e-distribuzione

SMM ePlus
Requirements
Integration

Version: 2.4

Data: 18/09/2020

Compiled by: Enel Global Infrastructure & Network - Infrastructure and Networks Digital Hub

1

CONTENTS

1. Scope

This document describes the Integration Layer following <mark>standard IEC 61968-9.</mark> These requirements are applicable to SMM ePlus AMI System.

2. Reference

Document Reference:

[1] Ref. 1   IEC 61968-9 II ed.

3. Architecture

The SMM ePlus Integration Layer is based on SOAP Web Services and following standard IEC 61968-9.

An external system could consume the web service with the following advantages:

- External System can decide when to consume the web service.
- External System can require data when it needs it.
- Integration is simpler because SMM ePlus doesn't require to know the architecture or wsdl of the External System.

SMM ePlus could export data and events consuming an external system designed using the standard IEC 61968-9.

The following schemas describe the interaction between an external MDM/System and SMM ePlus.

Provisioning and devices management:

![e-distribuzione logo]
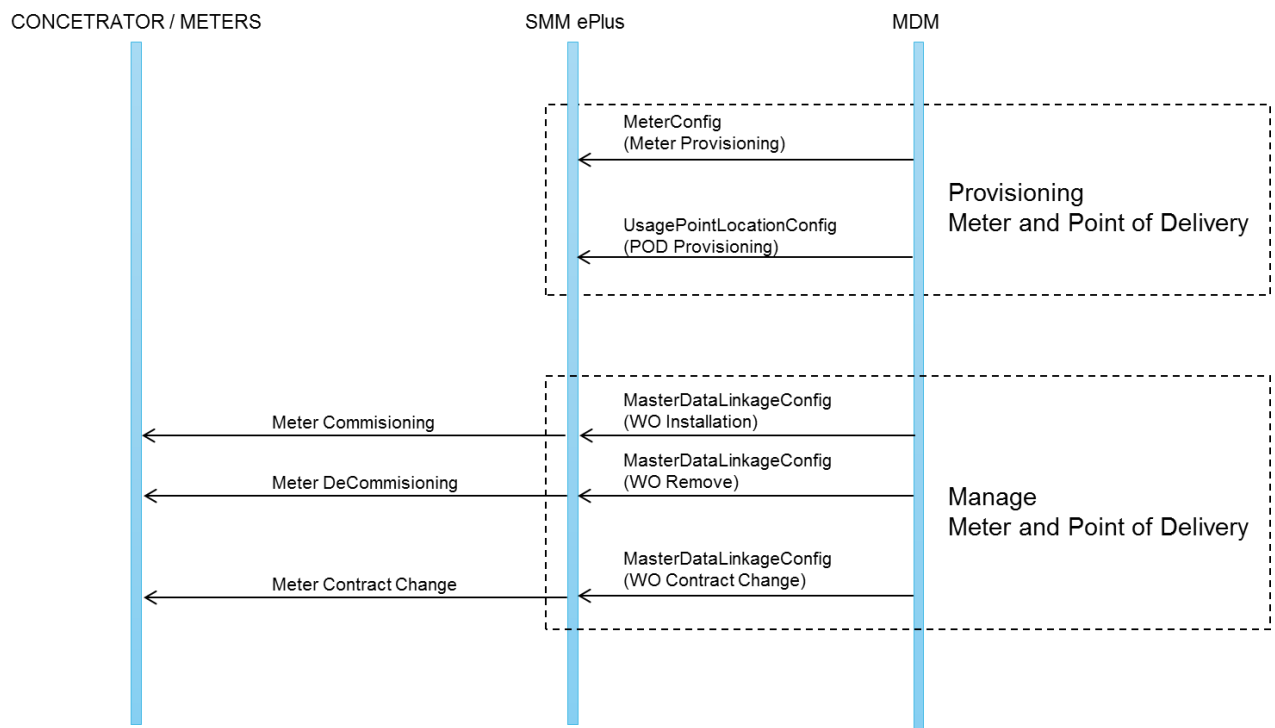
Work Orders and readings operations:
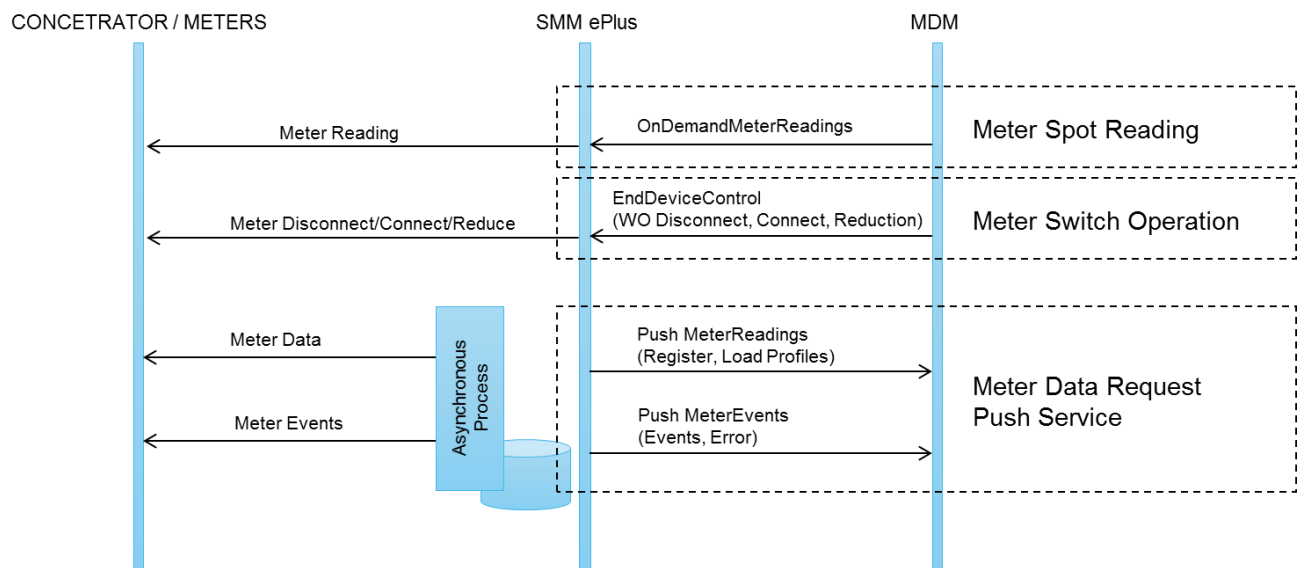
SMM ePlus supports a two-way integration where AMI sends Data and Events to MDM.

In order to have an asynchronous workflow for collected data and events, the SMM ePlus integration service pushed information on a shared cloud stream called Event Hub.

