80	<i>Tantalus – The meter was out of service for all or part of the interval</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 80	null
Bit 8	01 00	<i>Tantalus – The meter has failed</i> <i>EnergyIP</i> MtrDiagError flag is set in GUI, data is subject to the Meter Diagnostic Validation check	R 01 00	METER_RESET
Bit 9	02 00	<i>Tantalus – The meter unavailable due to maintenance by the utility</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 02 00	null

# File Format Specification

## Data Quality Flags – SmartSynch



Bit	Bit Value	SmartSynch Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
	00 00	<i>SmartSynch – No data quality problems</i> No <i>EnergyIP</i> flag is set, data will be treated as normal data	R 00 00	null
Bit 0	00 01	<i>SmartSynch – Manually entered or modified</i> <i>EnergyIP</i> DCEstimated flag is set in GUI, Validation status set to 'EST', Change Method set to 'EDC'	R 00 01	DC_DATA_ESTIMATION
Bit 1	00 02	<i>SmartSynch – Automatically estimated</i> <i>EnergyIP</i> DCEstimated flag is set in GUI, Validation status set to 'EST', Change Method set to 'EDC'	Not used	DC_DATA_ESTIMATION
Bit 2	00 04	<i>SmartSynch – Missing data for this interval</i> <i>EnergyIP</i> NoData flag is set in GUI, data is subject to the Missing Intervals Validation check	N 00 04	NO_DATA
Bit 3	00 08	<i>SmartSynch – Overflow: Consumption is more than the meter can record</i> <i>EnergyIP</i> Overflow flag is set in GUI, data is subject to the Pulse Overflow Validation check	R 00 08	PULSE_OVERFLOW
Bit 4	00 10	<i>SmartSynch – Partial: Indicates partial data in the interval. TMS Partial (short interval) flag is set</i> <i>EnergyIP</i> ShortInt flag is set in GUI, data will be treated as normal data	R 00 10	SHORT_INTERVAL
Bit 5	00 20	<i>SmartSynch – Too full: Indicates too much pulse content, happens when the clock is adjusted backwards</i> <i>EnergyIP</i> LongInt flag is set in GUI, data is treated as normal data	R 00 20	LONG_INTERVAL

# File Format Specification

## Data Quality Flags – SmartSynch (cont'd)



Bit	Bit Value	SmartSynch Data Quality Flag Description EnergyIP Action	Required CMEP Flag	EnergyIP Flag
Bit 6	00 40	<i>SmartSynch – Power outage: Indicates start of power outage</i> EnergyIP PwrFail flag is set in GUI, Missing Interval Validation check NO_DATA flag is cleared, no estimation is done	R 00 40	POWER_OFF
Bit 7	00 80	<i>SmartSynch – Power restore: Indicates power was restored</i> EnergyIP PwrOn flag is set in GUI, Missing Intervals validation check NO_DATA flag is cleared, validation/estimation resumes on subsequent interval data	R 00 80	POWER_ON
Bit 8	01 00	<i>SmartSynch – Clock error: The meter clock was corrected due as a result of being outside allowable drift tolerances</i> EnergyIP TimeChg flag is set in GUI, data is subject to the Time Change Validation check	R 01 00	TIME_CHANGE
Bit 9	02 00	<i>SmartSynch – Diagnostic error: RAM or memory error</i> EnergyIP MtrDiagError flag is set in GUI, data is subject to the Meter Diagnostic Validation check	R 02 00	METER_RESET