European Network of
Transmission System Operators
for Electricity

CACM LIST OF INFORMATION TO ACER

IMPLEMENTATION GUIDE

2018-11-08

APPROVED DOCUMENT
VERSION 1.0

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- SHALL: This word, or the terms “REQUIRED” or “MUST”, means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase, or the phrase “MUST NOT”, means that the definition is an absolute prohibition of the specification.
- SHOULD: This word, or the adjective “RECOMMENDED”, means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
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Revision History

Version	Release	Date	Paragraph	Comments
0	1	2018-05-29		First draft of the ACER CACM Implementation guide.
0	2	2018-10-01		Second draft of the IG. All comments from EDI members have been considered.
0	3	2018-11-08		Third draft of the IG. Comments from EDI members, CGMES and RSC experts have been considered.
1	0	2018-11-08		Approved by MC

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1 Scope

The objective of this implementation guide is to make possible for ENTSO-E and TSOs to submit data on the list of information elaborated by ACER in cooperation with ENTSO-E, in accordance with Article 82(4, 5) of the CACM guideline.

The implementation guide is one of the building blocks for using UML (Unified Modelling Language) based techniques in defining processes and messages for interchange between actors in the electrical industry in Europe.

The implementation guide is developed for the harmonisation of the underlying data exchange process.

2 References

2.1 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 62325-351:2016, Framework for energy market communications – Part 351: CIM European market model exchange profile.
- IEC 62325-450:2013, Framework for energy market communications – Part 450: Profile and context modelling rules.
- IEC 62325-451-1:2017, Framework for energy market communications – Part 451-1: Acknowledgement business process and contextual model for CIM European market.
- IEC 62325-451-3:2014+AMD1:2017 CSV, Framework for energy market communications – Part 451-3: ENTSO-E Capacity Allocation and Nomination business process and contextual model for CIM European market.
- IEC 62325-451-6:2018 Framework for energy market communications - Part 451-6: Publication of information on market, contextual and assembly models for European-style markets
- IEC TS 61970-600-1:2017 Energy management system application program interface (EMS-API) - Part 600-1: Common Grid Model Exchange Specification (CGMES) - Structure and rules
- IEC TS 61970-600-2:2017 Energy management system application program interface (EMS-API) - Part 600-2: Common Grid Model Exchange Specification (CGMES) - Exchange profiles specification

2.2 Other references

- Articles 82(4) and (5) of the CACM Guideline (Commission Regulation (EU) N° 1222/2015 of 24 July 2015 establishing a guideline on capacity allocation and congestion management)
- Article 8(9) of Regulation 714/2009
- Critical Network Element Implementation Guide
- The Harmonised Electricity Market Role Model
- Detailed Data Descriptions for the purpose of the ACER CACM list of information

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3 Terms and definitions

ACER: Agency for the Cooperation of Energy Regulators.

Actual network losses on the relevant interconnectors: means the quantity of energy (in MW) over a market time unit that is consumed due to losses.

Applied loss factor on the relevant interconnectors: means the assumed linearization of the loss (in % of the nominal flow) on a particular cross-border grid element.

Available margin (MW), Article 29(7)(e) CACM: means the maximum flow of the CNEC reduced by base case flow, reliability margin and the calculated flow from previously allocated capacities.

Available margin (MW), Article 29(7)(f) CACM: means the available margin pursuant to Article 29(7)(e) CACM adjusted for the consideration of remedial actions in capacity calculation.

Base case flow (MW), Article 29(7)(d) CACM: means the calculated physical flow on the CNEC assuming no cross zonal exchanges within the concerned CCR as specified in the capacity calculation methodology.

Begin date and time: means the first day and exact time including the market time unit of the curtailment.

Bidding zone border: means the borders between two bidding zones, a bidding zone being the largest geographical area within which market participants are able to exchange energy without capacity allocation.

Binding constraint in defining cross-zonal capacity: means the most critical network element(s) with contingency limiting the cross-zonal capacity.

Calculated realised physical flow in real time (MW): means for those Critical Network Element & Contingency with non-zero shadow prices the actual flow over the selected critical network element that would occur in the specified contingency.

Capacity calculation market time unit (date, hour): means the period for which the market price is established or the shortest possible common time period for the two bidding zones, if their market time units are different, all times are expressed in UTC time zone.

Capacity calculation region (CCR): means the concerned capacity calculation region as defined in Article 2(3) CACM.

Capacity calculation timeframes:

- Day-ahead timeframe means the period of time within which the day-ahead market is organized. It starts with the closure of the long-term market and ends with the gate closure of the day-ahead market. Delivery is for the following day for each market time unit.

- Intraday timeframe means the period of time within which the intraday market is organized. It starts with the gate opening of the intraday market and ends with the closure of the intraday market. Delivery is either for the following day or within the day for each market time unit.

CIM: Common Information Model, set of standards for modelling data exchanges in an electrical utility enterprise developed under IEC TC 57.

Common Grid Model (CGM): means a Union-wide data set agreed between TSOs describing the main characteristic of the power system (generation, loads and grid topology) and rules for changing these characteristics during the capacity calculation process.

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CGMES: Common Grid Model Exchange Specification

CGMES v2.4.15: means the Edition 1 of the IEC Technical Specifications of CGMES: IEC TS 61970-600-1:2017 and IEC TS 61970-600-2:2017.

Compensation/reimbursement: means the amount of money paid by TSO(s) for each individual curtailment, expressed in €.

Critical Network Element & Contingency (CNEC): means a critical network element limiting the cross-zonal exchanges, potentially associated to a contingency which is defined as the tripping of one single or several network elements.

Cross-Zonal Capacity (MW), Article 29(8)(e) CACM: means maximum admissible power flow between two bidding zones calculated in accordance with Article 29(8)(c) CACM taking into account reliability margin, previously allocated cross-zonal capacity and rules for efficiently sharing the power flow capabilities of critical network elements among different bidding zone borders.

Curtailment: means the cancellation or reduction of already allocated cross-border transmission rights before or after their nomination.

DACF: Day Ahead Congestion Forecast.

DEP: Data Exchange Processes.

End date and time: means the last day and exact time including the market time unit of the curtailment.

EQ: Equipment.

Flow-based approach, Article 2(9) CACM: means a capacity calculation method in which energy exchanges between bidding zones are limited by power transfer distribution factors and available margins on critical network elements.

Flow from previously allocated capacity (MW), Article 29(7)(c) CACM: cross-zonal capacity allocated in previous timeframes in a form of long term transmission rights per bidding zone border for each market time unit.

IGM: Individual Grid Model.

