

BSP - Implementation Guide

aFRR energy market

Business process: aFRR energy market

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Revision History

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0.3	11.8.2023	Finnish aFRR project	First published draft
1.1	6.8.2024	Finnish aFRR project	Included test cases (8). Watchdog timeout information added (2.3.3). Updated price limits (3.2.1).

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1 Introduction

This implementation guide describes the messaging interface between BSP and TSO for the aFRR Energy Market. The guide will be updated based on feedback from the market participants and reassessment of the TSO's implementation plans. This document will be common Nordic guide when completed.

The initial version contains only Fingrid's implementation information, targeting to aFRR Energy Market set up in Finland and Fingrids PICASSO accession.

1.1 Scope

This document covers the implementation of aFRR Energy Market and provides information about the processes required to support this market. Both functional and technical aspects are covered. The intended users of this document are the participating BSPs¹.

The main processes described are:

- Bid collection process, including
 - CIM-based xml message format
- Bid activation process
 - real-time signal
- Bid unavailability process
 - CIM-based xml message format

¹ In Denmark the BSP role has not been separated from the BRP role, so in Denmark the target audience for this document is the BRP. Whenever the term BSP is used throughout this document it should be interpreted - for Denmark - as the «BRP acting as BSP»

1.2 Terms and definitions

Acronym	Term	Definition
AOF	Activation Optimization Function	<i>The role to operate the algorithm applied for the optimisation of the activation of Balancing Energy bids within a Coordinated Balancing Area.</i>
BEGCT (BSP GCT)	Balancing Energy Gate closure time	<i>The point in time when submission or update of a balancing energy bid is no longer permitted</i>
BEGOT	Balancing Energy Gate opening time	<i>The first point in time when submission of a balancing energy bid is permitted</i>
BRP	Balance Responsible Party	<i>A market participant or its chosen representative responsible for its imbalances</i>
BSP	Balancing Services Provider	<i>A market participant with reserve-providing units or reserve-providing groups able to provide balancing services to TSOs</i>
CIM	IEC Common Information Model	<i>A standard for describing information about an electrical network. The European style market profile is a profile derivation from the CIM to harmonize the energy market data exchanges in Europe.</i>
CMOL	Common Merit Order List	<i>A combined list of local balancing energy bid lists (MOL) from each price area maintained by the PICASSO platform</i>
CZC	Cross Zonal Capacity	<i>The cross-zonal transmission capacity between two bidding zones</i>
FAT	Full Activation Time	<i>The period between the activation request by the connecting TSO and the corresponding full delivery of the concerned product</i>
FRCE	Frequency Restoration Control Error	<i>PICASSO platform calculates every optimization cycle a frequency restoration control error for each LFC area. This error acts as an input for the LFC optimization calculation. The sign convention is: positive value where the LFC area is in power surplus and indicates that negative aFRR balancing energy needs to be activated; and negative value where the LFC area is in power deficit and indicates that positive aFRR balancing energy needs to be activated.</i>
ECP	Energy Communication Platform	<i>Reference implementation of MADES standard</i>
ETP	Entso-E Transparency Platform	<i>The ENTSO-E Transparency Platform is an online data platform for European electricity system data</i>
ISP	Imbalance Settlement Period	<i>The time unit for which balance responsible parties' imbalance is calculated</i>
LFC	Load Frequency Control	<i>A TSO system to maintain reasonably uniform frequency, to divide the load between the generators and to control the tie-line interchange schedules. Receives input from the PICASSO platform and distributes aFRR control signal to BSP's within the LFC area.</i>
LFC AREA	Load Frequency Control Area	<i>The control area to which the aFRR providing units or aFRR providing groups shall deliver the aFRR standard balancing energy.</i>
LMOL	Local Merit Order List	<i>After the BSP GCT the TSO creates a merit order list consisting of balancing energy bids from the BSP's in the respective LFC</i>

		<i>area which will be sent to PICASSO platform. Often just referred as MOL.</i>
MADES	Market Data Exchange Standard	<i>Communication IEC standard designed by ENTSO-E</i>
MOL	Merit Order List	<i>A list of balancing energy bids sorted in order of their bid prices, used for the activation of those bids</i>
MTU	Market Time Unit	<i>The period for which the market price is established as a result of PICASSO platform optimization cycle. For PICASSO the MTU is 4 seconds.</i>
CC	Control Cycle	<i>Period in which a single optimization result is calculated in LFC and new control signals (if changed from previous cycle) are sent from TSO to BSP's</i>
OC	Optimization cycle	<i>Period in which a single optimization result is calculated in PICASSO platform and new FRCE values are sent to each LFC area. Current optimization cycle is 4 seconds, equal to MTU.</i>
TSO	Transmission System Operator	<i>A party that is responsible for a stable power system operation (including the organisation of physical balance) through a transmission grid in a geographical area. In the Nordic synchronous area, there are four TSOs: Svenska kraftnät, Fingrid, Energinet.dk and Statnett.</i>
	Connecting TSO	<i>the TSO that operates the scheduling area in which balancing service providers and balance responsible parties shall be compliant with the terms and conditions related to balancing;</i>
TSO GCT	TSO energy bid submission gate closure time	<i>The latest point in time when a connecting TSO can forward the balancing energy bids received from a balancing service provider to the activation optimisation function</i>
VP	Validity Period	<i>The time period when the balancing energy bid offered by the BSP can be activated, whereas all the characteristics of the product are respected. The amount of time for which a bid is valid and firm. The first validity period of each day begins right at 00:00 market time. Validity periods are consecutive and not overlapping. The length of a single validity period is 15 minutes.</i>

1.3 References

- Ref [1] Implementation Framework for aFRR Platform
https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agency/Pages/Annexes-to-the-DECISION-OF-THE-AGENCY-FOR-THE-COOPERATION-OF-ENERGY-REGULATORS-No-02-2020.aspx
- Ref [2] Common Information Model (CIM) and CIM based documents. [ENTSO-E implementation guides, see ENTSO-E Electronic Data Interchange \(EDI\) Library](#)
- Ref [3] Acknowledgement: [IEC 62325-451-1: Acknowledgement Business Process And Contextual Model For CIM European Market.](#)

