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Framework for energy market communications

Part 451-2: Scheduling business
process and contextual model
for CIM European market
(IEC 62325-451-2:2014)

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National foreword

This British Standard is the UK implementation of EN 62325-451-2:2014. It is identical to IEC 62325-451-2:2014, incorporating corrigendum August 2016.

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Scheduling business process and contextual model for CIM
European market
(IEC 62325-451-2:2014)**

Cadre pour les communications pour le marché de l'énergie
- Partie 451-2: Processus métier de programmation et
modèle contextuel pour le marché européen CIM
(CEI 62325-451-2:2014)

Kommunikation im Energiemarkt - Teil 451-2: Planungs-
Geschäftsprozess und kontextbezogene CIM-Modelle für
den europäischen Markt
(IEC 62325-451-2:2014)

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

The text of document 57/1355/CDV, future edition 1 of IEC 62325-451-2, prepared by IEC/TC 57, "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62325-451-2:2014.

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- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-03-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-06-12

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The text of the International Standard IEC 62325-451-2:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61968-11	NOTE	Harmonised as EN 61968-11.
IEC 61970-301	NOTE	Harmonised as EN 61970-301.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62325-301	-	Framework for energy market communications -- Part 301: Common Information Model (CIM) extensions for markets	EN 62325-301	-
IEC 62325-351	-	Framework for energy market communications -- Part 351: CIM European market model exchange profile	EN 62325-351	-
IEC 62325-450	-	Framework for energy market communications -- Part 450: Profile and context modelling rules	EN 62325-450	-
IEC 62325-451-1	-	Framework for energy market communications -- Part 451-1: Acknowledgement business process and contextual model for CIM European market	EN 62325-451-1	-
IEC 62361-100	-	Power systems management and associated information exchange - Interoperability in the long term -- Part 100: CIM profiles to XML schema mapping	EN 62361-100	-
IEC/TS 61970-2	-	Energy management system application program interface (EMS-API) -- Part 2: Glossary	CLC/TS 61970-2	-

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INTRODUCTION

This International Standard is one of the IEC 62325-451-x series for deregulated energy market data exchanges based on the European style market profile. This standard defines the document contextual models, the message assembly models as well as the XML schemas to be used for the time based scheduling process.

The principal objective of the IEC 62325 series of standards is to produce standards which facilitate the integration of market application software developed independently by different vendors into a market management system, between market management systems and market participant systems. This is accomplished by defining message exchanges to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The common information model (CIM), i.e. IEC 62325-301, IEC 61970-301 and IEC 61968-11 standards, specifies the basis for the semantics for message exchange.

This European style market profile is based on different parts of the CIM IEC standard and specifies the content of the messages exchanged.

This document provides for the European style market profile the time based scheduling process. These market processes are based on the European regulations, and on the concepts of third party access and zonal market. This standard was originally based upon the work of the European Transmission System Operators (ETSO) Task Force EDI (Electronic Data Interchange) and then on the work of the European Network of Transmission System Operators (ENTSO-E) Working Group EDI.

FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –

Part 451-2: Scheduling business process and contextual model for CIM European market

1 Scope

This part of IEC 62325 specifies a UML package for the scheduling business process and its associated document contextual models, assembly models and XML schemas for use within the European style electricity markets.

This International Standard is based on the European style market contextual model (IEC 62325-351). The scheduling business process covered by this International Standard is described in Clause 5.

The relevant aggregate core components (ACCs) defined in IEC 62325-351 have been contextualised into aggregated business information entities (ABIEs) to satisfy the requirements of the European style market scheduling business process.

The contextualised ABIEs have been assembled into the schedule document, contextual model, the anomaly report contextual model and the confirmation report contextual model.

Related assembly models and XML schema for the exchange of scheduling information between market participants is automatically generated from the assembled document contextual models.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TS 61970-2, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

IEC 62325-301, *Framework for energy market communications – Part 301: Common information model (CIM) – Extensions for markets*

IEC 62325-351, *Framework for energy market communications – Part 351: CIM European market model exchange profile*

IEC 62325-450, *Framework for energy market communications – Part 450: Profile and context modelling rules*

IEC 62325-451-1, *Framework for energy market communications – Part 451-1: Acknowledgement business process and contextual model for CIM European market*

IEC 62361-100, *Power systems management and associated information exchange – Interoperability in the long term – Part 100: CIM profiles to XML schema mapping*¹

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61970-2, as well as the following apply.

NOTE General glossary definitions can be found in IEC 60050, *International Electrotechnical Vocabulary*.

3.1

aggregate business information entity

ABIE

a re-use of an aggregate core component (ACC) in a specified business

3.2

aggregate core component

ACC

collection of related pieces of business information that together convey a distinct business meaning, independent of any specific business context

Note 1 to entry: Expressed in modelling terms, this is the representation of an object class, independent of any specific business context.

[SOURCE: ISO/TS 15000-5:2005, Clause 9, modified (second sentence has been transformed into Note 1 to entry)]

3.3

application program interface

API

set of public functions provided by an executable application component for use by other executable application components

3.4

assembly model

assembly model is a model that prepares information in a business context for assembly into electronic documents for data interchange

3.5

based on

IsBasedOn

use of an artefact that has been restricted according to the requirements of a specific business context

[SOURCE: IEC 62325-450:2013, 3.4]

3.6

business context

formal description of a specific business circumstance as identified by the values of a set of context categories, allowing different business circumstances to be uniquely distinguished

[SOURCE: UN/Cefact, Unified Context Methodology Technical Specification]

¹ To be published.

3.7

European style market profile

ESMP

the European style market profile, the object of this International Standard

3.8

information model

representation of concepts, relationships, constraints, rules, and operations to specify data semantics for a chosen domain of discourse

Note 1 to entry: It can provide shareable, stable, and organized structure of information requirements for the domain context.

[SOURCE: IEC 62325-450:2013, 3.6]

3.9

market management system

MMS

computer system comprised of a software platform providing basic support services and a set of applications providing the functionality needed for the effective management of the electricity market

Note 1 to entry: These software systems in an electricity market may include support for capacity allocation, scheduling energy, ancillary or other services, real-time operations and settlements.

3.10

message business information entity

MBIE

aggregation of a set of ABIEs that respects a define set of assembly rules

3.11

profile

basic outline of all the information that is required to satisfy a specific environment

[SOURCE: IEC 62325-450:2013, 3.7]

4 Document contextual model and message assembly model basic concepts

4.1 Overview

IEC 62325-450 defines a set of CIM profiles that follows a layered modelling framework as outlined in Figure 1 going from the common information model (CIM), to different regional contextual models and their subsequent contextualized documents for information exchange; the final step being the message specifications for information interchange.

