



Integrated Single Electricity Market (I-SEM)

I-SEM MI MMS MDP Interfaces

Function Description

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Preface

Purpose

The purpose of this document is to describe the interface between Meter Data Providers (MDP) and MMS Metering Interface.

Associated Documents

- [1] SEM Central Systems & Services: User Requirements Specification Metering Interface V1.0
- [2] I-SEM System Design, 1KUS015307D0036, Rev A

1 Introduction

This document details the structure of the MMS Metering Interface XML Data template files received from and sent to the Meter Data Provider (MDP), logging the receipt of Meter Data and the Market Operator Interface (MOI) to view the Meter Data Submissions and the Meter Data.

The Market Operator will be able to submit these datasets on behalf of the external parties in the event that there is some technical reason that the Meter Data Provider cannot submit via the normal channels. The Market Operator will perform this function in exceptional circumstances as the preferred approach will be for the MDP to correct and/or resubmit files. For the avoidance of doubt, the Market Operator will be able to submit a completed file on behalf of a Meter Data Provider. The Market Operator will not create, edit or substitute data within this file. Validations rules applied in this special situation will be consistent with those applied for Meter Data Provider meter reading data submission. For this feature, the existing XML and schema will be changed. The following new attributes will be added into both XML and schema files:

- **MODE** – The value should always be “NORMAL”.
- **DATE** – The date of the file submission. Format is “YYYY-MM-DD”
- **ADMIN_MODE** – “ACT_AS_MP” to indicate this submission is “ACT as a Market Participant”. When a Meter Data Provider (MDP) submits meter data this field should not be used.

Please refer to Appendix A for an example.

1.1 Reference to the Requirement Specification

I-SEM Central Systems & Services: User Requirements Specification Metering Interface V1.0

1.2 Overview of the Meter Data Provider Submission Flow

The process flow figure for Meter Data Provider Submission in the MMS Metering Interface is shown below.

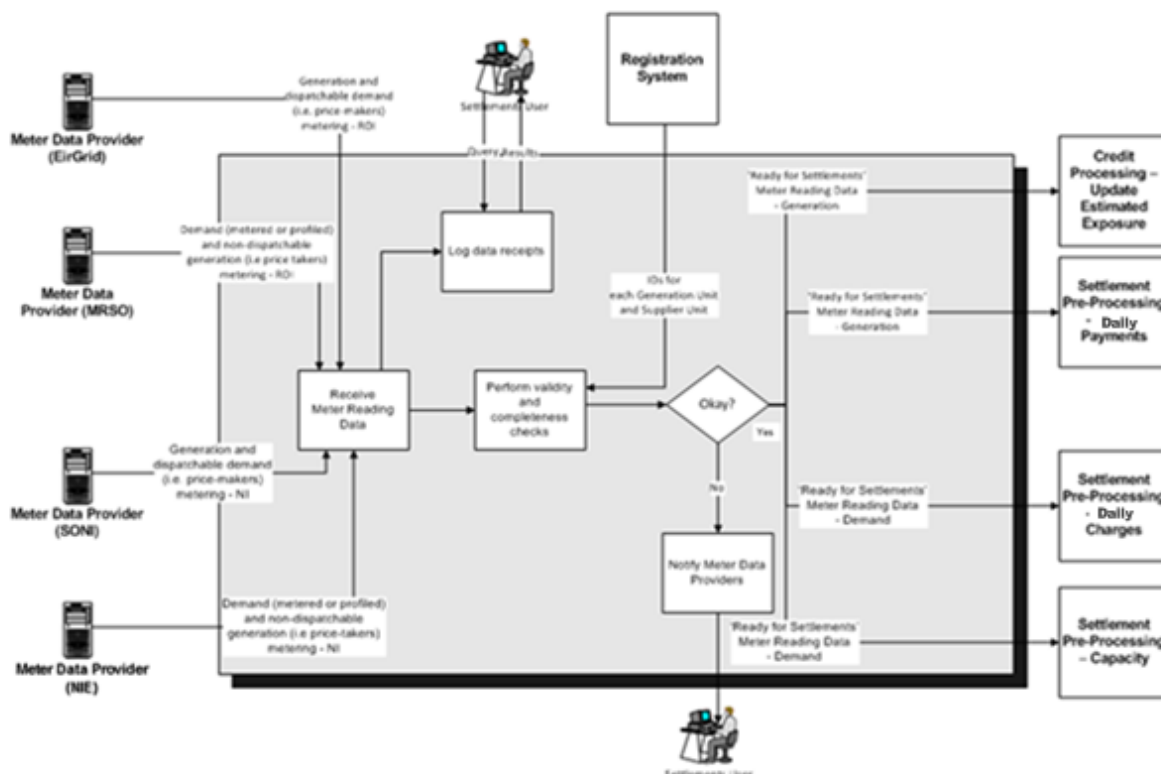


Figure 1-1. Summary Process Flow

1.3 Assumptions

This section sets out the assumptions that have been made when preparing this specification:

- The Meter Data Providers are responsible for the quality, completeness, and delivery of meter data.
- The Meter Data Providers will deliver meter reading data of a quality such that it is ready to be used for settlement purposes. That is, the following processes will have been executed (where appropriate):
 - ♦ Validation – to assure accuracy
 - ♦ Summation – to ensure the time period of the meter reading data is a Trading Period
 - ♦ Estimation and substitution – to ensure completeness
 - ♦ Aggregation – to deliver quantities for Aggregated Generator Units and Supplier Units
 - ♦ Netted – to account for house load with respect to Generator Units (Such netting of Generator house load is only pertinent to specific TCON sites) or to account for embedded de-minimis generation with respect to Supplier Units
 - ♦ Signed – positive to indicate generation and negative to indicate supply/demand
 - ♦ Loss factor adjusted – to take account of distribution losses as required
- Meter Data Providers will deliver Meter Reading Data that is date and time stamped with local time (i.e., accounts for daylight saving adjustments).
- All meter reading data is received in MWh for the Trading Period.
- Only one value will be provided per Trading Period for a Generator Unit.
- The Meter Data Providers must always deliver a complete set of meter data according to the configuration of Meter Data Provider, Transmission Type and associated Units.
- The Meter Data Providers will be using the unit ID's and not separate meter ID's. There is therefore no need to keep track of meter ID's in the system.