- Ref [4] Reserve Bid market document [IEC 62325-451-7](#) urn:iec62325.351:tc57wg16:451-7:reservebiddocument:7:4
- Ref [5] Bid availability document [IEC 62325-451-n](#) urn:iec62325.351:tc57wg16:451-n:bidavailabilitydocument:1:1
- Ref [6] EIC codes: [The Energy Identification Coding \(EIC\)](#)
- Ref [7] ENTSO-E codelist: [ENTSO-E Codelist in ENTSO-E EDI library](#)
- Ref [8] European platform - PICASSO : [The Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation](#)
- Ref [9] Nordic Trading System BRS: [This document is a Business Requirement Specification \(BRS\) detailing the document exchanges related to trade in the Nordic energy market](#)
- Ref [10] Nordic Operate BRS: [This document is a Business Requirement Specification \(BRS\) detailing the document exchanges related to operation of the Nordic energy market.](#)
- Ref [11] NMEG Code List Library: [Description of additional codes used for the Nordic Market, Code list schema.](#)

2 Business context

2.1 Overall process and timeline

aFRR activation in Nordics is currently based on frequency. The aFRR demand of each TSO is defined based on Nordic aFRR Capacity Markets result, and a Nordic aFRR controller control signal. The control signal is splitted to Nordic TSOs pro-rata based on maintained aFRR capacity of respective hour. For TSOs not having aFRR Energy Market, the activation signal is splitted based on accepted capacity bids.

For TSOs having aFRR Energy Market, the aFRR demand of TSO will be splitted to BSPs on aFRR Energy Bids Merit Order. If a BSP has bids accepted at aFRR Capacity Markets, it must place at least corresponding volume of aFRR Energy bids. BSP can leave bids to aFRR Energy Markets, even if it have not participated in aFRR Capacity Markets.

Once Nordic Balancing Model project and all Nordic TSOs are ready, the Nordics will change to Area Control Error based balancing, meaning that the aFRR demand will be defined by each TSO based on Area Control Error for each bidding zone.

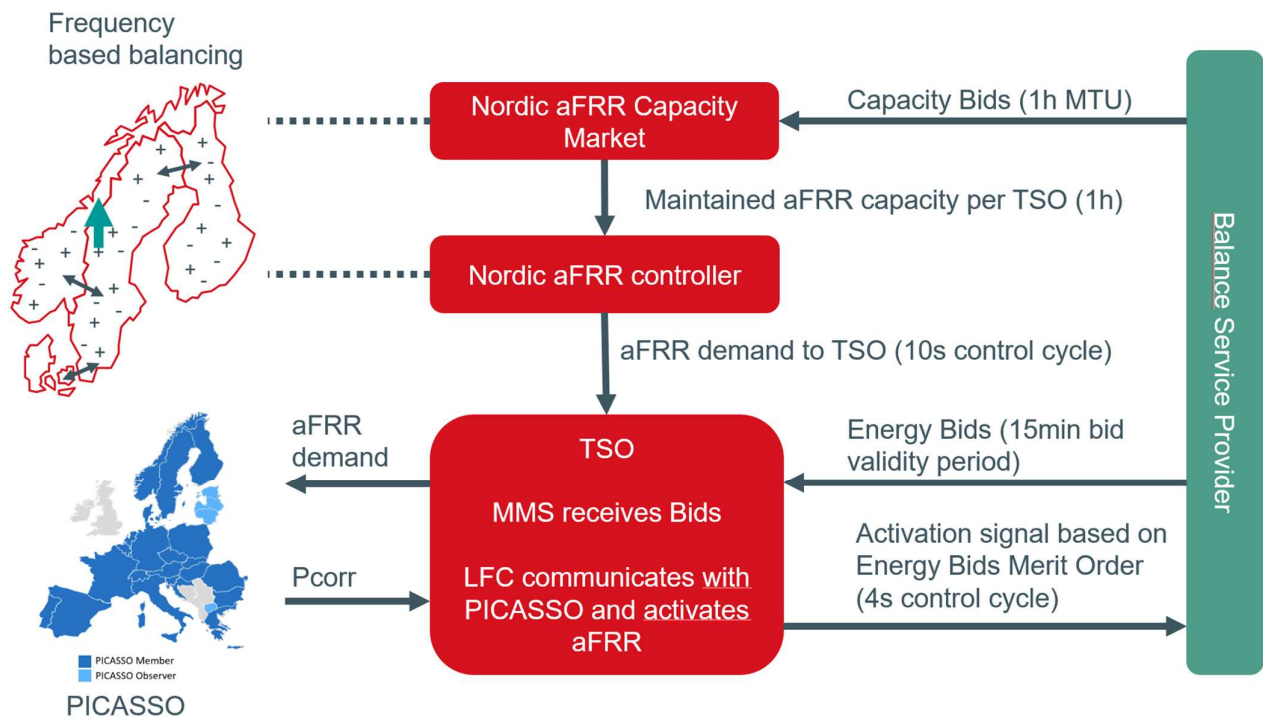


Figure 1 High level schematic diagram of aFRR Capacity and Energy Markets relations, when aFRR demand is based on frequency

Additional information from PICASSO can be found in [PICASSO \(entsoe.eu\)](https://entsoe.eu/picasso).

aFRR energy markets process starts from Balancing Energy Gate Opening time, and ends at settlement and invoicing. Figure 2 illustrates the steps at that process.

Full Activation Time, FAT (minutes)	5
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T-x means x minutes before the start of the validity period.

