Business Requirements

for

Alignment of Metering Configuration Characteristics for a Metering Point

C O N T E N T

A.   About this document

This document is a Business Requirements Specification (BRS) for Alignment of metering configuration characteristics for a Metering Point (MP), a process within the structuring process of the European energy market. In this BRS we use business terms for the actors, and we map them to the terms used in the Harmonised Role Model from ENTSO-E, ebIX® and EFET [2].

In the Harmonised Role Model, a Metering Point may be a Metering Point or an Exchange Point. Since the Exchange Points are included in the metering administration, we use Metering Points and not Accounting Points in this BRS.

The alignment of metering configuration characteristics consists of several sub processes:

- The Meter Administrator administrates the metering configuration characteristics of Metering Points. The metering configuration characteristics is the set of data elements of the metering configuration that is or might be relevant to parties linked to the Metering Point and/or parties that have a consent to receive metering configuration characteristics to fulfil their obligations. These parties are in the rest of this document called Entitled Parties.

- After a change of the metering configuration characteristics (including a change of meter), the Meter Administrator will notify all Entitled Parties to the Accounting Point, such as the Meter Operator and Metered Data Responsible, of the change.

- Entitled Parties can request metering configuration characteristics. It is a prerequisite that the requesting party is authorised, i.e. that the requesting party has a formal responsibility in using the Meter, such as Metered Data Collector, Metered Data Responsible and other parties dependent on national regulations (e.g. Energy Supplier and Grid Company), or an explicit consent from the Customer at the Metering Point. The Request metering configuration characteristics process will return all metering configuration characteristics elements the requesting party may need to fulfil its obligations in the energy market or is consented for.

- It is the Meter Operator that is responsible for the metering configuration characteristics, i.e. being the Content Responsible Party. Hence, he will request the Meter Administrator to change the metering configuration characteristics in the Meter administration when needed.

- The metering configuration characteristics can be requested updated to the Meter Operator by an Entitled Party. The Meter Operator will thereafter request the Meter Administrator to change these characteristics.

    Example:

    o   An Entitled Party can request the Meter Operator to update the address of the Meter. After the Meter Operator has accepted the update, he will request the Meter Administrator to change the metering configuration characteristics.

As a general introduction ebIX® has published a separate document "Introduction to ebIX® Business Requirements and Business Information Models" [4]. The introduction also includes the generic model elements that are not specific for a business process.

In line with UN/CEFACT Modelling Methodology version 2 (UMM-2) ebIX® defines the business requirements before starting the actual modelling. These requirements have been specified by the ebIX® Business Group (EBG) and are the basis for the Business Information Model, which is published in a separate document.

The Business Information Model is in turn the basis for the creation of XML schema's and is the basis for the specification of web services. The Business Information Model and the syntax specific structures are specified by the "ebIX® Technical Committee" (ETC).

A.1.   Comments to the ebIX® model

These Business Requirements, as part of the ebIX® Model for the European Energy Market (see [4]), are made in a project with the members of EBG, see www.ebix.org. For comments to the document please contact the secretary@ebix.org.

A.2.   References

A.2.1.   Standards

[1] UML Profile for UN/CEFACT's Modelling Methodology (UMM), Base Module 2.0, (http://www.unece.org/tradewelcome/un-centre-for-trade-facilitation-and-e-business-uncefact/outputs/technical-specifications/uncefact-modelling-methodology-umm.html);

[2] UML Profile for UN/CEFACT's Modelling Methodology (UMM), Foundation Module 2.0 (http://www.unece.org/tradewelcome/un-centre-for-trade-facilitation-and-e-business-uncefact/outputs/technical-specifications/uncefact-modelling-methodology-umm.html);

[3] The Harmonised Role Model (for the Electricity Market) by ebIX®, ENTSO-E, and EFET (www.ebix.org)

A.2.2.   ebIX® Documents

[4] Introduction to ebIX® Business Requirements and Business Information Models (www.ebix.org)

[5] Recommended Identification Schemes for the European Energy Market (www.ebix.org)

[6] ebIX® code lists (www.ebix.org)

[7] ebIX® BRS for Measure for Determine Meter Read (www.ebix.org)

A.3.   Main changes since last version

Old	New	Clarification	Date
		version 2.0.A	
v1r2B	v2r0A	Recast of document	20200820
		Version 2.1.A	
2.0.A	2.1.A	Addition of Check consent process.	20201019

1. Business Domain View: Alignment of metering configuration characteristics

The metering configuration is defined as the complete setup for metering at a given Metering Point that contains one or more meters.

1.1. Align metering configuration characteristics (Business Process UseCase)
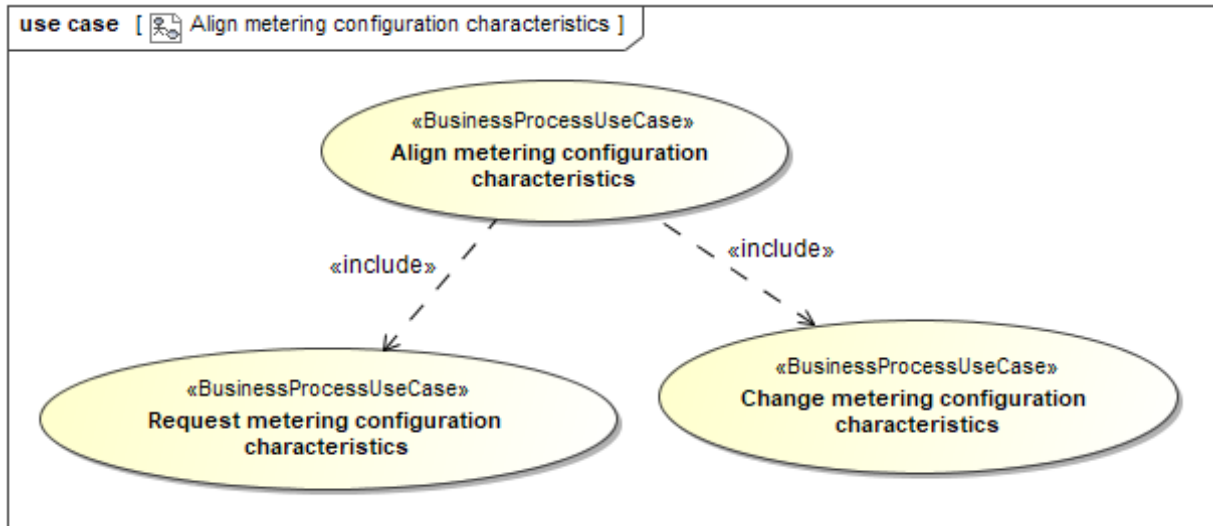
Figure 1 Alignment of metering configuration characteristics

1.1.1. Description

UseCase description: Align metering configuration characteristics	
definition	This is the process where metering configuration characteristics can be requested from the Meter Administrator by an Entitled Party or a change of one or more of the metering configuration characteristics at the Meter administration can be requested by the Content Responsible Party, i.e. Meter Operator. After a change all Entitled Parties are notified of the metering configuration characteristics by the Meter Administrator. The metering configuration characteristics are always related to a Metering Point.
beginsWhen	When an Entitled Party has a need to request metering configuration characteristics, or the Content Responsible Party has a need to change one or more of the metering configuration characteristics.
preCondition	The Meter Operator is responsible for the metering configuration characteristics at this Metering Point.

	The Entitled Party is authorised to request or to request update of the metering configuration characteristics.
endsWhen	When the Entitled Party has received the requested metering configuration characteristics or if there has been changes to the metering configuration characteristics, all Entitled Parties have received the (changed) metering configuration characteristics.
postCondition	The requesting Entitled Party has aligned the metering configuration characteristics, or all Entitled Parties have aligned the (changed) metering configuration characteristics for the Metering Point.
exceptions	None.
actions	Not relevant at this level.

1.1.2. Request metering configuration characteristics (Business Process UseCase)
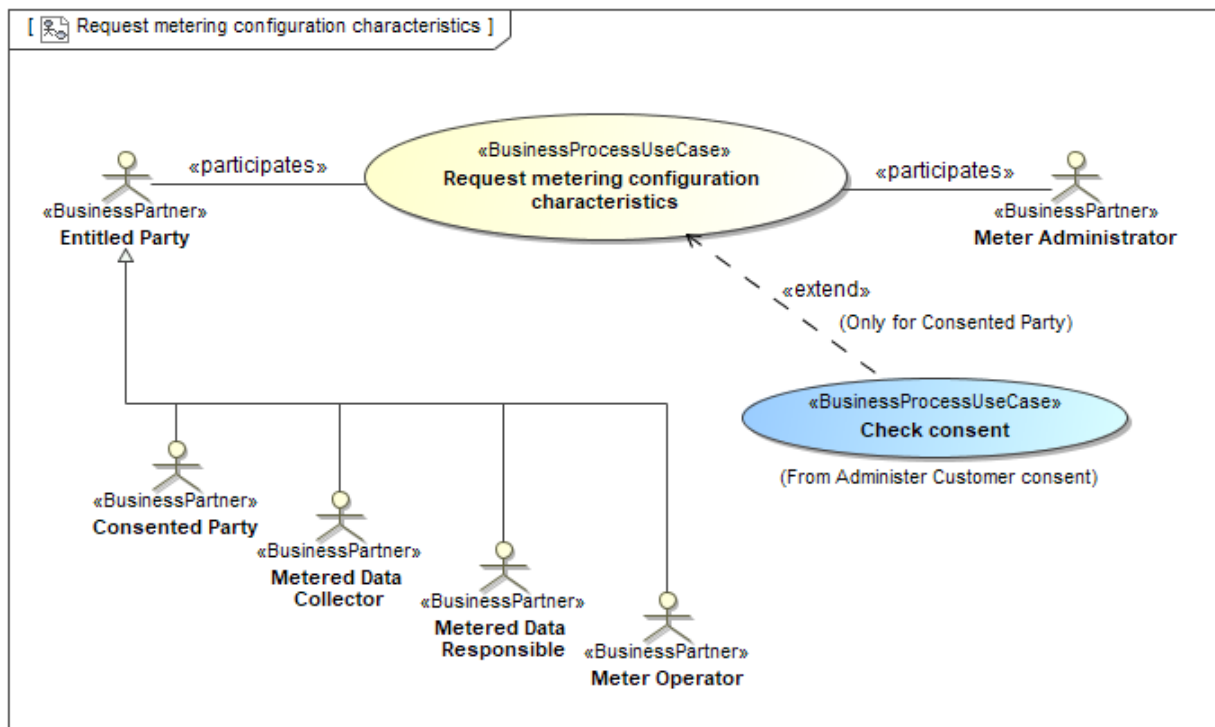
Figure 2 Request metering configuration characteristics

1.1.2.1. Description

UseCase description: Request metering configuration characteristics	
definition	This is the process where an Entitled Party, i.e. [1]: • Consented Party • Metered Data Collector[2] • Metered Data Responsible • Meter Operator can align on request its metering configuration characteristics with the Meter administration. The process is aimed to exchange the relevant set of information for the metering configuration at a Metering Point, including all meters in a Metering Point. For Consented Parties, the validity of the consent is checked before the response is sent.

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[1] The number of Entitled Parties may be increased nationally, e.g. addition of Energy Supplier and Grid Company.
[2] The Metered Data Collector is linked to the Metering Point for practical purposes and may need the Metering configuration characteristics, but is according to the Harmonised Role Model [1], linked to the Register.

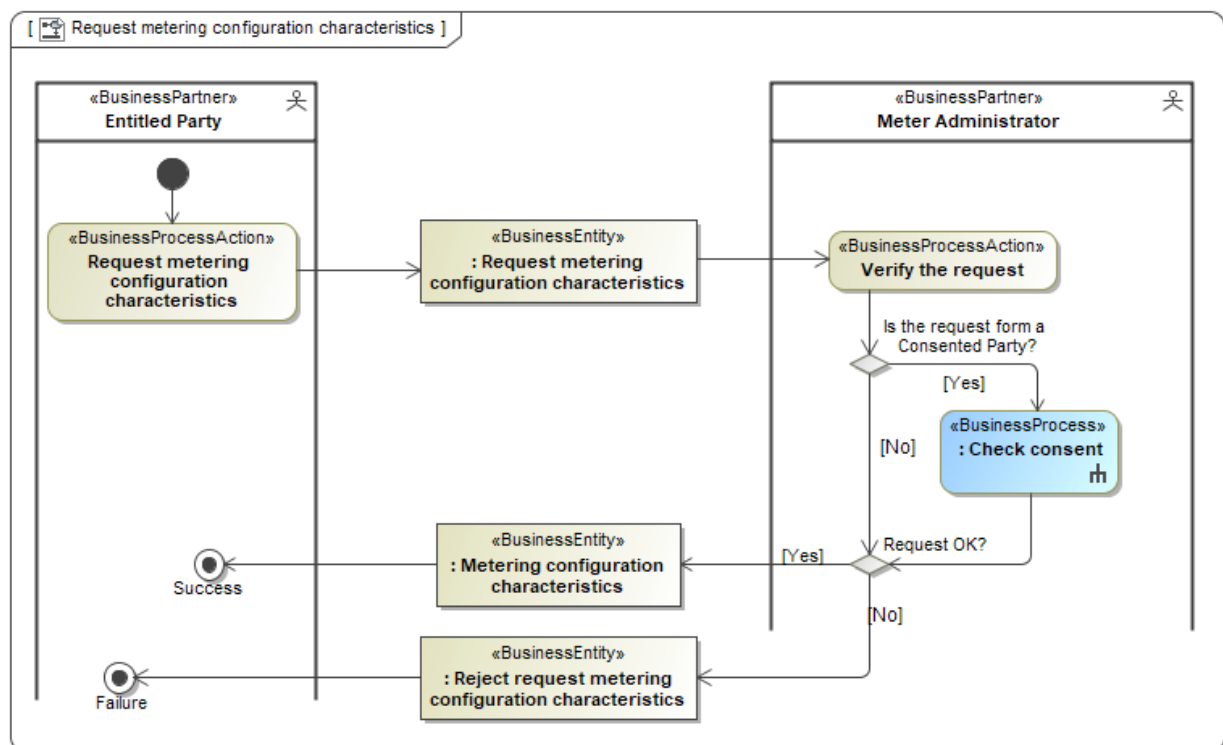| beginsWhen	When the Entitled Party needs to align the metering configuration at a Metering Point.
preCondition	• The Entitled Party is authorised to receive metering configuration characteristics for the Metering Point, either by regulation or by having an explicit consent from the Customer at the Metering Point; • The Entitled Party is known by the Meter Administrator.
endsWhen	When the Entitled Party has received the metering configuration characteristics from the Meter Administrator.
postCondition	The Entitled Party has aligned the metering configuration characteristics for the Metering Point.
exceptions	The request was rejected.
actions	See 1.1.2.2

1.1.2.2.   Business Process

Figure 3 Business Process: Request metering configuration characteristics

1.1.3. Change metering configuration characteristics (Business Process UseCase)

1.1.3.1.   Introduction to the UseCase Change metering configuration characteristics

The UseCase Change metering configuration characteristics can be initiated by the Content Responsible Party, i.e. the Meter Operator, or by another party that is entitled to do so. In the latter case, the UseCase Request **update** metering configuration characteristics is run. Here the Entitled Party requests the Content Responsible Party, i.e. the Meter Operator, to update the requested metering configuration characteristics. After acceptance, this implies the Content Responsible Party will start the UseCase Request **change** metering configuration characteristics.