2 Functional Description

This chapter describes all the functional details of the external meter data that is submitted to MMS Metering Interface through the web service for the Single Electricity Market (I-SEM).

The MMS Metering Interface will receive meter readings and NIEP (Non-Interval Energy Proportion) factors from Meter Data Providers and make the values available for Settlement calculations and Credit Risk calculations.

The overall process for MMS Metering will be:

- Meter Data Providers submit meter data using MMS Metering web service
 - ♦ The MMS Metering web service will validate the submission
 - ♦ If all validations are OK, the MMS Metering web service will save the values and create log records with an OK status and send Acceptance notice to the Meter Data Provider.
 - ♦ If any of the validations fail, the MMS Metering service will create log records with an Error status and send Rejection notice to the Meter Data Provider
- Market Operator Users can use MMS Metering Interface File Upload if a Meter Data Provider is unable to submit meter data. The same validations will be performed as if the Meter Data Provider was making the Meter Data Submission.
- Market Operator Users can use the Market Operator Interface (MOI) Participant Activities screen to see the status of all Meter Data Submissions and the Meter Data View to see the actual meter values.
- The MMS Event Manager will be configured with events to notify the Market Operator User if the Meter Data Providers have not made their Meter Data Submissions according to the defined timelines.
- Meter data will be made available to Counterparty Settlement and Billing (CSB) in daily Full and Incremental Push of data.

2.1 Meter Data Submission

The Meter Data Provider only submits meter data to SEMO systems. Meter reading data is delivered to the Market Operator, which will be used for settlement purposes. The data will be provided for Generator Units, Supplier Units, Net Inter-Jurisdictional Flow and Interconnectors. Meter values are provided at an Imbalance Settlement Period granularity, which is currently defined to be at 30-minute intervals.

2.1.1 Providers of Meter Data

Currently there are four Meter Data Providers (MDPs) who provide data to the Market Operator:

- NIE – Meter values for Northern Ireland
- MRSO – Meter values for Republic of Ireland
- SONI – Meter values for Northern Ireland (including Moyle Interconnector)
- EirGrid – Meter values for republic of Ireland (including EWIC and Net Inter-Jurisdictional Flow)

Each Meter Data Provider delivers meter data for each Imbalance Settlement Period for each of the Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow for which it is responsible as per registration. Each of the Meter Data Providers can be reconfigured to deliver meter values for other regions and additional Meter Data Providers can be added through registration.

Each Meter Data Provider should deliver Meter Data according to the defined timelines. Detail of timelines is in Section 2.1.3.

2.1.2 Meter Data Submission Flow

The following figure shows the functional flow of the Meter Data submission process.

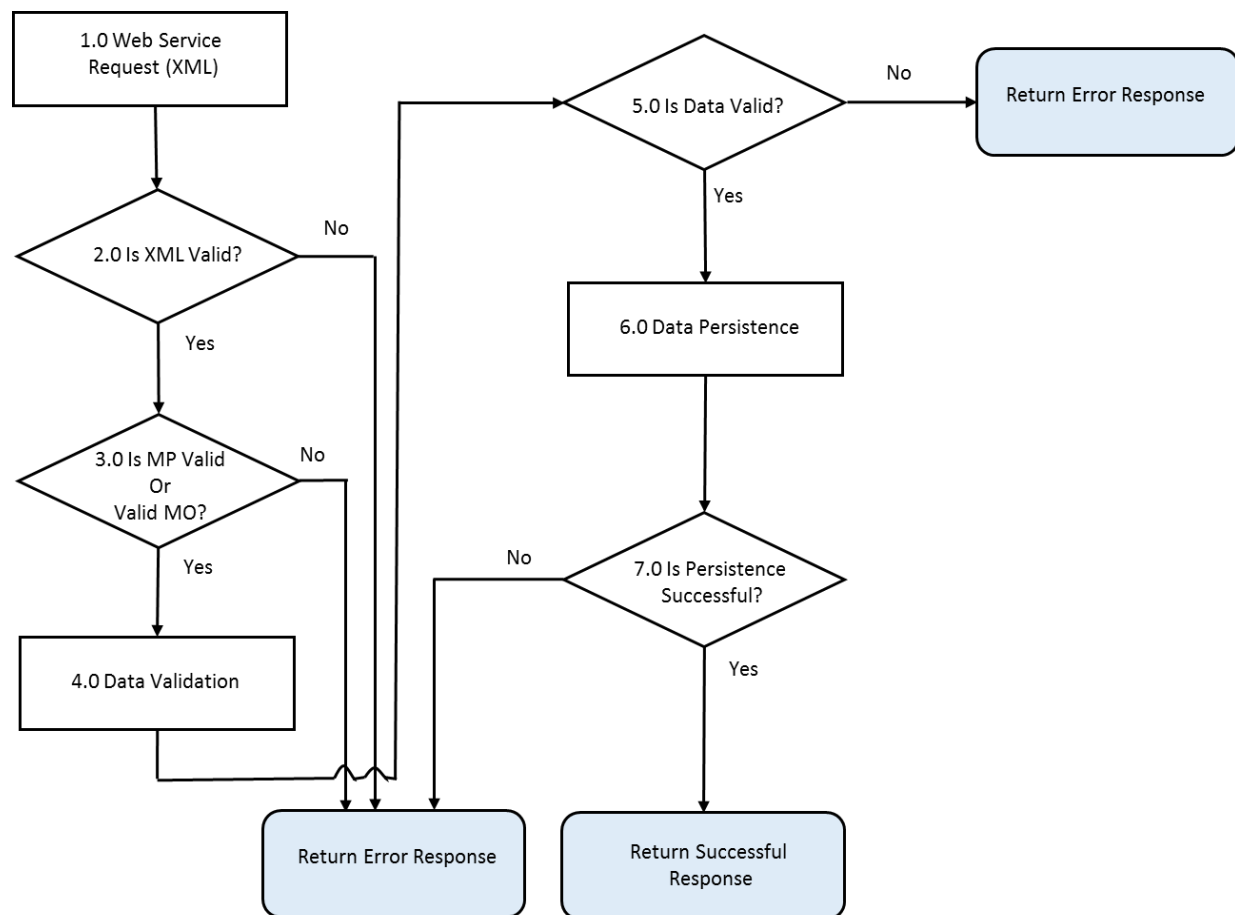


Figure 2-1. Process Flow Diagram

The process flow of the Meter Data submission is described below:

- Process Step 1.0:

Authentication using Digital Certificate and SSL handshaking is performed at the time of Web Service Client connection with the MMS Web Server.