2.2 System context

The diagram below shows the system context of the aFRR Energy Market from a BSP viewpoint. This document provides detailed information about the message exchanges between BSP and TSO. The other exchanges are shown for information purposes only and are outside the scope of this document

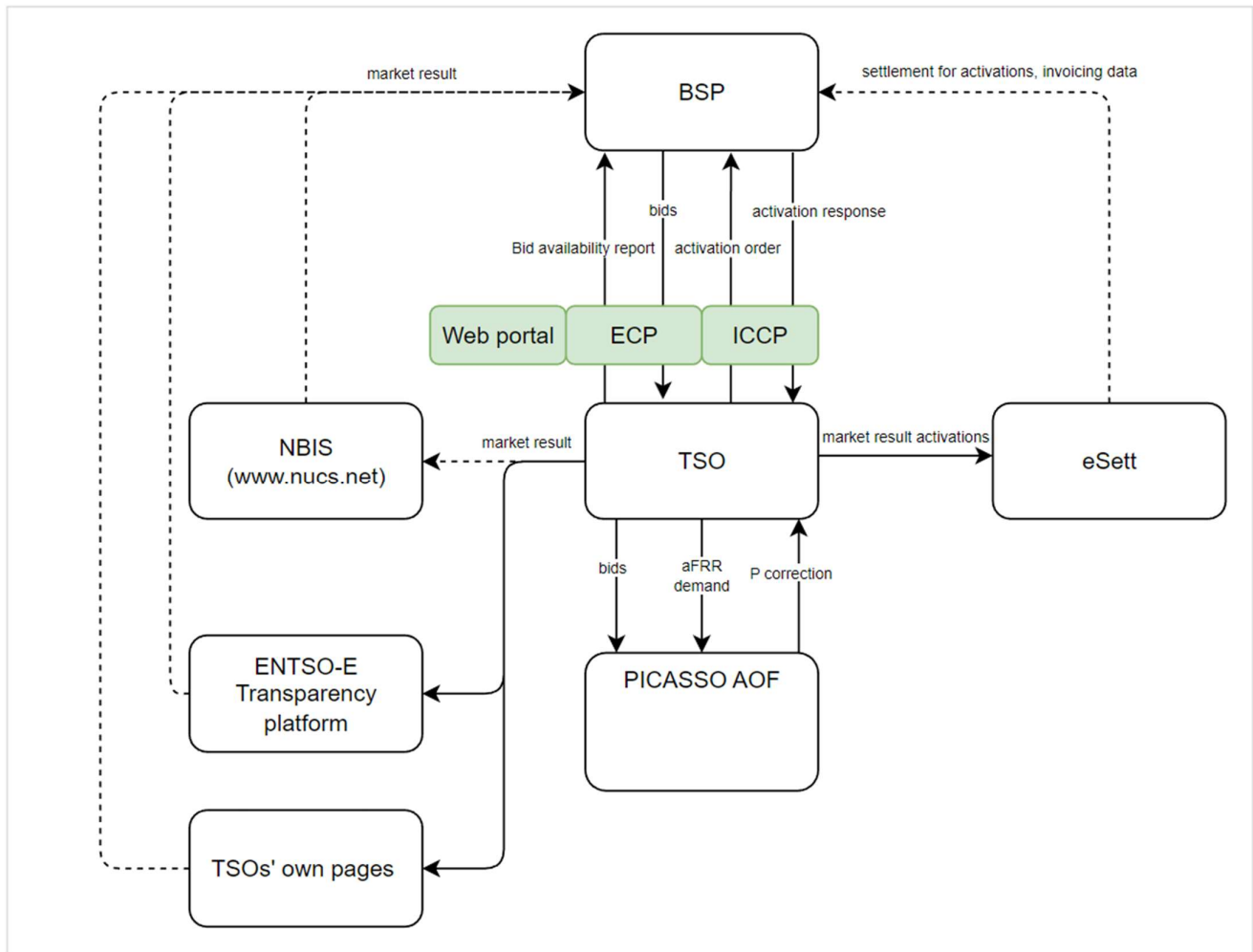


Figure 3 High level information flow of aFRR Energy Market

2.3 Fallback

2.3.1 Bid collection

Each TSO will have redundant mechanisms to receive bids from BSPs. In addition to machine-to-machine via ECP, it could be a web solution, e-mail, etc. See more on the TSO specific details in chapter 0.

2.3.2 Bid selection

In case when connection to PICASSO is lost, bid selection is done locally by TSOs own system. This will have no impact on BSPs' processes.

2.3.3 Bid activation process

When the watch dog signal exchange between TSO and BSP is lost **for a total of 3 minutes**, BSP's bids are automatically set as unavailable and not part of the bid selection process.

3 Business process

This chapter describes the aFRR Energy Market process from a BSP perspective with a focus on implementation of message exchanges. In addition to this implementation guide the BSPs need to comply with the relevant national Terms & Conditions.