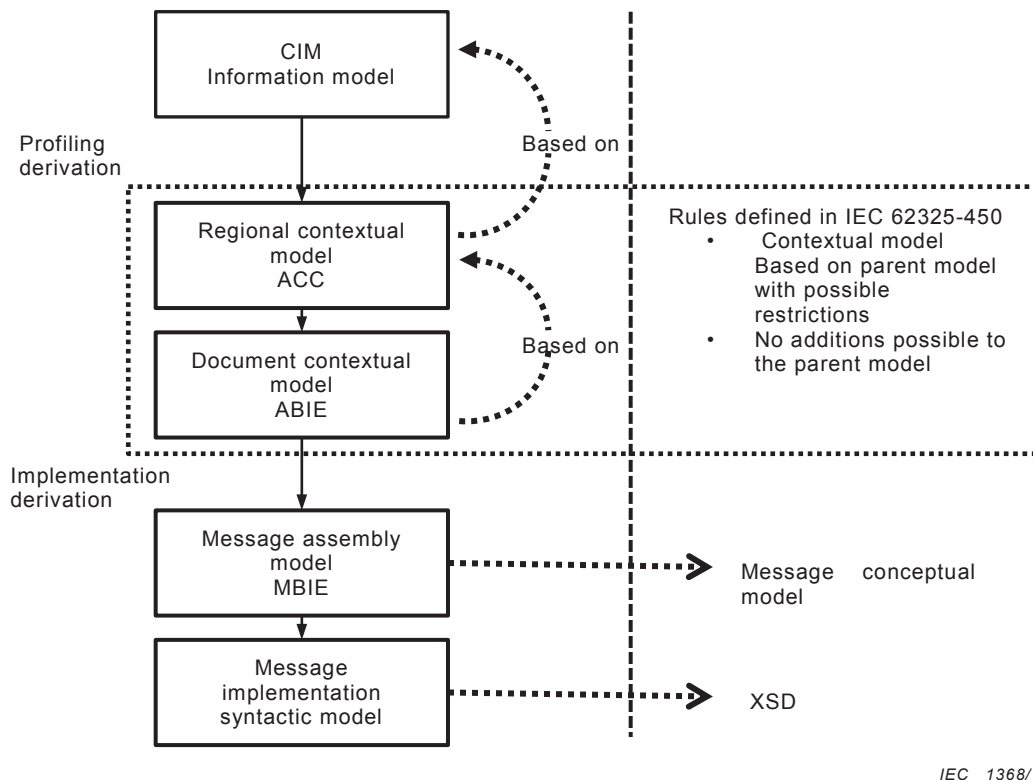


Figure 1 – IEC 62325-450 modelling framework

The regional contextual models are the basic components that are necessary to build electronic documents for information interchange. The European style market contextual model (IEC 62325-351) is, as an example, a regional contextual model based on IEC 62325-301. The components are also termed aggregate core components (ACCs).

A document contextual model is based upon a specific business requirements specification and is constructed from the contextualisation of the ACCs that can be found in the European style market contextual model. The contextualised ACCs at this stage are termed aggregate business Information entities (ABIEs). These ABIEs are the constructs that are assembled together into a specific electronic document to satisfy the information requirements outlined in the business requirements specification. The transformation from an ACC to an ABIE shall respect the rules defined in IEC 62325-450.

Once a document contextual model has been built that satisfactorily meets the business requirements, a message assembly model can be automatically generated from it. The automatic generation respects the rules defined in IEC 62361-100.

XML schema then may be automatically generated from the message assembly model. If necessary specific mapping can take place at this stage to transform the CIM class and attribute names into more market resilient names.

4.2 European style market package structure (ESMP)

The main package structure of the European style market profile is described in Figure 2.

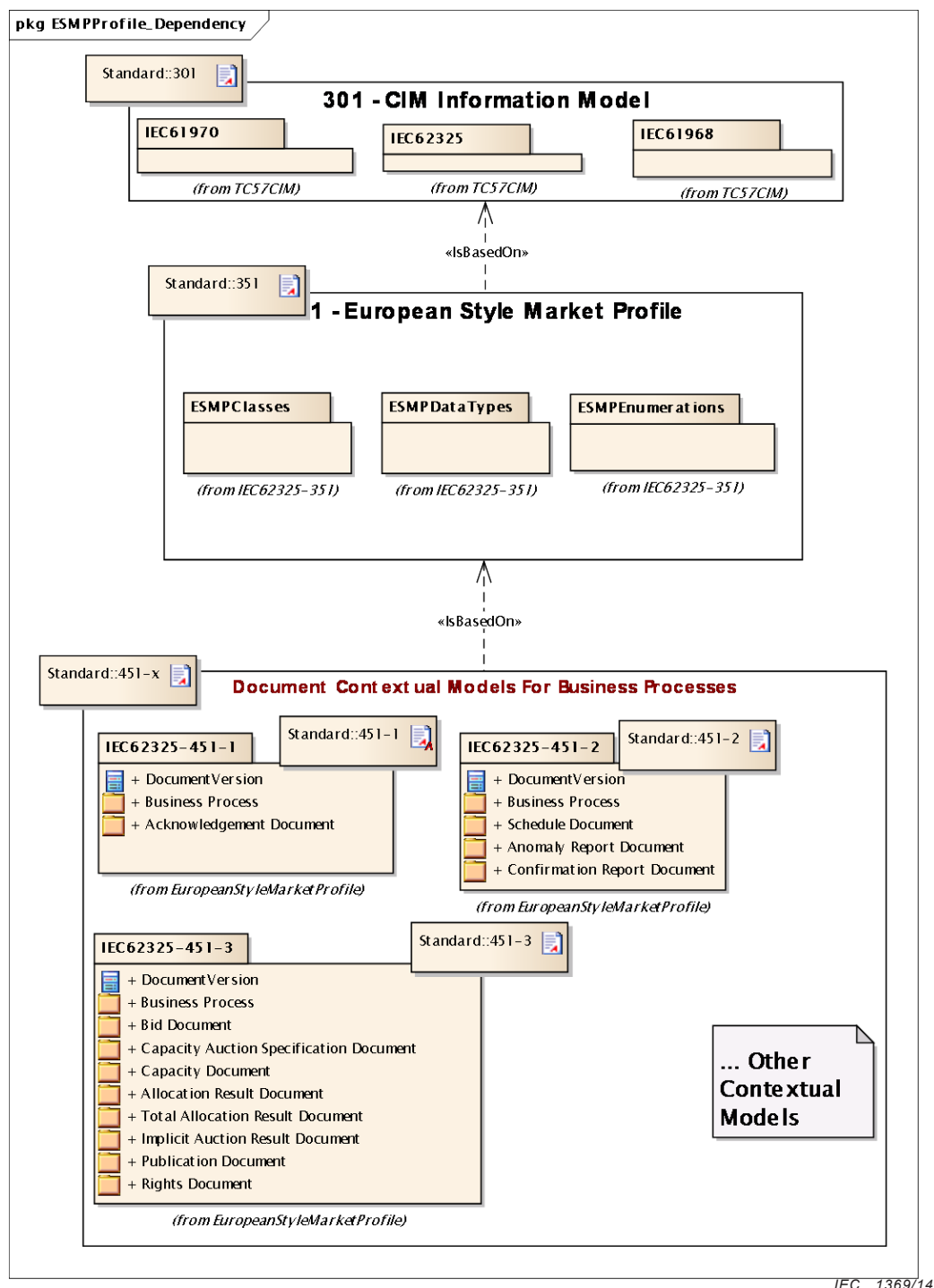


Figure 2 – Overview of European style market profile dependency

For each business process, a business process package is described in an IEC 62325-451-x standard. A business process package contains:

- the document contextual model (ABIE) and the automatically generated message assembly model (MBIE) for each electronic document required to enable the completion of the business process. Each document is a sub contextual model derived by restriction from the European style market profile;

- the XML schema of the business document that is automatically generated from the message assembly model.

The European style market profile (ESMP), as defined in the IEC 62325-351, provides the core components permitted for use in an IEC 62325-451-x standard. All ABIEs shall be “based on” the IEC 62325-351 core components:

- **ESMPClasses**: defining all the semi-contextual classes of the European style market profile derived by restriction from the CIM information model;
- **ESMPDataTypes**: defining all the core Datatypes used within the ESMP classes.

All the core components that are used in every electronic document structure have been harmonized and centralized in the European style market profile. These core components are consequently the basic building blocks from which all electronic document ABIEs are derived.

4.3 From the European style market profile to the document contextual model

The document contextual model for a given business process is constructed by an information analyst who identifies all the information requirements necessary to satisfy the business process.

Once the information requirements have been identified, the information analyst identifies the related ACCs that are available in the European style market profile and contextualises them to meet the information requirements. This contextualisation step creates a set of aggregate business Information entities (ABIEs).

In a final step the information analyst assembles together into a specific document contextual model package the ABIEs to form a document model satisfying the business requirements.

4.4 From the document contextual model to the message assembly model

Once the document contextual model has been finalised, the message assembly model may be automatically generated.