After connection is successful, the Meter Data Provider (MDP) or MO can submit meter data using web service client request, either by MMS Metering Interface File Upload or web service client (computer-to-computer). The authentication will occur at the very beginning of each web service request. Each Web Service request is in the form of SOAP message and has the following key components:

- ♦ The MDP and Username from the Digital Certificate
- ♦ Request Type attribute (Request type- will be 'MDP')
- ♦ XML Data Payload (Market Data)
- ♦ Digital Signature, which signs the XML Data Payload

- Process Step 2.0:

The process of validating the XML data payload involves the following steps:

- ♦ The Digital Signature in the SOAP request is verified using the Digital Certificate and the XML Data Payload (Meter Data) object in the SOAP request. If the Digital Signature is not valid, the request is rejected at this point and no additional processing is performed.
- ♦ The data validation is automatically performed at this stage based on the XML schema. XML data payload is un-marshalled to Java Objects and is validated against the XML schema

during the process. If the XML data payload is not in compliance with the XML schema, the request is rejected with an error message.

- Process Step 3.0:

Check if the submission is done on the behalf of Meter Data Provider by the MMS Market Operators and check for validity of the MO in the Registration system; If MO is valid, verify Meter Data Provider (Participant) against the Registration system also.

(For this feature, the existing XML and schema will be changed. A few new attribute(s) will be added into both XML and schema files, such as AdminMode="ACT_AS_MP" to indicate this submission is "ACT as Market Participant")

- Process Step 4.0:

The XML data payload (Meter Data), which was un-marshalled to Java Objects, will be validated against the Registration data (For Generator Units, Supplier Units, Net Inter-Jurisdictional Flow and Interconnectors). The applicable data technically valid checks are also performed at this stage. Please refer to Sections 2.2.3 through 2.2.5.

- Process Step 5.0:

Check if the validation passed or failed. If the validation is passed successful, it will proceed to data persistence module. If failed, the request is rejected with an error message.

- Process Step 6.0:

This process performs the persistence of the successfully validated data into the database. Depending on whether persistence passed or failed, if there are any failed Meter Data in the submission, they are skipped in the persistence process.

- Process Step 7.0:

Check if the persistence passed or failed. If all the data in the XML payload is successfully processed, successful response is returned. Error response is returned to the Meter Data Provider for any failure.

If the XML data fails the validation:

1. If the XML data fails the validation, the entire XML payload will be rejected; the process will generate a rejection response file and send it back to the Meter Data Provider.
2. Invalid and unsuccessful submissions are logged into the following tables:
 - a. CM_PARTICIPANT_ACTIVITY – The submission is logged as a single record and contains the summary information. The Market Operator may view / monitor the status of Participant submissions using the Participant Activities screen in the MOI. Please refer to Section 2.5.1 for details
 - b. CM_PARTICIPANT_SUBMIT_LOG – The submission details, which include Digital Signature and XML Data, are logged as a single record. The Market Operator may view the Digital Signature and MP submitted XML Data using the Participant Submit Log screen in the MOI. Please refer to Section 2.5.1 for details
 - c. CM_PART_INVALID_SUBMIT – The response details, which include the error messages, are logged as a single record. The Market Operator may view the response XML messages using the Invalid Submit Log screen in the MOI. Please refer to Section 2.5.1 for details.

If the XML submission is successful:

1. If the XML data passes the validation and is successfully persisted to the database, the process will generate an acceptance response file and send it back to the Meter Data Provider. Valid data is logged into a meter data table. The Market Operator may view data using Meter Data screen in the MOI. Please refer to Section 2.5.2 for details.
2. Valid and successful submissions are logged into the following tables:
 - a. CM_PARTICIPANT_ACTIVITY – The submission is logged as a single record and contains the summary information. The Market Operator may view / monitor the status of Participant submissions using the Participant Activities screen in the MOI. Please refer to Section 2.5.1 for details.

- b. CM_PARTICIPANT_SUBMIT_LOG – The submission details, which include Digital Signature and XML Data, are logged as a single record. The Market Operator may view the Digital Signature and MP submitted XML Data using the Participant Submit Log screen in the MOI. Please refer to Section 2.5.1 for details.

2.1.3 Frequency of Meter Data

Meter Data Providers will submit meter readings in accordance with agreed timelines and Ad-Hoc (as material data changes are identified). In one Meter Data Submission the Meter Data Providers submit meter data either for all units (Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow) for which they are responsible for or for units associated with a specific Transmission Type.