Each Event Hub can be read from one or more consumers.
A consumer only has to subscribe to the stream in order to download the new information as soon as they are available.
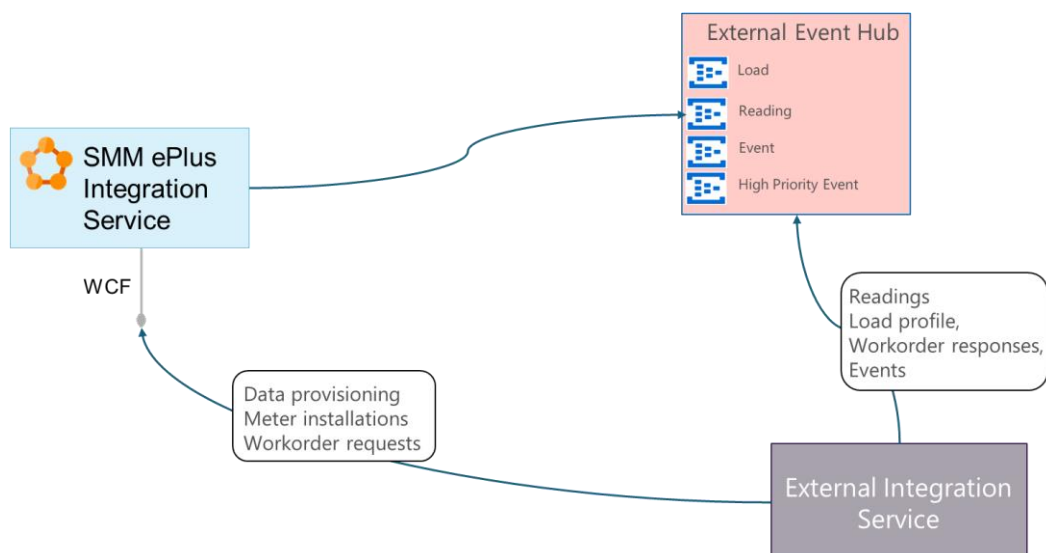
There is a dedicated stream for each kind of data (readings/samples, events/alarms, results fo workorders, ..).

4. Use Cases

This chapter describes the use cases of SMM ePlus Integration Layer.

4.1. Provisioning

This use case provides the roles for a smart meter and POD provisioning.
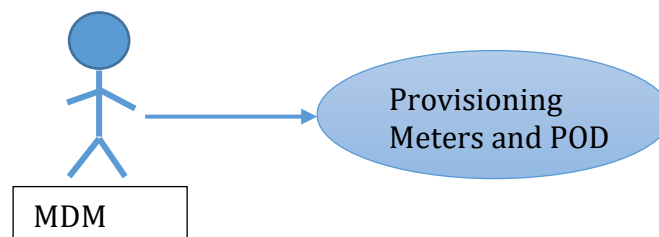
The method involved in this use case are:

- MeterConfig: it is used to communicate the provisioning variation of a meter.
- UsagePointLocationConfig: it is used to communicate the variation of an UsagePoint (Point of Delivery) and related UsagePointLocation.

4.2. Installation

This use case provides the roles for a smart meter installation or removal.
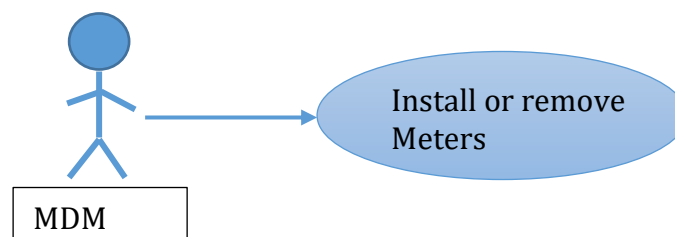
The method involved in this use case are:

- MasterDataLinkageConfig: it is used to communicate the association or disassociation between Meter and UsagePoint using the related identifiers.

4.3. Work Orders

This use case provides the roles for a smart meter work orders execution.
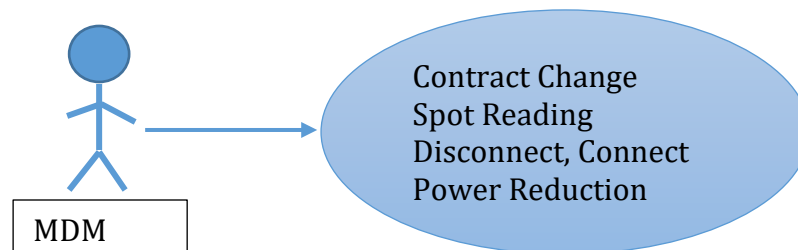
The method involved in this use case are:

- MasterDataLinkageConfig: it is used to communicate the association or disassociation between Meter and Contract Profile, Contract State and Tariff Profile. (Contract Change Work Order)
- OnDemandMeterReadings: it is used to request a synchronous spot reading to the meter. (Reading Work Order)
- EndDeviceControl: it used to request a disconnection, connection or power reduction to the meter. (Disconnection, Connection, Reduction Work Orders)

4.4. Data and Event Push Service

This use case provides the roles for a smart meter data and event [1] push service.
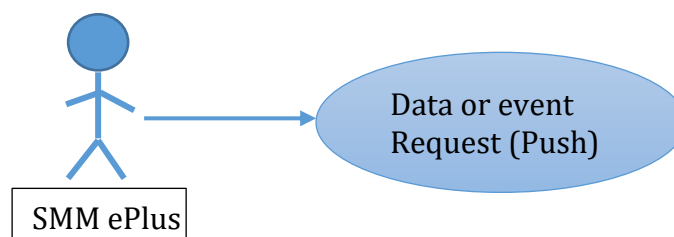
The method involved in this use case are:

- (Receive)MasterReadings: it is used to push the collected readings and load profiles.
- (Receive)MeterEvents: it is used to push the collected evets.

These methods are developed at MDM side following the requirements in this document.

---

[1] Data and events are collected from AMI system with asynchronous and automatic scheduled procedures. The Integration push service allows the AMI system to send data in real time.

5. Interfaces

This chapter describes the interfaces of SMM ePlus Integration Layer.

5.1. General Conventions

The interfaces support two types of date:
- All the timestamp in the header are type *DateTime* with format
  - aaaa-mm-ggThh:mm:ss.f+00:00
- All the effectiveDateTime field are type *DateTime* with format
  - aaaa-mm-ggThh:mm:ss

Related all the other fields are type *String*.

The description of the fields can indicate value marked with *"String"*, in this case the field must to be this value. (Example: Verb → *"create"*)

In this chapter, the fields are marked as follow:
- Mandatory: (M)
- Optional: (O)
- Alternative (At least one of the fields marked like Alternative must exist): (A)

The field Verb in the header supports:
- Verb = create: The 'create' verb is used to publish a request to the master system to create a new object;
- Verb = delete: The 'delete' verb is used to publish a request to the master system to delete one object;
- Verb = change: The 'change' verb is used to publish a request to the master system to change one object (already created);

The Error element of the ResponseMessageType is an array that can contain more than one item, if the related (Method)Config request contains more than one element (Example: MeterConfig creates 2 different Meters).
If the error is related to the missing ID in the request, the Error.Object.Name.name will report this error with the string "Id/name missing at element x" to allow the identification of the x element into the zero-based array in the request.

5.2. WS01 – MeterConfig

The method MeterConfig allows to provisioning meters.

5.2.1. Input – RequestMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	(1) *"create"* (2) *"change"* (3) *"delete"*
Noun	M	*"MeterConfig"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (a GUID)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD (1) "create"		
FIELD	**REQ**	**DESCRIPTION**
MeterConfig.Meter[n].ConfigurationEvents.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been created or deleted (in relation to the verb used)
MeterConfig.Meter[n].Names[0].name	M	Identify of the Meter
MeterConfig.Meter[n].Names[0].NameType.name	M	*"PrimaryName"*
MeterConfig.Meter[n].serialNumber	O	Identify of the board of the Meter
MeterConfig.Meter[n].type	M	Service kind: *"electric"*
MeterConfig.Meter[n].electronicAddress.macAddress	M	NeuronID or MacAdreess of the Meter
MeterConfig.Meter[n].electronicAddress.password	O	Meter access keys could be passed via MeterConfig (also encrypted). The method accepts a String with this format: *"k1:meterkey1;k2:meterkey2; … kn:meterkeyn"* Meter keys must be provided as hex strings
MeterConfig.SimpleEndDeviceFunction[n].FirmwareID	M	Firmware version of the Meter. It is the byte value represented as string (4 bytes = 8 characters)

FIELD	REQ	DESCRIPTION
MeterConfig.SimpleEndDeviceFunction[n].HardwareID	M	Hardware version of the Meter.
PAYLOAD (2) "change"		
FIELD	**REQ**	**DESCRIPTION**
MeterConfig.Meter[n].ConfigurationEvents.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been created or deleted (in relation to the verb used)
MeterConfig.Meter[n].Names[0].name	M	Identify of the Meter
MeterConfig.Meter[n].Names[n].NameType.name	M	*"PrimaryName"*
MeterConfig.Meter[n].serialNumber	A	Identify of the board of the Meter
MeterConfig.Meter[n].electronicAddress.password	A	Meter access keys could be passed via MeterConfig (also encrypted). The method accepts a String with this format: *"k1:meterkey1;k2:meterkey2; … kn:meterkeyn"* Meter keys must be provided as hex strings
MeterConfig.SimpleEndDeviceFunction[n].FirmwareID	A	Firmware version of the Meter. It is the byte value represented as string (4 bytes = 8 characters)

Verb "change" can be used to modify data. The MDM can require a meter software change[2].