All document contextual models share the same core components and core datatypes. These are defined in the European style market profile (IEC 62325-351) and are contextualised and refined in all document contextual models (IEC 62325-451-x series) respecting the rules as described in IEC 62325-450.

4.5 From the assembly model to the XML schema

The final modelling step applies a standardized set of criteria in order to generate a uniform XML schema from the assembly model. This transformation process respects the rules defined in IEC 62361-100.

5 The time based scheduling business process

5.1 General

The scenarios described below reflect the basic scenarios within the European electricity market. They are however not exhaustive and several extensions or variants are possible.

5.2 Business process definition

In the European electricity market, trading of energy is processed in two distinct phases:

- an initial phase for the trading of the commodity itself, i.e. when traders, power exchanges, etc. are involved in commodity trading exchanging information on quantities of energy and prices;

- a second phase where the physical aspects of the trade are provided to the transmission system operator.

This document deals specifically with the second phase that essentially addresses how much energy has been bought or sold or would be generated or consumed by each market participant. The energy amount is mainly expressed in MegaWatts (MW) for a given time period (hourly, half hourly or quarter of an hour). These specific energy declarations are termed “nominations”. The scheduling declaration process is used during this second phase.

The European electricity market is based on the concept of regulated third party access where all the market participants shall provide their position for a given period that should generally be balanced depending on local market rules. The fundamental basis underlying these energy schedules is that, for a given market participant, the input quantities, i.e. the energy that is generated by its power stations or that is bought on the energy market (over the counter or power exchange), should be equal to the output quantities, i.e. the energy that is consumed by its consumers or that is sold on the energy market.

There are three main ways to trade electricity energy as a commodity:

- Through a power exchange or an “organised” electricity market where a trader may purchase or sell standardized energy products in an “anonymous way” (i.e. without knowing its counterpart). Offers within a bidding area managed by a power exchange can either be matched in a standalone way or in coordination with offers from other bidding areas but taking into account the transmission capacity constraints between the areas.

This last form of market is known as “market coupling” (when there are different power exchanges managing the “coupled” bidding areas) or “market splitting” (when a single power exchange manages the “coupled” bidding areas). The trader is not aware either of the origin or of the destination of the energy purchased or sold. There are two forms of organised markets: (i) auction markets in which trades are matched altogether once the gate closure occurs and (ii) continuous markets in which trades are matched continuously until the gate closure.

The financial operations related to the trades are carried out between the central counter party linked to the power exchanges and the trader. Once the trades are cleared, the commercial schedules (or market hub nominations) consisting of the aggregated trades that have occurred are forwarded by the power exchange or the central counter party to the concerned transmission system operator in a day-ahead or intraday process.

Examples of standardized products are: minimum volume increment (such as 1 MW), minimum price increment in Euros per Megawatt hour (such as 0,01 Euros per MWh) and a time interval (such as the next day with closure at noon on day ahead). Generally the blocks of energy could be sold on a peak, off peak or a given number of hours.

- Through over the counter (OTC or bilateral) trades where two traders are involved in a trade within a bidding area managed by a single transmission system operator. In such a case, the traders are free to trade as they wish, i.e. they are free to establish any pattern of the energy transaction. However once the trade has been finalised they have to declare their position to the concerned transmission system operator for the gate prior to operation. Usually, nominations are delivered for the day-ahead process (one gate for D-1) or intraday process (up to one per quarter of an hour).
- Through International over the counter (OTC) trades where two traders are involved in a trade within bidding areas managed by different transmission system operators. In such a case, the transmission system operators on the borders of each bidding area have to match the nomination of each trader either in long term process, day-ahead process or intraday process. This process is also linked to the transmission capacity allocation process, i.e. auctions on transmission capacity rights.

In addition, to assess the balance of each market participant, other nominations have to be provided such as:

- Generation and consumption forecast schedules (where the market participants have to declare the aggregated generation or consumption forecast of their power stations).

consumers to the local transmission system operator) for the day ahead process and intraday process, etc.

- Supply of a block of energy to an end-consumer (where a supplier delivers energy to a consumer contractually linked to a different balance responsible party);
- etc.

Thus four basic use cases have to be handled for the processing of these nominations depending upon their typology:

- transmission of the nomination only;
- transmission of the nomination and acknowledgment process (IEC 62325-451-1);
- transmission of the nomination, acknowledgement process and confirmation report;
- transmission of the nomination, acknowledgement process, eventually an anomaly report and a confirmation report.

Each of the above market situations can be reflected in different business scenarios as defined in the following subclause.

5.3 Scheduling business process definition

5.3.1 Use case

The scheduling business process can be divided into 4 different scenarios as outlined in the use case in Figure 3.

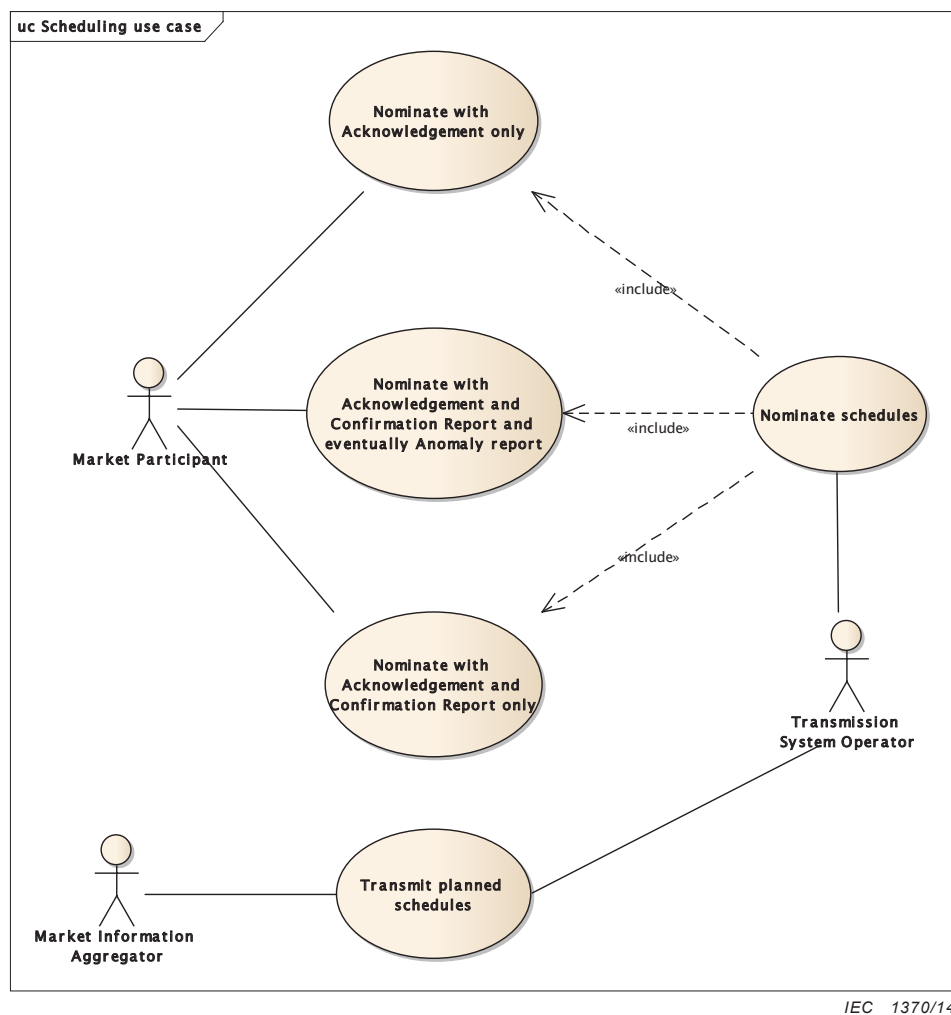


Figure 3 – Scheduling business scenarios

The first three scenarios are linked to the way the energy is traded as a commodity.