The meter data time lines shown in the table below is as per current requirements, where:

- Indicative, Initial, Resettlement M+4, Resettlement M+13 indicates Settlement Run Types
- PEG, NPEG, PED, NPED, CJF refers to the Transmission Type in the SEM-MDP format (each unit is associated with a Transmission Type in the registration data)

Table 2-1. Timeline Meter Data Submission

Timeline	Data	Frequency	Content
Indicative	Indicative Generation Metering	No later than each Business Day, by 14:00 on D+1	Meter readings, by Generator Unit for Transmission Types PEG and NPEG
Initial	Initial Generation Metering	No later than each Business Day, by 17:00 on D+4	Meter readings, by Generator Unit for Transmission Types PEG and NPEG
Indicative-CJF	Indicative Aggregated Inter-Jurisdiction Metering	Each Business Day, by 14:00 on D+1	Aggregated Meter readings for Transmission Type CJF
Initial-CJF	Initial Aggregated Inter-Jurisdiction Metering	Each Business Day, by 17:00 on D+4	Aggregated Meter readings for Transmission Type CJF
Indicative	Indicative Aggregated Demand Metering	Each Business Day, by 14:00 on D+1	Aggregated meter readings, by Supplier Unit for Transmission Types PED and NPED
Initial	Initial Aggregated Demand Metering	Each Business Day, by 17:00 on D+4	Aggregated meter readings, by Supplier Unit for Transmission Types PED and NPED
M+4	Resettlement M+4 Aggregated Demand Metering and Generation Metering as necessary	Each Business Day, by 14:00 on M+4 as per agreed timetable	Aggregated meter readings, by Supplier Unit for Transmission Types PED and NPED , generation meter readings as necessary by Generator Unit
M+13	Resettlement M+13 Aggregated Demand Metering and Generation Metering as necessary	Each Business Day, by 14:00 on M+13 as per agreed timetable	Aggregated meter readings, by Supplier Unit for Transmission Types PED and NPED generation meter readings as necessary by Generator Unit

Each SEM Business Day will therefore have multiple Meter Data Submissions per Meter Data Provider, where the first SEM Business Day after one or more Non SEM Business Day(s) will have more Meter Data Submissions than an average SEM Business Day.

An Event will be set up in the MMS Event Manager for each of the Meter Data Submission Timelines.

The event is run at a set time prior to the deadline of the timeline and will look out for missing Meter Data Submissions. The event will send a notification to Market Operator (ref also Section 2.5.1 and the Application Message sub section) about missing Meter Data Submissions with information about:

- Timeline (Settlement Run Type and Transmission Type)
- Settlement Day
- Meter Data Provider(s)
- Time of Verification

The timing of when to run these events are configurable by the Market Operator.

There will also be a set of Ad-Hoc Meter Data Submissions as indicated in the table below. There will be no event validating submission timeline for these submissions.

Table 2-2. Ad-Hoc Meter Data Submission

Ad-Hoc	Data	Frequency	Content
Ad-Hoc	Revised Generation Metering	Ad-hoc, as material data changes are identified	Meter readings, by Generator Unit
Ad-Hoc	Revised Aggregated Inter-Jurisdiction Metering	Ad-hoc, as material data changes are identified	Aggregated Meter readings
Ad-Hoc	Revised Aggregated Demand Metering	Ad-hoc, as material data changes are identified	Aggregated meter readings, by Supplier Unit

2.2 Meter Data Validation

The MMS Metering Interfaces receive Meter Data XML files from the Meter Data Providers and perform the following validations:

- Logon Security
- Digital Signature
- XML schema
- Transmission Type to Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow
- Validity and completeness check

2.2.1 Logon Security

The logon security consists two parts as follows:

- The digital certificate has to be valid
- The participant information contained in the Digital Certificate, which can be found in the CN part of the Digital Certificate - format <USER>@<PARTICIPANT>, must match the participant field PARTICIPANT_NAME in the XML submission. Digital Signature Validation.

2.2.2 Digital Signature Validation

The MI Web Service verifies that the digital signature in the SOAP message matches the data in the SOAP message. The steps to validate the signature are:

- Create a DOM representation of the XML data.
- Create a canonical representation of the DOM data.
- Create an SHA1 digest of the canonical representation.
- Decrypt the signature using the public key supplied in the sender's certificate used in making the network connection to the MI Web Service.
- Verify that the decrypted signature matches the digest.

The Meter Data will be digitally signed by the Meter Data Provider. Signature information passed in the SOAP envelope is the digital signature string itself. The key information is obtained from the public portion of the user's certificate that is sent to the web server as part of making the SSL connection to the web server. ABB's MMS software, which runs in the web server, extracts the public certificate string from the connection and forwards it to the web service. The web service converts the certificate string into a certificate object and extracts the public key information from the certificate object.

If the digital signature cannot be verified, the entire XML payload will be rejected.

If the digital signature is verified, the digital signature is saved in the MI system database for later use in non-repudiation. The standard MMS tool MpNonRepudiationTool can be used for non-repudiation verification.

2.2.3 XML Schema Validation

The XML data submission must be valid and conform to the MMS Meter Data Schema. The Meter Data XML schema will take meter submissions and automatically check the following validations:

- Date fields conform to the XML Date format, which is "YYYY-MM-DD" (year, month and date).
- Time fields conform to the XML Time format, which is "HH:MM:SS" (hour, minutes and seconds). The hour is expected to be submitted in the 24 hour format (00-23). The second's field will be truncated to "00" for time submissions.
- String fields conform to the minimum and maximum length. For example, EXTERNAL_ID will be defined to have a minimum of 1 character and a maximum of 20 characters.
- Some of string fields will be defined as enumerated list of values and those fields should have a value from the pre-defined list. For example, STATUS can only have either "OK" or "ERROR".
- Some of integer fields have a minimum and a maximum value. For example, NIEP will be defined to have minimum of 0 and maximum of 1. If the NIEP falls outside the Meter Data XML schema defined range, it automatically fails the MI XML Schema check.

2.2.4 Transmission Type to Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow Validation

Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow as provided by the Meter Data Providers must be validated against the necessary Registration Data:

- The Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow are active for this Settlement Day (the whole day or parts of the day)
 - ♦ For this Meter Data Provider
 - ♦ If Transmission Type in the submission is not ALL then the Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow must be configured to be of this Transmission Type.

- The Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow should only have values for the intervals of the day for which it is valid (either valid for full day, or valid for partial day).). Registration data is per Trading Day.

2.2.5 Validity and Completeness Check

Validation related to submitted data will be performed by following rules:

- The unit should not have duplicate intervals and the <READING.num> must correspond to the relative period in the day.
- The date and time in START_PERIOD_TIME and END_PERIOD_TIME must be within the same calendar day.
- The date and time in START_TIME must be within the same calendar day.
- The END_TIME must be 30 minutes after the START_TIME.
- The Measured Quantity should have a maximum of 3 decimals.
- If unit is Supplier Unit, the element NIEP and corresponding value should be presented in the Meter Data submission. The value of NIEP should be between 0 and 1 inclusive with a maximum of 8 decimal places.
- For each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow contained within a Meter Data submission, the data must include all possible Settlement Intervals.