PAYLOAD (3) "delete"		
FIELD	**REQ**	**DESCRIPTION**
MeterConfig.Meter[n].ConfigurationEvents.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been created or deleted (in relation to the verb used)
MeterConfig.Meter[n].Names[0].name	M	Identify of the Meter
MeterConfig.Meter[n].Names[0].NameType.name	M	*"PrimaryName"*

5.2.2. Output

See chapter 5.4.1

---

[2] The feature must be supported from the MDM in according with a defined process to provision the software version before the change request.

5.3. WS02 – UsagePointLocationConfig

5.3.1. Input – RequestMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	(1) *"create"* (2) *"change"* (3) *"delete"*
Noun	M	*"UsagePointLocationConfig"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (a GUID)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD (1) "create"		
FIELD	**REQ**	**DESCRIPTION**
UsagePointLocationConfig.UsagePointLocation[n].Names.name	M	Primary Identifier of the UsagePointLocation (Point of Delivery)
UsagePointLocationConfig.UsagePointLocation[n].Names[0].NameType.name	M	*"PrimaryName"*
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.xPosition	M	GPS Latitude
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.yPosition	M	GPS Longitude
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.zPosition	O	Altitude
UsagePointLocationConfig.UsagePointLocation[n].MainAddress.townDetail.name	O	City name where the UsagePointLocation is located
UsagePointLocationConfig.UsagePointLocation[n].MainAddress.townDetail.stateOrProvince	O	Region name where the UsagePointLocation is located
UsagePointLocationConfig.UsagePointLocation[n].MainAddress.townDetail.Country	O	State name where the UsagePointLocation is located

FIELD	REQ	DESCRIPTION
UsagePointLocationConfig.UsagePointLocation[n].MainAddress.streetDetail.addressGeneral	M	Full address of the UsagePointLocation Example: *"Via Roma 1, 20100, Milano"*
UsagePointLocationConfig.UsagePointLocation[n].CustomAttributes[0].name	M	*"RegionTreeName"*
UsagePointLocationConfig.UsagePointLocation[n].CustomAttributes[0].value	M	According with the SMM ePlus region tree definition. Last ring of the chain. Example: *"Santiago"*

PAYLOAD (1) "change"		
FIELD	REQ	DESCRIPTION
UsagePointLocationConfig.UsagePointLocation[n].Names[0].name	M	Primary Identifier of the UsagePointLocation (Point of Delivery)
UsagePointLocationConfig.UsagePointLocation[n].Names[0].NameType.name	M	*"PrimaryName"*
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.xPosition	M	GPS Latitude
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.yPosition	M	GPS Longitude
UsagePointLocationConfig.UsagePointLocation[n].PositionPoints.zPosition	O	Altitude
UsagePointLocationConfig.UsagePointLocation[n].MainAddress.streetDetail.addressGeneral	M	Full address of the UsagePointLocation Example: *"Via Roma 1, 20100, Milano"*
UsagePointLocationConfig.UsagePointLocation[n].CustomAttributes[0].name	M	*"RegionTreeName"*
UsagePointLocationConfig.UsagePointLocation[n].CustomAttributes[0].value	M	According with the SMM ePlus region tree definition. Last ring of the chain. Example: *"Santiago"*

PAYLOAD (1) "delete"		
FIELD	REQ	DESCRIPTION
UsagePointLocationConfig.UsagePointLocation[n].Names[0].name	M	Primary Identifier of the UsagePointLocation (Point of Delivery)
UsagePointLocationConfig.UsagePointLocation[n].Names[0].NameType.name	M	*"PrimaryName"*

5.3.2. Output

See chapter 5.4.1

5.4. WS03 – MasterDataLinkageConfig

5.4.1. Input – RequestMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	(1) *"create"* (2) *"change"* (3) *"delete"*
Noun	M	*"MasterDataLinkageConfig"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (a GUID)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD (1) "create"		
FIELD	**REQ**	**DESCRIPTION**
MasterDataLinkageConfig.ConfigurationEvent.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been installed at the UsagePoint
MasterDataLinkageConfig.Meter[n].Names[0].name	M	Identifier of the Meter
MasterDataLinkageConfig.Meter[n].Names[0].NameType.name	M	*"PrimaryName"*
MasterDataLinkageConfig.UsagePoint[n].Names[0].name	M	Primary Identifier of the UsagePoint
MasterDataLinkageConfig.UsagePoint[n].Names[0].NameType.name	M	*"PrimaryName"*
MasterDataLinkageConfig.PricingStructure[n].Names[0].name	M	Identifier of the Tariff Profile
MasterDataLinkageConfig.PricingStructure[n].Names[0].NameType.name	M	*"PrimaryName"*
MasterDataLinkageConfig.CustomerAgreement[n].Names[0].name	M	Identifier of Contract Profile
MasterDataLinkageConfig.CustomerAgreement[n].Names[0].Nam	M	*"PrimaryName"*

FIELD	REQ	DESCRIPTION
eType.name		
MasterDataLinkageConfig.CustomerAccount[n].Names[0].name	M	Contract State: *"active"* or *"close"*
MasterDataLinkageConfig.CustomerAccount[n].Names[0].NameType.name	M	*"PrimaryName"*

PAYLOAD (2) "change"		
FIELD	**REQ**	**DESCRIPTION**
MasterDataLinkageConfig.ConfigurationEvent.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been installed at the UsagePoint
MasterDataLinkageConfig.Meter[n].Names[0].name	M	Identifier of the Meter
MasterDataLinkageConfig.Meter[n].Names[0].NameType.name	A/M	*"PrimaryName"*
MasterDataLinkageConfig.UsagePoint[n].Names[0].name	A	Primary Identifier of the UsagePoint
MasterDataLinkageConfig.UsagePoint[n].Names[0].NameType.name	A/M	*"PrimaryName"*
MasterDataLinkageConfig.PricingStructure[n].Names[0].name	A	Identifier of the Tariff Profile
MasterDataLinkageConfig.PricingStructure[n].Names[0].NameType.name	A/M	*"PrimaryName"*
MasterDataLinkageConfig.CustomerAgreement[n].Names[0].name	A	Identifier of Contract Profile
MasterDataLinkageConfig.CustomerAgreement[n].Names[0].NameType.name	A/M	*"PrimaryName"*
MasterDataLinkageConfig.CustomerAccount[n].Names[0].name	A	Contract State: *"active"* or *"close"*
MasterDataLinkageConfig.CustomerAccount[n].Names[0].NameType.name	A/M	*"PrimaryName"*

Verb "change" can be used to operate a Change Contract.