The last scenario consists of the transmission of the nominations for information purposes to a third party. This use case is not described in this process

5.3.2 Nominate schedules for commodity trades

5.3.2.1 General

The transmission system operator has to be informed of the commodity trades made by the market participant, either through a third party, such as market operator (power exchange) or a nomination validator (coordinated international OTC trade), or with another market participant. Consequently it is necessary to nominate the schedule to enable its verification before acceptance.

Three forms of nomination are covered in this process.

5.3.2.2 Nominate with acknowledgement only

This is the simplest form of nomination and could be used where a market operator or a nomination validator provide nomination information to the transmission system operator. In such a case, the transmission system operator does not need to match the nominations of each counterpart as they have been validated by an external trusted third party.

5.3.2.3 Nominate with acknowledgement, confirmation and anomaly

This is the case for OTC trades, where market participants individually submit their nominations to the transmission system operator who carries out the following steps:

- Verifies that the schedule is coherent independently from the counter nomination. At the end of the verification process an acknowledgement document is transmitted informing the market participant of the results of the initial verification.
- On reception of the nomination from the counter party the nominations are matched and if any mismatches are identified an anomaly report is submitted to both parties. A time driven event may be provided in order to verify that nominations from one party without a nomination from a counter party are taken into consideration and the appropriate anomaly report can be generated.
- Just prior to the closure of a given period an intermediate confirmation report may be transmitted to the market participants informing them of the situation of their nominations and eventually what will happen to nominations where there are outstanding anomalies.
- At the closure of a given period a final confirmation report is transmitted to the market participants informing them of what will be effectively scheduled from their nominations.

5.3.2.4 Nominate with acknowledgement and confirmation

The third case can be used where the transmission system operator does not provide anomaly information and consequently it reflects the second case without the anomaly report step.

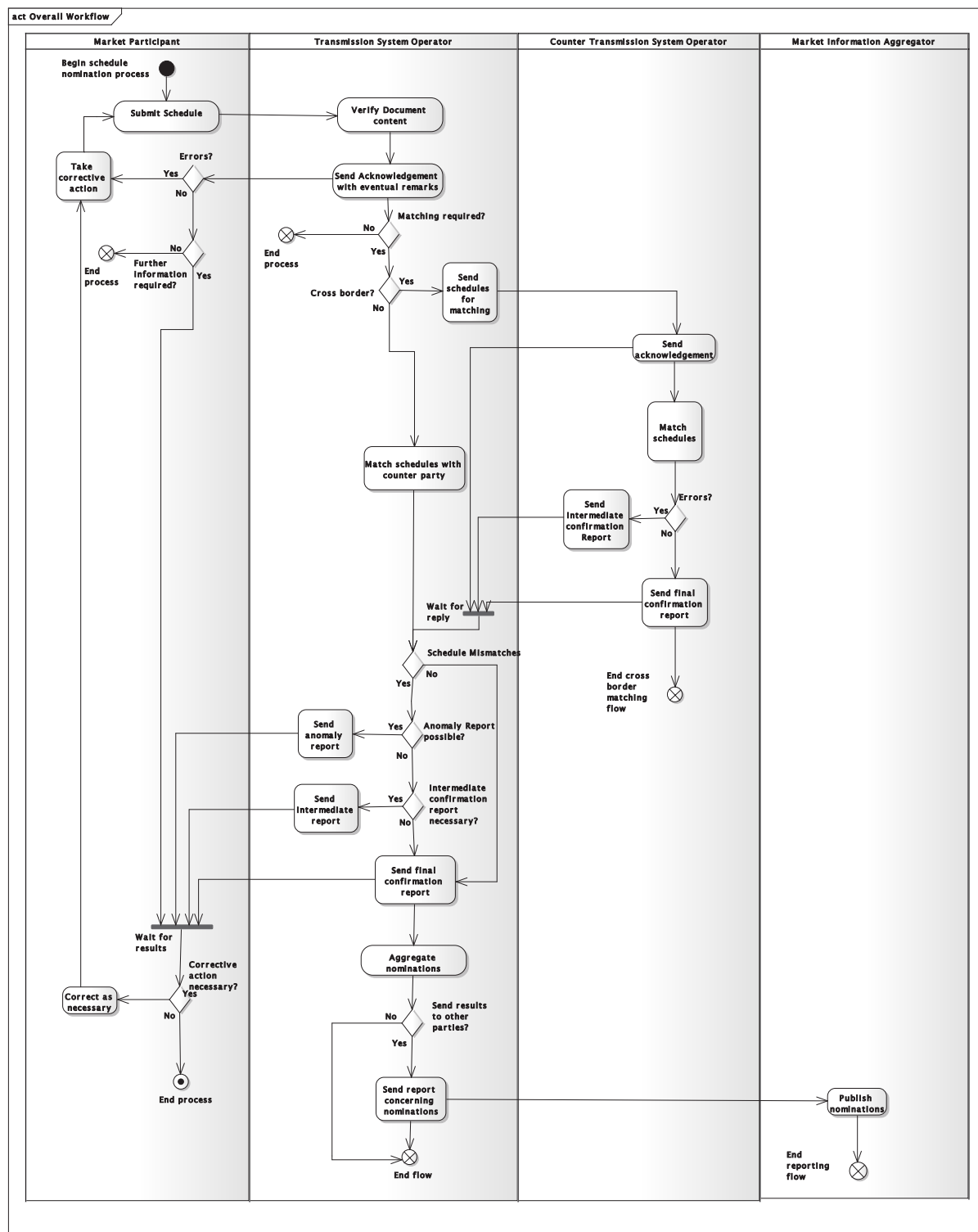
It is also more generally used in the transmission system operator to transmission system operator allocation of interconnection capacity in the case of international trades. This process is carried out to ensure that the nominations on each side of the transmission system operator areas are coherent and respect the agreed cross border rules. Such exchanges may employ a single matching principle where one transmission system operator acts as the matching transmission system operator who carries out the schedule matching and informs the participating transmission system operator of the results in a confirmation report. Any mismatches may be resolved by applying an agreed set of rules and integrated into the confirmation report.

5.3.3 Transmit planned schedules

This use case is to enable transmission system operators to inform interested parties and in particular market information aggregators of the schedules, in aggregated form, that have been approved for a given period.

5.4 Schedule business process workflow

5.4.1 General



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Figure 4 – Scheduling process workflow

The four scenarios described above can be represented in the workflow diagram outlined in Figure 4. As can be seen from the workflow the schedule process can be looked upon as an integrated process that can also be broken down into four specific scenarios.

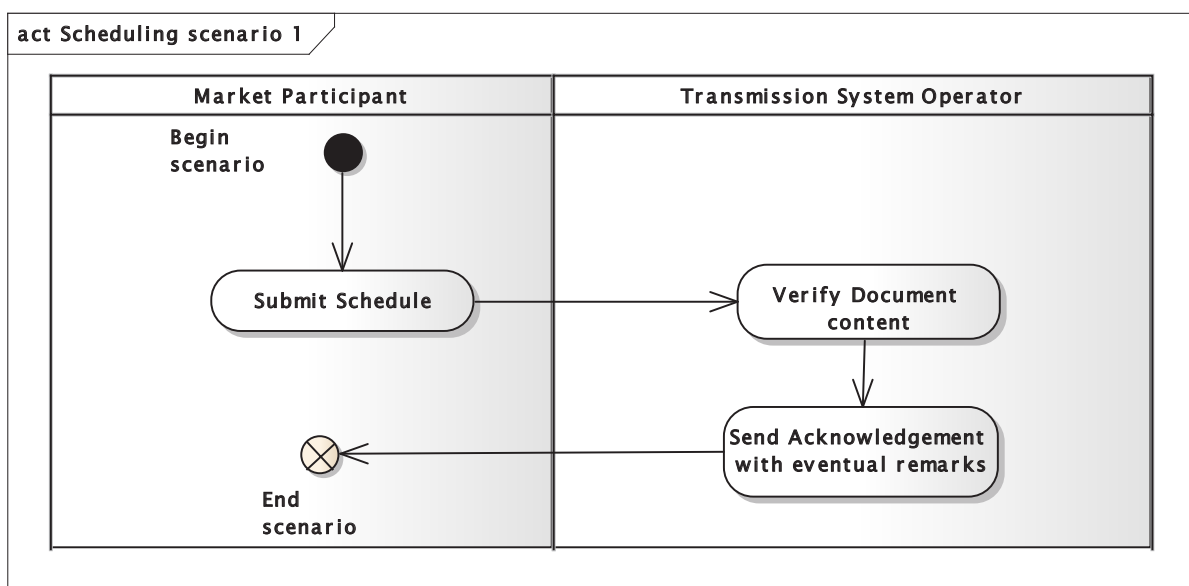
The complete schedule process that begins with a nomination being submitted by a market participant to the system operator managing a market balance area and ends with the list of the schedules being transmitted to a market information aggregator for posting to a website corresponds to the complete workflow diagram.