After a change of metering configuration characteristics, independent on the initiator, the metering configuration characteristics (including the changed characteristics) are notified to all Entitled Parties.
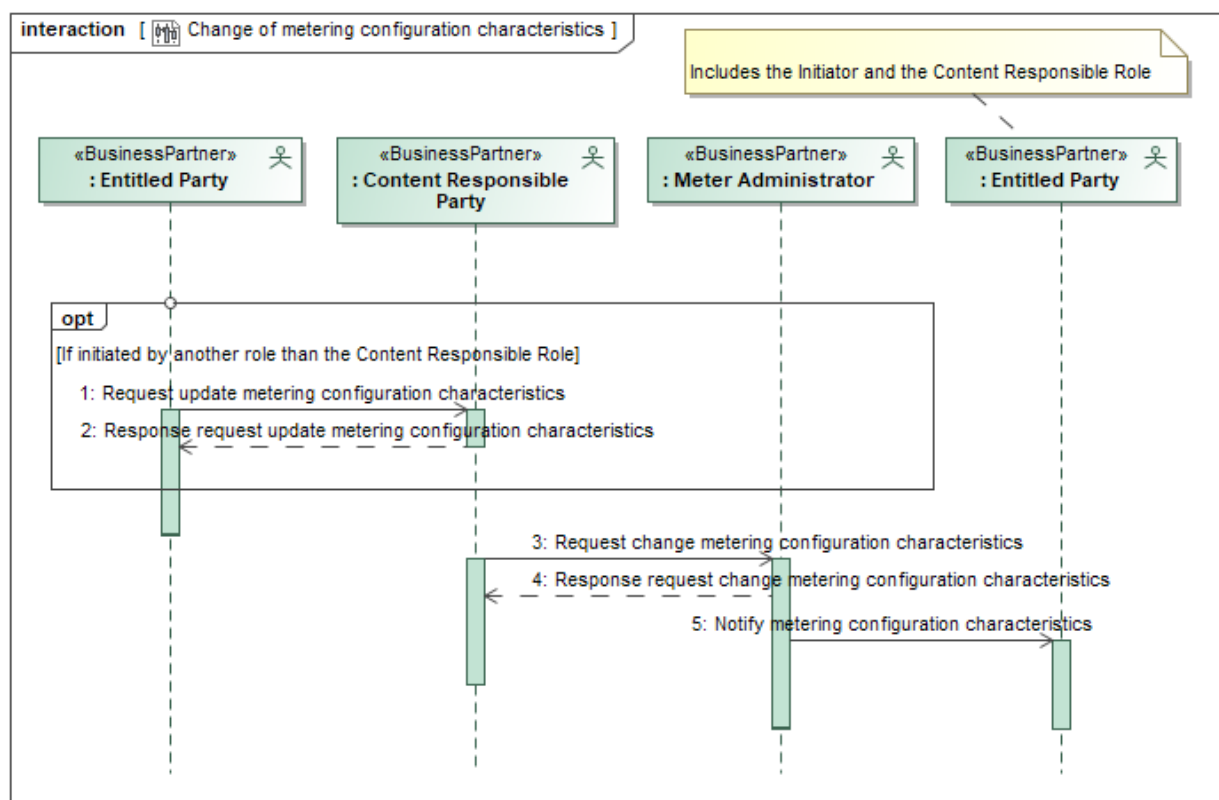

Figure 1 Sequence diagram: Request Change metering configuration characteristics

1.1.3.2. Change metering configuration characteristics (Business Process UseCase)
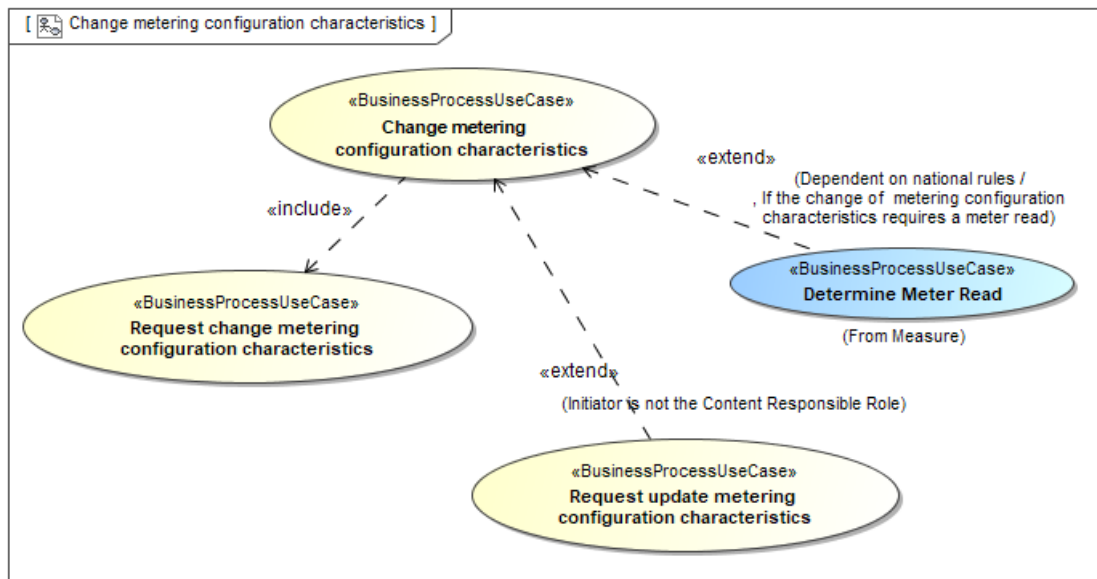

Figure 4 Change metering configuration characteristics

1.1.3.3. Description

UseCase description: Change metering configuration characteristics	
definition	In this process the Content Responsible Party, i.e. the Meter Operator, requests changes to the metering configuration of a Metering Point (including change of meter) in the Meter administration. This could be on a request for update by an Entitled Party. The Meter Administrator makes all necessary changes, including notification of the metering configuration characteristics to the Entitled Parties.
beginsWhen	When the Content Responsible needs to change metering configuration characteristics, or an Entitled Party asks the Content Responsible Party for an update.
preCondition	• The Content Responsible Party is authorised to request change of the metering configuration characteristics of the Metering Point in the Meter administration. • If the process is initiated by an Entitled Party, this party must be authorised to request update of the metering configuration characteristics of the Metering Point.
endsWhen	When the following is fulfilled: • Metering configuration characteristics have been changed in the Meter administration; • All Entitled Parties have been notified about the changed metering configuration characteristics;

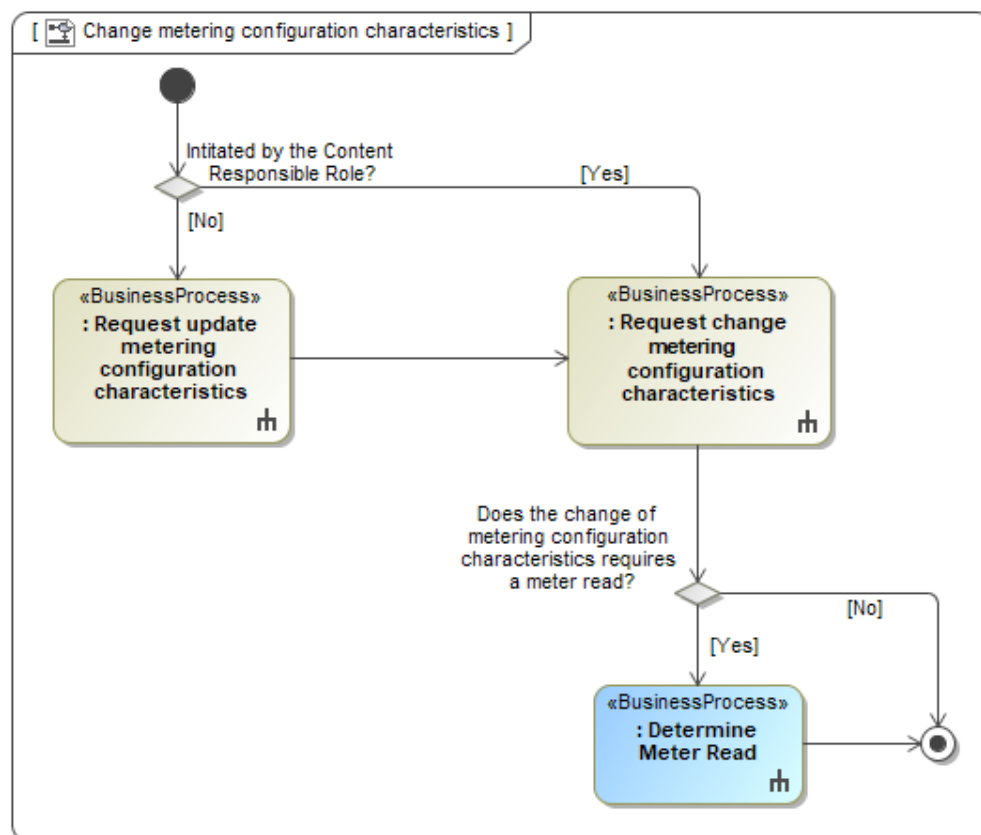|	
	• Meter read has been exchanged, if the change of metering configuration characteristics requires a meter read.
postCondition	All Entitled Parties have aligned the changed metering configuration characteristics for the Metering Point.
exceptions	None.
actions	See 1.1.3.4

1.1.3.4. Business process

Figure 5 Business Process Change metering configuration characteristics

1.1.3.5. Request change metering configuration characteristics (Business Process UseCase)
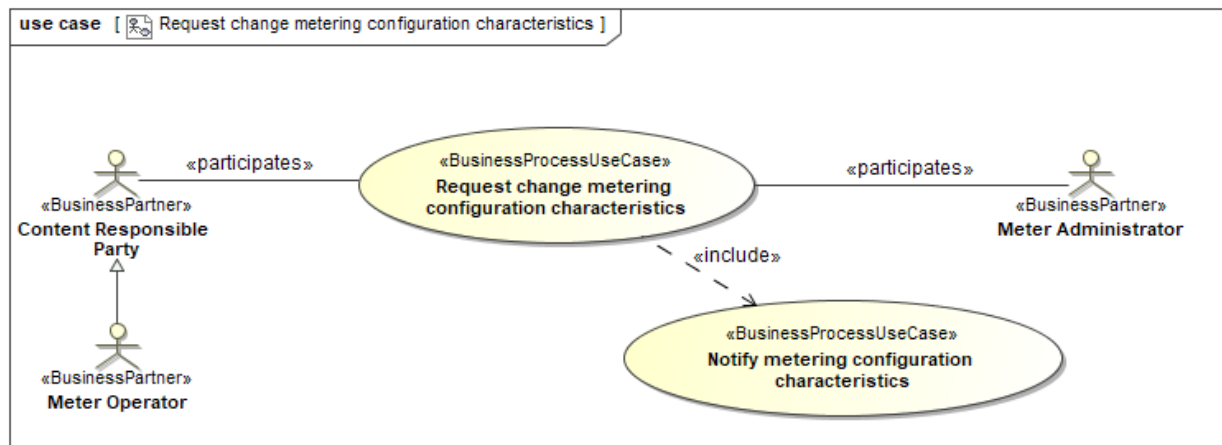

Figure 6 Request Change metering configuration characteristics

1.1.3.5.1. Description

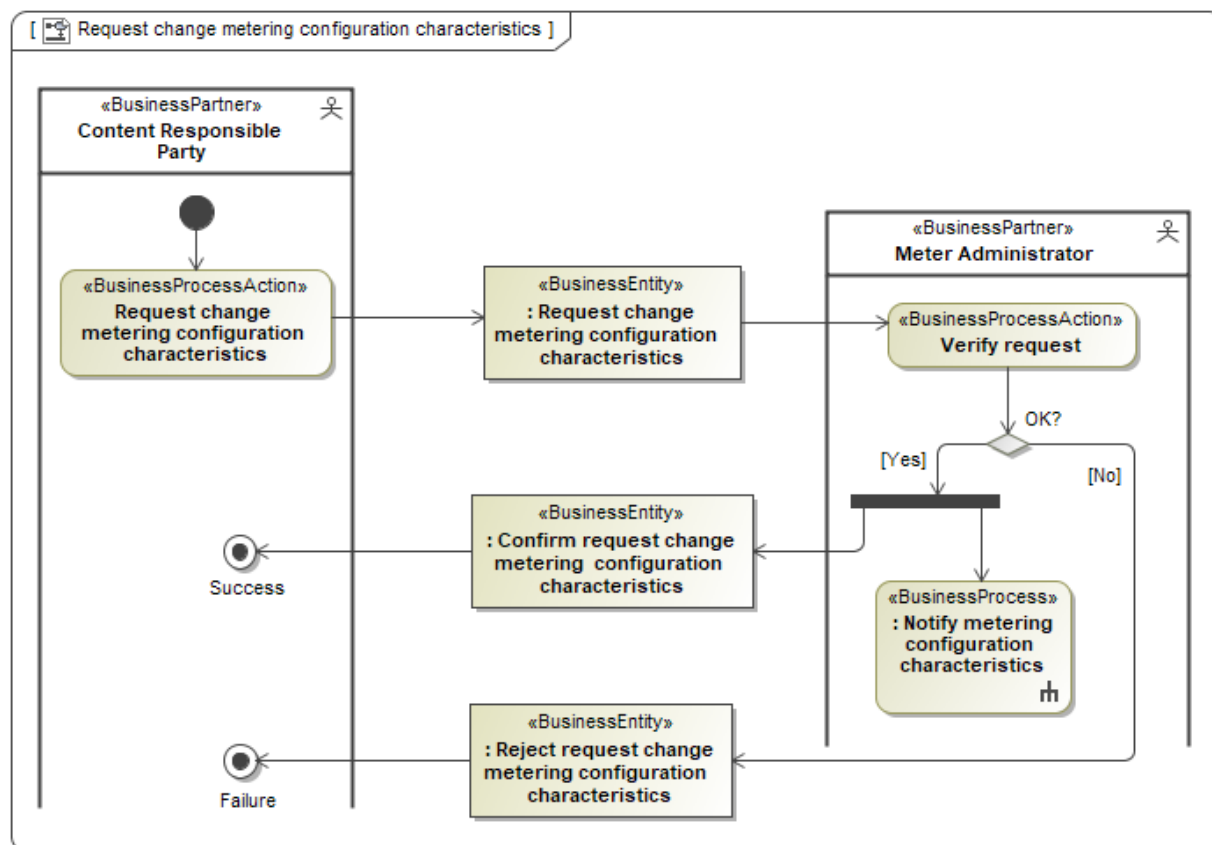| UseCase description: Request change metering configuration characteristics	
definition	In this process the Content Responsible Party, i.e. Meter Operator, requests change of one or more metering configuration characteristics (including change of meter) in the Meter administration with the Meter Administrator, who confirms it.
beginsWhen	The Content Responsible Party has the need to change the metering configuration characteristics.
preCondition	The Content Responsible Party must be authorised to change the metering configuration characteristics at the Metering Point.
endsWhen	When the change of the metering configuration characteristics is confirmed by the Meter Administrator and all Entitled Parties have received a notification of the change.
postCondition	The metering configuration characteristics for the Metering Point have been changed in the Meter administration and all Entitled Parties have aligned the metering configuration characteristics.
exceptions	The request for change of metering configuration characteristics is rejected by the Meter Administrator.
actions	See 1.1.3.5.2