WORK ORDER
Change Contract
MasterDataLinkage

MDM — SMM ePlus

PAYLOAD (3) "delete"		
FIELD	REQ	DESCRIPTION
MasterDataLinkageConfig.ConfiguratationEvent.effectiveDateTime	M	Date and time the SMM ePlus shall consider the Meter to have been installed at the UsagePoint
MasterDataLinkageConfig.Meter[n].Names[0].name	M	Identifier of the Meter
MasterDataLinkageConfig.Meter[n].Names[0].NameType.name	M	*"PrimaryName"*
MasterDataLinkageConfig.UsagePoint[n].Names[0].name	M	Primary Identifier of the UsagePoint

Verb "delete" can be used to remove a meter/pod association (Example: removal on failure)

5.4.2.   Output

See chapter 5.4.1

5.5. WS01/WS02/WS03 – Reply

5.5.1. Output – ReplyMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"reply"*
Noun	M	*"MeterConfig", "UsagePointLocationConfig", "MasterDataLinkageConfig"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	SMM ePlus System Identifier
MessageID	M	SMM ePlus Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

REPLY		
FIELD	**REQ**	**DESCRIPTION**
Result	M	"OK" for no errors. "FAILED" for one or more fatal error.
Error[n].code	M	Example "0.3" as simple acknowledge ment
Error[n].@object.objectType	O	Type of the object (Example: "Meter"). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error[n].@object.Name[0].name	O	Id of the object related to the error (Example: identifier of the Meter). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.

17

Error[n].@object.Name[0].NameType.name	O	NameType of the name (Example: "PrimaryName") Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.

5.6. WS04 OnDemandMeterReadings

This method allows the External System to send to SMM ePlus a request of a specific meter reading.
In relation of the implementation used, the response of the requested reading can be sent:
- Synchronously, using the ReceiveMeterReadings method ("push logic")
- Asynchronously, pushing the collected information and the result OK/KO on the shared Event Hubs.

The following schema exemplifies how the process for an OnDemand Reading work order.

e-distribuzione

0.0.15.1.1.1.12.0.0.0.0.0.0.0.0.0.72.0	Total Amount Forward Active Energy (Wh)
0.8.15.1.1.1.37.0.0.0.0.0.0.0.0.0.38.0	Total Maximum Demand Forward (Watt)
0.0.15.13.1.1.3.0.0.0.0.0.0.0.0.0.80.0	Pre-paid credit available

OnDemand Reading

YES   NO   **Generic Error**

Executable?

26.0.0.79	ComModule Generic Error

YES   NO   **Reading Failed**

Executed?

3.21.87.85	Response Reading KO

Reading Execute

3.21.87.30	Response Reading OK

5.6.1. Input – RequestMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"get"*
Noun	M	*"MeterReadings"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (GUID suggested)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD		
FIELD	**REQ**	**DESCRIPTION**
MeterReadings.MeterReading[n].Meter.Names[0].name	A	Unique identifier of the meter for which the reading is being requested.
MeterReadings.MeterReading[n].UsagePoint.Names[0].name	A	Unique identifier of the usage point for which the control function is being requested.
MeterReadings.MeterReading[n].Readings[m].ReadingType.@ref	M	Unique code to specify the types of meter reading (see Chapter 6). The Readings array support a list of ReadingType.@ref in the same request.

5.6.2. Output – ResponseMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"reply"*
Noun	M	*"MeterConfig", "UsagePointLocationConfig", "MasterDataLinkageConfig"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	SMM ePlus System Identifier
MessageID	M	SMM ePlus Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

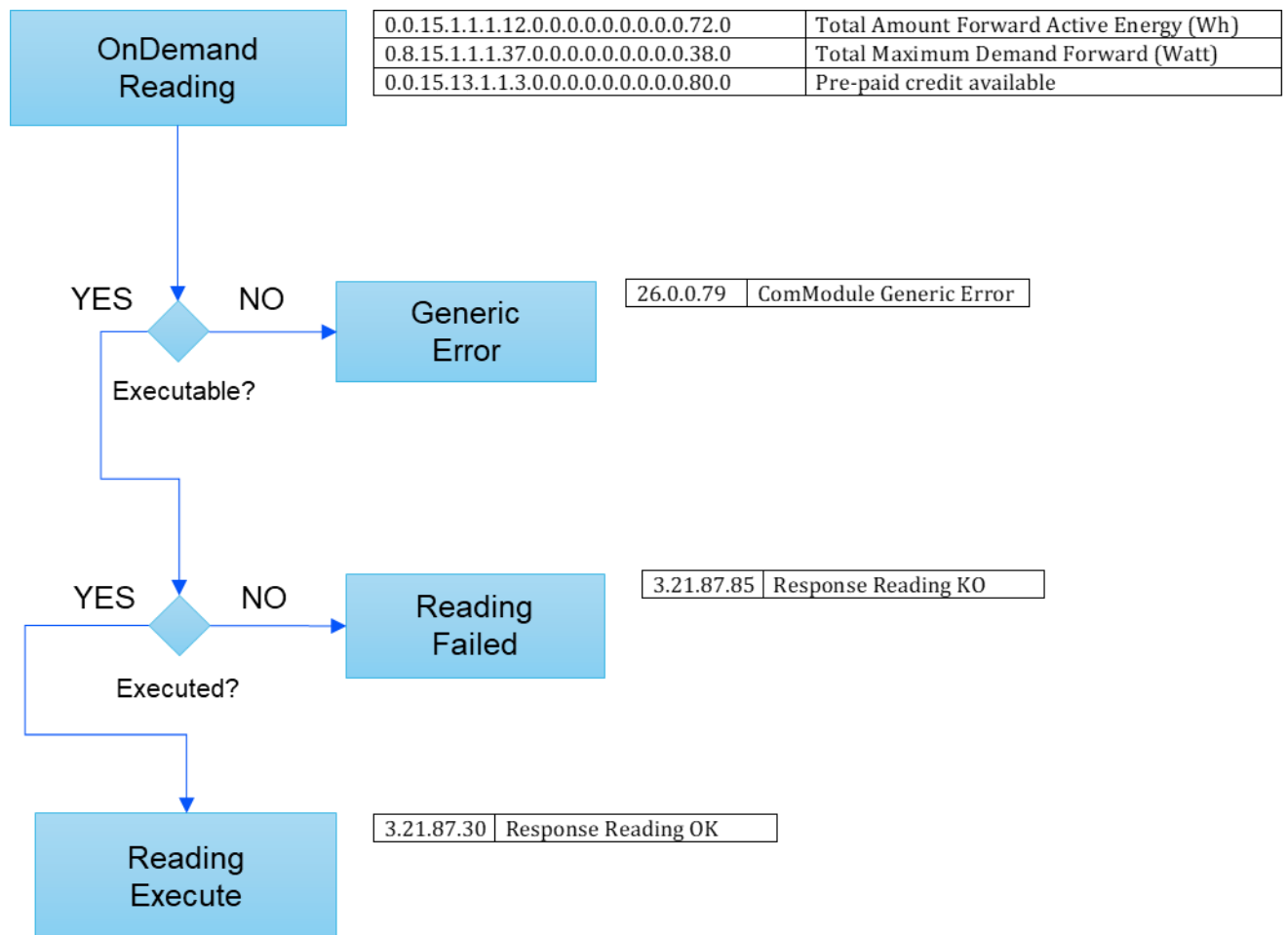| REPLY		
FIELD	**REQ**	**DESCRIPTION**
Result	M	"OK" for no errors. "FAILED" for one or more fatal error.
Error[n].code	M	Example "0.3" as simple acknowledgement
Error[n].@object.objectType	O	Type of the object (Example: "Meter"). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error[n].@object.Name[0].name	O	Id of the object related to the error (Example: identifier of the Meter). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error[n].@object.Name[0].NameType.name	O	NameType of the name: *"MeterReadings"*

e-distribuzione

5.7. WS05 EndDeviceControl

This method allows the External System to send to SMM ePlus a request to:
- open/close the breaker of the meter or reduce the power available
- exclude an outage checking meter reachability
- charge/reduce the credit of meter (prepayment mode)
- enable and configure prepayment mode inside a meter
- disable and configure prepayment mode inside a meter