However, it is possible to use parts of the overall process individually to cover specific business requirements.

These individual scenarios have been outlined in the use case diagram in Figure 3.

5.4.2 Scenario 1 workflow

Scenario 1 (see Figure 5), may be used when a party (market participant or system operator) wishes to transmit scheduling information to another party and requires that an acknowledgement is sent in reply.



IEC 1372/14

Figure 5 – Scheduling scenario 1 workflow

The schedule document in this case may contain detailed time series information or time series that have aggregated to a given level (area, agreement identification or metering point).

Should a negative acknowledgement occur then the schedule document is retransmitted after the necessary corrections have been made.

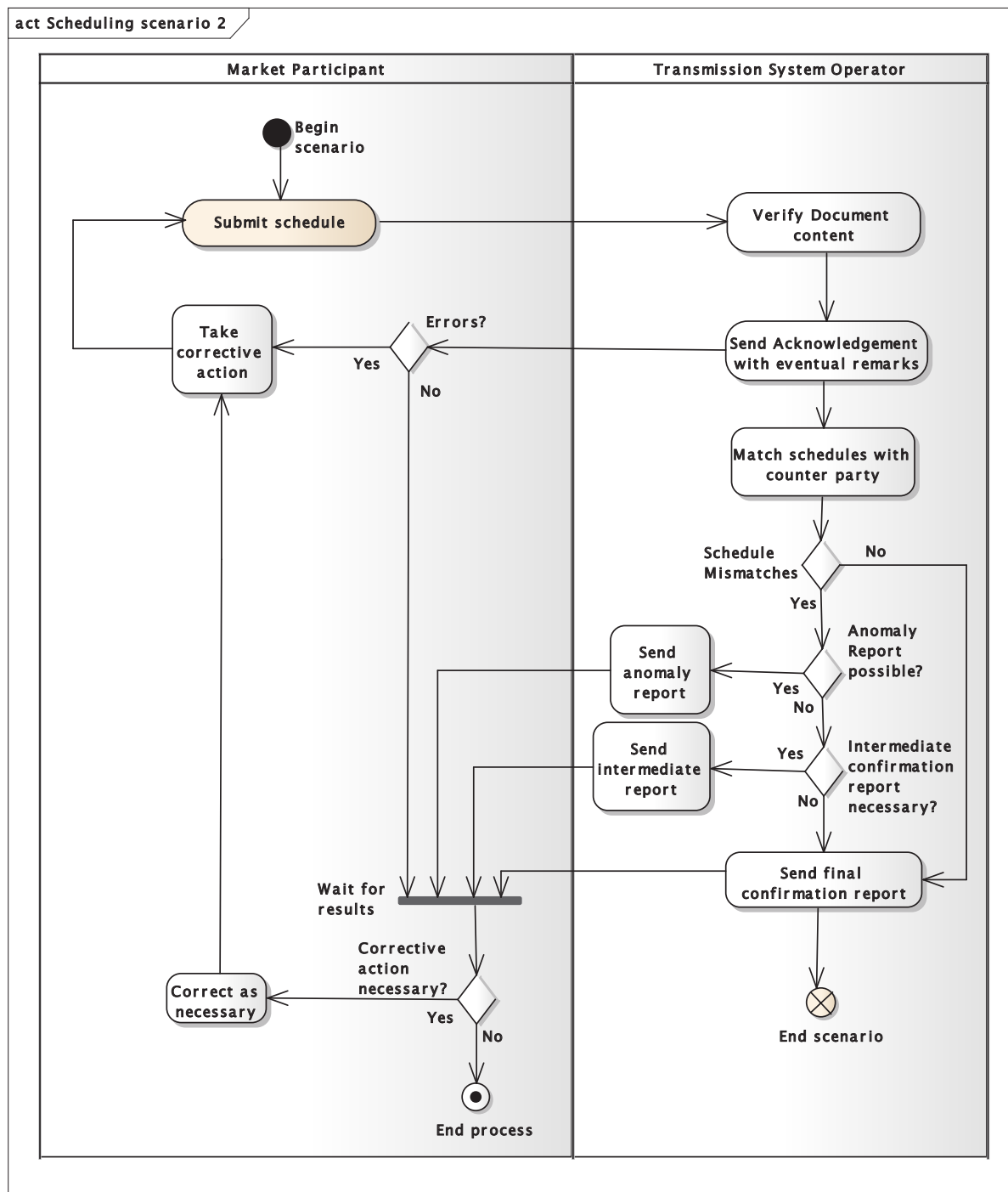
5.4.3 Scenario 2 workflow

Scenario 2 (see Figure 6), corresponds to the general day ahead or intraday scheduling process where the schedules are matched. It is a three step process:

- The market participant nominates the schedule to the transmission system operator who after verification of its contents in isolation replies with an acknowledgement document.
- The market participant's time series in the schedule document are matched with the time series of the counterpart.
- The schedule document content is confirmed for application for the period requested.

Error situations can be identified in the documents submitted in which case corrective action has to be taken by the market participant or the counter party.

A particular error situation may occur whenever there is a mismatch between two time series or whenever there is no counter party time series to match. In this situation it is possible to transmit an anomaly report containing the information of the mismatched time series. It should be noted that this information is sent to both parties for information.



IEC 1373/14

Figure 6 – Scheduling scenario 2 workflow

It is also possible to transmit an intermediate confirmation report that contains all the schedule information provided by the market participant and indicates what will be accepted.

for processing at cut off. For example it can provide a time series that mismatches where the quantities have been reduced in respect of local market rules. This value will be the final value if the market participant takes no corrective action.

The final confirmation report terminates the transaction and provides all the time series that have been accepted, with eventually any corrections due to local market rules. In some circumstances it may also include an imposed time series that does not figure in the market participant's schedule but has been imposed by the transmission system operator in order to complete some contractual obligations.

5.4.4 Scenario 3 workflow

Scenario 3 (see Figure 7), is typical of a system operator to system operator matching situation where single sided matching is carried out. It may also be used with market participants if local market rules dictate its use.