1.1.3.5.2. Business process

Figure 7 Business Process: Request Change metering configuration characteristics

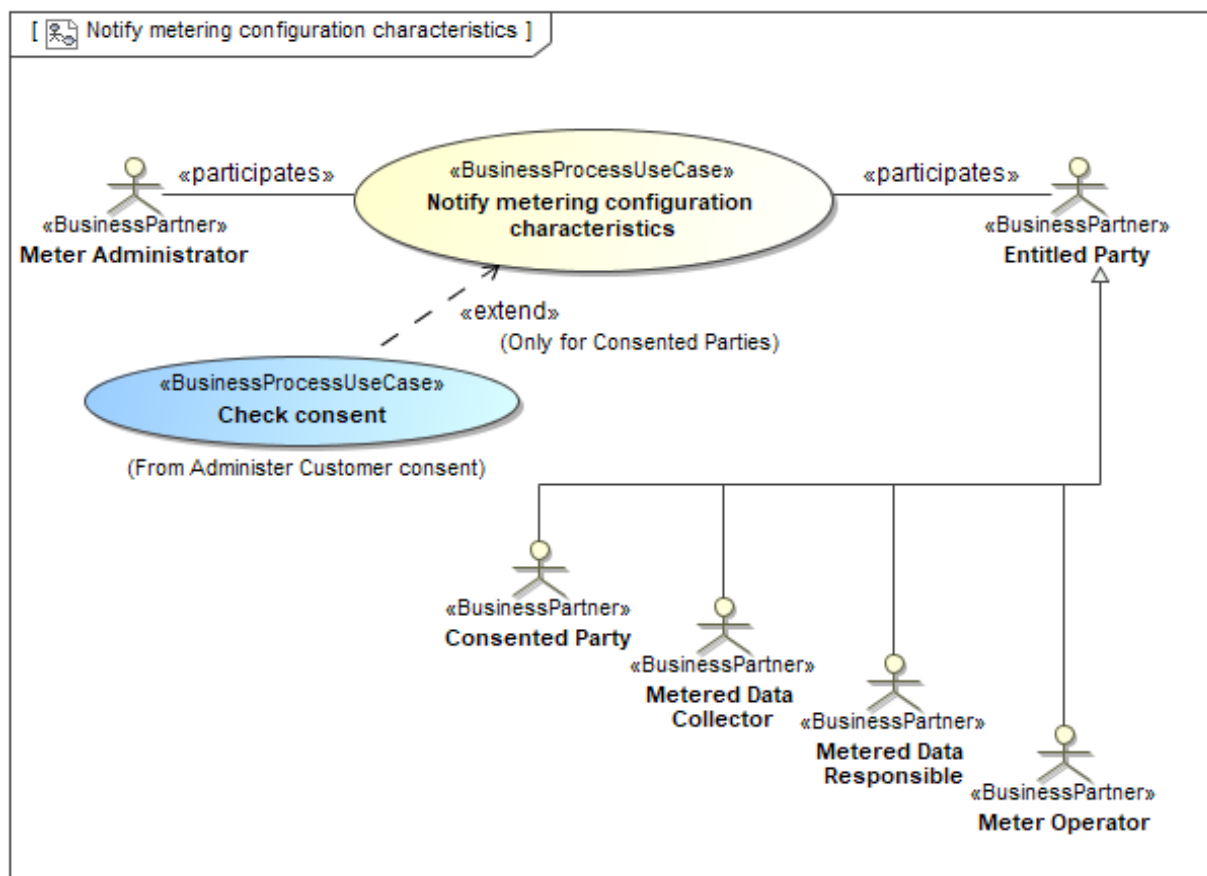### 1.1.3.5.3. Business Domain View: Notify metering configuration characteristics (Business Process UseCase)

Figure 8 Notify metering configuration characteristics

1.1.3.5.3.1. Description

UseCase description: Notify metering configuration characteristics	
definition	In this process, the Meter Administrator distributes metering configuration characteristics to Entitled Parties[3]: • Consented Party • Metered Data Collector[4] • Metered Data Responsible • Meter Operator after update of one or more of these metering configuration characteristics, including change of meter, of a Metering Point.

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[3] The number of Entitled Parties may be increased nationally, e.g. addition of Energy Supplier and Grid Company.
[4] The Metered Data Collector is linked to the Metering Point for practical purposes and may need the Metering configuration characteristics, but is according to the Harmonised Role Model [1], linked through the Register.

|	For Consented Parties, the validity of the consent is checked before the notification is sent.
beginsWhen	When there have been changes to the metering configuration characteristics of the Metering Point. Time constraints are based on national rules.
preCondition	One or more of the metering configuration characteristics of the Metering Point have been changed.
endsWhen	When the Entitled Parties have received the notification.
postCondition	The Entitled Parties have aligned the metering configuration characteristics for the Metering Point.
exceptions	None.
actions	See 1.1.3.5.3.2

1.1.3.5.3.2.   Business Process
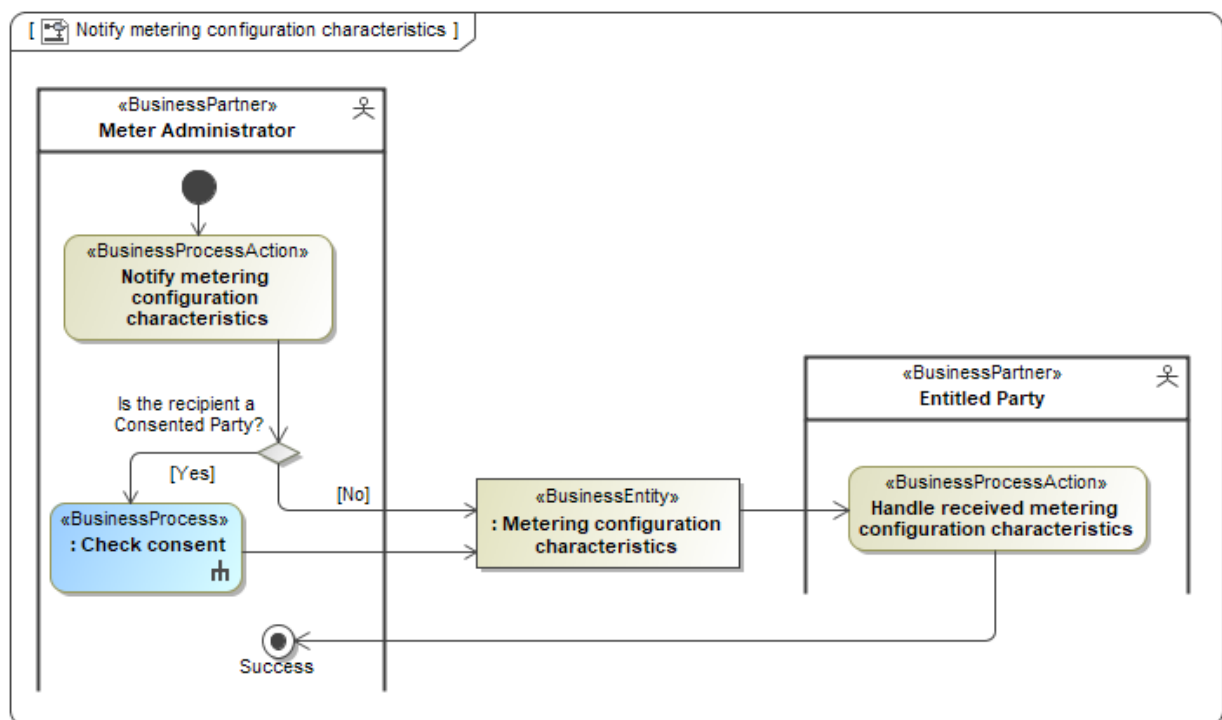
Figure 9 Business Process Notify metering configuration characteristics

1.1.3.6. Request update metering configuration characteristics (Business Process UseCase)
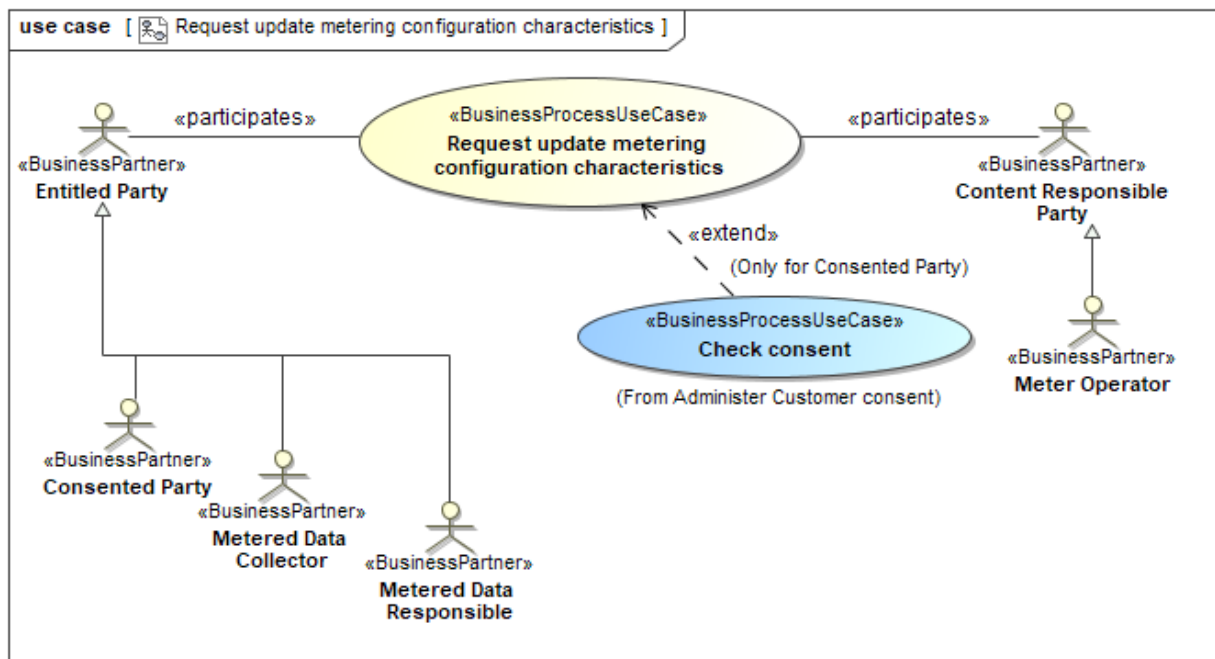

Figure 10 Request update metering configuration characteristics

1.1.3.6.1. Description

UseCase description: Request update metering configuration characteristics	
definition	In this process an Entitled Party, such as[5]: • Consented Party • Metered Data Collector[6] • Metered Data Responsible requests the Content Responsible Party for an update of one or more of the metering configuration characteristics (including change of meter) for a Metering Point it is entitled to update. For Consented Parties, the validity of the consent is checked before the response is sent.
beginsWhen	When the Entitled Party has the need to have the metering configuration characteristics updated (including change of meter) and decides to send a request for update of one or more metering configuration characteristics of the Metering Point to the Content Responsible Party.
preCondition	The Entitled Party must be entitled to request update metering configuration characteristics of the Metering Point.

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[5] The number of Entitled Parties may be increased nationally, e.g. addition of Energy Supplier and Grid Company.
[6] The Metered Data Collector is linked to the Metering Point for practical purposes and may need the Metering configuration characteristics, but is according to the Harmonised Role Model [1], linked through the Register.

| endsWhen	When the request for update of metering configuration characteristics is confirmed.
postCondition	The requested update of metering configuration characteristics has been confirmed by the Content Responsible Party and the process Request change metering configuration characteristics can be triggered.
exceptions	The request update of metering configuration characteristics is rejected.
actions	See 1.1.3.6.2

1.1.3.6.2. Business process
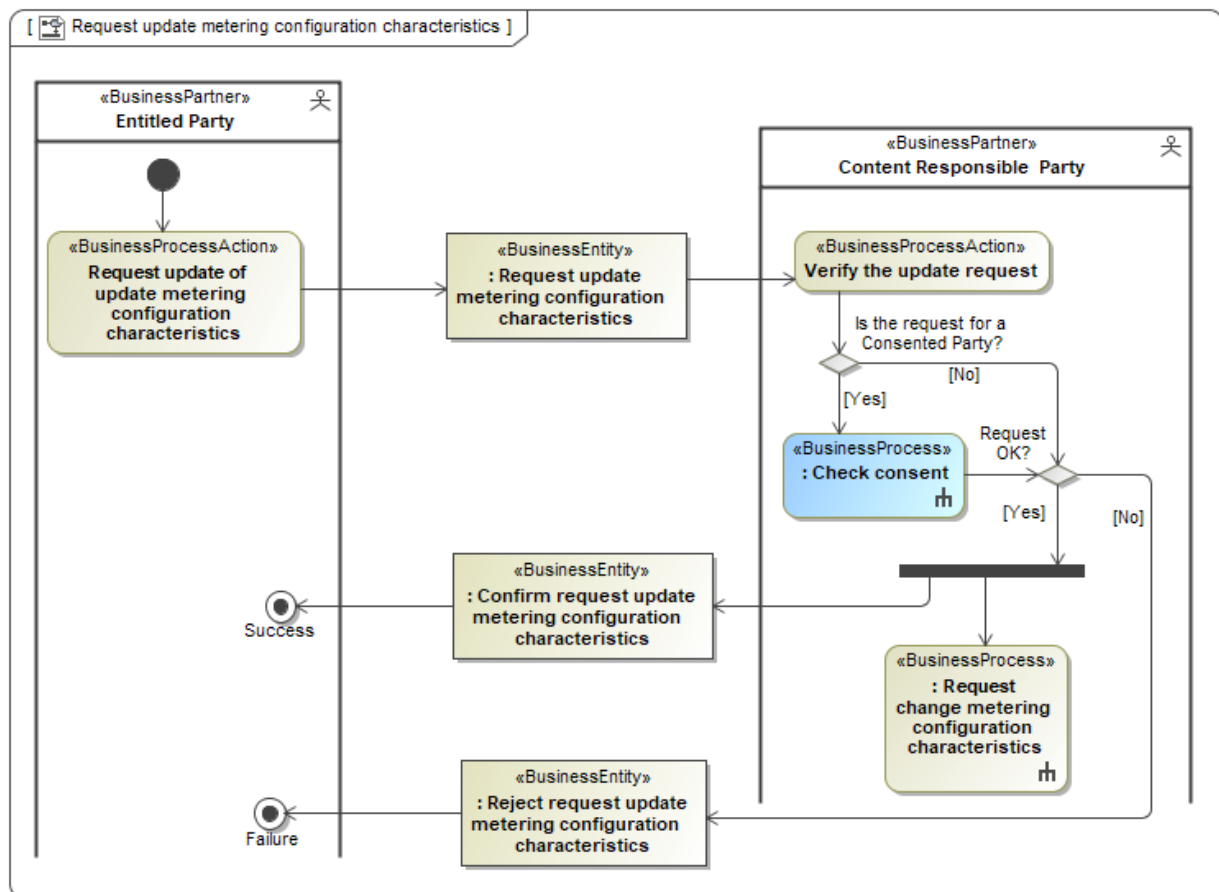
Figure 11 Business Process: Request update metering configuration characteristics

1.1.3.6.3. Determine Meter Read

For some changes in the metering configuration of the Metering Point there may be a need for meter reads. The Process Area *Determine Meter Read* is documented in the ebIX® BRS for Measure for Determine Meter Read (www.ebix.org) [7].