Maximum Flow (MW), Article 29(7)(a) CACM: means the maximum admissible power flow when considering the operational security limits e.g. permanent admissible transmission loading (PATL) as defined in the capacity calculation methodology of the concerned CCR.

MIA: Market Information Aggregator.

Power Transfer Distribution Factors (PTDF): indicates the incremental change in real power that occurs on transmission lines due to real power transfers between two regions.

Previously allocated cross zonal capacity (MW), Article 29(8)(e) CACM: means the cross-zonal capacity allocated in previous timeframes in a form of long-term transmission rights per bidding zone border for each market time unit.

Resource Description Framework (RDF): Is a data model for objects ("resources") and relations between them, provides a simple semantics for this data model, and these data models can be represented in an XML syntax.

Resource Description Framework Schema (RDFS): Is a vocabulary for describing properties and classes of RDF resources, with a semantics for generalization-hierarchies of such properties and classes.

Reduction in cross-zonal capacity: means the value of reduction of the cross zonal capacity for each market time unit between begin and end time expressed in MW.

Reliability margin (MW), Article 22(5) CACM: means the transmission reliability margin calculated and applied for each bidding zone border in accordance with the capacity calculation.

241 **RSC:** Regional Security Coordinator.

242 **Shadow price of critical branches (€/MW)**: means the marginal increase of market surplus
243 when the constraint of the critical branches is marginally relaxed.

244 **SSH:** Steady State Hypothesis.

245 **SV:** State Variables.

246 **TP:** Topology.

247 **TSO:** Transmission System Operator.

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4 The ACER list of information Business Process

4.1 Overview

Article 82(4) of the CACM guideline says that “The Agency, in cooperation with ENTSO for Electricity, shall draw up by six months after the entry into force of this Regulation a list of the relevant information to be communicated by ENTSO for Electricity to the Agency in accordance with Articles 8(9) and 9(1) of Regulation (EC) No 714/2009. The list of relevant information may be subject to updates. ENTSO-E shall maintain a comprehensive, standardised format, digital data archive of the information required by the Agency.”

Article 82(5) of the CACM says also that “All TSOs shall submit to ENTSO for Electricity the information required to perform the tasks in accordance with paragraphs 2 and 4.”

These articles provide a legal basis for ACER to request ENTSO-E and TSOs to provide the information required to monitor the implementation of the CACM regulation. Following these articles, ACER prepared a list of information that focuses on the information needed to monitor the effect of the implementation of the CACM Regulation on the harmonisation of applicable rules aimed at facilitating market integration, non-discrimination, effective competition and the efficient functioning of the market.

In practice, the different categories of information to be submitted are:

- Monitoring the efficiency of bidding zones.
  To monitor the efficiency between bidding zones, it is necessary to provide the curtailments on a border during a certain time interval. It is also mandatory to provide the DACF CGM in CGMES format. The DACF process is executed every calendar day, whereby the RSCs get the individual grid models as input and merge them into a common grid models.

- Information on Capacity Calculation Process and result

  - Critical network elements and contingencies and results
    This information consists on data extracted from the capacity calculation process such as contingencies, monitored elements and remedial actions. Additionally, maximum flows studied by the load flow calculation per border and interconnectors will be provided. For flow-based approach, PTDF factors and shadow price of the critical elements are also included in the data submission.

  - Results of capacity calculation
    It is mandatory to provide also the results of the capacity calculation like the allocated capacities or reliability margins.

- Incremental social welfare
  Finally, it is mandatory to send the loss factors on the interconnectors, and the actual losses per market time unit period.

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4.2 Use Cases

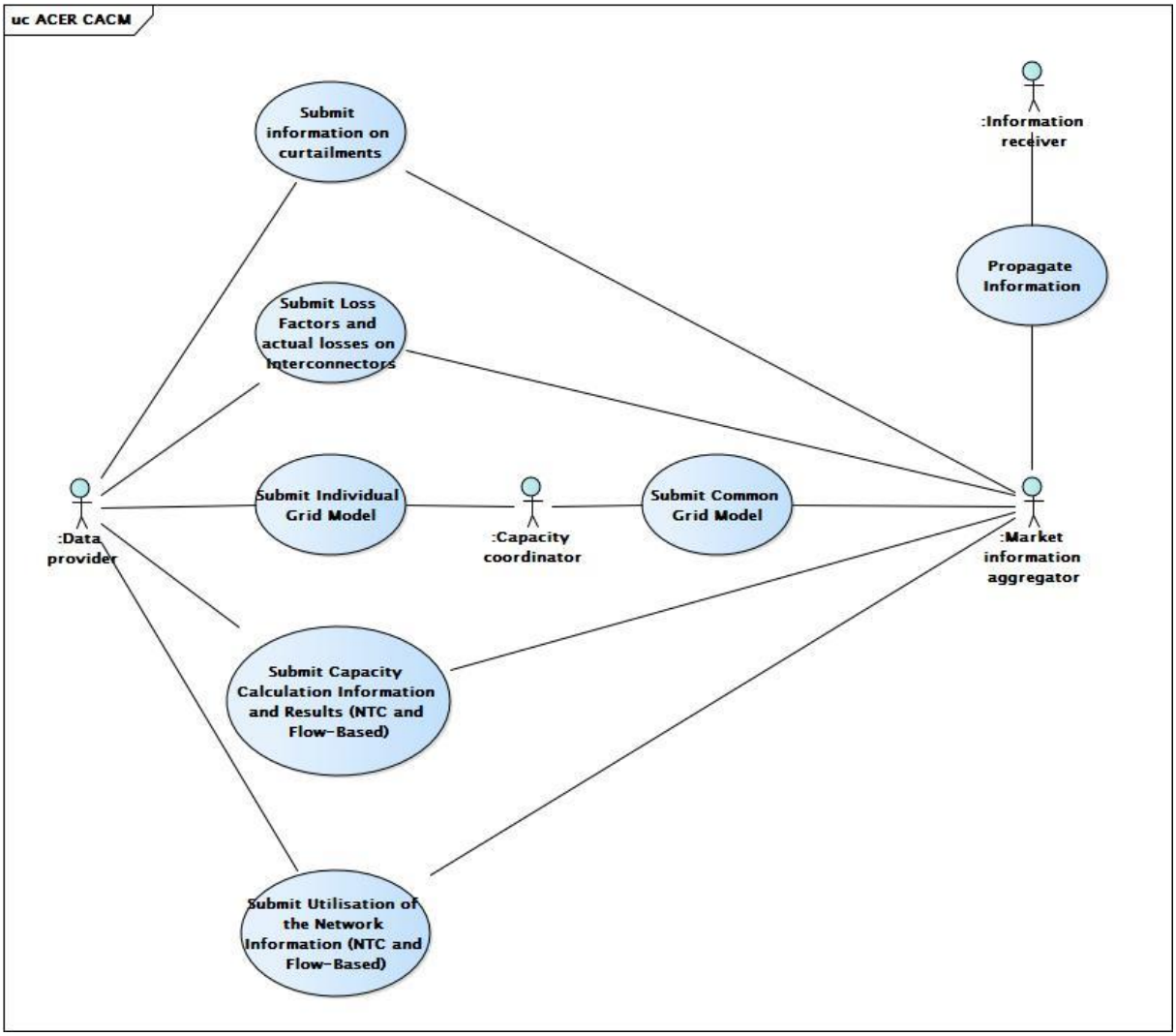

Figure 1 - Use Cases

Table 1 gives a list of actors involved in ACER list of information from CACM data exchanges.