3.1 The aFRR Energy Market sequence diagram

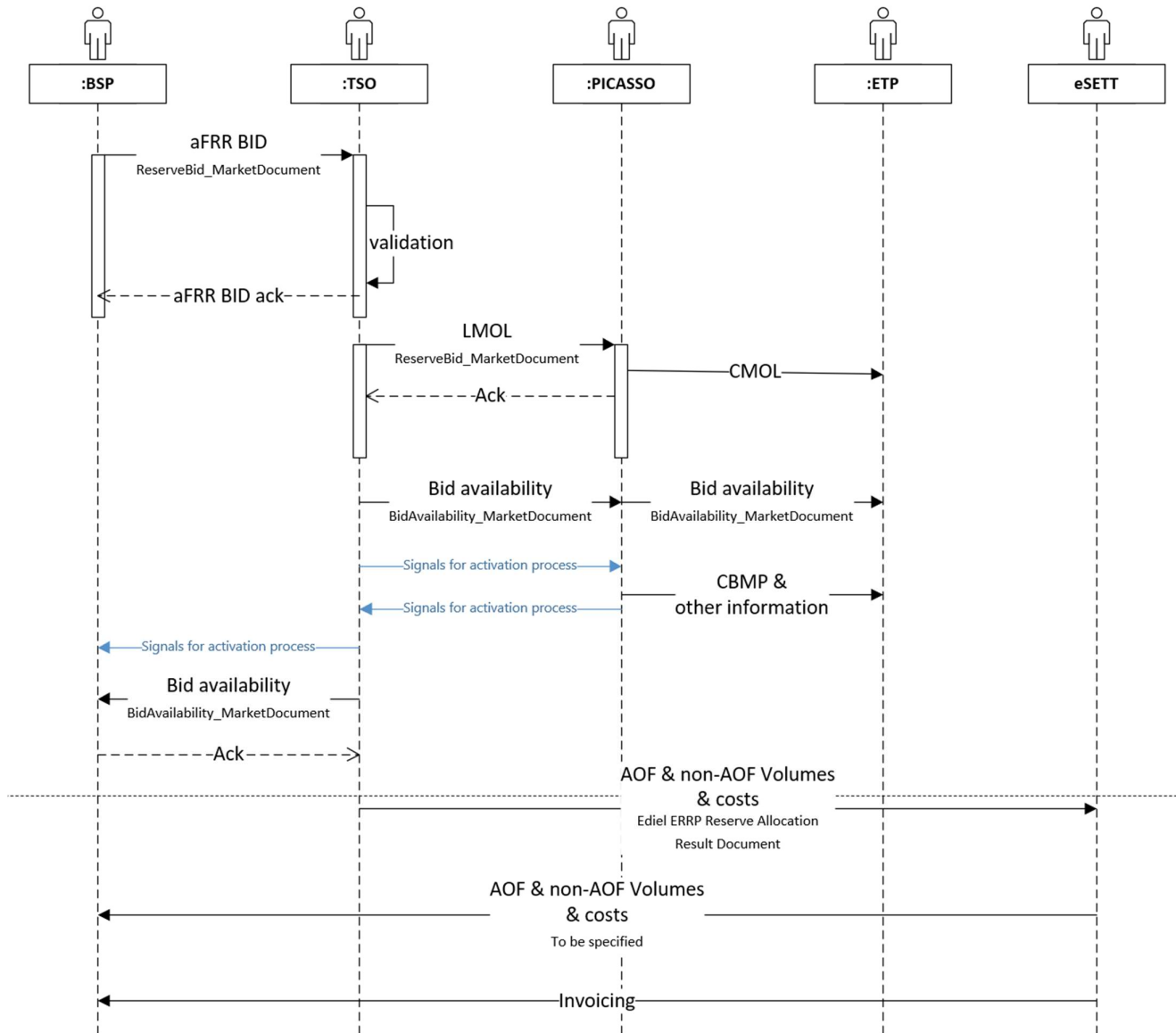


Figure 4: Sequence diagram for Energy Market bid information on energy market

3.2 Submit bid process

Bids can be submitted in a *ReserveBid_MarketDocument*. A bid is placed in the market when the TSO has provided a positive *Acknowledgement* referring to the bid document.

3.2.1 Stepwise implementation of product characteristics

The bid characteristics and bid attributes used in the aFRR Energy Market are described in the table below.

	Go-live of PICASSO Finland
Currency	EUR
Maximum/minimum price (EUR/MWh)	15000/-15000
Price granularity (EUR)	0.01
Minimum bid size (MW)	1
Maximum bid size (MW)	999 (technical limit)
BSP portfolio limit	Based on prequalified capacity
Bid granularity (MW)	1
Activation signal (MW)	float
BSP bid time resolution for price and volume	validity period = 15 min

3.2.2 Attribute descriptions

In this chapter new bid attributes are described.

Common bid attributes

All bids are fully divisible.

National bid attributes

See chapter 4 for TSO specific information on which attributes is planned to be implemented and additional information on usage of the bid attributes.

Bid attribute	Description	Comment
Maximum duration	BSPs include information on the technical limitations regarding how long a bid can be activated. This attribute is necessary to allow BSP to send in bids in advance so that	Finland: not is use Denmark:

<p>CIM: BidTimeSeries. maximum_ConstraintDuration.duration</p>	<p>they do not need to update bid if they are activated.</p> <p>When using maximum duration, technical linking of the bids must be used. All the linked bids must have the same maximum duration.</p>	<p>Norway:</p> <p>Sweden:</p>
<p>Resting time</p> <p>CIM: BidTimeSeries. resting_ConstraintDuration.duration</p>	<p>The BSP can add information on the required minimum duration between the end of deactivation and the following activation.</p> <p>When using resting time, technical linking of the bids must be used. All the linked bids must have the same resting time.</p>	<p>Finland: not is use</p> <p>Denmark:</p> <p>Norway:</p> <p>Sweden:</p>
<p>Inclusive bids</p> <p>CIM: BidTimeSeries.inclusiveBidsIdentification)</p>	<p>If one bid is activated, another bid (e.g. a resource downstream) must also be activated.</p>	<p>Finland: not is use</p> <p>Denmark:</p> <p>Norway:</p> <p>Sweden:</p>
<p>Locational information on bids</p> <p>CIM: BidTimeSeries.registeredResource.mRID</p>	<p>More detailed location on where the resources in the bid are situated, than bidding zone.</p>	<p>Finland: not is use</p> <p>Denmark:</p> <p>Norway:</p> <p>Sweden:</p>
<p>Faster activation</p> <p>CIM: BidTimeSeries. activation_ConstraintDuration.duration</p>	<p>Bids that can support a FAT that is faster than standard FAT of 5 minutes.</p>	<p>Finland: not is use</p> <p>Denmark:</p> <p>Norway:</p> <p>Sweden:</p>

3.2.3 Bid validation rules

Document level

- The bid document must be submitted by the BSP and received by the TSO after the BEGOT and before the BEGCT of every bid in the document.
- Technical validation of the bid file

All bids:

- Bid size and resolution
- Price resolution
- Time period is within the document time period
- Sum of the bids shall be within the portfolio limits of BSP

Rules for updating bids:

- The time period of a bid cannot be changed. If a bid has been submitted with incorrect time period the bid must be cancelled and a new bid (with new bid identification) must be submitted for the correct time period.
- The resource object of a bid cannot be changed. If a bid has been submitted with incorrect resource object the bid must be cancelled and a new bid (with new bid identification) must be submitted for the correct resource object. Not in use in Finland.