2. Business Partner View

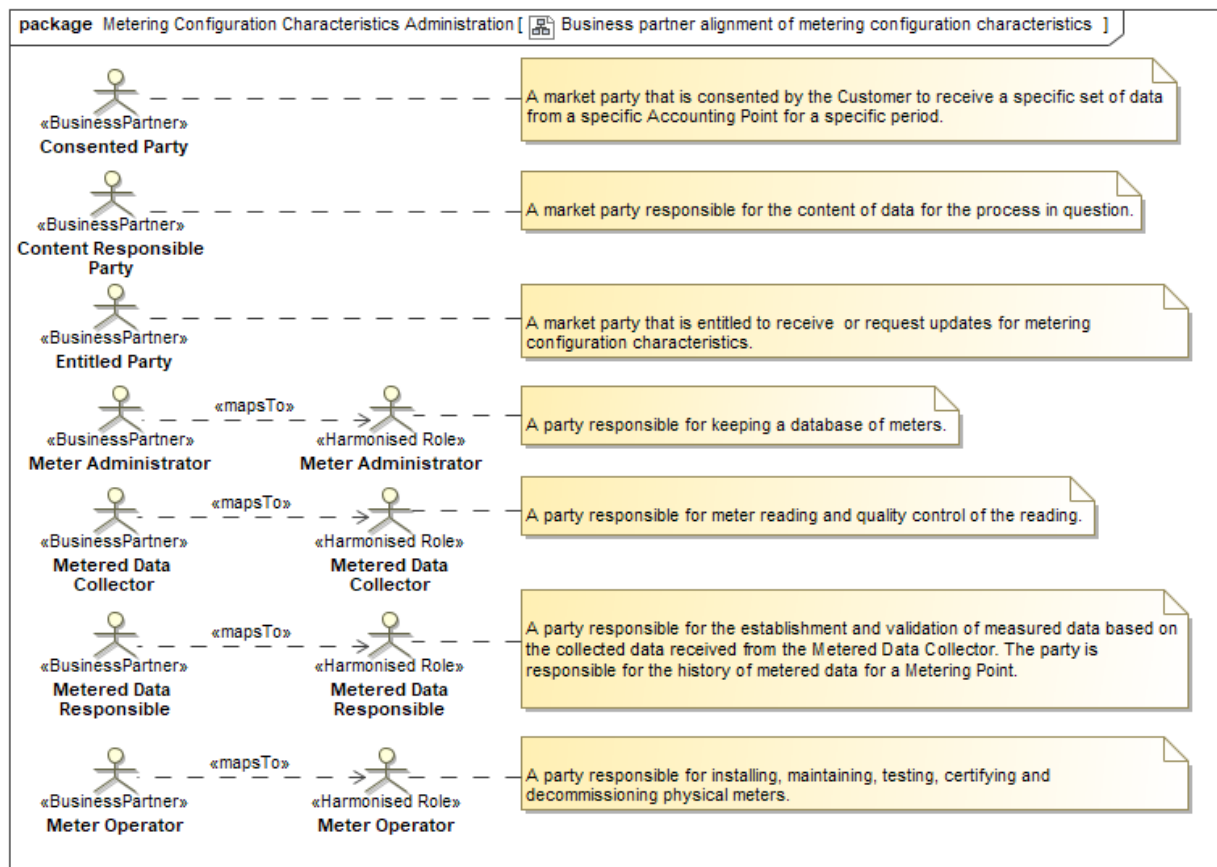## 1.2.   Business Partners for alignment of metering configuration characteristics

Figure 12 Business Partners related to alignment of metering configuration characteristics

3. Business Entity View

A general introduction to the Business Entity View can be found in [4].

1.3.   Metering configuration characteristics (Class Diagram)

Figure 13 Metering configuration characteristics

1.3.1. Element definitions: Metering configuration characteristics

Class/attribute	Sector[7]	Description
«Business entity» Metering configuration characteristics		The information set of metering configuration characteristics of a Metering Point sent by the Meter Administrator to the Entitled Party in response to a request or when notifying metering configuration characteristics after a change in the characteristics. Entitled Parties[8]: • Consented Party • Meter Operator • Metered Data Collector • Metered Data Responsible
Validity start date		The date when the set of metering configuration characteristics for this Metering Point in this business document becomes or became valid.
Snapshot date		The date and time when the set of information was extracted from the Meter administration.
Metering Point ID		The unique identification of the Metering Point of this metering configuration.
Meter Operator ID		The identification of the Meter Operator for this Meter at this Metering Point, which is the party responsible for installing, maintaining, testing, certifying and physically decommissioning this Meter.
«Business entity» Meter		A physical device containing one or more registers.
Meter ID		The unique identification of the Meter.
Type		A code representing the type of the Meter.
Pressure level	Gas	The Pressure level at which the Meter operates at this Metering Point. **Dependency**: • Required if different from "standard low national distribution pressure".
Voltage level	Elec.	The Voltage level at which the Meter operates at this Metering Point. **Dependency**: • Required if different from "standard low distribution voltage (230V/400V)"

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[7] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

[8] The number of Entitled Parties may be increased nationally, e.g. addition of Energy Supplier and Grid Company.

Class/attribute	Sector[7]	Description
Field ID		The unique identification of the Field (as part of the physical Connection of this Metering Point) where this Meter is installed. A Field is a physical entity connecting a Grid to the Installation belonging to a Party Connected to Grid. The Field may contain active objects, such as Transformers, Meters and Fuses. The Field is sometimes referred to as (measure) street in Gas sector, or bay in the electricity sector. **Dependency**: • Only used for complex installations.
Metered data collection method		Indication of the way the Meter is read and thereby indicating the corresponding functionality to access reads. **Dependency**: • Dependent on national rules.
Measurement granularity		The actual measurement intervals of the Meter, such as 15 minutes or monthly. **Dependency**: • Dependent on national rules.
Registers remotely switchable	Elec	Indication that the Meter is remotely switchable between the registers, for example by a tone frequency receiver. **Dependency**: • Dependent on national rules.
Meter technique		A code indicating what kind of technique is used in the Meter. **Dependency**: • Dependent on national rules.
Number of Registers		Number of Registers available in the Meter.
Pressure correction	Gas	Indication whether the Meter corrects measured values for pressure or not. **Dependency**: • Dependent on national rules.
Temperature correction	Gas	Indication whether the Meter corrects measured values for the temperature or not. **Dependency**: • Dependent on national rules.
Altitude correction	Gas	Indication whether the Meter corrects the measured values for altitude or not. **Dependency**: • Dependent on national rules.

Class/attribute	Sector[7]	Description
Conversion factor		A value that specifies a conversion factor for this specific Metering configuration, such as for voltage, current, pressure, temperature. There can be more than one Factor of each Type for a Meter, but only one of each Type.
Type		A code representing the type of Conversion Factor.
Factor		The conversion factor used in the calculation of a volume from the reading of register(s) of this Meter.
Communication gateway[9]		A communication device or service to exchange data between one or more physical equipment, and relevant market parties. It may have additional intelligent functions related to the exchange and/or the data. Examples of intelligent functions: Connection/disconnection, changing resolutions, handling time of use, multiplication of correction factors and other algorithms. Examples of equipment; Meters and Disconnector Switch.
Gateway ID		The unique identification of the Communication Gateway the metering configuration at this Metering Point is communicating through.
Communication protocol[10]		The Type of communication protocol used by this Communication Gateway.

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[9] The Communication Gateway and Gateway Operator are not yet agreed added to the Harmonised Role Model [3];
[10] Power Line Carrier
- Legacy NB-PLC (BPSK, FSK, CHIRP)
  - IEC 61334
- NextGen NB-PLC (OFDM)
  - G3-PLC (ITU-T G.9903)
  - PRIME (ITU-T G9904)
  - IEEE 1901.2

Wireless communication
- xG (Cellular Networks)
  - 2G (FDMA)
    - GSM
    - GPRS
    - EDGE
  - 3G (TDMA/CDMA)
    - UMTS
    - HSPA
    - HSPA+
  - 4G (CDMA)
    - LTE (450MHz/800MHz/1800MHz/2,6GHz)
    - LTE Advanced
  - 5G (CDMA)
- WiMax
- Mobile Networks (CDMA450)

Wired Communications

Class/attribute	Sector[7]	Description
Communication carrier		The Type of carrier, such as PLC, wired or wireless, used to contact the Communication Gateway.
Gateway Operator ID		The identification of the Gateway Operator responsible for this Communication Gateway.
Meter address		The physical address where this Meter is located. **Dependency:** • Dependent on national rules.
City Name		The name, expressed as text, of the city, town or village of this address.
Street Name		The name, expressed as text, of this street or thoroughfare of this address.
Building Number		The number, expressed as text, of the building or house on this street at this address.11
Postcode		The code specifying the postcode of this address.
Room Identification		The identification, expressed as text, of the room, suite, office or apartment as part of this address.
Floor Identification		The identification by name or number, expressed as text, of the floor in the building as part of this address.
Country		The unique identifier of the country for this address (Reference ISO 3166 and UN/ECE Rec 3).
Geographical Coordinates		The set of geographical coordinates of the exact location of this Meter. **Dependency**: • Dependent on national rules
Latitude		The measure of the latitude as an angular distance north or south from the Equator meridian to the meridian of the location of this Meter for its geographical coordinate. (Reference ISO 6709). **Dependency**: • Must be used together with Longitude

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- POTS (Plain Old Telephone Service)
- PSTN (Public Switched Telecommunication Network)
- Ethernet
- PPP
- xDSL
- Fiber Optic (FTTH)

Reference

[1]   B. Sörries: Communication technologies and networks for Smart Grid and Smart Metering, CDG 450 Connectivity Special Interest Group (450 SIG), 2013.

[2]   N. Andreadou, M. Olariaga Guardiola and G. Fulli: Telecommunication Technologies for Smart Grid Projects with Focus on Smart Metering Applications, 2016.

11   The Building Number may include a "Building Number Extension", such as one or more character making the address unique.

Class/attribute	Sector[7]	Description
Longitude		The measure of the longitude as an angular distance east or west from the Greenwich meridian to the meridian of the location of this Meter (Reference ISO 6709). **Dependency**: • Must be used together with Latitude
Altitude	Gas	The measure of the altitude that reflects the vertical elevation of this Meter above a surface for the geographical coordinate of the location of this Meter (Reference ISO 6709).
System		The unique identifier of the reference system used for measuring these geographical coordinates.
Placement Information		Information on how to physically get to the location of the installation where this Meter is installed.
Placement Description		Textual description of the placement (where and how) of this Meter.
Key Information		Textual description of how to get hold of key(s) to get access to this Meter.
<<Business Entity>> Register		A physical or logical counter on this Meter, measuring energy products. **Dependency**: • At least one of Identification, OBIS Code, Meter Time Frame and/or Product must be present • If no OBIS Code, the Product, Direction and Measure Unit are required
Register ID		The unique identification of the Register (at least unique within this Meter).
OBIS code		A coded string to indicate the function of this Register. **Dependency**: • Dependent on national rules
Meter time frame	Elec.	A code specifying the tariff time frame for this Register.
Product		A code specifying a type of product for the quantity measured by this register.
Direction		The direction of the measured energy flow, such as production, consumption or combined.
Number of integer digits		The number of digits in the log of this Register, without decimals.
Number of decimal digits		The number of decimals in the log of this Register.

Class/attribute	Sector[7]	Description
Constant		The multiplication factor for this Register, used to calculate a metric volume or meter read for a meter reading. **Dependency**: • The constant is required if different from 1.
Measure unit		The unit of measure for this Register.
Sustainable energy		An indication of what kind of sustainable energy (in case of production at this Metering Pointy) is measured in this Register. **Dependency**: • Only used for Direction equal to production (E18) or combined (E19) • Dependent on national rules.
Incrementation type		A code showing if this Register provides cumulative readings or volumes between two points in time. **Dependency**: • Dependent on national rules.
Metering configuration characteristics Additions		Additional information related to these metering configuration characteristics, to be agreed on a national level.
Business process ID		The unique identification, given by the Meter Administrator, of this metering configuration characteristics process that this response is part of.
Metering configuration characteristics, Async Additions		Additional information related to these metering configuration characteristics, needed when using asynchronous communication.
Transaction ID		The unique identification of this set of information, given by the Meter Administrator.
Reference to requesting Transaction ID		A reference to the requesting business document, used in the responding business document in a business transaction. **Dependency:** • Only used when responding to a request.

1.4. Request metering configuration characteristics (Class Diagram)

Figure 14 Request metering configuration characteristics

1.4.1. Element definitions: Request metering configuration characteristics

Class/attribute	Sector[12]	Description
«Business entity» Request metering configuration characteristics		The information set to be sent by an Entitled Party, i.e.: • Consented Party • Meter Operator • Metered Data Collector • Metered Data Responsible to the Meter Administrator when requesting metering configuration characteristics for a Metering Point
Entitled Party ID		The unique identification of the party that requests metering configuration characteristics for this Metering Point.
Metering Point ID		The unique identification of the Metering Point, the metering configuration characteristics are requested for.
Request metering configuration characteristics Additions		Additional information, related to this Request metering configuration characteristics, to be agreed on a national level.

[12] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Transaction ID		The unique identification of this set of information, given by the Entitled Party.
Validity date		The date metering configuration characteristics are requested for.
Request metering configuration characteristics Async Additions		Additional information, related to the requested for metering configuration characteristics, needed when using asynchronous communication (however not used in this request).

1.5.   Reject request metering configuration characteristics (Class Diagram)

package [🗂 Reject request metering configuration characteristics]

Reject request metering configuration characteristics Additions
+Transaction ID [0..1]

0..1

Reject request metering configuration characteristics Async additions
+Metering Point ID [1]
+Reference to requesting Transaction ID [0..1]

0..1

Reject request metering configuration characteristics
+Reason : ResponseReasonDescriptionCode [1..*]

«use»

ResponseReasonDescriptionCode

ResponseReasonDescriptionCode
E10{codeName = "Metering point not identifiable"}
E14{codeName = "Other reason"}
E0H{codeName = "Data not available"}
E0S{codeName = "No consent"}
E0T{codeName = "Unauthorised requesting party"}
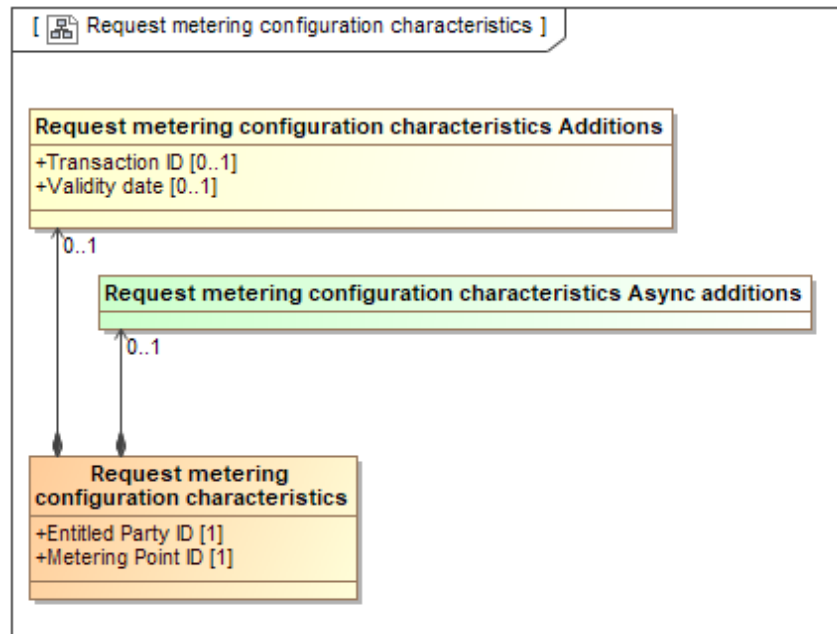...

Figure 15 Reject request metering configuration characteristics

1.5.1. Element definitions: Reject request metering configuration characteristics

Class/attribute	Sector[13]	Description
«Business entity» Reject request metering configuration characteristics		The information set sent from the Meter Administrator to the requesting Entitled Party, i.e.: • Consented Party • Meter Operator • Metered Data Collector • Metered Data Responsible when rejecting a request metering configuration characteristics.
Reason		A code specifying (one of) the reason(s) for the rejection of the Request metering configuration characteristics.