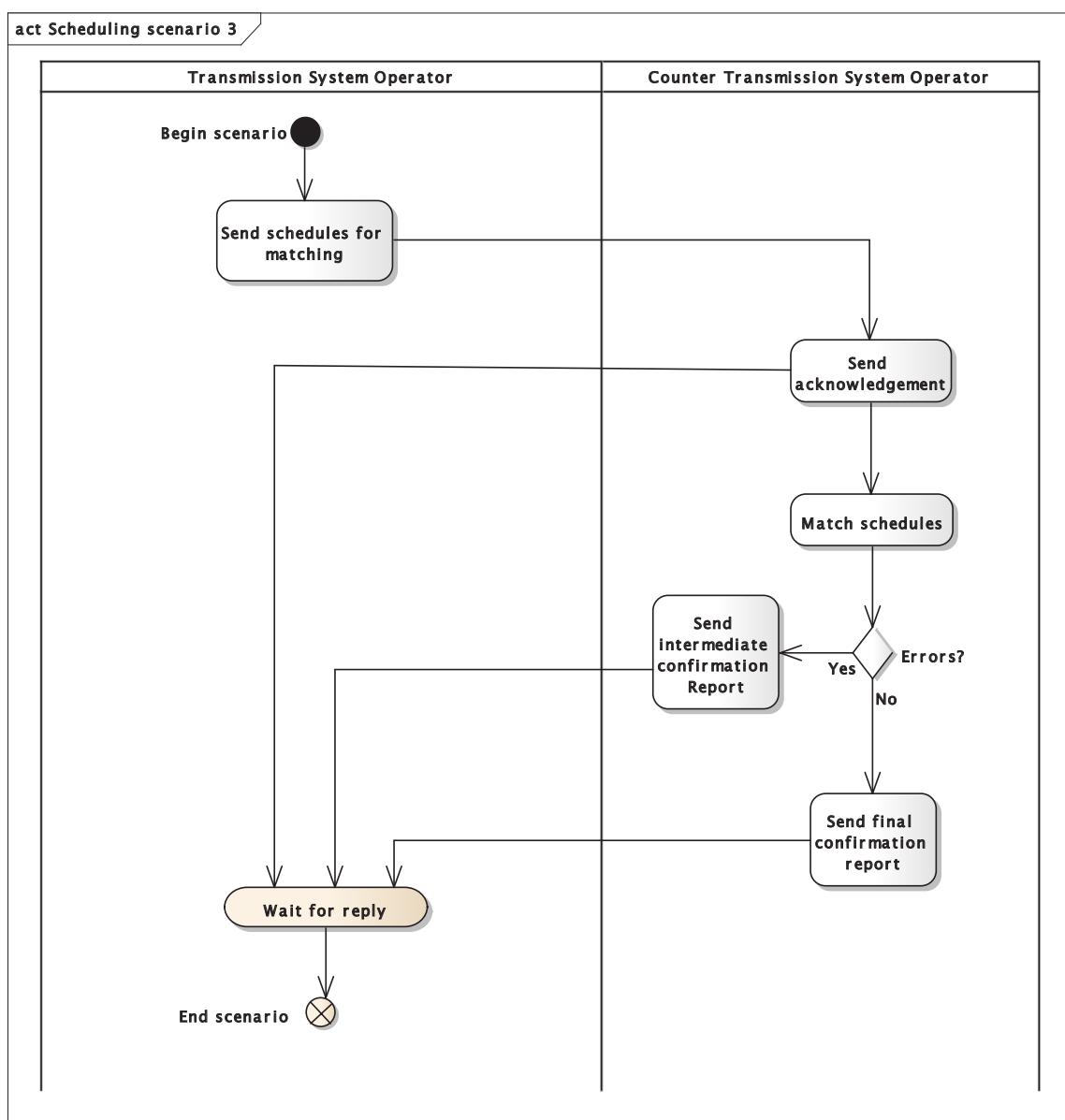


Figure 7 – Scheduling scenario 3 workflow

One party sends the schedule nominations that have already been validated to the matching party. For security reasons the matching party may also transmit the area schedules but basically this is making use of scenario 2.

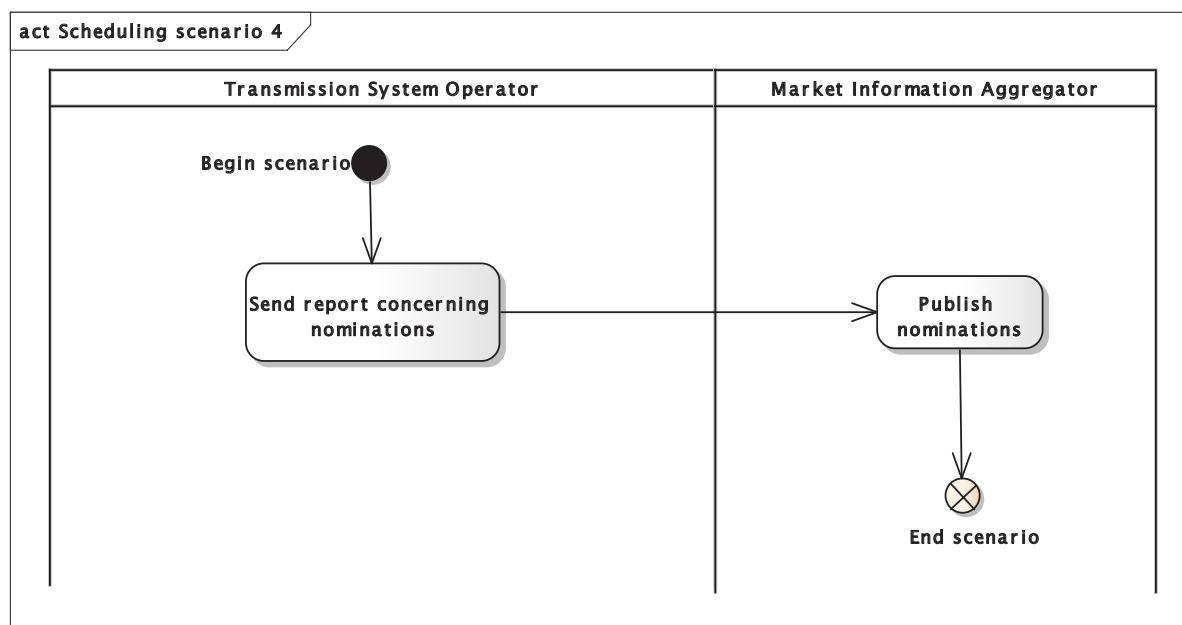
The matching party acknowledges reception of the schedules and then proceeds to carry out matching with the local counter schedules. If there are any differences the matching party applies agreed rules in order to resolve all outstanding issues.

In the case where rules have been applied to resolve matching issues an intermediate confirmation report is transmitted to the participating party. It may be necessary to retransmit the schedules in order to finalise any outstanding issues.

If there are no issues a final confirmation report is transmitted which concludes the scenario.

5.4.5 Scenario 4 workflow

Scenario 4 (see Figure 8), consists of the transmission of the scheduled nominations for information purposes to a third party. There is no response expected in this scenario.



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Figure 8 – Scheduling scenario 4 workflow

The transmitting party may be any party who has schedule information of interest to another party. For example a nomination validator may send the information to a transmission system operator, or an auction office handling implicit auctions may carry out a similar transmission to a transmission system operator. The information that is transmitted in this scenario may be in detailed or aggregated form depending on its destination.

The workflow depicts a typical case where it is used by the transmission system operator to inform a market information aggregator of the nominations. The market information aggregator may then publish these on a website as required.

5.5 Position of the market participant

Nominations are provided at different gate closures, such as long term, day-ahead, intraday. Different possibilities exist on the way nominations are submitted:

- at a given gate, only the nominations for the time period for this gate are provided;

- at a given gate, only the total nomination is provided (including all the previous nominations);
- etc.

Table 1 outlines the characteristics that apply to day-ahead and intra-day trading.