If the Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow is valid from 23:00 to 24:00:

- ♦ It should have 2 interval values present:

If the Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow is valid from 00:00 to 23:00:

- ♦ For a short day, each Generator Unit, Supplier Unit, Interconnector or Net-Jurisdictional flow should have 44 interval values present
- ♦ For a long day, each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow should have 48 interval values present
- ♦ For a standard day, each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow should have 46 interval values

If the Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow is valid from 00:00 to 24:00:

- ♦ For a short day, each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow should have 46 interval values present
- ♦ For a long day, each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow should have 50 interval values present
- ♦ For a standard day, each Generator Unit, Supplier Unit, Interconnector or Net Inter-Jurisdictional Flow should have 48 interval values

Note

Daylight saving will be recognized within the Market Operator's systems. The implication for meter reading data is that on two days each year the meter readings for a Generator Unit or Supplier Unit will not be for 24 hours. In March, when Daylight Saving starts, the Trading Day that ends after the time at which Daylight Saving starts will span 23 hours for meter reading data purposes. Conversely, when Daylight Saving ends in October, the Trading Day that ends after the time at which Daylight Saving ends will span 25 hours for meter reading data purposes. Thus, for clock change days, the Meter Data Providers will provide files containing meter data for 46 or 50 periods as appropriate.

- The number of Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow in the XML payload should match the value of the TOTAL_UNIT_ROWS tag in the end of XML submission.
- The sum of MEASURED_QUANTITY in XML payload should match the value of TOTAL_QUANTITIES tag in the end of XML submission.

- XML payload must contain all valid Generator Units, Supplier Units, Interconnector and Net Inter-Jurisdictional Flow for which the Meter Data Provider is responsible.

2.3 Meter XML Submission Data

The XML data includes the following types:

- Digital Certificate used for encryption of the SOAP message and authentication of the Meter Data Provider submitting a file using the Web Service
- Unit level information, including the Unit name
- Time period Meter readings at a half-hourly resolution
- Time period NIEP (Non-Interval Energy Proportion) factors at half-hourly resolution for Supplier Units
- Footer details, including a checksum to verify the integrity of the file

The following principles apply to the SEM-MDP format:

- The meter data is formatted via XML
- Full stop is used in fractional numbers, e.g., 12.34 or 0.34.
- For zero values the following numbers will be valid: 0 and 0.0 and 0.00 and 0.000. Zero values should not have a sign.
- A minus sign, e.g., -12.34 or -0.34 should prefix negative numbers.
- Numbers, for meter readings, should be expressed to a maximum of three decimal places
- Numbers, for NIEP (Non-Interval Energy Proportion) factors, should be expressed to a maximum of eight decimal places
- Numbers, for NIEP (Non-Interval Energy Proportion) factors, should be between 0 and 1 inclusive
- Readings for generation should be positive, and for demand should be negative. There will be no validations against this requirement as both types could have either sign depending on the characteristics of the unit (pump storage, for example).
- Fractional numbers should skip trailing zeroes when less than three decimals is sufficient to express the value, e.g., use 0.34 and not 0.340.
- Fractional numbers should not skip the leading zero in cases when the value is greater than -1 and less than 1; e.g., use 0.34 and not .34. There will however be no validation on trailing zeros.

Data Elements descriptions for Import Meter request.

Table 2-3. SEM-MDP XML Format

Column Name	Description	Required (R) / Optional (O)	Format
TRANSMISSION_ID	The Transmission type: Permitted values are: <ul style="list-style-type: none"> ▪ ALL ▪ PED ▪ PEG ▪ NPED ▪ NPEG ▪ CJF 	R	xs:string
PARTICIPANT_NAME	This is the name of the sender of the information	R	xs:string

Column Name	Description	Required (R) / Optional (O)	Format
START_PERIOD_TIME	Start of Period where reported metered values are measured	R	xs:dateTime
END_PERIOD_TIME	End of Period where reported metered values are measured	R	xs:dateTime
TIME_CREATED	Creation time of the file	R	xs:dateTime
UNIT_ID	Name of the unit to which the meter readings relate	R	xs:string
EXTERNAL_ID	Sender's identification field limited to max. 20 characters (This can hold SSAC, MPID, transmission node, etc.)	O	xs:string max length 20
START_TIME	Local start time for an individual reading (which shall be the start of an hour or half-hour)	R	xs:dateTime
END_TIME	Local end time for an individual reading (which shall be the start of a half-hour or hour value, one half hour after the start time START_TIME)	R	xs:dateTime
MEASURED_QUANTITY	The Measured Quantity in MW	R	xs:double
QUERY_FLAG	Set to 0 normally, or 1 if the reading is the subject of a Data Query	R	xs:integer domain: 0 or 1
READING_STATUS	This can hold details on whether it was an estimate or actual reading, check or main meter, etc.	R	xs:string max length 20
NIEP	Non-Interval Energy Proportion factors. This is to indicate the proportion of the Measured Quantity that is based on Non-Interval metering. This field is optional. This is because a common interface format is used for both demand and generation metering, while this field only applies to Supplier Units.	O	xs:decimal value between 0 and 1 inclusive with max 8 decimals
TOTAL_UNIT_ROWS	Total number of Units (rows) included in the data feed	R	xs:integer
TOTAL_QUANTITIES	Sum of all the MEASURED_QUANTITY amounts in the file.	R	xs:double
Other XML items	Description		
ROW	For each Unit there will be a Row included in the data feed.	R	xs:integer
READING	For each Meter reading, there will be a reading entry (46, 48, or 50 in total depending on short, normal or long day) The READING num= value will correspond to the relative period in the day	R	xs:integer

2.4 XML Response Data

After meter data submission is completed, a confirmation receipt is returned to the Meter Data Provider with information if the submission Passed or Failed validation. The response consists of:

- Processing Statistics (ref table Response Statistics Format)
- Messages (ref table Response Message Format)
- Original Data Submitted by the Meter Data Provider (Required if submission failed)
 - ♦ With embedded messages for each error in the submission

The Processing Statistics data fields:

Table 2-4. Response Statistics Format

Field	Description	Required (R) / Optional (O)
TRANSACTION_ID	Transaction ID is a unique 10-character code generated during the Meter Data processing, and is used for the Meter Data tracking.	R
RECEIVED	The number of received data sets	O
VALID	The number of valid Unit(s) in data sets	O
INVALID	The number of invalid Unit(s) in data sets	O
TIME_MS	The time spent in processing the data in milliseconds.	O
TIME_STAMP	Received time	O

For each data element in the submitted data with an error there will be an Error message

The Message data fields:

Table 2-5. Response Message Format

Message Type	Code	Category	Required (R) / Optional (O)
INFORMATION			O
ERROR	Code permitted values are: <ul style="list-style-type: none"> ▪ AUTH <ul style="list-style-type: none"> - Authentication Check ▪ COMPLETE <ul style="list-style-type: none"> - Complete Check INVALID <ul style="list-style-type: none"> - Invalid Value ▪ TIME <ul style="list-style-type: none"> - Invalid Time 	Category permitted value is: <ul style="list-style-type: none"> ▪ HARD <ul style="list-style-type: none"> - Failed Validation 	O

Please refer to Appendix B and C for details for the definition of the format and error messages.

2.5 Meter Data View and Traceability

After the Meter Data Submissions are successfully stored into the database table(s), the Market Operator Users can use Market Operator Interface (MOI) to view the Meter Data Submission Activities and the Meter Data. The Meter Data can be exported into CSV format, on demand by the Market Operator User.

2.5.1 Meter Data Submission View

The Market Operator User can monitor and track the Meter Data transaction through the following views:

- Participant Activity

Each Meter Data Submission activity is logged into a database table CM_PARTICIPANT_ACTIVITY. The Participant Activity View assist the Market Operator User in tracking this activity. This view details Meter Data Submissions by Meter Data Provider.

Table 2-6. Participant Activity Field Descriptions

Field	Description
Transaction ID	A unique ID generated for a particular Participant activity.
Participant Name	This is the name of the sender of the information.
Participant User	This field displays the registered user name of Participant.
Admin Participant Name	This field displays the Participant Name of the Market Operator if applicable. This field is populated when the Market Operator performs the Activity on behalf of the Participant (Meter Data Provider).
Admin Participant User	This field displays the name of the Market Operator (if applicable). This field is populated when the Market Operator performs the Activity on behalf of the Participant (Meter Data Provider).
Status	Status of request and may be one of the following: <ul style="list-style-type: none"> ▪ I – Initialized ▪ S – Successfully Completed ▪ E – Error processing the request
Start Time	Start time of the request.
End Time	End time of the request.
Application Name	The name of the Application that processes the activity.
Activity	Activity performed by the Meter Data Provider. It can be one of the following (where only the last Activity Type is applicable for Meter Data Submissions): <ul style="list-style-type: none"> ▪ Report List – List available reports request ▪ Report Download – Report download request ▪ Market Submit – Market Trading submission ▪ Market Query – Market Trading query request ▪ External Data Submit – Meter Data Provider Submission
Trade Date	Date of Trading Day.
File Name	In the case of Report Download Activity, this field will show the name of the report downloaded by the Market Participant.
Message	This field displays full text of the application message, should there be any.
Total Count	This field displays the total count of the offers/records submitted in the request.
Unsuccessful Count	This field displays the total count of the unsuccessful offers/records in the request.

Field	Description
Invalid Count	This field displays the total count of the invalid (failed validation) offers/records in the request.
External ID	External ID, if submitted in the request by the Participant.

- Participant Valid Submit

Each valid Meter Data Submission is logged into data base CM_PARTICIPANT_SUBMIT_LOG. The Participant Valid Submit View assist the Market Operator in tracking all successful Meter Data Submissions.

Table 2-7. Participant Valid Submit Log Field Descriptions

Field	Description
Transaction ID	Electronic Transaction ID. A unique ID generated for a particular Meter Data Submission activity.
Submit ID	Submission Identifier
Digital Signature	The Digital Signature of the submission
Trade Date	Trade date in the request.

The actual XML submission is also stored along with this record. It can be viewed by following the steps below:

- Select the record for which XML data is to be viewed.
- Right-click and select **Data Details > Details** from the pop-up menu.
- Display navigates and shows that record only.
- Right-click on that row and select **Row Details**, which will show the XML content. CTRL+D can also be used as a short cut here.

- Participant Invalid Submit

Each invalid Meter Data Submission is logged into data base CM_PART_INVALID_SUBMIT. The Participant Invalid Submit View assist the Market Operator in tracking all failed Meter Data Submissions.

Table 2-8. Invalid Participant Submit Log Field Descriptions

Field	Description
Submit ID	Submission Identifier.
Transaction ID	Electronic Transaction Number. A unique ID generated for a particular MP activity if applicable.
Market Type	Type of the Market.
Participant Name	This is the name of the sender of the information
Participant User	This is the registered user name of Participant.
Trade Date	Date of Trading Day

The response XML (submitted XML along with Error messages) is also stored along with this record. It can be viewed by following the steps below:

- Select the record for which XML data is to be viewed.
- Right-click and select the **Data Details > Details** from the pop-up menu.
- Display navigates and shows that record only.
- Right-click on that row and select **Row Details**, which will show the XML content. CTRL+D can also be used as a short cut here.

- Application Message

Each Application Message is created either by a system call or by the Market Operator intervention. If Metering Interface does not receive the Meter Data on time, a warning message is written to the application message table by the MMS Event Manager. The Market Operator can then notify the Meter Data Provider after reviewing the message.