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[13] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Reject request metering configuration characteristics Additions		Additional information related to rejecting the request for metering configuration characteristics, to be agreed on a national level.
Transaction ID		The unique identification of this set of information given by the Meter Administrator.
Reject request metering configuration characteristics Async Additions		Additional information, related in the rejection of the request for metering configuration characteristics needed when using asynchronous communication.
Metering Point ID		The unique identification of the Metering Point the metering configuration characteristics were requested for.
Reference to requesting Transaction ID		The Transaction ID from the request, where this is the response for, given by the requesting Entitled Party.

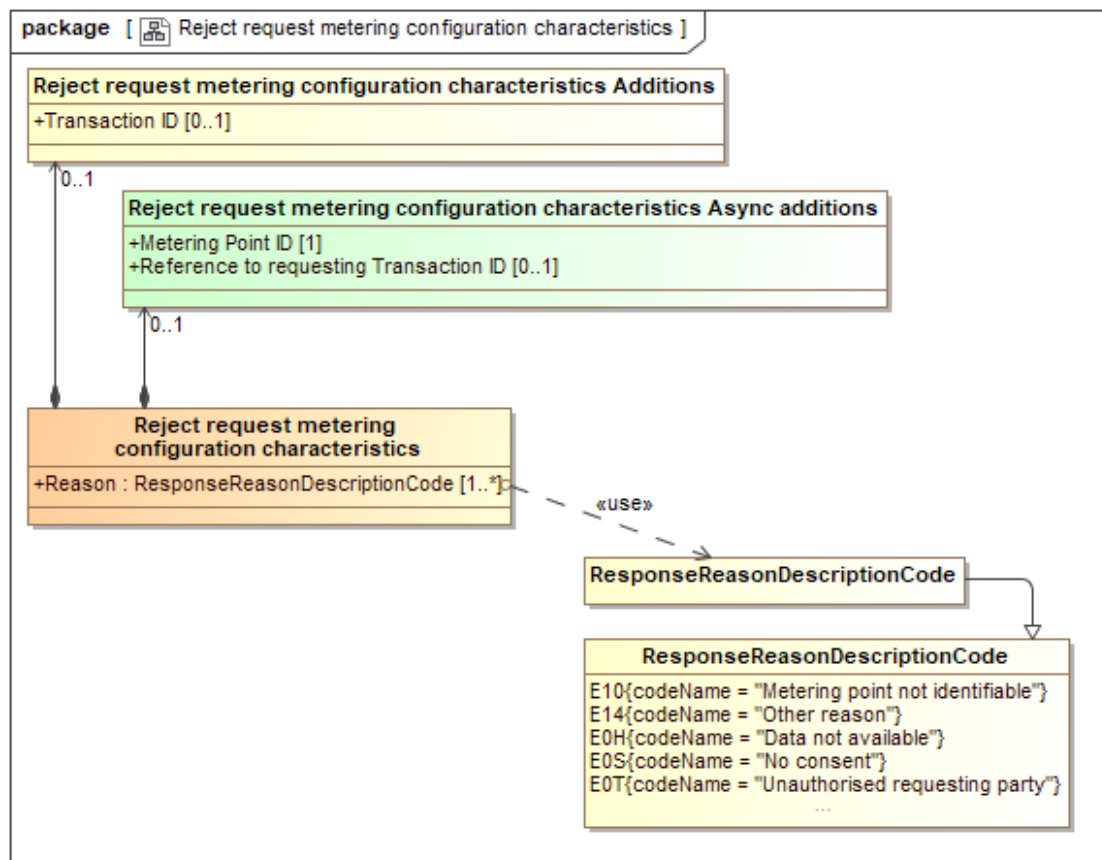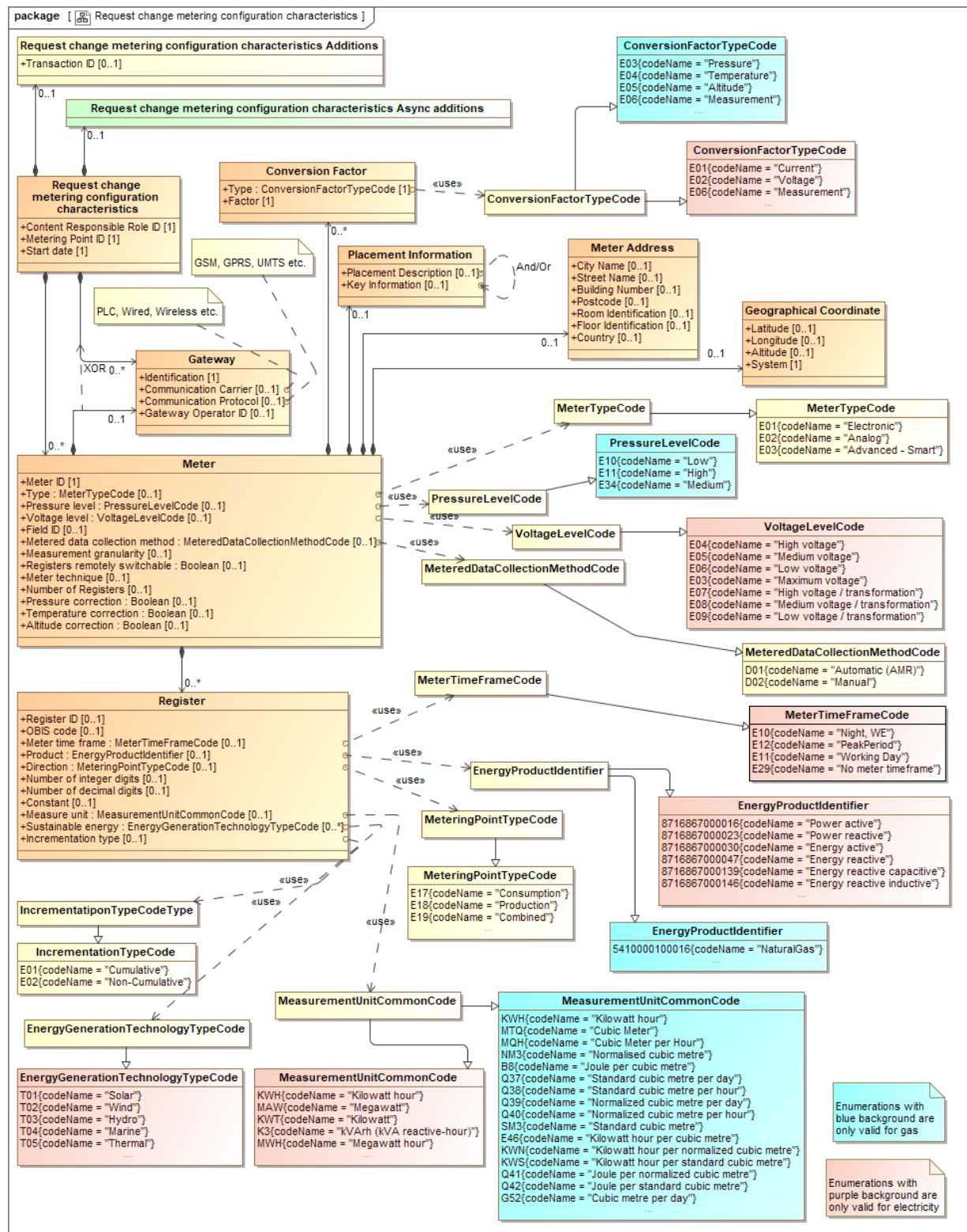## 1.6. Request change metering configuration characteristics (Class Diagram)

Figure 16 Request change metering configuration characteristics

1.6.1. Element definitions: Request change metering configuration characteristics

Class/attribute	Sector [14]	Description
«Business entity» Request change metering configuration characteristics		The information set of metering configuration characteristics in a Metering Point sent by the Content Responsible Party (Meter Operator) to the Meter Administrator when requesting change of metering configuration characteristics.
Content Responsible Party ID		The unique identification of the Content Responsible Party that requests change metering configuration characteristics.
Metering Point ID		The unique identification of the Metering Point of the metering configuration characteristics.
Start date		The date when the metering configuration characteristics for this Metering Point in this business document become or became valid.
«Business entity» Meter		A physical device containing one or more registers.
Identification		The unique identification of the Meter.
Type		A code representing the type of Meter.
Meter Operator ID		The identification of the Meter Operator for this Meter, which is the party responsible for installing, maintaining, testing, certifying and physically decommissioning this Meter.
Pressure Level	Gas	The Pressure level at which the Meter operates **Dependency**: Required if different from "standard low national distribution pressure".
Voltage Level	Elec.	The Voltage level at which the Meter operates. **Dependency**: Required if different from "standard low distribution voltage (230V/400V)"

[14] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector 14	Description
Field ID		The unique identification of the Field (as part of the Connection) where this Meter is installed. A Field is a physical entity connecting a Grid to the Installation belonging to a Party Connected to Grid. The Field may contain active objects, such as Transformers, Meters and Fuses. The Field is sometimes referred to as (measure) street in Gas sector, or Bay in the electricity sector. **Dependency**: • Only used for complex installations.
Metered data collection method		Indication of the way the Meter is read and thereby indicating the corresponding functionality to access reads. **Dependency**: • Dependent on national rules.
Measurement Granularity		The actual measurement intervals of the Meter, such as 15 minutes or monthly. **Dependency**: • Dependent on national rules.
Registers remotely switchable	Elec	Indication that the Meter is remotely switchable between the registers, for example by a tone frequency receiver. **Dependency**: • Dependent on national rules.
Meter technique		A code indicating what kind of technique is used in the Meter. **Dependency**: • Dependent on national rules.
Number of Registers		Number of Registers available in the Meter.
Pressure correction	Gas	Indication whether the Meter corrects measured values for pressure or not. **Dependency**: • Dependent on national rules.
Temperature correction	Gas	Indication whether the Meter corrects measured values for the temperature or not. **Dependency**: • Dependent on national rules.
Altitude correction	Gas	Indication whether the Meter corrects the measured values for altitude or not. **Dependency**: • Dependent on national rules.

Class/attribute	Sector [14]	Description
Conversion factor		A value that specifies a conversion factor for this specific Metering configuration, such as for voltage, current, pressure, temperature. There can be more than one Factor of each Type for a Meter, but only one of each Type.
Type		A code representing the type of Conversion Factor.
Factor		The conversion factor used in the calculation of a volume from the reading of register(s) of this Meter.
Communication Gateway[15]		A communication device or service to exchange data between one or more physical equipment, and relevant market parties. It may have additional intelligent functions related to the exchange and/or the data. Examples of intelligent functions: Connection/disconnection, changing resolutions, handling time of use, multiplication of correction factors and other algorithms. Examples of equipment; Meters and Disconnector Switch.
Identification		The unique identification of this Communication Gateway.
Communication Protocol[16]		The Type of communication protocol used by this Communication Gateway.

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[15] The Communication Gateway and Gateway Operator are not yet agreed added to the Harmonised Role Model [3];
[16] Power Line Carrier
- Legacy NB-PLC (BPSK, FSK, CHIRP)
    - IEC 61334
- NextGen NB-PLC (OFDM)
    - G3-PLC (ITU-T G.9903)
    - PRIME (ITU-T G9904)
    - IEEE 1901.2
Wireless communication
- xG (Cellular Networks)
    - 2G (FDMA)
        - GSM
        - GPRS
        - EDGE
    - 3G (TDMA/CDMA)
        - UMTS
        - HSPA
        - HSPA+
    - 4G (CDMA)
        - LTE (450MHz/800MHz/1800MHz/2,6GHz)
        - LTE Advanced
    - 5G (CDMA)
- WiMax
- Mobile Networks (CDMA450)
Wired Communications

Class/attribute	Sector [14]	Description
Communication Carrier		The Type of carrier, such as PLC, wired or wireless, used to contact the Communication Gateway.
Gateway Operator ID		The identification of the Gateway Operator responsible for this Communication Gateway.
Meter Address		The physical address where this Meter is located. **Dependency:** • Dependent on national rules.
City Name		The name, expressed as text, of the city, town or village of this address.
Street Name		The name, expressed as text, of this street or thoroughfare of this address.
Building Number		The number, expressed as text, of the building or house on this street at this address.17
Postcode		The code specifying the postcode of this address.
Room Identification		The identification, expressed as text, of the room, suite, office or apartment as part of this address.
Floor Identification		The identification by name or number, expressed as text, of the floor in the building as part of this address.
Country		The unique identifier of the country for this address (Reference ISO 3166 and UN/ECE Rec 3).
Geographical Coordinates		The set of geographical coordinates of the exact location of this Meter. **Dependency**: • Dependent on national rules
Latitude		The measure of the latitude as an angular distance north or south from the Equator meridian to the meridian of the location of this Meter for its geographical coordinate. (Reference ISO 6709). **Dependency**: • Must be used together with Longitude

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- POTS (Plain Old Telephone Service)
- PSTN (Public Switched Telecommunication Network)
- Ethernet
- PPP
- xDSL
- Fiber Optic (FTTH)

Reference

[3]   B. Sörries: Communication technologies and networks for Smart Grid and Smart Metering, CDG 450 Connectivity Special Interest Group (450 SIG), 2013.

[4]   N. Andreadou, M. Olariaga Guardiola and G. Fulli: Telecommunication Technologies for Smart Grid Projects with Focus on Smart Metering Applications, 2016.

17   The Building Number may include a "Building Number Extension", such as one or more character making the address unique.

Class/attribute	Sector [14]	Description
Longitude		The measure of the longitude as an angular distance east or west from the Greenwich meridian to the meridian of the location of this Meter (Reference ISO 6709). **Dependency**: • Must be used together with Latitude
Altitude	Gas	The measure of the altitude that reflects the vertical elevation of this Meter above a surface for the geographical coordinate of the location of this Meter (Reference ISO 6709).
System		The unique identifier of the reference system used for measuring these geographical coordinates.
Placement Information		Information on how to physically get to the location of the installation where this Meter is installed.
Placement Description		Textual description of the placement (where and how) of this Meter.
Key Information		Textual description of how to get hold of key(s) to get access to this Meter.
<<Business Entity>> Register		A physical or logical counter measuring energy products. **Dependency**: • At least one of Identification, OBIS Code, Meter Time Frame and/or Product must be present • If no OBIS Code, the Product, Direction and Measure Unit are required
Identification		The unique identification of the Register (within this Meter).
OBIS code		A coded string to indicate the function of this Register. **Dependency**: • Dependent on national rules
Meter Time Frame	Elec.	A code specifying the tariff time frame for this Register.
Product		A code specifying a type of product for the quantity measured by this register.
Direction		The direction of the measured energy flow, such as production or consumption.
Number of Integer Digits		The number of digits in the log of this Register, without decimals.
Number of Decimal Digits		The number of decimals in the log of this Register.

Class/attribute	Sector [14]	Description
Constant		The multiplication factor for this Register, used to calculate a metric volume or meter read for a meter reading. **Dependency**: • The constant is required if different from 1.
Measure Unit		The unit of measure for this Register.
Sustainable energy		An indication of what kind of sustainable energy (in case of production) is measured in this Register. **Dependency**: • Only used for Direction equal to production (E18) or combined (E19) • Dependent on national rules.
Incrementation Type		A code showing if a Register provides cumulative readings or volumes between two points in time. **Dependency**: • Dependent on national rules.
Request change metering configuration characteristics Additions		Additional information related to this request for update of metering configuration characteristics, to be agreed on a national level.
Transaction ID		The unique identification of this set of information, given by the Content Responsible Party.
Request change metering configuration characteristics, Async Additions		Additional information related to this request to change of metering configuration characteristics, needed when using asynchronous communication.