See chapter 5.7 for general rules on updating and cancellation of bids.

3.2.4 Bid acknowledgment

Each time a BSP submits a Reserve bid document to the TSO the TSO will return an Acknowledgement document. If all bids in the bid document are valid a positive Acknowledgement will be returned. If one or more of the bids in the bid document are invalid, according to the bid validation rules, a negative Acknowledgment will be returned and all bids in the document will be rejected. The negative Acknowledgement will contain error codes and text that indicate the reason for why the bids are not valid.

3.3 Bid availability process

TSO has a possibility to change the availability status of a bid. By default, all bids have status available. TSO can declare a bid or all bids of a BSP unavailable. Reasons for unavailability can originate from automatic procedures in LFC (e.g. losing real-time connection towards the BSP) or manual actions done by the TSO operator. TSO operator can also declare a bid unavailable on request from the BSP. A bid can also be partly unavailable during the validity period.

If a bid is declared as unavailable by the TSO, the BSP is informed about this through a bid availability document that is sent to the BSP. The document is sent 1 minute after the validity period of the bid. The BSP will receive a bid availability document if there were bids from that BSP that were partly or fully unavailable during the validity period. If there are no unavailabilities, the document is not sent.

3.3.1 Bid availability report

Submitted bids must be available for activation ordering. If bids become unavailable for activation before BEGCT for any reason, the BSP must cancel the bids. In case bids become unavailable for activation after BEGCT, the BSP must inform the TSO as quickly as possible by phone.

The TSO will assess the availability of activation for each bid for each market period.

The TSO can mark a bid unavailable for the following reasons:

- local congestions
- unavailability of the BSP electronic ordering process
- BSP informs TSO that bid is unavailable due to failure on reserved delivery unit
- IT or other technical issue
- System security

The TSO will inform the BSP about bids that have been marked unavailable for activation by sending a *BidAvailability_MarketDocument*. Please see Appendix 1 for further details on the message document.

3.4 Activate bid process

The TSO will send activation orders for selected bids to the respective BSPs every control cycle (4 seconds) via real-time communication protocol. TSO-specific realtime signals & process is defined in Chapter 4.

3.5 Publication and reporting of market results

3.5.1 Publication of market prices and volumes

Market prices and volumes for the aFRR Energy Market will be published on the ENTSO-E Transparency platform (transparency.entsoe.eu), as well as TSOs' open data service. After Nordic PICASSO accession, it will be decided whether the Nordic Transparency platform NBiS (www.nucs.net) will be used additionally as a common platform for publishing market data.

3.5.2 Invoicing data per BSP

Information of each BSP's activations and activation costs will be available from eSett to the BSP after each ISP (Imbalance settlement period). The format of this information is subject to detail design during H2/2023. The information contains aggregated data on ISP (15 minutes) resolution including activation volumes and costs of activated volumes separated to AOF and non-AOF volumes.

4 TSO specific information

4.1 Energinet

4.1.1 TSO contact information

Any questions and concerns regarding this implementation guide, and the follow-up of the implementation in Energinet, can be directed to: electricitymarket@energinet.dk

4.2 Fingrid

4.2.1 Submit bid process

The Balancing energy gate opening time (BEGOT) for BSPs is 7 days. The preferred channel for bid submission is sending a reserve bid document via ECP/EDX².

Alternative channel for bid submission

Additionally, bids may be submitted manually in TSO's MMS (Vaksi Web). More detailed description of manual bid submission can be found in Fingrid's reserve trading and information exchange guidelines (Fingridin reservikaupankäynti- ja tiedonvaihto-ohje).

4.2.2 Activate bid process

Fingrid will have following real-time signals in use at aFRR process (some of them relating to aFRR Capacity Markets).

Sender	Receiver	Signal	Unit	Description
BSP	Fingrid	aFRR capacity up	MW	Capacity sold for reserve maintenance, if the capacity is not limited by the maximum power. Please note that if, due to an ordered up-regulation of the aFRR, the free capacity is less than the sold aFRR capacity, this does not reduce the aFRR capacity.
BSP	Fingrid	aFRR capacity down	MW	Capacity sold for reserve maintenance, if the capacity is not limited by the minimum power. Please note that if, due to an ordered down-regulation of the aFRR, the free capacity is less than the sold aFRR capacity, this does not reduce the aFRR capacity.
BSP	Fingrid	Amount of activated aFRR reserve	MW	Realised activation power of the aFRR reserve. Includes only the aFRR power, not the Reserve Unit's other active power production.
BSP	Fingrid	aFRR momentary active power	MW	Active power measurement of the Reserve Unit or other real-time data

² https://www.fingrid.fi/en/electricity-market/reserves_and_balancing/reserve-trading-and-information-exchange/ecp-messaging2/ and <https://ediel.org/nordic-ecp-edx-group-nex/market-actor-onboarding/>

Fingrid	BSP	aFRR activation	MW	aFRR activation setpoint
Fingrid	BSP	Watchdog signal	-	Watchdog signal to check the health of communication & receiving system.
BSP	Fingrid	Watchdog feedback signal	-	Watchdog-signal feedback

Watchdog signal is an increasing number, that is mirrored back to Fingrid by BSP. If the watchdog feedback signal of BSP is not updated for 60 seconds (waiting time subject to further discussions during H2/2023), Fingrid interprets that aFRR realtime communication is not working properly, and will automatically mark all BSP bids as unavailable.