Table 2-9. Application Message Field Descriptions

Column Name	Description
Time Stamp	Date of message creation.
Market Type	The market name that logged the message.
Application	The market module name that logged the message.
Severity	Severity of the message and may be one of the following: <ul style="list-style-type: none"> D – Debug I – Info W – Warning E – Error F – Fatal
Operator	Operator name if applicable
Priority	0 or 1; <ul style="list-style-type: none"> 0 for Info/Warnings 1 for Errors
Message	The full text of the message.
Message ID	A unique ID generated for the message used for filtering.
Transaction ID	A unique ID generated for a particular MP activity if applicable.
Participant Name	This is the name of the sender of the information
Participant User	This is the registered user name of Participant.

Note All above tables and fields may change during design.

2.5.2 Meter Data View

Meter Data View enable the Market Operator User to view the meter data submitted by all the Meter Data Providers in one place. For the Operator to easily verify the Meter Data, the data can be filtered and sorted on the fields in the following table. This view details Meter Data submitted by Meter Data Provider.

Table 2-10. Meter Data Field Descriptions

Column Name	Description
Transaction ID	A unique alphanumeric ID generated for each activity.
TRANSMISSION_ID	The Transmission type: permitted values are: <ul style="list-style-type: none"> ALL PED PEG NPED NPEG CJF
PARTICIPANT_NAME	This is the name of the sender of the information
START_PERIOD_TIME	Start of Period where reported metered values are measured
END_PERIOD_TIME	End of Period where reported metered values are measured
TIME_CREATED	Creation time of the file
UNIT_ID	Name of the unit to which the meter readings relate
EXTERNAL_ID	Sender's identification field limited to max. 20 characters (This can hold SSAC, MPID, transmission node, etc.)
START_TIME	Local start time for an individual reading (which shall be the start of an hour or half-hour)
END_TIME	Local end time for an individual reading (which shall be the start of a half-hour or hour value, one half hour after the start time START_TIME)
MEASURED_QUANTITY	The Measured Quantity in MW.
QUERY_FLAG	Set to 0 normally, or 1 if the reading is the subject of a Data Query
READING_STATUS	This can hold details on whether it was an estimate or actual reading, check or main meter, etc.
NIEP	Non-Interval Energy Proportion factors.
Update Time	Date and time when the database was updated for this submission
Update User	Time at which the record was updated

Note All above tables and fields may change during design.

A Appendix – Meter Data Submission XML Templates

```

<?xml version="1.0" encoding="UTF-8"?>
<IMPORT_METER_REQUEST xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                        xsi:noNamespaceSchemaLocation="MeterData.xsd"
                        MODE="NORMAL"
                        DATE="YYYY-MM-DD"
                        ADMIN_MODE="ACT_AS_MP">
<!-- The ADMIN_MODE attribute use for Market Operator only. The Meter Data
Provider does not need to submit this attribute -->
<!-- The MODE default to NORMAL -->

<METER_DATA_PROVIDER_DATA_TRANSFER>
  <TRANSMISSION_ID></TRANSMISSION_ID>
  <!-- Transmission identifier-->
  <PARTICIPANT_NAME></PARTICIPANT_NAME>
  <!--Participant Name identifier (This is the Short Name)-->
  <START_PERIOD_TIME></START_PERIOD_TIME>
  <!--The 'Start Period Time' date and time stamp format is 'YYYY-MM-
DDThh:mm:ssTZD'.-->
  <END_PERIOD_TIME></END_PERIOD_TIME>
  <!--The 'End Period Time' date and time stamp format is 'YYYY-MM-
DDThh:mmTZD'.-->
  <TIME_CREATED></TIME_CREATED>
  <!--The 'Time Created' date and time stamp format is 'YYYY-MM-
DDThh:mmTZD'.-->
  <ROW num="1">
    <!--One row for each unit-->
    <UNIT_ID></UNIT_ID>
    <!--Unit identifier-->
    <EXTERNAL_ID></EXTERNAL_ID>
    <!--The External identifier is an optional unit reference that can
be set by the sender of the data-->
    <READING num="1">
      <START_TIME></START_TIME>
      <!--The 'Start Time' date and time stamp format is 'YYYY-MM-
DDThh:mmTZD'.-->
      <END_TIME></END_TIME>
      <!--The 'End Time' date and time stamp format is 'YYYY-MM-
DDThh:mmTZD'.-->
      <MEASURED_QUANTITY></MEASURED_QUANTITY>
      <!--The Measured Quantity in MW-->
      <QUERY_FLAG></QUERY_FLAG>
      <!--The Query Flag. Valid values are 1,0-->
      <READING_STATUS></READING_STATUS>
      <!--The Reading Status is to be set by the sender of the data as
per Meter and Grid Code-->
      <NIEP></NIEP>
      <!--The NIEP is to be set by the sender of the data as per T&SC--
> </READING>
    </ROW>
    <TOTAL_UNIT_ROWS></TOTAL_UNIT_ROWS>
    <!--The Total number of Unit Rows-->
    <TOTAL_QUANTITIES></TOTAL_QUANTITIES>
    <!--The sum of all the Measured Quantity values in the file-->
  </METER_DATA_PROVIDER_DATA_TRANSFER>
</IMPORT_METER_REQUEST>

```

B Appendix – Meter Data Response XML Templates

▪ Meter Data Submission Successful Response

```
<?xml version="1.0" encoding="UTF-8"?>
<IMPORT_METER_REQUEST xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"

xsi:noNamespaceSchemaLocation="MeterData.xsd"

SUCCESS="true"

VALIDATION="PASSED">

    <PROCESSING_STATISTICS TRANSACTION_ID="TRANSACTION_ID"
        RECEIVED="RECEIVED_NUM"
        VALID="VALID_NUM "
        INVALID="VALID_NUM "
        TIME_MS="TIME_MS "
        TIME_STAMP=" TIME_STAMP "/>

    <MESSAGES>
        <INFORMATION>Successfully processed the
METER_DATA_PROVIDER_DATA_TRANSFER.</INFORMATION>
    </MESSAGES>
</IMPORT_METER_REQUEST>
```