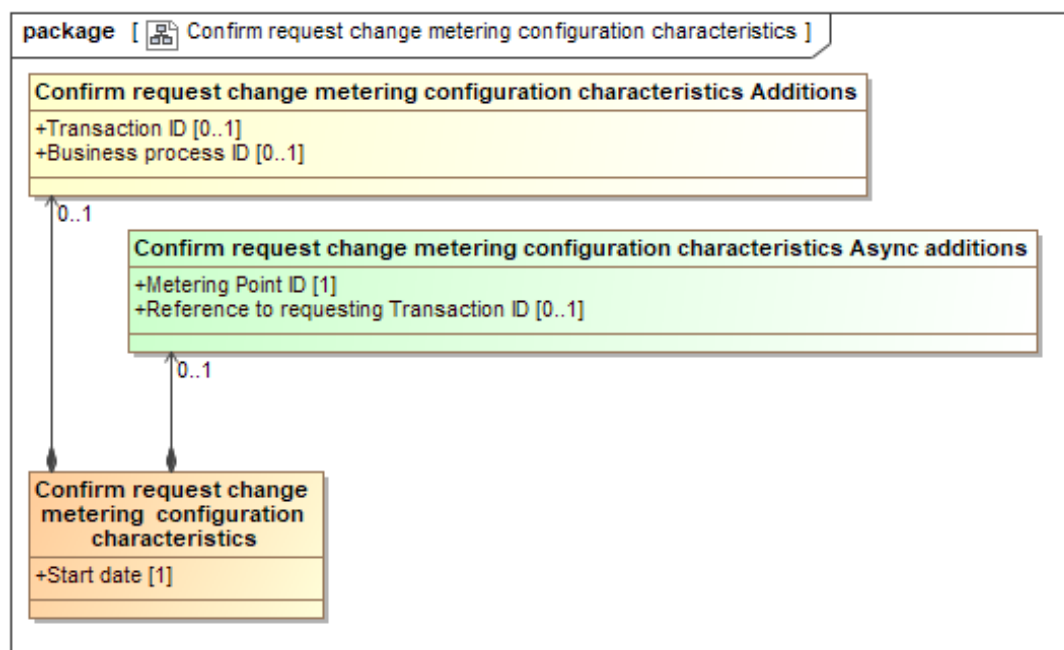## 1.7. Confirm request change metering configuration characteristics (Class Diagram)

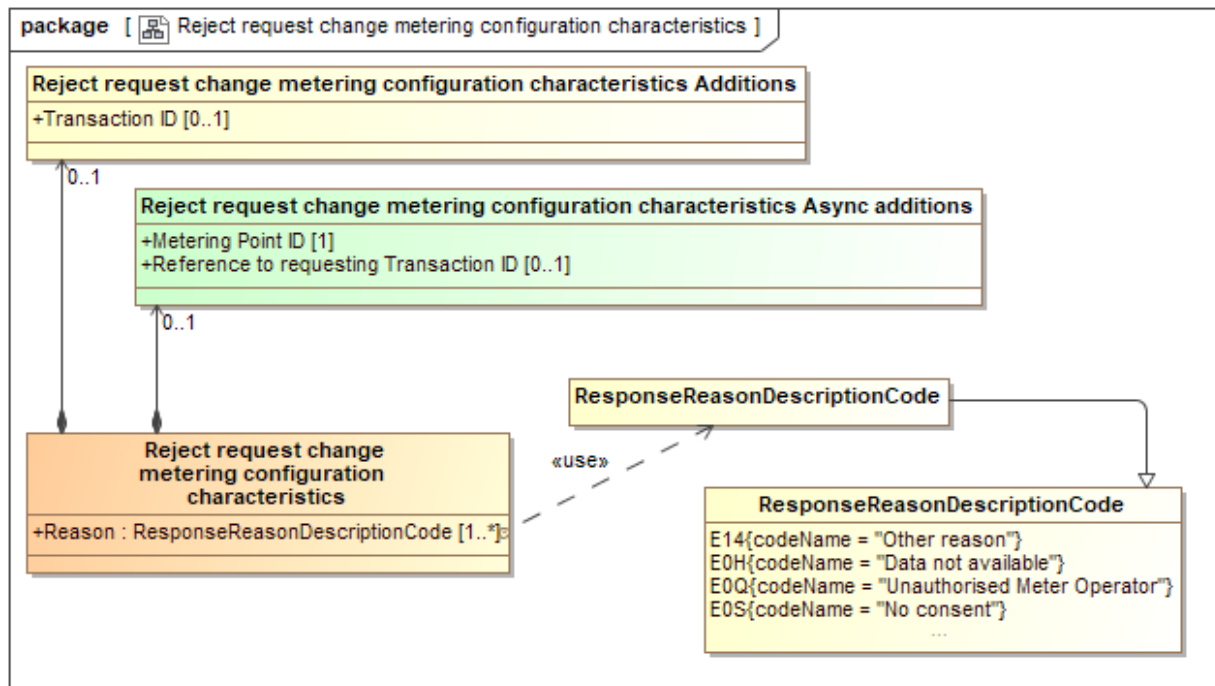*Figure 17* Confirm request change metering configuration characteristics

1.7.1. Element definitions: Confirm request update metering configuration characteristics

Class/attribute	Sector[18]	Description
«Business entity» Confirm request change metering configuration characteristics		The information set to be sent from the Meter Administrator to the Content Responsible Party (Meter Operator) when confirming a request for change of metering configuration characteristics.
Start date		The confirmed date for the changed metering configuration characteristics for the Metering Point to become valid. ***Dependency:*** • The usage of Start date is dependent on national rules.
Confirm request change metering configuration characteristics Additions		Information related to the document exchange, to be agreed on a national level.
Transaction ID		The unique identification of this set of information, given by the Entitled Party.

---

[18] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector[18]	Description
Business process ID		The unique identification of the instance of the process that this transaction is a part of.
Confirm request change metering configuration characteristics Async Additions		Information related to the document exchange, needed when using asynchronous communication.
Metering Point ID		The unique identification of the Metering Point for which the metering configuration characteristics are changed.
Reference to requesting Transaction ID		The Transaction ID from the request.

1.8.   Reject request change metering configuration characteristics (Class Diagram)

Figure 18 Reject request change metering configuration characteristics

1.8.1. Element definitions: Reject request change metering configuration characteristics

Class/attribute	Sector[19]	Description
«Business entity» Reject request change metering configuration characteristics		The information set sent from the Meter Administrator to the Content Responsible Party (Meter Operator) when rejecting a request for update of metering configuration characteristics.
Reason		A code specifying (one of) the reason(s) for the rejection of the request for update of Metering Point characteristics.
Reject request change metering configuration characteristics Additions		Additional information related to rejecting the request for change of metering configuration characteristics, to be agreed on a national level.
Transaction ID		The unique identification of this set of information given by the Meter Administrator.

---

[19] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector[19]	Description
Reject request change metering configuration characteristics Async Additions		Additional information, related to the rejection of the request for update of metering configuration characteristics, needed when using asynchronous communication.
Metering Point ID		The unique identification of the Metering Point for which the change of metering configuration characteristics was rejected.
Reference to requesting Transaction ID		The Transaction ID from the request, where this is the response for, given by the Entitled Party.

1.9. Request update metering configuration characteristics (Class Diagram)

Figure 19 Request update metering configuration characteristics

1.9.1. Element definitions: Request update metering configuration characteristics

Class/attribute	Sector [20]	Description
«Business entity» Request update metering configuration characteristics		The information set of metering configuration characteristics in a Metering Point sent by an Entitled Party to the Content Responsible Party when requesting update of metering configuration characteristics. Entitled Party s (requesting parties): - Consented Party - Metered Data Collector - Metered Data Responsible
Entitled Party ID		The unique identification of the party that requests update metering configuration characteristics for this Metering Point.
Metering Point ID		The unique identification of the Metering Point the request change metering configuration characteristics is aimed for.
Start date		The date when the set of information for this Metering Point and this Meter in this business document becomes or became valid.
«Business entity» Meter		A physical device containing one or more registers.
Identification		The unique identification of the Meter.
Type		A code representing the type of Meter.
Meter Operator ID		The identification of the Meter Operator for this Meter, which is the party responsible for installing, maintaining, testing, certifying and physically decommissioning this Meter.
Pressure level	Gas	The Pressure level at which the Meter operates **Dependency**: Required if different from "standard low national distribution pressure".
Voltage level	Elec.	The Voltage level at which the Meter operates. **Dependency**: Required if different from "standard low distribution voltage (230V/400V)"

---

[20] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector [20]	Description
Field ID		The unique identification of the Field (as part of the Connection) where this Meter is installed. A Field is a physical entity connecting a Grid to the Installation belonging to a Party Connected to Grid. The Field may contain active objects, such as Transformers, Meters and Fuses. The Field is sometimes referred to as (measure) street in Gas sector, or Bay in the electricity sector. **Dependency**: • Only used for complex installations.
Metered data collection method		Indication of the way the Meter is read and thereby indicating the corresponding functionality to access reads. **Dependency**: • Dependent on national rules.
Measurement granularity		The actual measurement intervals of the Meter, such as 15 minutes or monthly. **Dependency**: • Dependent on national rules.
Registers remotely switchable	Elec	Indication that the Meter is remotely switchable between the registers, for example by a tone frequency receiver. **Dependency**: • Dependent on national rules.
Meter technique		A code indicating what kind of technique is used in the Meter. **Dependency**: • Dependent on national rules.
Number of Registers		Number of Registers available in the Meter.
Pressure correction	Gas	Indication whether the Meter corrects measured values for pressure or not. **Dependency**: • Dependent on national rules.
Temperature correction	Gas	Indication whether the Meter corrects measured values for the temperature or not. **Dependency**: • Dependent on national rules.
Altitude correction	Gas	Indication whether the Meter corrects the measured values for altitude or not. **Dependency**: • Dependent on national rules.

Class/attribute	Sector [20]	Description
Conversion factor		A value that specifies a conversion factor for this specific Metering configuration, such as for voltage, current, pressure, temperature. There can be more than one Factor of each Type for a Meter, but only one of each Type.
Type		A code representing the type of Conversion Factor.
Factor		The conversion factor used in the calculation of a volume from the reading of register(s) of this Meter.
Communication gateway[21]		A communication device or service to exchange data between one or more physical equipment, and relevant market parties. It may have additional intelligent functions related to the exchange and/or the data. Examples of intelligent functions: Connection/disconnection, changing resolutions, handling time of use, multiplication of correction factors and other algorithms. Examples of equipment; Meters and Disconnector Switch.
Identification		The unique identification of this Communication Gateway.
Communication protocol[22]		The Type of communication protocol used by this Communication Gateway.

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[21] The Communication Gateway and Gateway Operator are not yet agreed added to the Harmonised Role Model [3];
[22] Power Line Carrier
- Legacy NB-PLC (BPSK, FSK, CHIRP)
  - IEC 61334
- NextGen NB-PLC (OFDM)
  - G3-PLC (ITU-T G.9903)
  - PRIME (ITU-T G9904)
  - IEEE 1901.2
Wireless communication
- xG (Cellular Networks)
  - 2G (FDMA)
    - GSM
    - GPRS
    - EDGE
  - 3G (TDMA/CDMA)
    - UMTS
    - HSPA
    - HSPA+
  - 4G (CDMA)
    - LTE (450MHz/800MHz/1800MHz/2,6GHz)
    - LTE Advanced
  - 5G (CDMA)
- WiMax
- Mobile Networks (CDMA450)
Wired Communications

Class/attribute	Sector [20]	Description
Communication carrier		The Type of carrier, such as PLC, wired or wireless, used to contact the Communication Gateway.
Gateway Operator ID		The identification of the Gateway Operator responsible for this Communication Gateway.
Meter address		The physical address where this Meter is located. **Dependency:** • Dependent on national rules.
City name		The name, expressed as text, of the city, town or village of this address.
Street name		The name, expressed as text, of this street or thoroughfare of this address.
Building number		The number, expressed as text, of the building or house on this street at this address.[23]
Postcode		The code specifying the postcode of this address.
Room identification		The identification, expressed as text, of the room, suite, office or apartment as part of this address.
Floor identification		The identification by name or number, expressed as text, of the floor in the building as part of this address.
Country		The unique identifier of the country for this address (Reference ISO 3166 and UN/ECE Rec 3).
Geographical coordinates		The set of geographical coordinates of the exact location of this Meter. **Dependency**: • Dependent on national rules
Latitude		The measure of the latitude as an angular distance north or south from the Equator meridian to the meridian of the location of this Meter for its geographical coordinate. (Reference ISO 6709). **Dependency**: • Must be used together with Longitude

• POTS (Plain Old Telephone Service)
• PSTN (Public Switched Telecommunication Network)
• Ethernet
• PPP
• xDSL
• Fiber Optic (FTTH)

Reference

[5] B. Sörries: Communication technologies and networks for Smart Grid and Smart Metering, CDG 450 Connectivity Special Interest Group (450 SIG), 2013.

[6] N. Andreadou, M. Olariaga Guardiola and G. Fulli: Telecommunication Technologies for Smart Grid Projects with Focus on Smart Metering Applications, 2016.

23 The Building Number may include a "Building Number Extension", such as one or more character making the address unique.

Class/attribute	Sector [20]	Description
Longitude		The measure of the longitude as an angular distance east or west from the Greenwich meridian to the meridian of the location of this Meter (Reference ISO 6709). **Dependency**: • Must be used together with Latitude
Altitude	Gas	The measure of the altitude that reflects the vertical elevation of this Meter above a surface for the geographical coordinate of the location of this Meter (Reference ISO 6709).
System		The unique identifier of the reference system used for measuring these geographical coordinates.
Placement information		Information on how to physically get to the location of the installation where this Meter is installed.
Placement Description		Textual description of the placement (where and how) of this Meter.
Key information		Textual description of how to get hold of key(s) to get access to this Meter.
<<Business Entity>> Register		A physical or logical counter measuring energy products. **Dependency**: • At least one of Identification, OBIS Code, Meter Time Frame and/or Product must be present • If no OBIS Code, the Product, Direction and Measure Unit are required
Identification		The unique identification of the Register (within this Meter).
OBIS code		A coded string to indicate the function of this Register. **Dependency**: • Dependent on national rules
Meter time frame	Elec.	A code specifying the tariff time frame for this Register.
Product		A code specifying a type of product for the quantity measured by this register.
Direction		The direction of the measured energy flow, such as production or consumption.
Number of integer digits		The number of digits in the log of this Register, without decimals.
Number of decimal digits		The number of decimals in the log of this Register.

Class/attribute	Sector [20]	Description
Constant		The multiplication factor for this Register, used to calculate a metric volume or meter read for a meter reading. **Dependency**: • The constant is required if different from 1.
Measure unit		The unit of measure for this Register.
Sustainable energy		An indication of what kind of sustainable energy (in case of production) is measured in this Register. **Dependency**: • Only used for Direction equal to production (E18) or combined (E19) • Dependent on national rules.
Incrementation type		A code showing if a Register provides cumulative readings or volumes between two points in time. **Dependency**: • Dependent on national rules.
Request update metering configuration characteristics Additions		Additional information related to this request for update of metering configuration characteristics, to be agreed on a national level.
Transaction ID		The unique identification of this set of information, given by the Entitled Party.
Request update metering configuration characteristics, Async Additions		Additional information related to this request for update of metering configuration characteristics, needed when using asynchronous communication.