Table 1 – Characteristics of day ahead and intra-day trading

Process type	Document identifications	Information (values)	Schedule TimeInterval	Matching period
Day-ahead	1	Current position	Whole day	Whole day
Intraday incremental	N (1 per gate)	Incremental values	Remaining hours	Remaining hours
Schedule day	1	Current position	Whole day	Remaining hours
Intraday total	N (1 per gate)	Current position	Whole day	Remaining hours
Intraday accumulated	1	Incremental values	Whole day	Remaining hours

Depending on the way the intraday process is implemented in a market, there are different ways to calculate the “current position” for a party at a given point in time:

- Intraday incremental: Current position is the aggregation of the confirmed schedules, especially within day ahead (P_a) and intraday (P_b) processes
 - $CP = P_a + P_b$ (1st intraday) + P_b (2nd intraday) + P_b (...) + ...
- Schedule day: Current position is given by the last confirmed document
 - $CP =$ Last confirmed document.
- Intraday total: Current position is given by the last confirmed document
 - $CP = P_a$, and at a latter point in time replaced by the Intraday Total document
- Intraday accumulated: Current position is the aggregation of the confirmed schedules from the day-ahead (P_a) schedule document and the schedules from the last confirmed intraday accumulated document
 - $CP = P_a +$ Intraday accumulated document

5.6 Generic business rules for document

5.6.1 General

All the business rules described in IEC 62325-351 are also valid for this standard. Additional rules are provided hereafter.

When a schedule document is received, it shall be check at the application level to ensure that there are no faults in it that could prevent its normal processing. After this check, an acknowledgement document, as defined in IEC 62325-451-1, shall be generated either accepting in its entirety the document in question or rejecting it.

5.6.2 Process type for distinguishing between day ahead and intraday trading

The day ahead and intra-day document respect exactly the same rules.

The fundamental difference between the two is that intra-day scheduling can only take place within the scope of the hours already scheduled but not executed.

5.6.3 Use of the In_Domain and Out_Domain

Basically the In_Domain and the Out_Domain is always required excepting two circumstances:

- where the BusinessType identifies a production time series then only the In_Domain is to be used;
- where the BusinessType identifies a consumption time series then only the Out_Domain is to be used.

5.6.4 Use of the In_MarketParticipant and Out_MarketParticipant

Basically the In_MarketParticipant and the Out_MarketParticipant is always required excepting three circumstances:

- where the BusinessType identifies a production time series then only the In_MarketParticipant is to be used;
- where the BusinessType identifies a consumption time series then only the Out_MarketParticipant is to be used;
- where the information provided is of an aggregated nature (i.e. the ObjectAggregation indicates an aggregation at area or agreement level) then the In_MarketParticipant and Out_MarketParticipant shall not be used.

5.6.5 Use of the MarketAgreement

The MarketAgreement shall only be used in the case where the BusinessType indicates an external trade with explicit capacity.

5.6.6 Acknowledgement of a schedule market document

Upon reception of a schedule market documents, an acknowledgement document as defined in IEC 62325-451-1 is to be sent either for acceptance, rejection or errors indication.

An acknowledged version of a schedule market document replaces the previous version of the document in question.

5.6.7 Acceptance and rejection criteria of a schedule market document

The conditions described in Table 2 provide the error conditions as well as the action to be carried out.

Table 2 – Error condition and possible action

Error	Secondary condition	Action
A Schedule_MarketDocument error.		The complete document is rejected.
A TimeSeries identification level error.	If it is the initial transmission of a document, or if it concerns the addition of a new time series.	The complete time series in question is rejected.
A TimeSeries identification level error.	If it is the retransmission of a document with a new version number then if it concerns an error at the time series level or if the time series is missing.	The complete document is rejected.
A Series_Period level error.	An error concerning the time interval or the resolution.	The complete document is rejected.
A Point error.	If it is an error with the quantity.	The complete document is rejected.
A Point error.	If the position does not exist.	The complete document is rejected.
A Point error.	If the position is missing.	The complete document is rejected.

5.6.8 Document without any TimeSeries instances

A document that contains no time series instances shall be considered to be a valid transmission from a market participant indicating that there is no time series information forthcoming. This is dependent on market rules that in some circumstances require the systematic transmission of a document from a market participant.

The market participant may at a later time transmit a new version of the document in question with time series information.

5.6.9 Business rules for anomaly report market documents

The anomaly report market document provides, on an individual basis, information concerning an anomaly that prevents the matching of a time series between two parties. This information is sent to each party for resolution.

The report contains the identification of schedule document submitted by each party as well as the time series where the anomaly has occurred.

The time series provided in the anomaly report market document shall be identical to the time series submitted in the schedule market document by each party.

In the case where only one party has submitted a time series only that time series is provided in the anomaly report market document.

5.6.10 Business rules for confirmation report market documents

The confirmation report market document is used to inform all interested parties of the situation in respect to their schedule.

A confirmation report market document is generated once a cutoff time has been reached for the schedule time interval in question. At that point in time the total schedule is balanced and all outstanding discrepancies are noted.

Depending on market rules, apart from a final confirmation report market document that is produced after cutoff, intermediate confirmation market documents may be generated. The cutoff time refers to daily, intra daily and also the different markets that cover imbalance adjustments, reserve allocation, etc. (ancillary services markets).

The confirmation report market document provides all the time series that have been provided in the schedule market document for the schedule time interval in question. It may also include one or several time series that a system operator has imposed on the market participant in compliance with market rules.

Their schedule can either be globally confirmed, or in the case of discrepancies, they will be informed of what aspects of their time series have been finally accepted.

A confirmation report market document may be sent to a market participant who has not sent beforehand a schedule market document. This may occur for example whenever a time series has to be imposed on a market participant in order to confirm obligations that have been previously agreed and for which the market participant has not complied.

All the time series that have been sent in a schedule market document by the concerned party are identified in the confirmation report market document. If there are discrepancies these are identified with a reason code and eventual text. A time series if being rejected in the confirmation report market document shall not contain any period information.

A time series may be imposed by the system operator on the market participant in respect to specific market rules. For example, if market rules indicated that in case of mismatch one of the parties time series would automatically be taken and imposed on the other party. Such a condition could occur if a market participant had a document that was rejected due to syntax errors and the document was never retransmit prior to cutoff. An imposed time series cannot be provided if an equivalent time series has already been accepted.

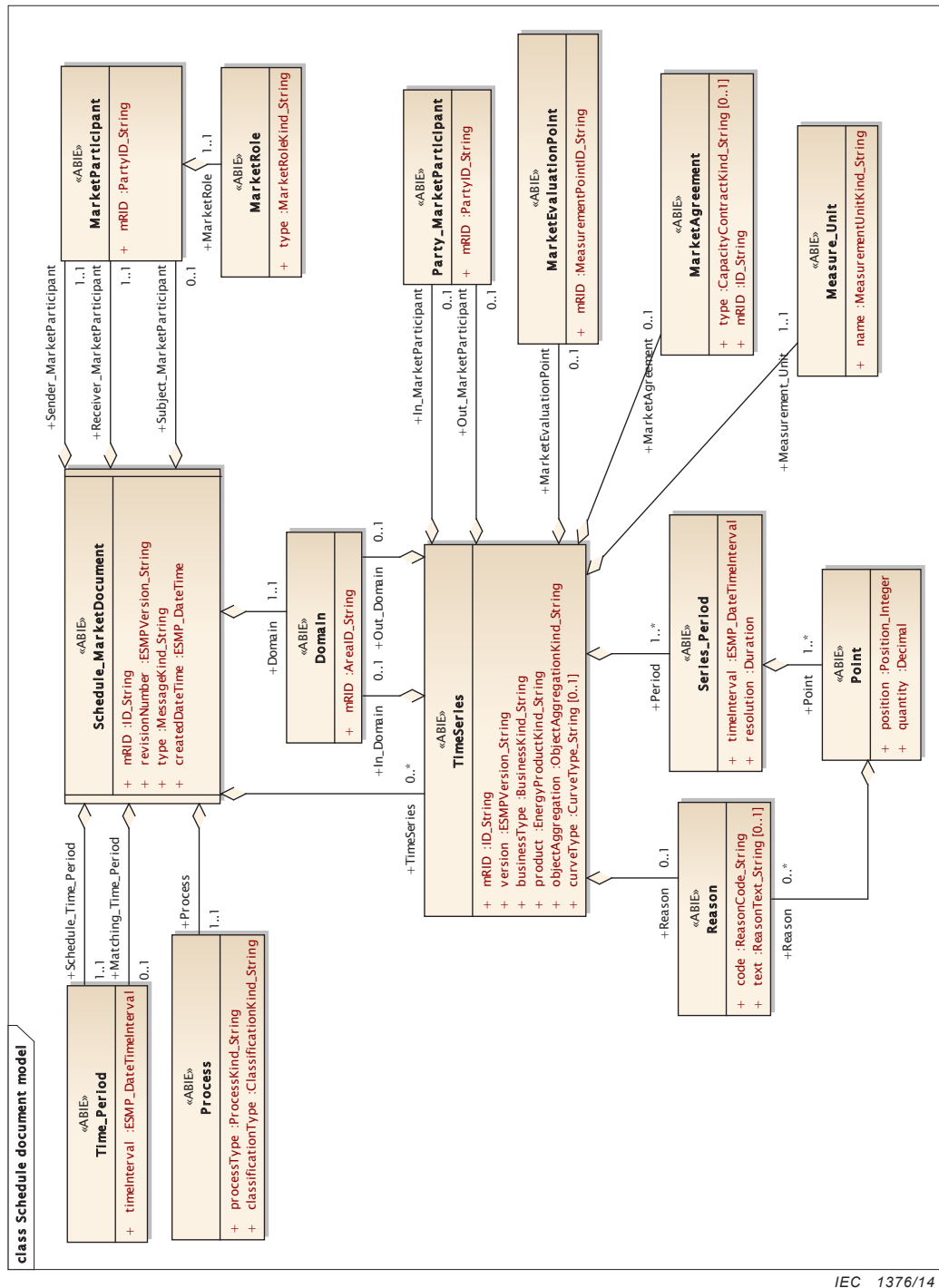
The Series_Period class Time Interval and Resolution attributes shall be the same as those in the original schedule market document and shall be sent in the confirmation report market document for all time series that have been accepted or accepted with modification. In the case of imposed time series the resolution shall be the same as the one for the market participant's time series.