The following schemas exemplify how the process works:

3.31.6.18	Connect/Reconnect
3.31.6.23	Disconnect
3.31.6.26	Power Reduction
3.26.17.48	Outage Check
3.20.81.30	Credit Charge/Reduction
3.20.81.26	Prepay Configuration
3.20.81.22	Prepay Disable
3.7.83.30	Programmed Configuration [ACM]

26.0.0.79	ComModule Generic Error

3.31.17.67	Connect/Reconnect KO
3.31.17.84	Disconnect KO
3.31.17.221	Power Reduction KO
3.26.17.85	Outage Check KO
3.20.81.85	Credit Charge/Reduction KO
3.20.81.221	Prepay Configuration KO
3.20.81.220	Prepay Disable KO
3.7.83.85	Programmed Configuration [ACM] KO

3.31.17.42	Connect/Reconnect OK
3.31.17.68	Disconnect OK
3.31.17.76	Power Reduction OK
3.26.17.16	Outage Check OK
3.20.81.15	Credit Charge/Reduction OK
3.20.81.76	Prepay Configuration OK
3.20.81.66	Prepay Disable OK
3.7.83.58	Programmed Configuration [ACM] OK

5.7.1.   Input – RequestMessageType

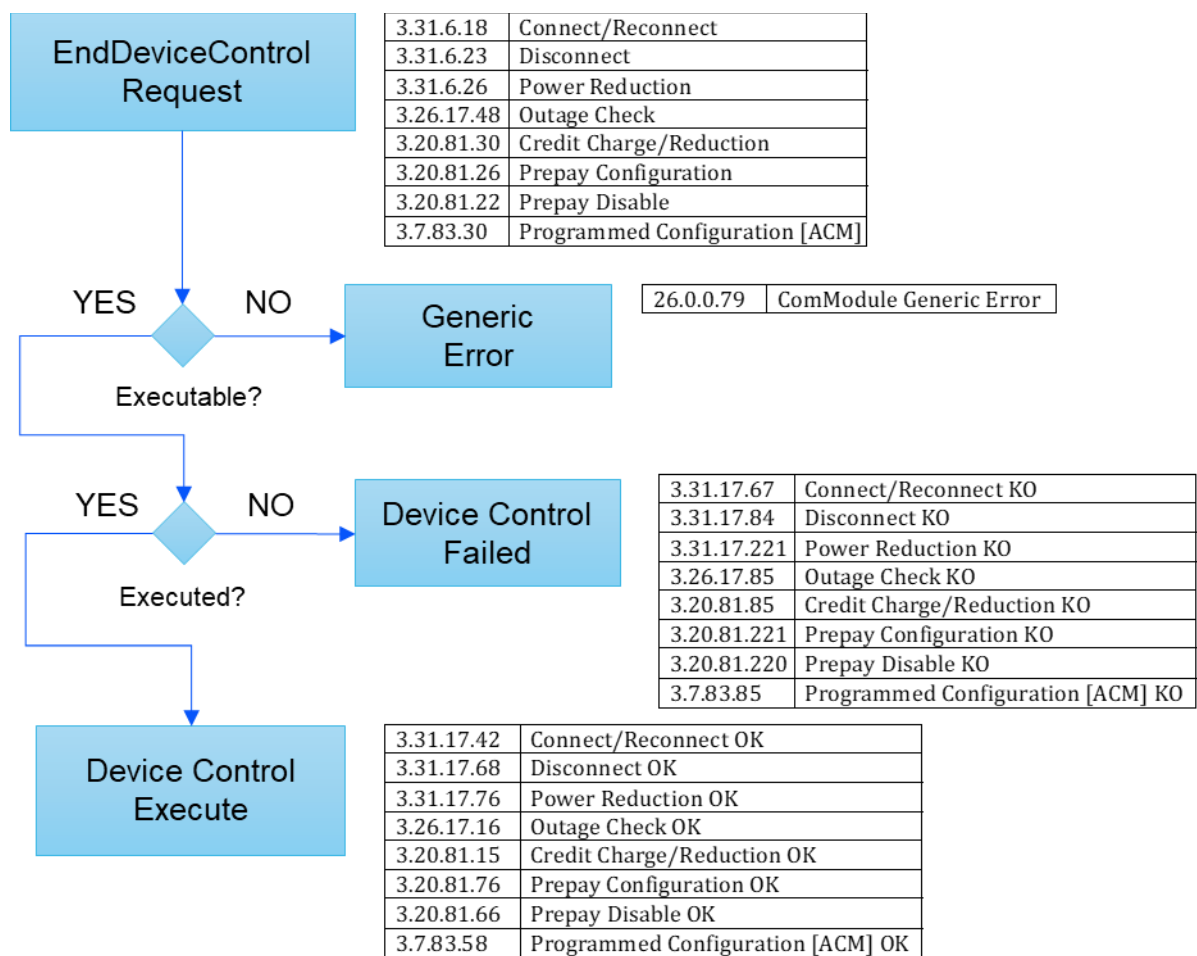| HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"get"*
Noun	M	*"EndDeviceControls"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (a GUID)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD		
FIELD	**REQ**	**DESCRIPTION**
EndDeviceControls.EndDeviceControl[n].EndDevices.Names[0].name	A	Unique identifier of the meter for which the reading is being requested.
EndDeviceControls.EndDeviceControl[n].UsagePoints.Names[0].name	A	Unique identifier of the usage point for which the control function is being requested.
EndDeviceControls.EndDeviceControl[n].EndDeviceControlType.@ref	M	Unique (CIM) code to specify the type of end device control (see Chapter 6.3).
EndDeviceControls.EndDeviceControlType[n].eventOrAction	M	Values: Disconnect → 0 Connect → 100 Reduction → Value in percentage Credit charge / reduction → Value of charge / reduction (Wh) Programmed Configuration [ACM] → Name of script

5.7.2. ResponseMessageType

See chapter 5.6.2

5.8. WSO01 ReceiveMeterReadings

This method allows SMM ePlus to send readings to an External System. This method should be implemented following the WSDL example in the specific document.

ReceiveMeterReadings

5.8.1. Input – MeterReadings

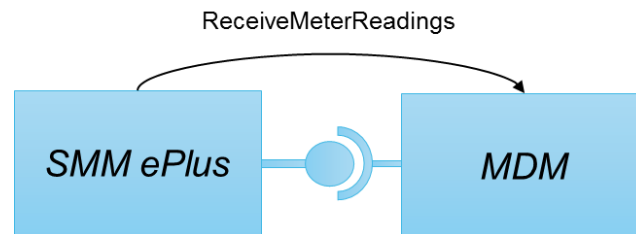| HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"created"*
Noun	M	*"MeterReadings"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	SMM ePlus System Identifier
MessageID	M	SMM ePlus Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD		
FIELD	**REQ**	**DESCRIPTION**
MeterReadings.MeterReading[n].Meter.Names[0].name	A	Unique identifier of the meter from which the readings have been obtained.
MeterReadings.MeterReading[n].UsagePoint.Names[0].name	A	Unique identifier of the usage point from which the readings have been obtained.
MeterReadings.MeterReading[n].Readings[m].ReadingType.@ref	M	Unique code to specify the type of register reading in this sub-block of the payload.
MeterReadings.MeterReading[n].Readings[m].value	M	The value of the reading.
MeterReadings.MeterReading[n].Readings[m].ReadingQualities[0].ReadingQualityType.@ref	M	The "quality" of the reading value. (see Chapter 6)
MeterReadings.MeterReading[n].Readings[m].timeStamp	M	The date/time at which the metered value was observed.