1.10. Confirm request update metering configuration characteristics (Class Diagram)
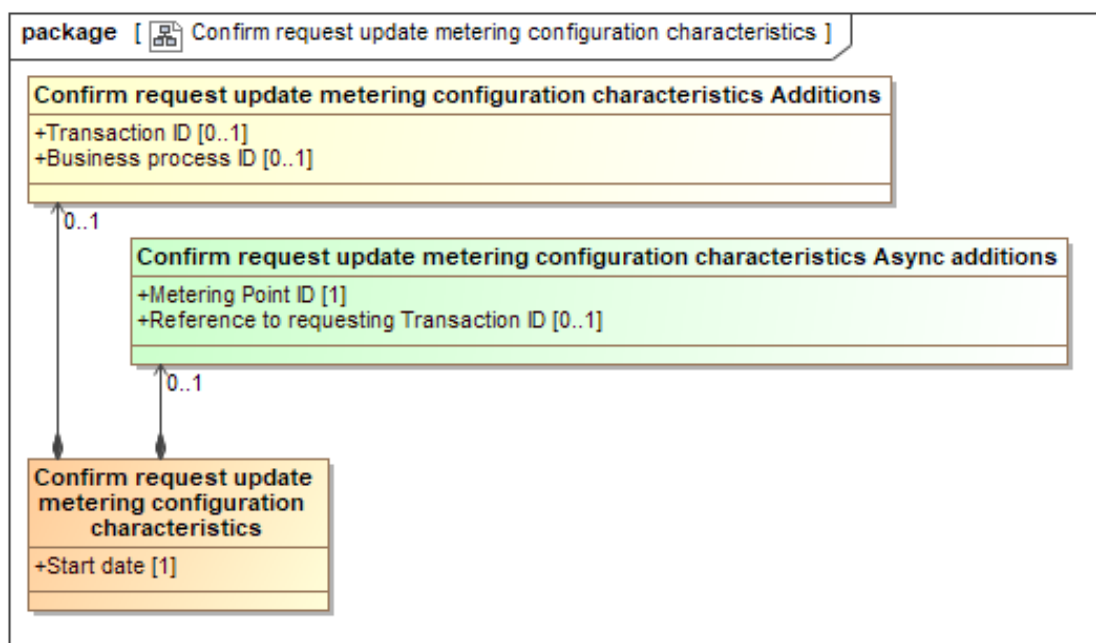

Figure 20 Confirm request update metering configuration characteristics

1.10.1. Element definitions: Confirm request update metering configuration characteristics

Class/attribute	Sector[24]	Description
«Business entity» Confirm request update metering configuration characteristics		The information set to be sent from the Content Responsible Party to the Entitled Party when confirming a request for update of metering configuration characteristics. Entitled Parties: - Consented Party - Metered Data Collector - Metered Data Responsible
Start date		The confirmed date for this requested update of metering configuration characteristics to become valid. ***Dependency:*** The usage of Start date is dependent on national rules.

---

[24] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector[24]	Description
Confirm request update metering configuration characteristics Additions		Information related to the document exchange, to be agreed on a national level.
Transaction ID		The unique identification of this set of information, given by the Entitled Party.
Business process ID		The unique identification of the instance of the process that this transaction is a part of.
Confirm request update metering configuration characteristics Async Additions		Information related to the document exchange, needed when using asynchronous communication.
Metering Point ID		The unique identification of the Metering Point for which the metering configuration characteristics will be updated.
Reference to requesting Transaction ID		The Transaction ID from the request.

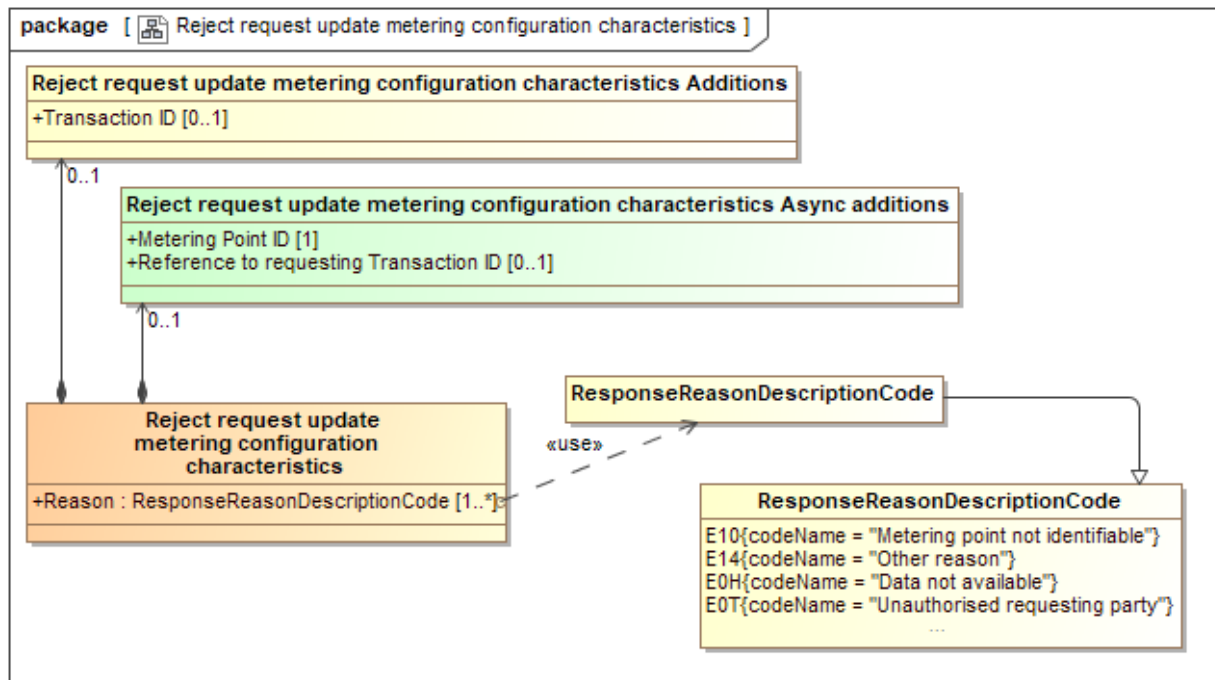## 1.11. Reject request update metering configuration characteristics (Class Diagram)

Figure 21 Reject request update metering configuration characteristics

1.11.1. Element definitions: Reject request update metering configuration characteristics

Class/attribute	Sector[25]	Description
«Business entity» Reject request update metering configuration characteristics		The information set sent from the Content Responsible Party to the Entitled Party when rejecting a request for update of metering configuration characteristics. Entitled Parties: - Consented Party - Metered Data Collector - Metered Data Responsible
Reason		A code specifying (one of) the reason(s) for the rejection of the request for update of Metering Point characteristics.
Reject request update metering configuration characteristics Additions		Additional information related to rejecting the request for update of metering configuration characteristics, to be agreed on a national level.
Transaction ID		The unique identification of this set of information given by the Content Responsible Party.

---

[25] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

Class/attribute	Sector[25]	Description
Reject request update metering configuration characteristics Async Additions		Additional information, related to the rejection of the request for update of metering configuration characteristics, needed when using asynchronous communication.
Metering Point ID		The unique identification of the Metering Point the update of metering configuration characteristics was rejected for.
Reference to requesting Transaction ID		The Transaction ID from the request, where this is the response for, given by the Entitled Party.

Appendix A.   Header and Context information for the class diagrams

A.1.   Header and Context Information attributes definitions

Class/attribute	Sector[26]	Description
Header and Context Information		The set of information specifying the information to be added to this payload to enable the exchange as a document.
Document Type		A code representing the document type used for the exchange of this set of information.
Business Reason		A code representing the business reason for the exchange of this set of information.
Ancillary Business Process Role		A code representing the market role taking part in this exchange together with the Responsible Role, responsible for the process/this exchange.

A.2.   Metering configuration characteristics
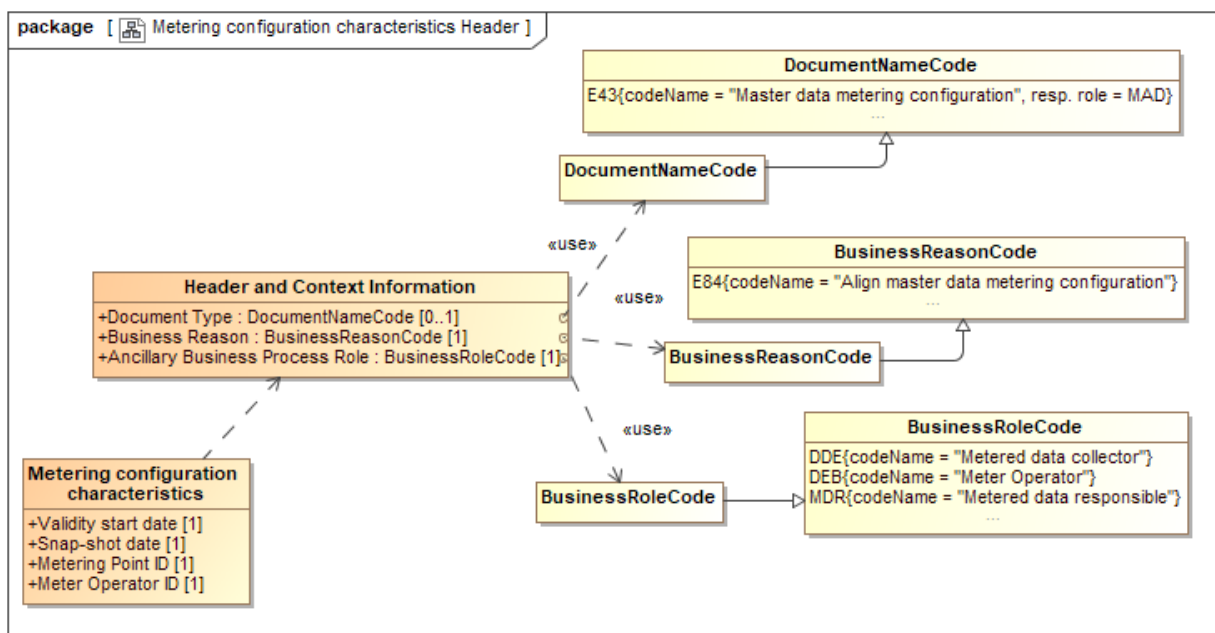
Figure 22 Class diagram: Header and Context Information Metering configuration characteristics

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[26] It is assumed that Metering Points are uniquely dedicated to either electricity or to gas.

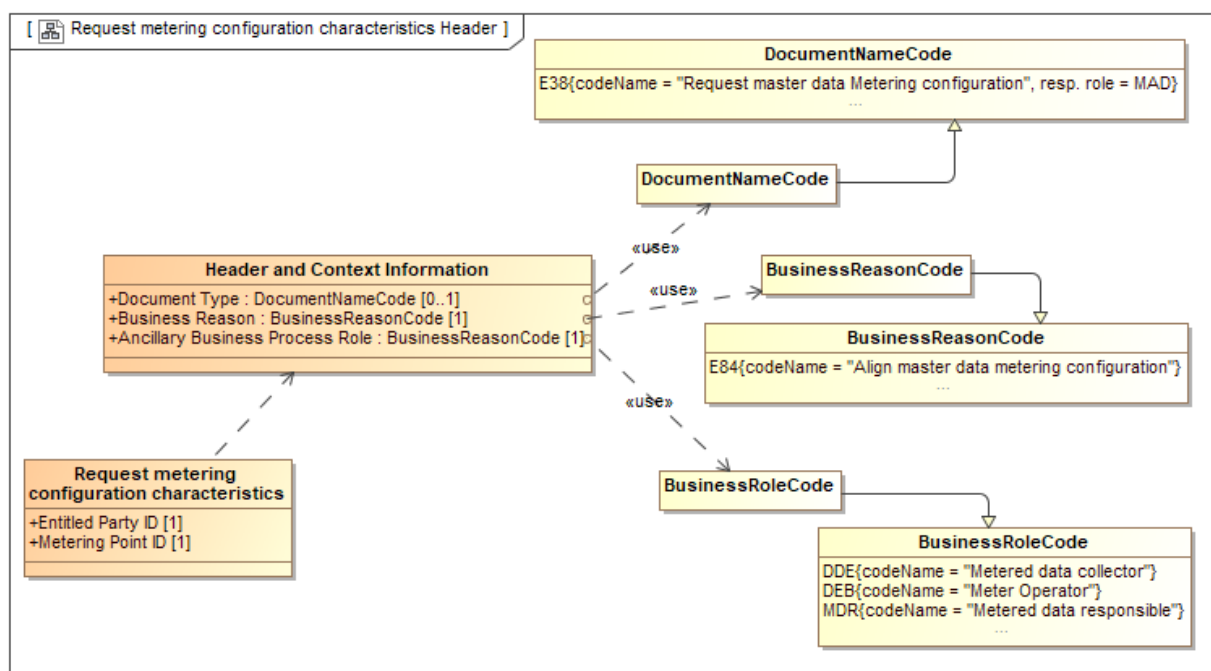## A.3.   Request metering configuration characteristics

Figure 23 Class diagram: Header and Context Information Request metering configuration characteristics

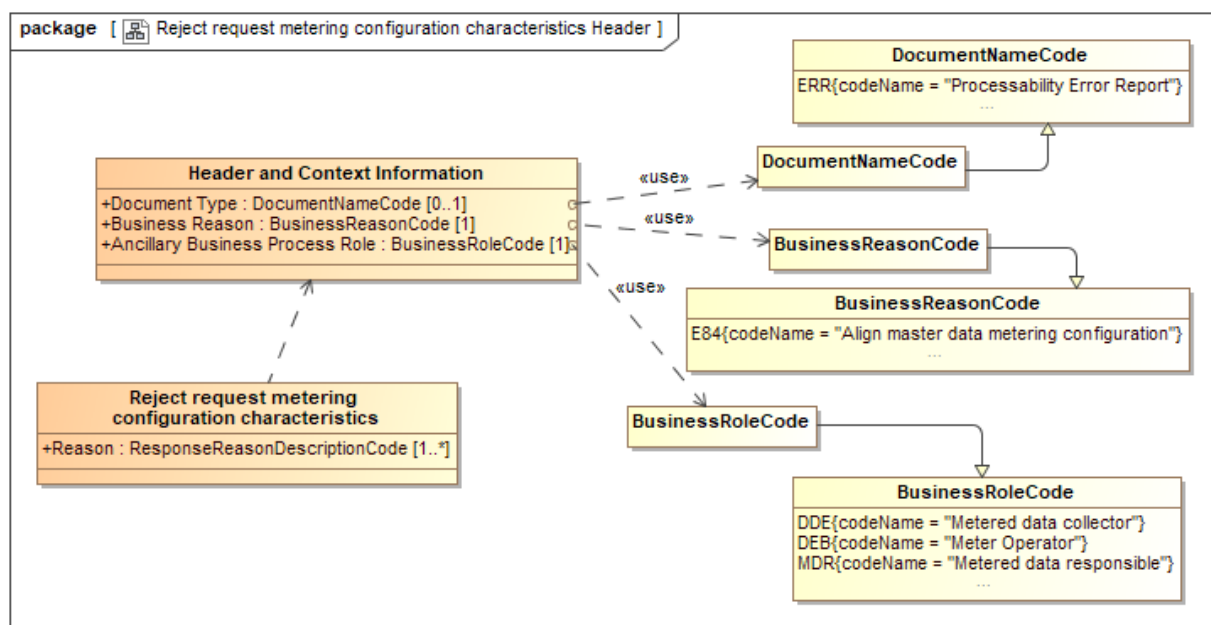## A.4.   Reject request metering configuration characteristics

Figure 24 Class diagram: Header and Context Information Reject request metering configuration characteristics