6 Contextual and assembly models

6.1 Schedule contextual model

6.1.1 Overview of the model

Figure 9 shows the model.



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Figure 9 – Schedule contextual model

6.1.2 IsBasedOn relationships from the European style market profile

Table 3 shows the traceability dependency of the classes used in this package towards the upper level.

Table 3 – IsBasedOn dependency

Name	Is BasedOn Class	Complete IsBasedOn Path
Domain	ESMPClasses::Domain	IEC62325-351\ESMPClasses
MarketAgreement	ESMPClasses::MarketAgreement	IEC62325-351\ESMPClasses
MarketEvaluationPoint	ESMPClasses::MarketEvaluationPoint	IEC62325-351\ESMPClasses
MarketParticipant	ESMPClasses::MarketParticipant	IEC62325-351\ESMPClasses
MarketRole	ESMPClasses::MarketRole	IEC62325-351\ESMPClasses
Measure_Unit	ESMPClasses::Measure_Unit	IEC62325-351\ESMPClasses
Party_MarketParticipant	ESMPClasses::MarketParticipant	IEC62325-351\ESMPClasses
Point	ESMPClasses::Point	IEC62325-351\ESMPClasses
Process	ESMPClasses::Process	IEC62325-351\ESMPClasses
Reason	ESMPClasses::Reason	IEC62325-351\ESMPClasses
Schedule_MarketDocument	ESMPClasses::MarketDocument	IEC62325-351\ESMPClasses
Series_Period	ESMPClasses::Series_Period	IEC62325-351\ESMPClasses
Time_Period	ESMPClasses::Time_Period	IEC62325-351\ESMPClasses
TimeSeries	ESMPClasses::TimeSeries	IEC62325-351\ESMPClasses

6.1.3 Detailed Schedule contextual model

6.1.3.1 Schedule_MarketDocument root class

A schedule document provides the position of a party or a domain related to some market information; it includes a set of time series.

An electronic document containing the information necessary to satisfy the requirements of a given business process.

IsBasedOn: ESMPClasses::MarketDocument

Table 4 shows all attributes of Schedule_MarketDocument.

Table 4 – Attributes of Schedule contextual model::Schedule_MarketDocument

mult.	Attribute name	Attribute type	Description
[1..1]	createdDateTime	ESMP_DateTime	The date and time of the creation of the document.
[1..1]	mRID	ID_String	The unique identification of the document being exchanged within a business process flow.
[1..1]	revisionNumber	ESMPVersion_String	The identification of the version that distinguishes one evolution of a document from another.
[1..1]	type	MessageKind_String	The coded type of a document. The document type describes the principal characteristic of the document.

Table 5 shows all association ends of Schedule_MarketDocument with other classes.

**Table 5 – Association ends of Schedule contextual model::
Schedule_MarketDocument with other classes**

mult.	Role	Class type name	Description
[1..1]	Domain	Domain	The identification of the domain that is covered in the schedule document. It is in general the market balance area that is the subject of the schedule plan. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::Domain.Domain[0..1]
[0..1]	Matching_Time_Period	Time_Period	This information provides the start and end date and time of the period to be matched. The matching period start date and time shall begin at the start of the schedule time interval or be within the bounds of the schedule time interval. The matching period end date and time shall be the same as that of the schedule time interval. It is this period that is being presented for matching. The period prior to the matching period is generally considered to be historical data and should correspond to the information received in previous transmissions. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::Time_Period.Period[0..*]
[1..1]	Schedule_Time_Period	Time_Period	This information provides the start and end date and time of the schedule time interval. All time intervals for the time series in the document shall be within the total time interval for the schedule. The receiver will discard any time intervals outside the schedule period. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::Time_Period.Period[0..*]
[1..1]	Process	Process	The process dealt with in the document. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::Process.Process[0..*]
[0..1]	Subject_MarketParticipant	MarketParticipant	The party that is the subject of the documents time series. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::MarketParticipant.MarketParticipant[0..*]
[1..1]	Sender_MarketParticipant	MarketParticipant	Document owner. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::MarketParticipant.MarketParticipant[0..*]
[1..1]	Receiver_MarketParticipant	MarketParticipant	Document recipient. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::MarketParticipant.MarketParticipant[0..*]
[0..*]	TimeSeries	TimeSeries	The time series that is associated with an electronic document. Association Based On: ESMPClasses::MarketDocument.[] ----- ESMPClasses::TimeSeries.TimeSeries[0..*]

6.1.3.2 Domain

A domain covering a number of related objects, such as market balance area, grid area, borders etc.

IsBasedOn: ESMPClasses::Domain

Table 6 shows all attributes of Domain.

Table 6 – Attributes of Schedule contextual model::Domain

mult.	Attribute name	Attribute type	Description
[1..1]	mRID	AreaID_String	The unique identification of the domain.

6.1.3.3 MarketAgreement

A formal agreement between two parties defining the terms and conditions for a set of services. The specifics of the services are, in turn, defined via one or more service agreements.

IsBasedOn: ESMPClasses::MarketAgreement

Table 7 shows all attributes of MarketAgreement.

Table 7 – Attributes of Schedule contextual model::MarketAgreement

mult.	Attribute name	Attribute type	Description
[1..1]	mRID	ID_String	The unique identification of the agreement.
[0..1]	type	CapacityContractKind_String	The specification of the kind of the agreement, e.g. long term, daily contract.

6.1.3.4 MarketEvaluationPoint

The location where one or more products are measured. This may be a physical or virtual location.

IsBasedOn: ESMPClasses::MarketEvaluationPoint

Table 8 shows all attributes of MarketEvaluationPoint.

Table 8 – Attributes of Schedule contextual model::MarketEvaluationPoint

mult.	Attribute name	Attribute type	Description
[1..1]	mRID	MeasurementPointID_String	A unique identification of the measurement point.

6.1.3.5 MarketParticipant

The identification of the party participating in energy market business processes.

IsBasedOn: ESMPClasses::MarketParticipant