5.8.2. Output – ResponseMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	"reply"
Noun	M	"MeterReadings"
Revision	M	"2.0"
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (GUID suggested)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

REPLY		
FIELD	**REQ**	**DESCRIPTION**
Result	M	"OK" for no errors. "FAILED" for one or more fatal error.
Error[n].code	M	Example "0.3" as simple acknowledgement
Error[n].@object.objectType	O	Type of the object (Example: "Meter"). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error[n].@object.Name[0].name	O	Id of the object related to the error (Example: identifier of the Meter). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error[n].@object.Name[0].NameType.name	O	NameType of the name: *"MeterReadings"*

e-distribuzione

5.9. WSO02 ReceiveEndDeviceEvents

This method allows SMM ePlus to send events to an External System. This method should be implemented following the WSDL example in the specific document.

ReceiveEndDeviceEvents

SMM ePlus → MDM
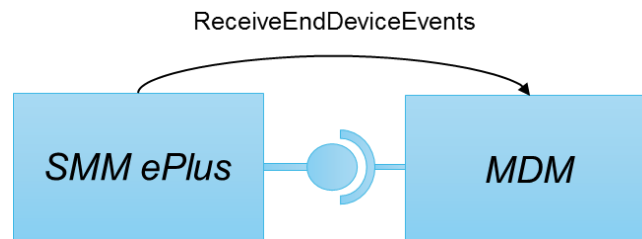
5.9.1. Input – EndDeviceEvent

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"created"*
Noun	M	*"EndDeviceEvents"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	SMM ePlus System Identifier
MessageID	M	SMM ePlus Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

PAYLOAD		
FIELD	**REQ**	**DESCRIPTION**
EndDeviceEvents.EndDeviceEvent.createdDateTime	M	Date and time of the event.
EndDeviceEvents. EndDeviceEvent.EndDeviceEventType.@ref	M	CIM type of event (see Chapter 3)
EndDeviceEvents.EndDeviceEvent.Assets.Names.name	A	Unique identifier of the meter from which the event has been generated.
EndDeviceEvents.EndDeviceEvent.UsagePoint.Names.name	A	Usage Point of the Meter
EndDeviceEvents.EndDeviceEvent.reason	O	Reason data of the events
EndDeviceEvents.EndDeviceEvent.severity	O	From 1 to 5 where 1 equals "Very high" and 5 is "very low"

5.9.2. Output – ResponseMessageType

HEADER		
FIELD	**REQ**	**DESCRIPTION**
Verb	M	*"reply"*
Noun	M	*"EndDeviceEvents"*
Revision	M	*"2.0"*
Timestamp	M	Date and time this message was created
Source	M	External System Identifier (GUID suggested)
MessageID	M	External System Message Identifier
CorrelationID	O	External System Correlation Identifier for allowing request-response correlation

REPLY		
FIELD	**REQ**	**DESCRIPTION**
Result	M	"OK" for no errors. "FAILED" for one or more fatal error.
Error.code	M	Example "0.3" as simple acknowledgement
Error.Object.ObjectType	O	Type of the object (Example: "Meter"). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error.Object.Name.name	O	Id of the object related to the error (Example: identifier of the Meter). Although is marked as Optional, it is mandatory if the error is related to some elements in the payload of the request.
Error.Object.Name.NameType.name	O	NameType of the name: *"MeterReadings"*

6. CIM References

6.1. Quality Code Supported

This chapter describes the supported CIM Code in the quality code.

Attribute #1 – System Identifier		
Code	**Description**	**Comments**
0	None	Not Applicable
1	End Device	
2	Metering System	

Attribute #2 #3 – Category Index		
Category	**Index**	**Description**
0	0	Data Valid
1	0	Diagnostic Flag
1	1	Battery Low
3	1	Cover Opened
3	4	Reverse Rotation
4	0	Alarm Flag
4	7	NotRecording
5	256	DataOutsideExpectedRange
5	257	ErrorCode
5	259	KnownMissingRead
6	0	Faild Generic Validation
10	0	Indeterminate

6.2. MeterReadings Code Supported

This section describes all the CIM Code supported by System. The availability of these codes depends from the implementation, the system configuration and the companies' agreement.

6.2.1. Energy Registry

This chapter describes the Supported CIM Code for energy registries.

Energy Registry	
Code	**Comments**
0.0.15.1.1.1.12.0.0.0.0.0.0.0.0.0.72.0	Total Amount Forward Active Energy (Wh)
0.0.15.1.19.1.12.0.0.0.0.0.0.0.0.0.72.0	Total Amount Reverse Active Energy (Wh)
0.0.15.1.1.1.12.0.0.0.0.0.0.0.0.0.73.0	Total Amount Forward Reactive Energy (varh)
0.0.15.9.1.1.12.0.0.0.0.x.0.0.0.0.72.0	Total Amount Forward Active Energy (Wh) TOU 1-6 (x)
0.0.15.9.1.1.12.0.0.0.0.x.0.0.0.0.73.0	Total Amount Forward Reactive Energy (varh) TOU 1-6 (x)
0.0.15.9.19.1.12.0.0.0.0.x.0.0.0.0.72.0	Total Amount Reverse Active Energy (Wh) TOU 1-6 (x)
0.0.16.1.1.1.12.0.0.0.0.0.0.0.0.0.72.0	Total Amount Forward Active Energy (Wh) Daily Closure
0.0.16.1.19.1.12.0.0.0.0.0.0.0.0.0.72.0	Total Amount Reverse Active Energy (Wh)
0.0.16.1.1.1.12.0.0.0.0.0.0.0.0.0.73.0	Total Amount Forward Reactive Energy (varh) Daily Closure
0.0.16.9.1.1.12.0.0.0.0.x.0.0.0.0.72.0	Total Amount Forward Active Energy (Wh) TOU 1-6 (x) Daily Closure
0.0.16.9.1.1.12.0.0.0.0.x.0.0.0.0.73.0	Total Amount Forward Reactive Energy (varh) TOU 1-6 (x) Daily Closure
0.0.16.9.19.1.12.0.0.0.0.x.0.0.0.0.72.0	Total Amount Reverse Active Energy (Wh) TOU 1-6 (x) Daily Closure

6.2.2. Load Profile

This chapter describes the Supported CIM Code for load profiles.

Energy Load Profile	
Code	**Comments**
0.0.2.4.1.1.12.0.0.0.0.0.0.0.0.0.72.0	15 minute Forward Active Energy (Wh)
0.0.2.4.1.1.12.0.0.0.0.0.0.0.0.0.73.0	15 minute Forward Reactive Energy (varh)
0.0.2.4.1.19.12.0.0.0.0.0.0.0.0.0.72.0	15 minute Reverse Active Energy (Wh)
0.0.2.4.1.19.12.0.0.0.0.0.0.0.0.0.73.0	15 minute Reverse Reactive Energy(varh)
0.0.2.4.1.18.12.0.0.0.0.0.0.0.0.0.73.0	15 minute Forward Capacitive Energy(varh)
0.0.2.4.1.16.12.0.0.0.0.0.0.0.0.0.73.0	15 minute Reverse Capacitive Energy (varh)
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.0.72.0	60 minute Forward Active Energy (Wh)
0.0.7.4.1.1.12.0.0.0.0.0.0.0.0.0.73.0	60 minute Forward Reactive Energy (varh)
0.0.7.4.1.19.12.0.0.0.0.0.0.0.0.0.72.0	60 minute Reverse Active Energy (Wh)
0.0.7.4.1.19.12.0.0.0.0.0.0.0.0.0.73.0	60 minute Reverse Reactive Energy(varh)
0.0.7.4.1.18.12.0.0.0.0.0.0.0.0.0.72.0	60 minute Forward Capacitive Energy(varh)
0.0.7.4.1.16.12.0.0.0.0.0.0.0.0.0.73.0	60 minute Reverse Capacitive Energy (varh)

The time attribute must be chosen according with the configuration of the meters.