Table 1 - Actor labels and descriptions

Actor Label	Actor Description
Data provider	Data provider is responsible for providing to MIA the curtailments, loss factors and actual losses, capacity calculation information and results and utilisation of the network. He also provides the IGM to the capacity coordinator. This role will be played by the TSOs and/or RSCs.
Capacity coordinator	For doing the capacity calculation, capacity coordinator has to do a merging of the different IGM received from the data providers and create a CGM. This merged CGM will be submitted to MIA. This role will be played by the RSCs.
Market information aggregator (MIA)	MIA is the role that receives, validates and acknowledges all submitted information from data provider and capacity coordinator. The role subsequently propagates this

	information to the information receiver. This role will be played by the ENTSO-E.
Information receiver	Information receiver receives the information propagated by MIA. This role will be played by ACER.

Table 2 gives a list of use cases for ACER list of information from CACM data exchanges.

Table 2 - ACER CACM Data Exchange use cases

Use case label	Actors involved	Action descriptions and assertions
Submit information on curtailments	Data provider, MIA	Data providers send to the MIA the curtailment information. MIA acknowledges the received information.
Submit Loss Factors and actual losses on Interconnectors	Data provider, MIA	Data providers send to MIA the loss factors and actual losses on the interconnectors. MIA acknowledges the received information.
Submit Individual Grid Model.	Data provider, capacity coordinator	Data providers send to capacity coordinator their IGM. This way capacity coordinator can do the merge into a CGM,
Submit Capacity Calculation Information and Results (NTC or flow-based)	Data provider, MIA	Data provider submits to MIA the maximum flows in different situations (N, N-1…) between bidding zones and also per interconnectors. For flow-based approach, PTDF factors are also provided with the information previously described. For both methodologies contingencies and critical network elements have to be included. MIA acknowledges the received information.
Submit Utilisation of the Network Information (NTC or flow-based)	Data provider, MIA	Data Provider submits to MIA the contingencies and critical network elements for both methodologies like in the previous use case. But in this case physical flows in real time per critical network element have to be included. In flow base methodology the shadow price of critical network elements has to be included. MIA acknowledges the received information.
Submit Common Grid Model	Capacity coordinator, MIA	Capacity coordinators are the ones who merge all the

		received IGMs into one CGM and provide it to the MIA.
Propagate information	MIA, information receiver	MIA propagates all the gathered information to the information receiver. Information receiver acknowledges the received information.

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4.3 Document exchange processes

4.3.1 Overview

The use cases are supported by the following document exchanges:

- Submit information on curtailments - Publication_MarketDocument
- Submit actual losses - Outage_MarketDocument
- Submit loss factors – Configuration_MarketDocument (Out of Scope)
- Submit IGM and CGM - CGMES v2.4.15
- Submit network information on capacity calculation and utilisation (NTC or flow-based) - CriticalNetworkElement_MarketDocument
- Submit results information on capacity calculation and utilisation (NTC only) - Publication_MarketDocument
- Reply Acknowledgement_MarketDocument

Next figure shows a sequence diagram of the documents exchange processes.

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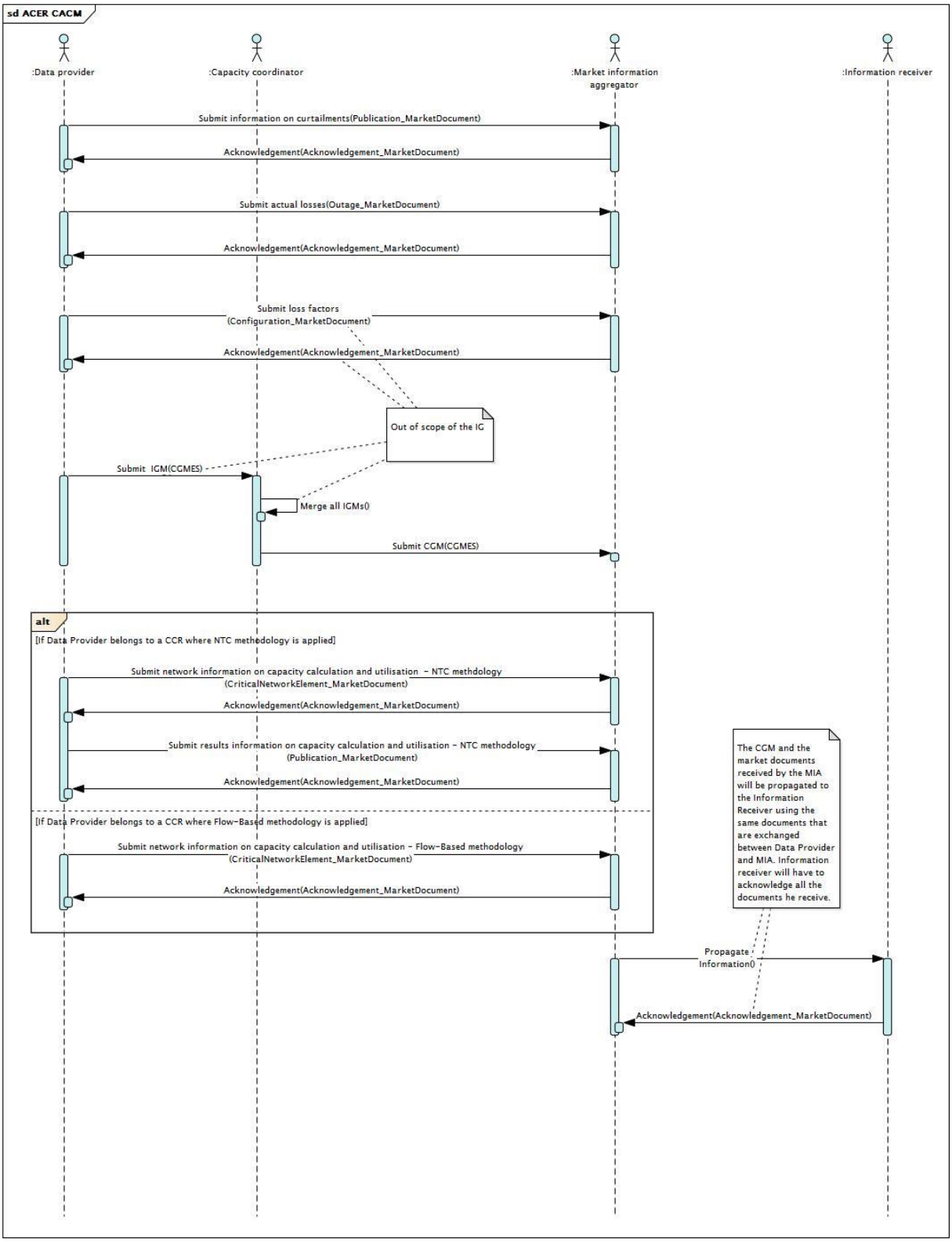