Realtime communication must use ELCOM or ICCP protocols. Detail information of setting up realtime communication with Fingrid is gone through at the aFRR Market Accession process.

4.2.3 TSO contact information

Any questions and concerns regarding this implementation guide, and the follow-up of the implementation in Fingrid, can be directed to reserve market information exchange experts, contact details found from [Reserve Trading and Information Exchange - Fingrid](#).

4.3 Statnett

4.3.1 Submit bid process

Alternative channel for bid submission

The recommended method for bid submission is by sending a reserve bid document via ECP. Alternatively, bids may be submitted in the manual user interface FiftyWeb (fiftyweb.statnett.no).

4.3.2 Activate bid process

4.3.3 TSO contact information

Any questions and concerns regarding this implementation guide, and the follow-up of the implementation in Norway, can be directed to: BSP@statnett.no.

4.4 Svenska kraftnät

4.4.1 Submit bid process

4.4.2 TSO contact information

Any questions and concerns regarding this implementation guide, and the follow-up of the implementation in Sweden, can be directed to:

5 General rules for messaging

5.1 Date and time

Date and Times are based on ENTSO-E Standards and shall be expressed in universal time (UTC+0) in compliance with ISO 8601 as YYYY-MM-DDThh:mm:ssZ. The last 'Z' stands for Zero and indicates UTC+0.

5.2 Document coverage

The beginning and ending date and time of the period covered by the document must be on the same CET/CEST day.

5.3 Daylight saving time

The day is always expressed in local time, i.e.:

- A day is from 23:00 to 23:00 during winter time.
- A day is from 22:00 to 22:00 during summer time (daylight saving time).
- When changing from winter time to summer time there are 23 hours in the time series (from 23:00 to 22:00).
- When changing from summer time to winter time there are 25 hours in the time series (from 22:00 to 23:00).

5.4 Unique identifiers - UUID

Unique identifiers should be proper UUIDs as per RFC 4122 (UUID v1, v4 or v5).

5.5 Document identification and revision number

The document identification must be unique over time for the sender in question and should be a proper UUID. The document identification will then not have any significant meaning. The revision number is not used and shall always be equal to '1'.

5.6 Message size limit

The maximum allowed number of time series in a message is 2000.

If a BSP wants to submit more bids than this limit the bids must be split into several messages.

The upper limit of number of bid messages sent from a BSP during one bid validity period is 100.

5.7 Update and cancellation principles

To update or cancel time series previously sent a new document is sent with the following information:

- A new unique document mRID (document identification)
- Fixed revision number (always equal to '1')
- A newer created date-time than the previously sent document

For *ReserveBid_MarketDocument* updates are done by sending the affected time series with new data. Cancellation of time series is done by sending value 0 for quantity. To ensure update of the correct time series the bid identification of the original time series must be used.

To update bids for upcoming bid validity period only the updated bids should be sent in a new bid message. There is no need to resend unchanged bids.

It is not allowed to include bids for any bid validity period which is closed for bidding in a bid message, ref. 3.2.3 Bid validation rules.

For *BidAvailability_MarketDocument* and *ReserveAllocationResult_MarketDocument* a new document completely replaces a previously sent document for the same *period*. Cancellation of time series is thus done by omitting the time series in the new document.

5.8 Acknowledgment

For each electronic data interchange defined in this document, an acknowledgement document, as defined in IEC 62325-451-1, should be generated either accepting the whole received document or rejecting it completely.

- All received messages shall be validated at both a technical and an application level.
- The Acknowledgement document shall be used as the tool to exchange errors.
- At a technical level, the reason code in the acknowledgement document shall reflect the error type, and the reason text should have a reference to the element containing the error.
- At the application level, the reason code shall reflect the error type and the reason text should reflect the appropriate business rule that is broken.
- An Acknowledgement document may contain many reason objects, to reflect multiple errors in the received document.

5.9 Energy communication platform

All the messages described in this document shall be communicated over the Energy communication platform (ECP) provided by each TSO.

Implementation guide for ECP can be requested from the respective TSO (ediel.org/nordic-ecp-edx-group-nex/market-actor-onboarding/).

6 Appendix 1 – Document attributes and dependencies

This chapter provides the attributes and dependencies for the documents used to support the aFRR Energy Market.

The following classifications are used for the attributes:

- M – Must be used for the document in the process described in this guide
- D – Must be used if a defined condition is met
- O – Optional, can be used