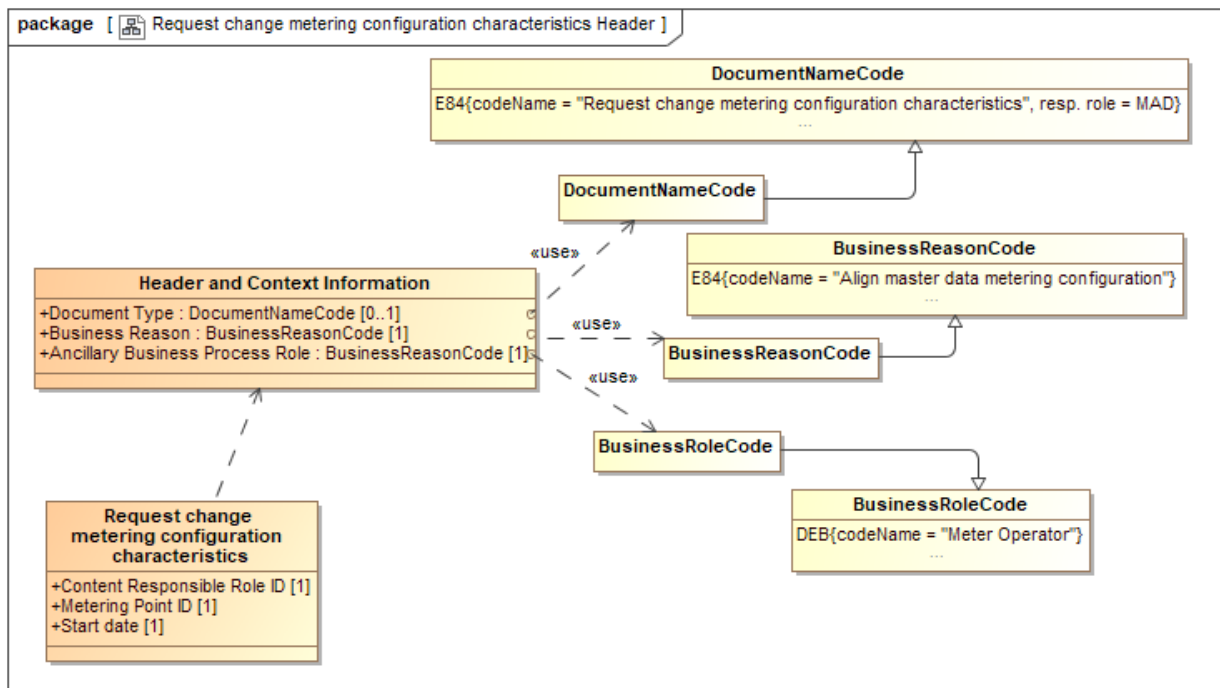## A.5. Request change metering configuration characteristics

Figure 25 Class diagram: Header and Context Information Request change metering configuration characteristics

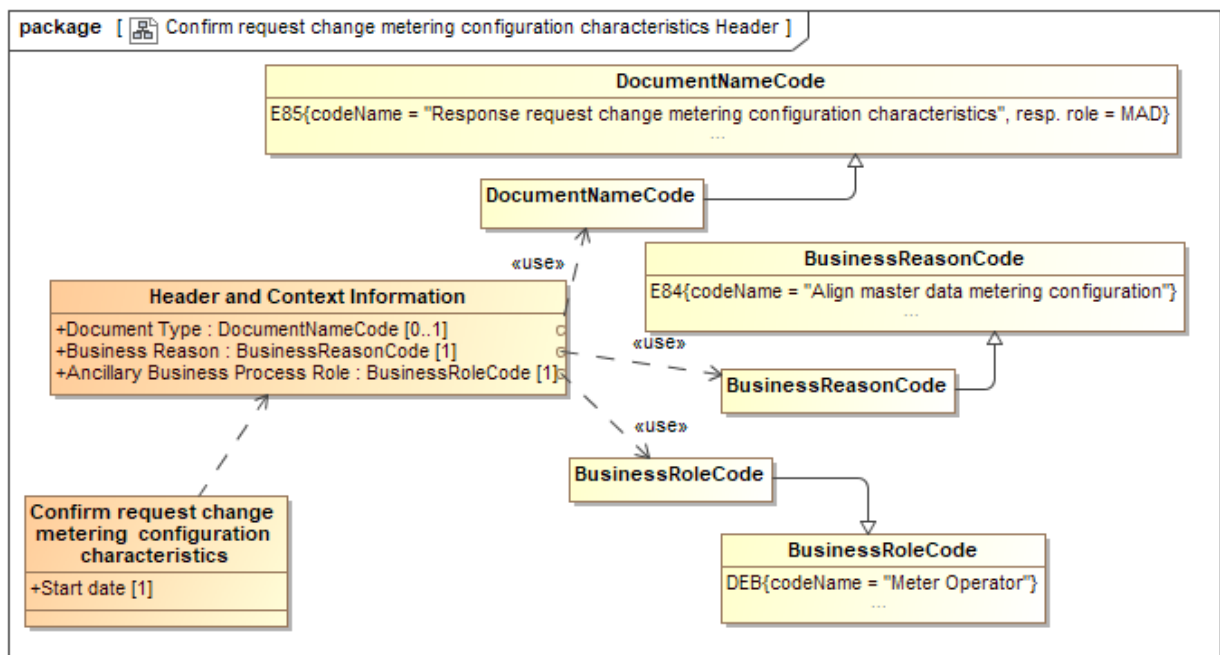## A.6. Confirm request change metering configuration characteristics

Figure 26 Class diagram: Header and Context Information Confirm request change metering configuration characteristics

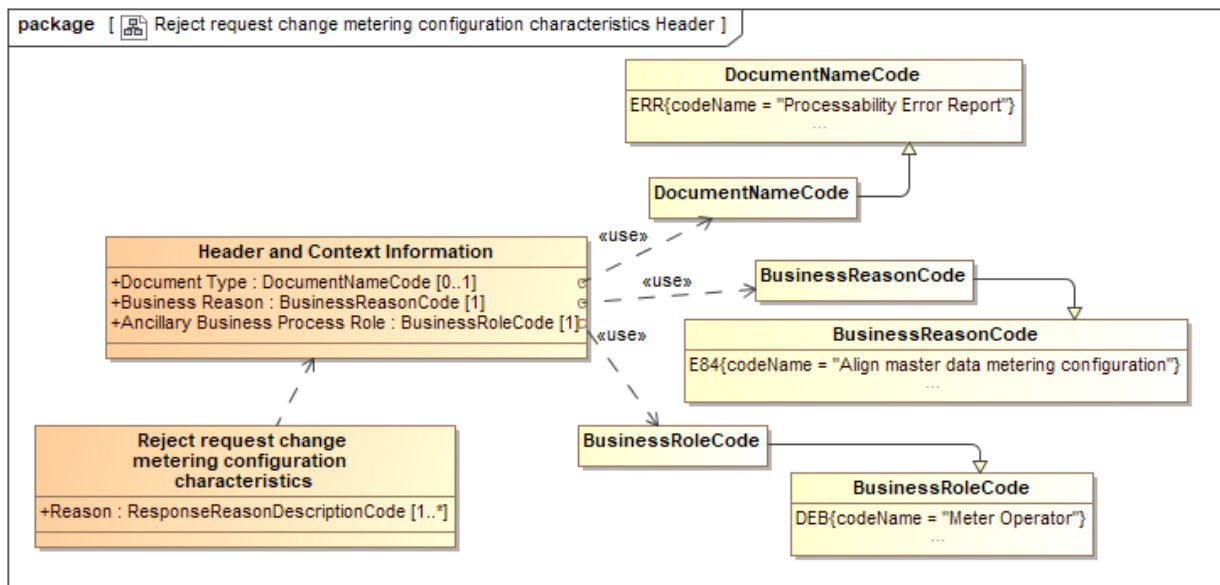## A.7.   Reject request change metering configuration characteristics

Figure 27 Class diagram: Header and Context Information Reject request change metering configuration characteristics

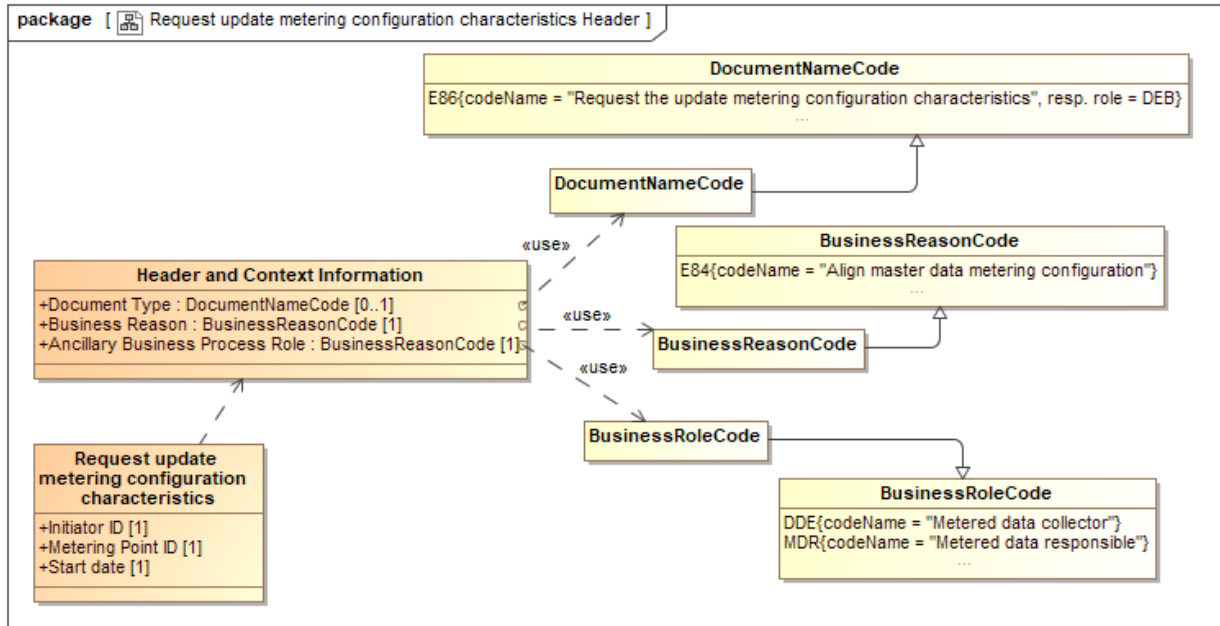## A.8.   Request update metering configuration characteristics

Figure 28 Class diagram: Header and Context Information Request update metering configuration characteristics

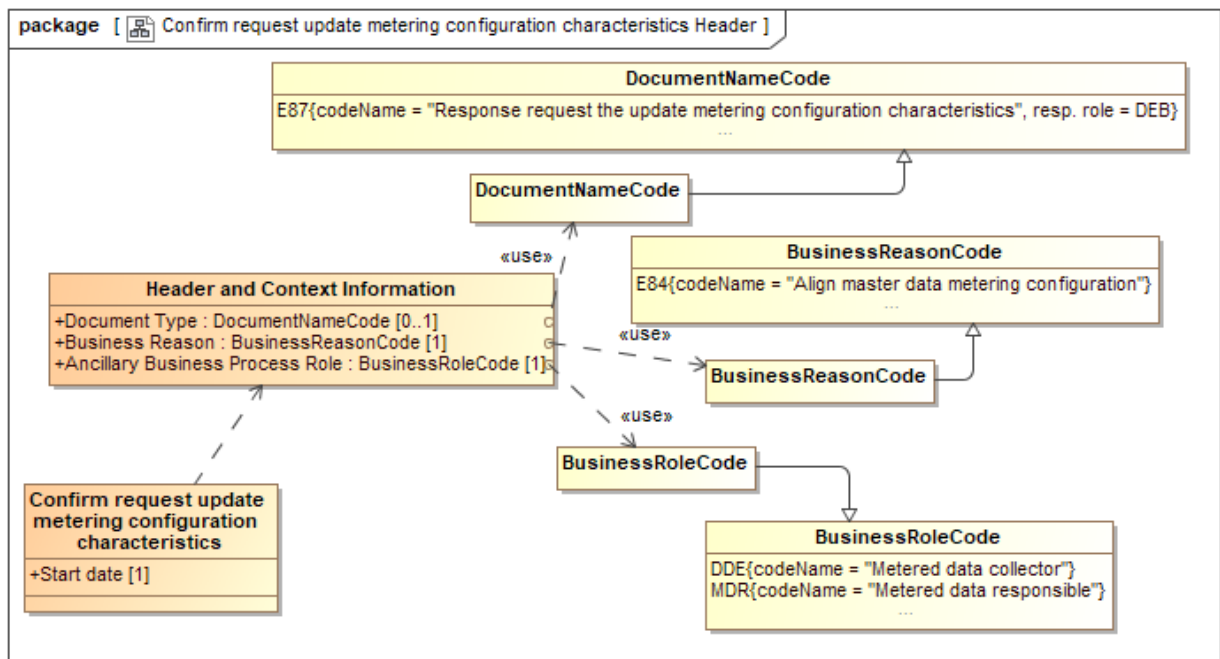## A.9.   Confirm request update metering configuration characteristics

Figure 29 Class diagram: Header and Context Information Confirm request update metering configuration characteristics

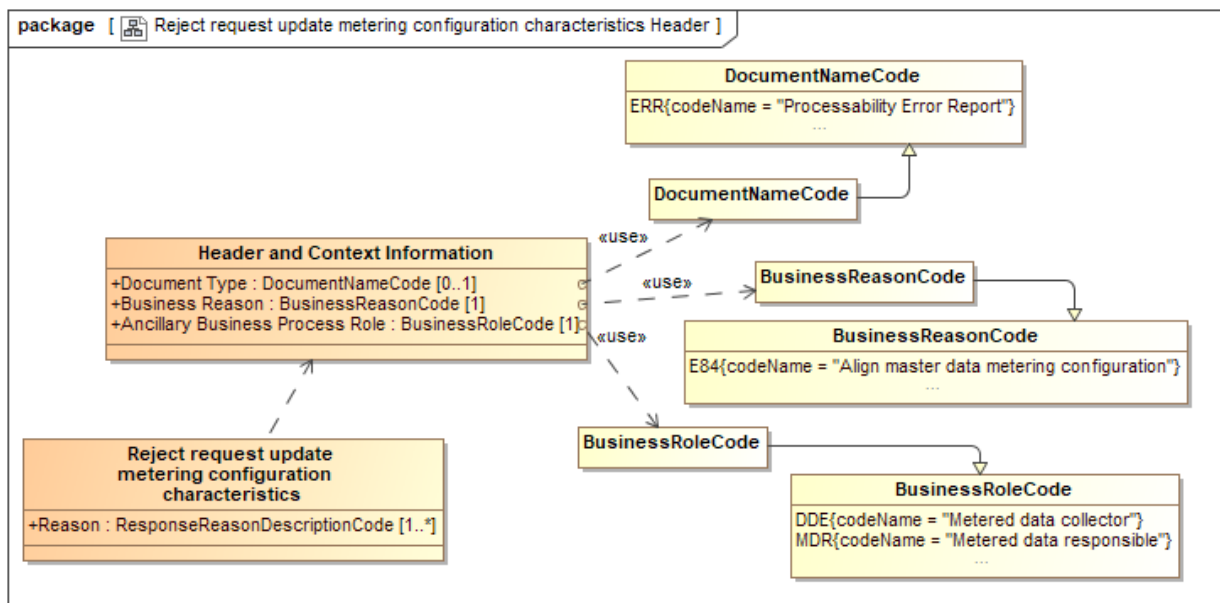## A.10. Reject request update metering configuration characteristics

Figure 30 Class diagram: Header and Context Information Reject request update metering configuration characteristics