Figure 2 - Sequence diagram for ACER CACM

- The above sequence diagram describes the exchange of documents between the different actors that participate in the data interchange.

4.3.2 Submission of information on curtailments Publication_MarketDocument

Data Providers should initiate the document exchange by submitting the curtailments to the MIA. Once MIA receives the document, he has to acknowledge it. If curtailments contained in the submitted document are rejected by a receiver (MIA or Information receiver), it sends a negative acknowledgement (A02 Message fully rejected) to the sender (Data provider or MIA), which gives a list of rejected curtailments and reasons for rejection. Else if curtailments are correct, receiver sends a positive acknowledgement (A01 fully accepted).

4.3.3 Submission of actual losses Outage_MarketDocument

Next information that data providers have to submit to MIA are the actual losses in the interconnectors. Loss factors are static data that rarely change and are therefore to be recorded as master data using the Configuration_MarketDocument. Once MIA receives the document, he has to acknowledge it. If losses contained in the submitted document are rejected by the MIA, he sends a negative acknowledgement (A02 Message fully rejected) to the data provider, which gives a list of rejected losses and reasons for rejection. Else if losses are correct MIA send a positive acknowledgement (A01 fully accepted)
When this document is propagated from MIA to information receiver, the process is the same. In this case information receiver has to acknowledge the reception of the document.

4.3.4 Submission of loss factors Configuration_MarketDocument (Out of Scope)

The loss factors on a line, are static values that rarely change. For this reason, it was decided to keep them separately as Master Data. ACER requires to submit the loss factors only for the interconnectors.
For submitting these factors, it is mandatory to use the configuration document. The dependency tables, structure and rules for using this document are available in the Configuration Transparency Process Implementation Guide that is available in the EDI library.

4.3.5 Submission of CGM CGMES v2.4.15

The DACF process is executed every calendar day, whereby the RSCs get the individual grid models as input and merge them into a common grid model for each hour of a given day. These CGM, which are outputs of the DACF process need to be provided by the capacity coordinators (RSCs) to the MIA (ENTSO-E). MIA will do the appropriate checking in the model just to be sure that the merging is correct and has no inconsistencies on it. Once is checked, MIA will provide it to the information receiver.

The CGM needs to be transferred with the version **2.4.15** of the CGMES. For getting more information about CGMES format please visit the next documents and files:

- HTML documents - This is HTML export of all profiles belonging to CGMES.
- HTML Enterprise Architect Export - This is HTML export directly from Enterprise Architect (EA). It has different views in comparison with HTML documents. The HTML export from EA is similar to the view in the EA - i.e. as if directly browsing the UML.
- RDFS of the CGMES profiles - This is RDFS export of the profiles belonging to the CGMES. It is used by vendors for processing the profile information.
- XMI of CGMES - This is the XMI export from EA. This file can be used for transfer of CGMES package from one EA file to another.
- OCL documentation of CGMES - This contains all OCL validation rules included in the CGMES.
- CGMES issue list and change log (09/08/2017) - Quality of CGMES datasets and calculations (18/11/2016)
- Energy management system application program interface (EMS-API) - Part 600-1: Common Grid Model Exchange Specification (CGMES) - Structure and rules

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- Energy management system application program interface (EMS-API) - Part 600-2: Common Grid Model Exchange Specification (CGMES) - Exchange profiles specification

The merging of IGMs into CGMs in day-ahead is required by the network codes: SOGL Art 64(1)(c) and Art 70; CACM Art 17, art 18(2) and art 14(1)(b). It is further explained in the Common Grid Model Methodology (CGMM). For getting more information about the process of merging, please check the following documents:

- All TSOs proposal for a common grid model methodology in accordance with Articles 67(1) and 70(1) of Commission Regulation (EU) 2017/1485 of 02 August 2017 establishing a guideline on electricity transmission system operation.
- All TSOs' proposal for a common grid model methodology in accordance with Article 17 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management

4.3.6 Submit network information on capacity calculation and utilisation (NTC or flow-based) CriticalNetworkElement_MarketDocument

Depending on whether the data provider is in a region where NTC methodology is applied, he will provide a document with the NTC methodology information, else if data provider is in a region where flow-based approach is applied, he will provide a document with the flow-based approach information.

Data providers have to provide in both document submissions (NTC and flow-based) the maximum flows in different situations (N, N-1…) between bidding zones and also per interconnectors. Also, contingencies and critical network elements have to be included.
For flow-based approach, PTDF factors are also provided with the information previously described.

Once MIA receives the document, he has to acknowledge it. If data contained in the submitted document is rejected by the MIA, he sends a negative acknowledgement (A02 Message fully rejected) to the data provider, which gives a list of rejected issues and reasons for rejection. Else if the document is correct MIA send a positive acknowledgement (A01 fully accepted)
When this document is propagated from MIA to information receiver, the process is the same. In this case information receiver has to acknowledge the reception of the document.

4.3.7 Submit results information on capacity calculation and utilisation (Only for NTC) Publication_MarketDocument

This document will be only provided if data provider belongs to a region where NTC methodology is applied. There's no need to send this document for the flow-based approach due to Critical Network Element document covers all the needs for the data submission of the different capacity results. For the flow-based approach it is not required to send capacity results per bidding zones, only for critical network elements. For this reason, this document will be used only for the NTC methodology.

If data provider is in a region where NTC methodology is applied, he will provide a document with the capacity results of the NTC methodology information.

Once MIA receives the document, he has to acknowledge it. If capacities contained in the submitted document are rejected by the MIA, he sends a negative acknowledgement (A02 Message fully rejected) to the data provider, which gives a list of rejected issues and reasons for rejection. Else if capacity results are correct MIA send a positive acknowledgement (A01 fully accepted)
When this document is propagated from MIA to information receiver, the process is the same. In this case information receiver has to acknowledge the reception of the document.