▪ Meter Data Submission Failed Response

```
<?xml version="1.0" encoding="UTF-8"?>
<IMPORT_METER_REQUEST xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"

xsi:noNamespaceSchemaLocation="MeterData.xsd"

SUCCESS='false'

VALIDATION="FAILED">
    <PROCESSING_STATISTICS TRANSACTION_ID="TRANSACTION_ID"
        RECEIVED="RECEIVED_NUM"
        VALID="VALID_NUM "
        INVALID="VALID_NUM "
        TIME_MS="TIME_MS "
        TIME_STAMP=" TIME_STAMP "/>

    <MESSAGES>
        <ERROR CODE="INVALID" CATEGORY="HARD">
            Processing of the METER_DATA_PROVIDER_DATA_TRANSFER
failed.
        </ERROR>
        <ERROR CODE="INVALID" CATEGORY="HARD">
            The reason for error
            <!-- Examples: -->
            <!-- The submission does not comply with the MeterData
schema -->
        </ERROR>
    </MESSAGES>

    <METER_DATA_PROVIDER_DATA_TRANSFER>
        <MESSAGES>
            <ERROR CODE="COMPLETE" CATEGORY="HARD">
                The reason for error
                <!-- Example: -->
                <!-- The summarized control value, of the tag
MEASURED_QUANTITY, differs from the
                    check sum found in the tag TOTAL_QUANTITY-->
            </ERROR>
            <ERROR CODE="TIME" CATEGORY="HARD">
```

```

        The reason for error
        <!-- Example: -->
        <!-- START_PERIOD_TIME and END_PERIOD_TIME is not
inside same        calendar day -->
        </ERROR>
    </MESSAGES>

    <TRANSMISSION_ID>TRANSMISSION_ID</TRANSMISSION_ID>
    <PARTICIPANT_NAME>PARTICIPANT_NAME</PARTICIPANT_NAME>
    <START_PERIOD_TIME>START_PERIOD_TIME</START_PERIOD_TIME>
    <END_PERIOD_TIME>END_PERIOD_TIME</END_PERIOD_TIME>
    <TIME_CREATED>TIME_CREATED</TIME_CREATED>

    <ROW num="1">
        <MESSAGES>
            <ERROR CODE="INVALID" CATEGORY="HARD">
                The reason for error
                <!-- Example: -->
                <!-- The unit is not valid for Meter Data Provider
in Registration system. -->
            </ERROR>
        </MESSAGES>

        <UNIT_ID>UNIT_ID</UNIT_ID>
        <EXTERNAL_ID>EXTERNAL_ID</EXTERNAL_ID>
        <READING num="1">
            <MESSAGES>
                <ERROR CODE="TIME" CATEGORY="HARD">
                    The reason for error
                    <!-- Example: -->
                    <!-- The END_TIME is not 30 minutes
after the START_TIME. -->
                </ERROR>
            </MESSAGES>
            <START_TIME>START_TIME</START_TIME>
            <END_TIME>END_TIME</END_TIME>

        <MEASURED_QUANTITY>MEASURED_QUANTITY</MEASURED_QUANTITY>
            <QUERY_FLAG>QUERY_FLAG</QUERY_FLAG>
            <READING_STATUS>READING_STATUS</READING_STATUS>
        <NIEP>NIEP</NIEP>
    </ROW>
    <TOTAL_UNIT_ROWS>TOTAL_UNIT_ROWS</TOTAL_UNIT_ROWS>
    <TOTAL_QUANTITIES>TOTAL_QUANTITIES</TOTAL_QUANTITIES>
</METER_DATA_PROVIDER_DATA_TRANSFER>
</IMPORT_METER_REQUEST>

```


C Appendix – Meter Data Response Messages

(Message ID is used internally by java code as key to map text messages)

Message ID	Message
EXTMDP_I_SUB-PASS	Successfully processed the METER_DATA_PROVIDER_DATA_TRANSFER
EXTMDP_E_SUB-FAILED	Processing of the METER_DATA_PROVIDER_DATA_TRANSFER failed.
MIWS_E_DIGITAL-SIGNATURE -INVALID	Digital signature verification failed. It could be due to either an invalid XML or digital certificate/signature issue.
EXTMDP_E_UNMARSHALL	The submission does not comply with the MeterData schema.
EXTMDP_E_DAO	Unexpected error occurred while updating the database. Please contact Market Operator to notify this problem.
EXTMDP_E_VAL_COMPLETE_UNIT_MISMATCH	Meter data set is not complete; mismatch between number of Units, counted by UNIT_ID, and TOTAL_UNIT_ROWS
EXTMDP_E_VAL_COMPLETE_QUANTITY_MISMATCH	The summarized control value, of the tag MEASURED_QUANTITY, differs from the check sum found in the tag TOTAL_QUANTITY.
EXTMDP_E_VAL_COMPLETE_UNIT_MISSING	Meter import is not complete for Meter Data Provider, valid units exists in Registration System that are not included in the meter import.
EXTMDP_E_VAL_READING_NUM_DUPLICATE	The unit should not have duplicate intervals and the <READING.num> must correspond to the relative period in the day.
EXTMDP_E_VAL_UNIT_INVALID	The unit is not valid for Meter Data Provider in Registration system from Start Time to End Time
EXTMDP_E_VAL_UNIT_TRANSMISSION_TYPE_INVALID	The unit is not valid for this Transmission Type.
EXTMDP_E_VAL_START_PERIOD_TIME_INVALID	START_PERIOD_TIME and END_PERIOD_TIME is not inside same calendar day
EXTMDP_E_VAL_START_TIME_INVALID	Not a valid START_TIME, START_TIME is outside the calendar day
EXTMDP_E_VAL_END_TIME_INVALID	The END_TIME is not 30 minutes after the START_TIME
EXTMDP_E_VAL_INTERVAL_INVALID	Request has invalid Daylight Saving Time change
EXTMDP_E_VAL_SORT_INVALID	Request is not sorted correctly
EXTMDP_E_VAL_NIEP_MISSING	NIEP is missing for Supplier Unit.

D Appendix – Tool Kit

A tool kit will be delivered with software to be able to test the web service

— End of Document —