6.1 Bid document – Attributes and dependencies

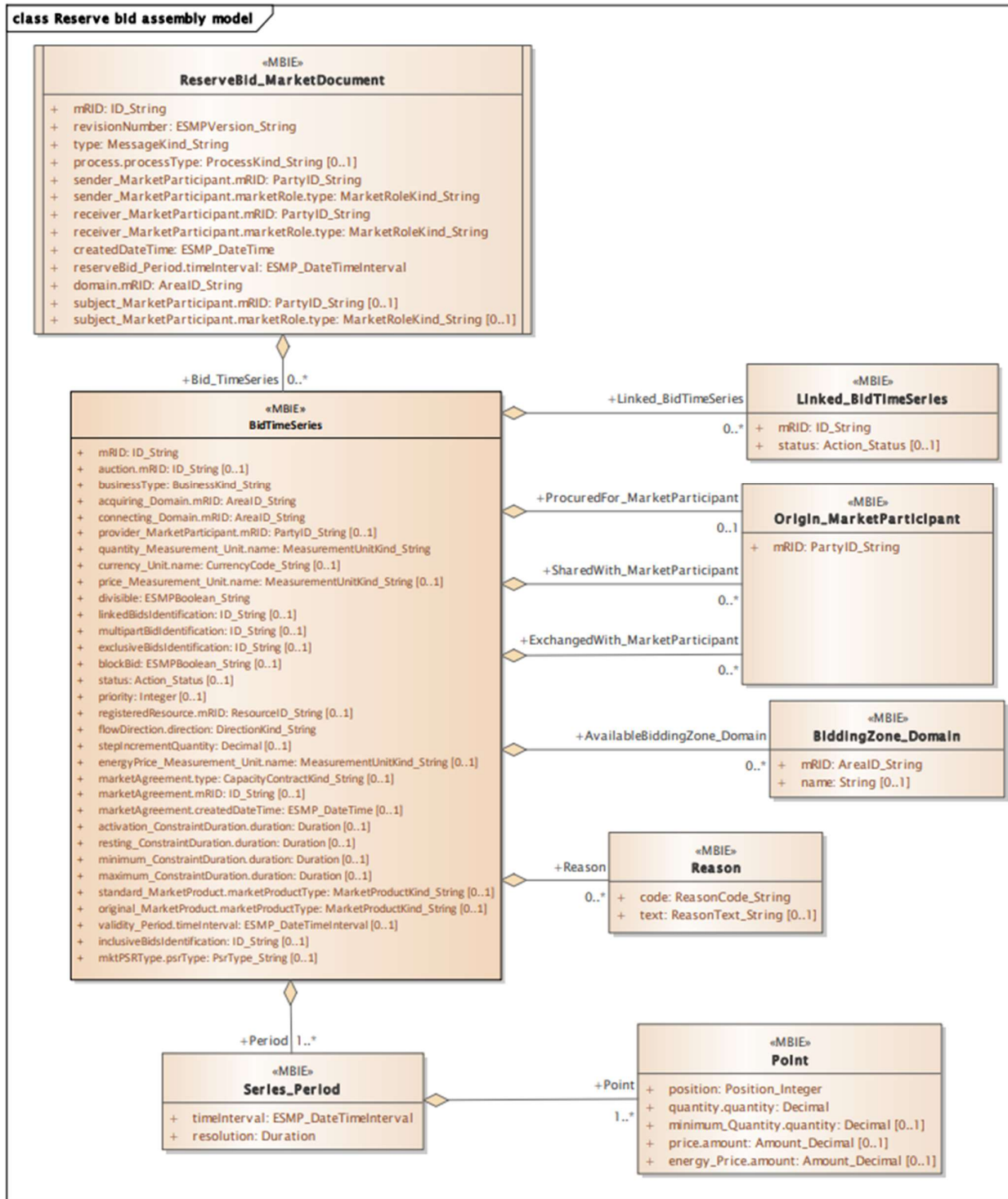
ReserveBid_MarketDocument		iec62325-451-7-reservebiddocument.xsd – version 7.4
mRID	M	Unique identification of the document. Proper UUID is required.
revisionNumber	M	Constant value of 1
Type	M	A37 - Reserve bid document
process.processType	M	A51 = automatic frequency restoration reserves
sender_MarketParticipant.mRID	M	Identification of the party sending the document See 6.5 for supported coding schemes.
sender_MarketParticipant.marketRole.type	M	A46 - Balancing Service Provider (BSP) A39 - Service Provider (Data Provider) In Denmark BRPs act as BSP and must use the BSP-role.
receiver_MarketParticipant.mRID	M	Identification of the party receiving the document. One of: - Energinet.dk - Fingrid - Statnett - Svenska kraftnät A01 - EIC coding scheme
receiver_MarketParticipant.marketRole.type	M	A04 – TSO
createdDateTime	M	Date and time of document creation (in ISO 8601 UTC format)

		YYYY-MM-DDTHH:MM:SSZ
reserveBid_Period.timeInterval	M	The period covered by the document (in ISO 8601 UTC format) Start: YYYY-MM-DDTHH:MMZ End: YYYY-MM-DDTHH:MMZ
domain.mRID	M	EIC identification of the Control Area Denmark: 10Y1001A1001A796 Finland: 10YFI-1-----U Norway: 10YNO-0-----C Sweden: 10YSE-1-----K <hr/> A01 - EIC coding scheme
subject_MarketParticipant.mRID	M	Identification of the party responsible for the bid See 6.5 for supported coding schemes.
subject_MarketParticipant.marketRole.type	M	A46 - Balancing Service Provider (BSP)

BidTimeSeries		
mRID	M	Unique identification of the bid. Proper UUID is required.
businessType	M	B74 – Offer
acquiring_Domain.mRID	M	10Y1001A1001A91G (Nordic Market Area)
		A01 - EIC coding scheme
connecting_Domain.mRID	M	The EIC identification of the bidding zone where the resource is located. A01 - EIC coding scheme
quantity_Measurement_Unit.name	M	MAW – megawatt
currency_Unit.name	M	EUR – euro
Divisible	M	A01 = Yes - quantity may be reduced to the zero by increments of minimum activation granularity
inclusiveBidsIdentification	O	Not used in Finland. Unique identification used to associate inclusive group bids. Proper UUID is required. All or none of the bids with the same “bid family” identification must be selected.
Status	M	A06 – Available
registeredResource.mRID	O	EIC or national code for the resource (regulation object) or sub-station. Not used in Finland
flowDirection.direction	M	A01 - Up A02 - Down
energyPrice_Measurement_Unit.name	M	MWH - Megawatt hours.
activation_ConstraintDuration.duration	O	Not used in Finland. Activation time - The minimum time for full activation of the physical resource including preparation time and ramping time. For bids that have a standard FAT of 5 activation time can be left blank or omitted. For bids that can be activated faster than 5 minutes the

		activation time should be specified and should assume a preparation time of 0.5 minute. E.g. PT3M, PT5M
maximum_ConstraintDuration.duration	O	Not used in Finland. Maximum duration of activation for the resource object, in number of minutes, divisible by 15. E.g.: PT45M, PT60M, PT90M. If maximum duration is specified and resting time is not specified, a resting time of 15 minutes will be assumed. Requires technical linking of bids.
standard_MarketProduct.marketProductType	M	A01 = Standard product
mktPSRType.psrType	O	Not used in Finland Production type B16 - Solar B18 – Wind Offshore B19 – Wind Onshore B20 – Other
Series_Period – exactly one instance per BidTimeSeries		
timeInterval	M	Period covered (in ISO 8601 UTC format). Must be 15 minutes. There must be one, and only one, period for each Bid_TimeSeries. Start: YYYY-MM-DDTHH:MMZ End: YYYY-MM-DDTHH:MMZ
Resolution	M	PT15M – the time resolution. Must be equal the duration of the timeInterval.
Point – exactly one instance per Series_Period		
Position	M	Position is always 1
quantity.quantity	M	Offered quantity
energy_Price.amount	M	The price of the product offered

6.1.1 ReserveBid_MarketDocument assembly model



Note: the cardinalities indicated in the assembly model are further restricted for the implementation according to this guide, please see Attributes and dependencies table above.