4.3.8 Propagate Information

The CGM and the market documents received by the MIA will be propagated to the information receiver using the same documents that are exchanged between data provider and MIA. The only difference is that in this case, the sender of the document will be the MIA and the receiver will be the information receiver.

To be more explicit, the market documents to be sent are:

- Publication_MarketDocument for submitting the curtailments and the results of the capacity calculation for the NTC methodology
- Outage_MarketDocument for submitting the actual losses.
- Configuration_MarketDocument for submitting the loss factors.
- CriticalNetworkElement_MarketDocument for sending the network information on capacity calculation and utilisation information
- Acknowledgement document for sending the acknowledges. Information receiver will have to acknowledge all the documents he receives from MIA.

Moreover, MIA will provide the CGM to the Information Receiver.

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5 General rules for document exchange

5.1 Overview

The document exchange processes of ACER CACM described in the previous chapter require sending and receiving various EDI documents and CGMES. The information to be exchanged is:

- Publication_MarketDocument v7.1 based on IEC 62325-451-3:2017 Ed1.1
- Outage_MarketDocument (Unavailability) v4.0 based on IEC 62325-451-6:2018 Ed2
- CGMES v2.4.15 based on IEC TS 61970-600-1:2017 Ed1 and IEC TS 61970-600-2:2017 Ed1
- CriticalNetworkElement_MarketDocument v2.2
- Acknowledgement_MarketDocument v8 based on IEC 62325-451-1:2017 Ed. 2

These EDI documents and CGMES shall be used to carry out the communication tasks

- **submit** - The document contains data to be processed by the receiver.
- **reply** - It is the acknowledge sent by the receiver to the sender when receiving a submit document.

Next table gives an overview, which EDI document and CGMES shall be used to carry out the communication tasks of document exchange processes (DEP). For reducing the size of the table, the next abbreviations are going to be used:

- PMD: Publication_MarketDocument
- OMD: Outage_MarketDocument
- CGMES: Common Grid Model Exchange Specification
- CNE: CriticalNetworkElement_MarketDocument
- ACK: Acknowledgement_MarketDocument

Table 3 – Document Exchange

DEP Chapter	DEP label	send/submit document	Reply document	Reply conditions
4.3.2	Submit curtailments information	PMD	ACK	PMD fully accepted.
				Fully rejected due to errors in the PMD.
4.3.3	Submit actual losses	OMD	ACK	OMD fully accepted.
				Fully rejected due to errors in the OMD

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4.3.5	Submission of IGM and CGM	CGMES	Done through OPDE and quality portal (QAS).	Done through OPDE and quality portal (QAS).
4.3.6	Submission of capacity calculation and utilisation of the network information	CNE	ACK	CNE fully accepted.
				Fully rejected due to errors in the CNE.
4.3.7	Submission of Capacity Allocation Results	PMD	ACK	PMD fully accepted.
				Fully rejected due to errors in the PMD

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5.2 Publication_MarketDocument dependency table for Curtailments

The dependency table below only apply to the curtailments

Table 4 - Publication_MarketDocument dependency table for curtailments

Publication_MarketDocument			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the document.	Mandatory
revisionNumber	Consecutive number. Pattern ([1-9]([0-9]){0,2})	Version of the document.	Mandatory
type	B30: Notification data market document	The document type describes the principal characteristic of the document.	Mandatory
sender_MarketParticipant.mRID	EIC-X code of the sender	The identification of the sender.	Mandatory
sender_MarketParticipant.marketRole.type	A32: Market Information Aggregator A39: Data Provider	The role of the sender.	Mandatory
receiver_MarketParticipant.mRID	EIC-X code of the receiver	The identification of the receiver.	Optional
receiver_MarketParticipant.marketRole.type	A32: Market Information Aggregator A33: Information Receiver	The role of the receiver.	Optional
createdDateTime	E.G: 2018-03-23T12:04:39Z	UTC time when the document is created in the sender application.	Mandatory
period.timeInterval	E.G: <start>2018-03-16T00:00Z</start> <end>2018-03-17T00:00Z</end>	Target time interval covered by the document.	Mandatory
domain	Not used	Domain of the document	Optional
docStatus	May be used: A13: Withdrawn	The identification of the condition or position of the document with regard to its standing.	Optional

483 **Table 5 – TimeSeries Publication Document dependency table**

TimeSeries			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the time series	Mandatory
auction.mRID	Not used	The unique identification of the auction	Optional
auction.type	Not used	The kind of the auction (e.g. implicit, explicit, ...).	Optional
auction.category	Not used	The product category of an auction	Optional
businessType	A58: Curtailed capacity compensation	The exact business nature identifying the principal characteristic of time series.	Mandatory
in_Domain	EIC-Y code of the importer bidding zone	Import bidding zone code	Mandatory
out_Domain	EIC-Y code of the exporter bidding zone	Export bidding zone code	Mandatory
contract_MarketAgreement	Not used	The specification of the kind of the agreement, e.g. long term, daily contract	Optional
quantity_Measure_Unit.name	MAW: Megawatt	Name of the unit measurement.	Optional
currency_Unit.name	EUR: Euro	Type of currency for the compensation or reimbursement incurred.	Optional
price_Measure_Unit.name	Not used	The unit of measure in which the price in the time series is expressed per unit of currency (MW per	Optional

		unit, MWh per unit, etc.).	
classificationSequence_Attribute InstanceComponent.position	Not used	A sequential value representing a relative sequence number. Used only for auctions.	Optional
participantNumber_Attribute InstanceComponent.position	Not used	A sequential value representing a relative sequence number. Used only for auctions.	Optional
winnerParticipantNumber_Attribute InstanceComponent.position	Not used	A sequential value representing a relative sequence number. Used only for auctions.	Optional
curveType	A01: Sequential fixed size block A03: Variable sized Block	The identification of the coded representation of the type of curve being described.	Optional
Reason.code	A97: Force majeure curtailment A98: Network security curtailment B26: Emergency Situation Curtailment	Indicates the reason of the curtailment. If necessary, additional codes can be added to the codelist	Optional
Reason.text	The textual explanation corresponding to the reason code.	Indicates the reason of the curtailment.	Optional
Winners_MarketParticipant.mRID	Not used	The identification of a party in the energy market.	Optional

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Table 6 – Series_Period Publication Document dependency table

Series_Period			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
timeInterval	E.G: <start>2018-03-16T00:00Z</start> <end>2018-03-16T00:30Z</end>	Time interval covered by elements of Point class. It must be included within header Time_Period.timeInterval.	Mandatory
resolution	PT15M PT30M PT60M	Resolution used in the Point class.	Mandatory