6.2.3. Measurands

This chapter describes the Supported CIM Code for measurands load profiles.

Energy Load Profile	
Code	**Comments**
0.0.7.6.0.1.54.0.0.0.0.0.0.0.32.0.151.0	RMS R-line-phase voltage RMS_V(t)
0.0.7.6.0.1.54.0.0.0.0.0.0.0.64.0.151.0	RMS S-line-phase voltage RMS_V(t)
0.0.7.6.0.1.54.0.0.0.0.0.0.0.128.0.151.0	RMS T-line-phase voltage RMS_V(t)
0.0.7.6.0.1.4.0.0.0.0.0.0.0.32.0.5.0	RMS R-line-phase current RMS_I(t)
0.0.7.6.0.1.4.0.0.0.0.0.0.0.64.0.5.0	RMS S-line-phase current RMS_I(t)
0.0.7.6.0.1.4.0.0.0.0.0.0.0.128.0.5.0	RMS T-line-phase current RMS_I(t)
0.0.7.6.0.1.38.0.0.0.0.0.0.0.32.0.65.0	Power factor COS_PHI(t) for R-line-phase
0.0.7.6.0.1.38.0.0.0.0.0.0.0.64.0.65.0	Power factor COS_PHI(t) for S-line-phase
0.0.7.6.0.1.38.0.0.0.0.0.0.0.128.0.65.0	Power factor COS_PHI(t) for T-line-phase
0.0.7.6.0.1.15.0.0.0.0.0.0.0.0.0.150.0	Network fundamental frequency

6.2.4. Maximum Demand Power

This chapter describes the Supported CIM Code for maximum demand power.

Maximum Demand	
Code	**Comments**
0.8.15.1.1.1.37.0.0.0.0.0.0.0.0.0.38.0	Maximum Demand Forward Active (W)
0.8.15.1.19.1.37.0.0.0.0.0.0.0.0.0.38.0	Maximum Demand Reverse Active (W)
0.8.15.1.1.1.37.0.0.0.0.x.0.0.0.0.38.0	Maximum Demand Forward Active (W) TOU 1-6 (x)
0.8.15.1.19.1.37.0.0.0.0.x.0.0.0.0.38.0	Maximum Demand Reverse Active (W) TOU 1-6 (x)
0.8.16.1.1.1.37.0.0.0.0.0.0.0.0.0.38.0	Maximum Demand Forward Active (W) – Previous Period
0.8.16.1.19.1.37.0.0.0.0.0.0.0.0.0.38.0	Maximum Demand Reverse Active (W) – Previous Period
0.8.16.1.1.1.37.0.0.0.0.x.0.0.0.0.38.0	Maximum Demand Forward Active (W) TOU 1-6 (x) – Previous Period
0.8.16.1.19.1.37.0.0.0.0.x.0.0.0.0.38.0	Maximum Demand Reverse Active (W) TOU 1-6 (x) – Previous Period

6.2.5. Quality Data

This chapter describes the Supported CIM Code for quality data.

Quality Data	
Code	**Comments**
24.9.0.1.0.1.54.0.0.0.0.0.0.0.0.0.151.0	(Variation) Minimum Weekly Voltage
24.8.0.1.0.1.54.0.0.0.0.0.0.0.0.0.151.0	(Variation) Maximum Weekly Voltage
24.4.0.3.20.1.137.0.0.0.0.0.0.0.0.0.0	(Variation) KO Weekly Samples
24.12.0.3.20.1.137.0.0.0.0.0.0.0.0.0.0	(Variation) OK Weekly Samples
0.0.0.4.0.1.136.0.0.0.0.0.0.0.0.0.27.0	(Interruption) Voltage Interruption

6.2.6. Prepayment Data

This chapter describes the Supported CIM Code for prepayment data.

Prepayment Data	
Code	**Comments**
0.0.15.13.1.1.3.0.0.0.0.0.0.0.0.-2.80.978	Currency available in Euro for Pre-Paid meter *
0.0.15.13.1.1.3.0.0.0.0.0.0.0.0.-2.80.152	Currency available in Chilean Peso for Pre-Paid meter *
0.0.15.13.1.1.3.0.0.0.0.0.0.0.0.-2.80.32	Currency available in Argentina Peso for Pre-Paid meter *
0.0.15.13.1.1.3.0.0.0.0.0.0.0.0.80.0	Credit available for Pre-Paid meter

*= at the moment SMMePlus does not export currency values

6.3. EndDeviceControl Code Supported

This chapter describes the Supported CIM End Device Control Codes.

End Device Control	
Code	**Comments**
3.31.6.18	Electric Meter Connect or Reconnect Request
3.31.6.23	Electric Meter Disconnect Request
3.31.6.26	Electric Meter Power Reduction Request
3.26.17.48	Electric Meter Outage Check Request
3.20.81.30	Electric Meter Credit Charge/Reduction Request
3.20.81.26	Electric Meter Prepay Configuration Request
3.20.81.22	Electric Meter Prepay Disable Request
3.7.83.30	Electric Meter Programmed Configuration [ACM] Request

6.4. EventType Code Supported

Event Type				
End Device Event Type	**End Device Domain**	**End Device Sub-domain**	**End Device Event or Action**	**Description**
3.18.42.85	Memory	EPROM	Failed	EEPROM Diagnostic
3.18.85.85	Memory	RAM	Failed	RAM Diagnostic
3.18.92.85	Memory	ROM	Failed	FLASH Diagnostic
3.21.67.85	Metrology	Measurement	Failed	Measurer Circiut Diagnostic
3.21.0.85	Metrology	n/a	Failed	Zero Crossing Circuit Diagnostic
3.37.0.85	Watch Dog	n/a	Failed	Watch Dog Alarm
3.12.29.79	Security	Cover	Error	Terminal Cover
3.12.29.212	Security	Cover	Removed	Meter Case Opening
3.12.60.88	Security	I/O	Frozen	Optical Interface Locked
3.2.1.79	Battery	Alarm	Error	Battery Alarm
3.12.32.62	Security	SecurityKey	Unlocked	KP on
3.26.17.43	Power	Status	Corrupted	Consumption with breaker open
3.36.17.85	Clock	Status	Failed	Clock not aligned
3.36.17.79	Clock	Status	Error	CE without temporal reference
3.7.31.24	Config	Data	Changed	Programming
3.20.140.24	Billing	Tariff	Changed	Programming parameter variation
3.20.140.88	Billing	Tariff	Frozen	End billing period
3.0.0.79	n/a	n/a	Error	Generic Error
3.21.87.30	Metrology	Readings	Execute	Meter Reading Response
3.21.87.85	Metrology	Readings	Failed	Meter Reading Response
3.31.17.42	RCDSwitch	Status	Connected	Meter Connect or Reconnect Response
3.31.17.68	RCDSwitch	Status	Disconnected	Meter Disconnect Response
3.31.17.17	RCDSwitch	Status	Confirmed	Meter Connect or Reconnect Response (meter already connected)
3.31.17.76	RCDSwitch	Status	Enabled	Meter Power Reduction