Table 7 – Point Publication Document dependency table

Point			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
position	Integer value > 0	A sequential value representing the relative position within a given time interval.	Mandatory
quantity	Decimal value (Float)	Used to specify the reduction of the cross zonal capacity.	Optional
Price.amount	Decimal value (Float)	The amount of money paid by TSO for the curtailment	Optional
Reason.code	Should not be used at point level.	Indicates the reason of the curtailment.	Optional
Reason.text	Should not be used at point level.	Indicates the reason of the curtailment.	Optional

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5.3 Outage_MarketDocument dependency table

Table 8 - Outage_MarketDocument dependency table

Outage_MarketDocument			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the document.	Mandatory
revisionNumber	Consecutive number. Pattern ([1-9]([0-9]){0,2})	Version of the document.	Mandatory
type	B30: Notification data market document	The document type describes the principal characteristic of the document.	Mandatory
process.processType	A16: Realised	The identification of the nature of process that the document addresses.	Mandatory
createdDateTime	E.G: 2018-03-23T12:04:39Z	UTC time when the document is created in the sender application.	Mandatory
sender_MarketParticipant.mRID	EIC-X code of the sender	The identification of the sender.	Mandatory
sender_MarketParticipant.marketRole.type	A32: Market Information Aggregator A39: Data Provider	The role of the sender.	Mandatory
receiver_MarketParticipant.mRID	EIC-X code of the receiver	The identification of the receiver.	Mandatory
receiver_MarketParticipant.marketRole.type	A32: Market Information Aggregator A33: Information Receiver	The role of the receiver.	Mandatory
unavailability_Time_Period.timeInterval	E.G: <start>2018-03-16T00:00Z</start>	The start and end date and time for a given interval.	Mandatory

	<end>2018-03-17T00:00Z</end>		
docstatus	May be used: A13: Withdrawn		Optional

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496 **Table 9 - TimeSeries Outage Document dependency table**

TimeSeries			
Attributes	**Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the time series	Mandatory
businessType	A15: Losses	The exact business nature identifying the principal characteristic of time series.	Mandatory
biddingZone_Domain.mRID	Not used	Bidding zone code	Optional
in_Domain.mRID	Not used (MasterData)	Control Area 1	Optional
out_Domain.mRID	Not used (MasterData)	Control Area 2	Optional
start_DateAndOrTime.date	Date as "yyyy-mm-dd", which conforms with ISO 8601.	Start date of the losses	Mandatory

start_DateAndOrTime.time	Time as "hh:mm:ss.sssZ", which conforms with ISO 8601.	Start time of the losses	Mandatory
end_DateAndOrTime.date	Date as "yyyy-mm-dd", which conforms with ISO 8601.	End date of the losses	Mandatory
end_DateAndOrTime.time	Time as "hh:mm:ss.sssZ", which conforms with ISO 8601.	End time of the losses	Mandatory
quantity_Measure_Unit.name	MAW: Megawatt	Measurement unit of the losses.	Mandatory
curveType	A01: Sequential fixed size block A03: Variable sized Block	The identification of the coded representation of the type of curve being described.	Mandatory
production_RegisteredResource.mRID	Not used	Identification of the interconnector	Optional
production_RegisteredResource.name	Not used	Name of the interconnector.	Optional
production_RegisteredResource.location.name	Not used	Location of the interconnector.	Optional
production_RegisteredResource.pSRType.psrType	Not used	Type of the interconnector.	Optional
production_RegisteredResource.pSRType.psrType.powerSystemResources.mRID	Not used	The unique identification of the power system resources	Optional
production_RegisteredResource.pSRType.psrType.powerSystemResources.name	Not used	The name of a production unit resource.	Optional
production_RegisteredResource.pSRType.psrType.powerSystemResources.nominalP	Not used	The nominal power of a production unit resource.	Optional

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498 **Table 10 - Asset Outage Document dependency table**

Asset_RegisteredResource			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	EIC-T code	Identification of the interconnector	Mandatory
name	Not used (MasterData)	Name of the resource.	Optional
asset_PSRType.psrType	Not used (MasterData)	Type of the resource.	Optional
location.name	Not used (MasterData)	Location of the resource.	Optional

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501 **Table 11 – Series_Period Outage Document dependency table**

Series_Period			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
timeInterval	E.G: <start>2018-03-16T00:00Z</start> <end>2018-03-16T00:30Z</end>	Time interval covered by elements of Point class. It must be included within header unavailability_Time_Period.timeInterval.	Mandatory
resolution	PT15M PT30M PT60M	Resolution used in the Point class.	Mandatory

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503 **Table 12 - Point Outage Document dependency table**

Point			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
position	Integer value > 0	A sequential value representing the relative position within a given time interval.	Mandatory
quantity	Float value with exactly one and only one decimal.	Used to specify the lost capacity per period.	Mandatory

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506 **Table 13 - Reason Outage Document dependency table**

Reason			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
Reason.code	Not used.	Indicates the reason at the Timeseries and Header level if necessary	Optional
Reason.text	Not used.	Indicates the reason at the Timeseries and Header level if necessary	Optional

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5.4 Publication_MarketDocument dependency table for the Capacity Results

Note: Publication_MarketDocument for the Capacity Results has to be used only for NTC approach results.

Table 14 - Publication_MarketDocument dependency table (Capacity Results)

Publication_MarketDocument			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the document.	Mandatory
revisionNumber	Consecutive number. Pattern ([1-9]([0-9]){0,2})	Version of the document.	Mandatory
type	A26: Capacity Document	The document type describes the principal characteristic of the document.	Mandatory
sender_MarketParticipant.mRID	EIC-X code of the sender	The identification of the sender.	Mandatory
sender_MarketParticipant.marketRole.type	A32: Market Information Aggregator A39: Data Provider	The role of the sender.	Mandatory
receiver_MarketParticipant.mRID	EIC-X code of the receiver	The identification of the receiver.	Optional
receiver_MarketParticipant.marketRole.type	A32: Market Information Aggregator A33: Information Receiver	The role of the receiver.	Optional
createdDateTime	E.G: 2018-03-23T12:04:39Z	UTC time when the document is created in the sender application.	Mandatory
period.timeInterval	E.G: <start>2018-03-16T00:00Z</start>	Target time interval covered by	Mandatory

	<end>2018-03-17T00:00Z</end>	the document.	
domain.mRID	EIC code of the capacity calculation region	The domain covered within the document.	Optional
docStatus	May be used: A13: Withdrawn	The identification of the condition or position of the document with regard to its standing.	Optional