				Response
3.31.17.67	RCDSwitch	Status	ConnectedFailed	Meter Connect or Reconnect Response
3.31.17.84	RCDSwitch	Status	DisconnectedFailed	Meter Disconnect Response
3.31.17.221	RCDSwitch	Status	EnabledFailed	Meter Power Reduction Response
3.31.17.1	RCDSwitch	Status	Aborted	Meter Request Aborted
3.31.17.41	RCDSwitch	Status	Preempted	Meter Connect, Disconnect, Reduction replaced by another activity
3.1.0.85	Communication	n/a	Failed	Communications failure
3.1.0.49	Communication	n/a	Re-established	Communications re-established
3.18.17.88	Memory	Status	Frozen	MNSW Data Segregated
3.23.1.79	Network	Access	Error	MNSW Alarm on comm. Line
3.15.17.22	LoadControl	Status	Disable	MESW Non cut-off funct
26.0.0.79	n/a	n/a	Error	Generic ComDevice Error
3.26.17.16	Power	Status	Closed	Meter Outage Check response
3.26.17.85	Power	Status	Failed	Meter Outage Check response
3.20.81.15	Billing	PrepaymentCredit	Charged	Meter Credit Charged Succesfully
3.20.81.85	Billing	PrepaymentCredit	Failed	Meter Credit Charge Failed
3.20.81.286	Billing	PrepaymentCredit	Limit Reached	Meter Credit Limit Reached (Warning threshold active)
3.20.81.150	Billing	PrepaymentCredit	Limit Reached	MinLimitReached (debt limit threshold reached)
3.20.81.76	Billing	PrepaymentCredit	Enabled	Response Meter Prepay Configuration OK
3.20.81.221	Billing	PrepaymentCredit	EnableFailed	Response Meter Prepay Configuration KO
3.20.81.66	Billing	PrepaymentCredit	Disabled	Response Meter Prepay Disable OK

3.20.81.220	Billing	PrepaymentCredit	DisableFailed	Response Meter Prepay Disable KO
3.20.81.15	Billing	PrepaymentCredit	Charged	Response Meter Credit Charge/Reduction OK
3.20.81.85	Billing	PrepaymentCredit	Failed	Response Meter Credit Charge/Reduction KO
3.7.83.58	Configuration	Program	Succeeded	Response Meter Programmed Configuration [ACM] OK
3.7.83.85	Configuration	Program	Failed	Response Meter Programmed Configuration [ACM] KO
3.26.38.35	Power	Voltage	Invalid	the POV procedure has a positive result (voltage in the output terminals with the main relay open)

6.4.1. Concentrator EventType Code Supported

Event Type				
End Device Event Type	End Device Domain	End Device Sub-domain	End Device Event or Action	Description
10.26.17.85	Collector	Power	Failed	Concentrator Power OFF (Last Gasp spontaneous)
10.26.17.16	Collector	Power	Closed	Concentrator Power ON (Last Gasp spontaneous)

6.5.   Verb Type Supported

This chapter describes the supported CIM Verb Type. There are approximately 15 used defined verbs in the IEC 61968-9 standard. The following table defines the verbs used in this specification.

Verb	Description
create	The 'create' verb is used to publish a request to the master system to create a new object. The master system may in turn publish the new object as an event using the verb 'created'. The master system may also use the verb 'reply' to respond to the 'create' request, indicating whether the request has been processed successfully or not.
change	The 'change' verb is used to publish a request to the master system to make a change to an object based on the information in the message. The master system may in turn publish the changed object as an event using the verb 'changed' to notify that the object has been changed since last published. The master system may also use the verb 'reply' to respond to the 'change' request, indicating whether the request has been processed successfully or not.
reply	There are two primary usages of the 'reply' verb, but in both cases it is only used in response to request messages, whether the pattern used is synchronous or asynchronous. The first usage is to indicate the success, partial success or failure of a transactional request to the master system to create, change, delete, cancel, or close a document. The second usage is in response to a 'get' request, where objects of interest may be returned in the response.
delete	The 'delete' verb is used to publish a request to the master system to delete one or more objects. The master system may in turn publish the closed message as an event using the verb 'deleted' to notify that the object has been deleted since last published. The master system may also use the verb 'reply' to respond to the 'delete' request, indicating whether the request has been processed successfully or not. The 'delete' verb is used when the business object should no longer be kept in the integrated systems either due to error(s) or due to archiving needs. However, the master system will most likely retain a historical record of the object after deletion.
created	The 'created' verb is used to publish an event that is a notification of the creation of a object as a result of either an external request or an internal action within the master system of that object. This message type is usually subscribed by interested systems and could be used for mass updates. There is no need to reply to this message type.

6.6. Error Code Supported

This chapter describes the supported CIM Error.code.

Reply	Code Description
0.1	Partial result (additional results conveyed in separate messages)
0.2	Partial result (no further results to follow)
0.3	Simple acknowledgment
1.5	Mandatory Header elements missing
1.6	Mandatory Request elements missing
1.7	Mandatory Payload elements missing
1.8	Format of request does not validate against schema
1.9	Unsupported message revision in Header
2.4	Invalid Meter(s)
2.5	Invalid Noun
2.6	Invalid ReadingType(s)
2.9	Invalid Verb
2.10	Unsupported ReadingType(s)
2.12	Invalid UsagePoint(s)
2.13	Meter / UsagePoint mismatch
2.14	Invalid Source
2.15	Invalid Request ID(s)
2.16	Invalid ServiceLocation(s)
2.17	Meter / ServiceLocation mismatch*
2.18	ComModule / Meter mismatch*
2.19	Invalid CustomerAccount(s)
2.20	Invalid ServiceSupplier(s)
2.21	CustomerAccount / ServiceSupplier mismatch
2.22	Invalid Customer(s)
2.23	Customer / CustomerAccount mismatch
2.24	Invalid CustomerAgreement(s)
2.25	CustomerAccount / CustomerAgreement mismatch
2.26	CustomerAgreement / UsagePoint mismatch
2.27	CustomerAccount / UsagePoint mismatch
2.28	ServiceSupplier / UsagePoint mismatch
2.29	Object relationship mismatch
2.30	Invalid ComModule(s)
2.31	Invalid ServiceCategory(ies)
2.32	Invalid UsagePointLocation(s)

2.33	Invalid PricingStructure(s)
3.1	Too many items in request
3.2	Too many pending requests
4.1	Request timed out
4.3	Local error in processing
5.1	Unable to process the request - high system activity level
5.2	Unable to process request -transaction not attempted
5.3	Unable to process the request - transaction attempted and failed
5.4	Unable to process the request - multiple error types encountered
5.5	Some or all of the requested ReadingTypes are unavailable in MDMS
5.6	Some or all of the requested ReadingTypes are unavailable in AMI
5.7	Some or all of the requested data is unavailable
5.8	Unable to process the request – mandatory field(s) missing
5.9	Transaction aborted to maintain transactional integrity
6.1	Request canceled per business rule *
6.2	Request placed on hold per business rule
6.3	Request released from business rule hold
6.4	Request rescheduled per business rule
6.5	Request canceled by user
7.1	Temporary authentication failure
7.2	Authentication required
7.3	Authentication mechanism insufficient
7.4	Authentication failure
7.5	Action not authorized for user
7.6	Authentication mechanism requires encryption
7.7	Policy violation

*= this error is returned also when the request has a requested Date too old (more than 1 month)

The standard message envelope also has a single Result value. This should be populated in the following manner:
- "OK" if all portions of the request have been processed without error, and, if applicable, a full set of the requested results is being returned. If "OK" is specified, any Error.codes returned must be informational in nature and not indicate the occurrence of actual error conditions.

- "PARTIAL" if no errors were encountered but only a portion of the requested results is being returned. If "PARTIAL" is specified, any Error.codes returned must be informational in nature and not indicate the occurrence of actual error conditions.
- "FAILED" if any error conditions (excluding informational items that are not true errors) are being reported. If "FAILED" is specified, Error.codes other than "0.*" must be returned along with additional information in the Error portion of the message that characterizes the details of the error condition(s) encountered. Please note that the Error structure of the message may be used to convey data that is informational in nature in addition to information concerning true errors.