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515 **Table 15 - Timeseries Publication Document for capacities dependency table**

TimeSeries			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the time series	Mandatory
auction.mRID	Not used	The unique identification of the auction	Optional
auction.type	Not used	The kind of the auction (e.g. implicit, explicit, ...).	Optional
auction.category	Not used	The product category of an auction	Optional

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businessType	**NTC** A29: Already allocated capacity (AAC) B31: Transmission Reliability Margin (TRM) A34: Capacity rights	The exact business nature identifying the principal characteristic of time series.	Mandatory (Only for NTC)
in_Domain	EIC-Y code of the importer bidding zone	Import bidding zone code	Mandatory
out_Domain	EIC-Y code of the exporter bidding zone	Export bidding zone code	Mandatory
contract_MarketAgreement	A01: Daily → Used as day ahead A07: Intraday contract → Used as intraday	The specification of the kind of the agreement, e.g. long term, daily contract	Optional
quantity_Measure_Unit.name	MAW: Megawatt	Name of the unit measurement.	Optional
currency_Unit.name	Not used	Type of currency for the compensation or reimbursement incurred.	Optional
price_Measure_Unit.name	Not used	The unit of measure in	Optional

		which the price in the time series is expressed per unit of currency (MW per unit, MWh per unit, etc.).	
classificationSequence_AttributeInstanceComponent.position	Integer value >0 (Used when the allocation has more than one round)	Used as round attribute to distinguish two different allocations, occurring at different points in time but concerning the same border and delivery period	Optional
participantNumber_Attribute InstanceComponent.position	Not used	A sequential value representing a relative sequence number. Used only for auctions.	Optional
winnerParticipantNumber_Attribute InstanceComponent.position	Not used	A sequential value representing a relative sequence number. Used only for auctions.	Optional
curveType	A01: Sequential fixed size block A03: Variable sized Block	The identification of the coded representation of the type of	Optional

		curve being described.	
Reason.code	Not used.	Indicates the reason at TimeSeries level	Optional
Reason.text	Not used.	Indicates the reason at TimeSeries level	Optional
Winners_MarketParticipant.mRID	Not used	The identification of a party in the energy market.	Optional

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517 **Table 16 - Series_Period Publication Document for capacities dependency table**

Series_Period			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
timeInterval	E.G: <start>2018-03-16T00:00Z</start> <end>2018-03-16T00:30Z</end>	Time interval covered by elements of Point class. It must be included within header Time_Period.timeInterval.	Mandatory
resolution	PT15M PT30M PT60M	Resolution used in the Point class.	Mandatory

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520 **Table 17 - Point Publication Document for capacities dependency table**

Point			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
position	Integer value > 0	A sequential value representing the relative position	Mandatory

		within a given time interval.	
quantity	Decimal value (Float)	Used to specify the quantity of the capacity.	Optional
Price.amount	Not used.	The quantity of the price.	Optional
Reason.code	Not used.	Indicates the reason at the Point level.	Optional
Reason.text	Not used.	Indicates the reason at the Point level.	Optional

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5.5 CriticalNetworkElement_MarketDocument dependency table for the capacity allocation and utilisation of the network information

Table 18 - CriticalNetworkElement_MarketDocument dependency table

CriticalNetworkElement_MarketDocument				
Attributes	**Business View Values**		**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)		Identification of the document.	Mandatory
revisionNumber	Consecutive number. Pattern ([1-9]([0-9]){0,2})		Version of the document.	Mandatory
type	B07: Critical Network Element Publication		The document type describes the principal characteristic of the document.	Mandatory
process.processType	**NTC**	**Flow-based**	The identification of the process	Mandatory
	A01: Day Ahead A40: Intraday process	A43: Flow based domain constraint day-ahead A44: The information provided concerns the flow-based process in intraday.		
sender_MarketParticipant.mRID	EIC-X code of the sender		The identification of the sender.	Mandatory
sender_MarketParticipant.marketRole.type	A32: Market Information Aggregator A39: Data Provider		The role of the sender.	Mandatory
receiver_MarketParticipant.mRID	EIC-X code of the receiver		The identification of the receiver.	Mandatory

receiver_MarketParticipant.marketRole.type	A32: Market Information Aggregator A33: Information Receiver	The role of the receiver.	Mandatory
createdDateTime	E.G: 2018-03-23T12:04:39Z	UTC time when the document is created in the sender application.	Mandatory
docstatus	May be used A13: Withdrawn	The identification of the condition or position of the document with regard to its standing.	Optional
time_Period.timeInterval	E.G: <start>2018-03-16T00:00Z</start> <end>2018-03-17T00:00Z</end>	Delivery period covered by the document.	Mandatory
domain.mRID	EIC code of the capacity calculation region	Used as EIC code of the NTC or Flow Based Study Area	Optional
Related_MarketDocument.mRID	**Mandatory only for NTC** Unique ID (Max 35 characters)	ID of the publication document that contains the capacity results	Optional
Related_MarketDocument.RevisionNumber	**Mandatory only for NTC** Revision Number	Revision Number of the publication document that contains the capacity results	Optional

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528 **Table 19 - Timeseries CriticalNetworkElement Document dependency table**

Timeseries				
Attributes	**Business View Values**		**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)		Identification of the timeseries.	Mandatory
businessType	**NTC**	**Flow-based**	The exact business nature identifying the principal characteristic of time series.	Mandatory
	B37: Constraint Situation	B39: Flow-based Domain Adjusted to Long Term schedules		
In_Domain.mRID	Not used		Used as EIC code of the InArea of the oriented border study impacted by the listed Critical network elements	Optional
Out_Domain.mRID	Not used		Used as EIC code of the OutArea of the oriented border study impacted by the listed Critical network elements	Optional
CurveType	A01: Sequential fixed size block		The identification of the coded representation of the type of curve being described.	Mandatory

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Note: Border_Series class shall be populated for NTC-based allocations only

Table 20 - Border_Series CriticalNetworkElement Document dependency table

Border_Series			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the border series.	Mandatory
businessType	**NTC** C12: Maximum power exchange C13: Maximum power exchange after remedial actions	The exact business nature identifying the principal characteristic of time series.	Mandatory
In_Domain.mRID	EIC-Y code	Used to identify the inArea of the flow	Optional
out_Domain.mRID	EIC-Y code	Used to identify the outArea of the flow	Optional
flow_Quantity.quantity	Decimal value (Float)	Used to specifiy the quantity of the specified businessType code	Optional

Note: The ConnectingLine_RegisteredResource class shall be populated with the interconnectors only when business type attribute in the border series class contains code C12 = Maximum power exchange.
Note: The maximum flow shall be recorded in an instance of the Analog class which must be associated with the connectingLine_RegisteredResource class.

Table 21 - ConnectingLine_RegisteredResource

ConnectingLine_RegisteredResource			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	EIC or CGMES code of the interconnector.	ID of the monitored element	Mandatory

name	Not used. (Master Data)	Used as the name of the interconnector.	Optional
In_Domain.mRID	Not used.	Used to identify the bidding zone border.	Optional
Out_Domain.mRID	Not used.	Used to identify the bidding zone border.	Optional
In_AggregateNode	Not used	Used to identify InAggregateNode for element orientation	Optional
Out_AggregateNode	Not used	Used to identify OutAggregate Node for element orientation	Optional
flowBasedStudy_Domain.mRD	Not used	Used as EIC code of the Flow Based Study Area	Optional
flowBasedStudy_Domain.flowBasedMargin_Quantity.quantity	Not used	Used to specify the available margin CACM Article 29.7.e	Optional
marketCoupling_Domain.mRID	Not used	ID of the market coupling domain	Optional
marketCoupling_Domain.shadow_Price.amount	Not used	Used to specify the shadow price amount.	Optional

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545 **Table 22 - Constraint_Series CriticalNetworkElement Document dependency table**

Constraint_Series			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	Unique ID (Max 35 characters)	Identification of the of the binding constraint	Mandatory
businessType	B40: Network Element Constraint	The exact business nature identifying the principal characteristic of time series.	Mandatory
name	Name of the binding constraint	Used to provide the name of the binding constraint.	Optional
Quantity_Measurement_Unit.name	MAW	The unit measurement	Optional
ExternalConstraint_Quantity.quantity	Not used	Quantity of the external constraint	Optional
pTDF_Measurement_Unit.name	**Mandatory only for Flow-Based** MAW	The unit measurement of the PTDF	Optional
shadowPrice_Measurement_Unit.name	**Mandatory only for Flow-Based** MAW	Measurement of the marginal relax of the constraint of the critical branches to get the shadow price	Optional
currency_Unit.name	**Mandatory only for Flow-Based** EUR	Currency of the marginal increase of market surplus to get the shadow price	Optional

Party_MarketParticipant.mRID	Not used	Used to identify the limiting TSOs	Optional
Optimization_MarketObjectStatus.status	Not used	Used to identify the status of the Series for a Remedial Action optimization process	Optional

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548 **Table 23 - Contingency_Series CriticalNetworkElement Document dependency table**

Contingecy_Series			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	ID of the contingency series	Used to identify the contingency series	Mandatory
name	Name of the contingency series	Name of the resource.	Optional
Party_MarketParticipant.mRID	Not used	Used to identify the owner of the contingency	Optional

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552 **Table 24 - Contingency_RegisteredResource CriticalNetworkElement Document dependency table**

Contingecy_RegisteredResource			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	EIC code of the contingency	Used as EIC code of the Outage element	Mandatory
name	Not used (Master Data)	Used as the name of the contingency network element.	Optional

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In_Domain.mRID	Not used (Master Data)	Used to identify InArea	Optional
Out_Domain.mRID	Not used (Master Data)	Used to identify OutArea	Optional

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556 **Table 25 - Monitored_Series CriticalNetworkElement Document dependency table**

Monitored_Series			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	ID of the monitored series	Used to identify a given set of monitored elements	Mandatory
name	Name of the monitored series	Used as the name of the set of monitored elements	Optional
Party_MarketParticipant.mRID	Not used	Used to identify the owner of the set of monitored elements	Optional

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559 **Table 26 - Monitored_RegisteredResource CriticalNetworkElement Document**
560 **dependency table**

Monitored_RegisteredResource			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	EIC or CGMES code of the monitored element.	ID of the monitored element	Mandatory
name	Not used. (Master Data)	Used as the name of the monitored element	Optional
In_Domain.mRID	Not used. (Master Data)	Used to identify InArea	Optional
Out_Domain.mRID	Not used. (Master Data)	Used to identify OutArea	Optional
In_AggregateNode	Not used	Used to identify InAggregateNode for	Optional

		element orientation	
Out_AggregateNode	Not used	Used to identify OutAggregate Node for element orientation	Optional
flowBasedStudy_Domain.mRID	**Mandatory only for Flow-based** EIC-Y code	Used as EIC code of the Flow Based Study Area	Optional
flowBasedStudy_Domain.flowBasedMargin_Quantity.quantity	**Mandatory only for Flow-based** Decimal value (Float)	Used to specify the available margin CACM Article 29.7.e	Optional
marketCoupling_Domain.mRID	Not used	ID of the market coupling domain	Optional
marketCoupling_Domain.shadow_Price.amount	**Mandatory only for Flow-Based** Decimal value (Float)	Used when non-zero shadow price.	Optional

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563 **Table 27 - Analog CriticalNetworkElement Document dependency table**

Analog				
Attributes	**Business View Values**		**Description**	**XSD Requirements**
measurementType	**NTC**	**Flow-based**	Used to identify the monitored measurement A01 = Flow shall be provided when non-zero shadow price (flow-based) or when binding constraint (NTC) A02: Used for	Mandatory
	A01: Flow A02: Permanent admissible transmission limit (PATL) A15: Base Case flow	A01: Flow A02: Permanent admissible transmission limit (PATL) A03: Flow reliability margin A05: Long term		

		allocation margin A15: Base Case flow A16: Available margin after remedial actions	maximum flow A05: Used for flow for previous allocated capacity	
unitSymbol	MAW		Used to identify the unit of the measurement	Mandatory
positiveFlowIn	Not used		May be used to identify on which direction the element is monitored	Optional
analogValues.value	Decimal value (Float)		Used to provide the analog value	Optional
analogValues.timeStamp	Not used		May be used to provide the constraint duration	Optional
analogValues.description	Not used		May be used to identify the situation of the measurement point	Optional

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566 **Table 28 - PTDF domain CriticalNetworkElement Document dependency table**

PTDF Domain			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
mRID	EIC-Y code of the bidding zone	Used to identify the impacted bidding zone	Mandatory

pTDF_Quantity.quantity	PTDF value	Used to provide the PTDF factor for the Bidding zone	Mandatory
pTDF_Quantity.quality	Not used	The PTDF factor value associated to the bidding zone for the critical network element.	Optional

Table 29 - RemedialAction_Series, RemedialAction_RegisteredResource, AdditionalConstraint_Series, AdditionalConstraint_RegisteredResource and Shared_Domain CriticalNetworkElement Document dependency table

Remedial Action Series, Registered Resource and Shared Domain			
Attributes	**Business View Values**	**Description**	**XSD Requirements**
Not used	Not used		Not used

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