6.1.2 Validation of bid document

An acknowledgement document is generated either accepting the completely received document or rejecting it completely. Partly accept is never used. Figure 1 shows an example of the acknowledgement document.

Following error codes are applied:

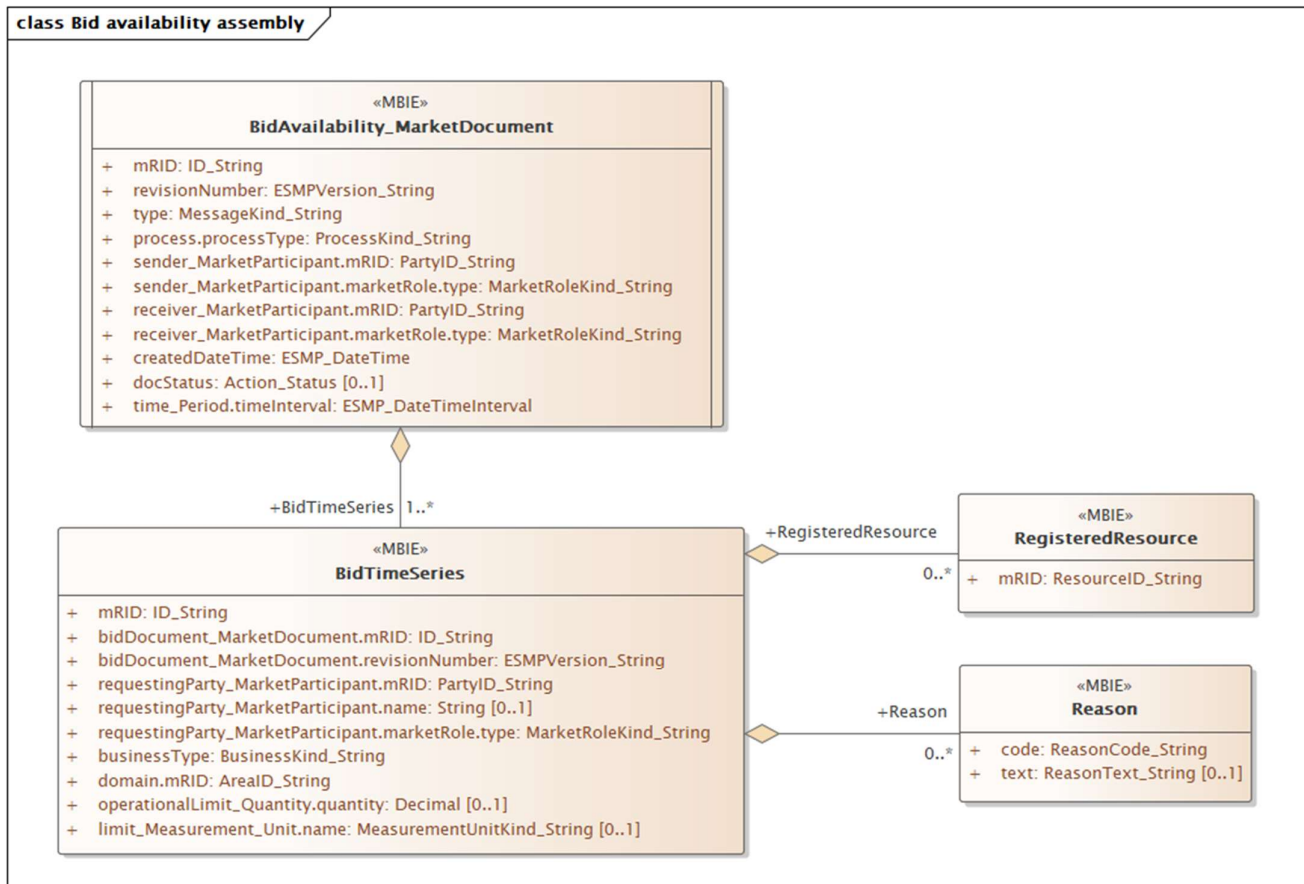
- A01 successfully received document.
- A02 discarded document.

6.2 Bid availability document – Attributes and dependencies

BidAvailability_MarketDocument		urn:iec62325.351:tc57wg16:451-n:bidavailabilitydocument:1:1
mRID	M	Unique identification of the document. Proper UUID is required.
revisionNumber	M	Constant value of 1
Type	M	B45 – Bid availability document
process.processType	M	A51 = automatic frequency restoration reserves
sender_MarketParticipant.mRID	M	10X1001A1001A264 A01 – EIC coding scheme
sender_MarketParticipant.marketRole.type	M	A04 – System Operator
receiver_MarketParticipant.mRID	M	Identification of the party receiving the document. See 6.5 for supported coding schemes.
receiver_MarketParticipant.marketRole.type	M	A46 – Balancing Service Provider (BSP) A39 - Service Provider (Data Provider)
createdDateTime	M	Date and time of document creation (in ISO 8601 UTC format) YYYY-MM-DDTHH:MM:SSZ
time_Period.timeInterval	M	The period(s) covered by the bid(s) referenced in the document (in ISO 8601 UTC format) Start: YYYY-MM-DDTHH:MMZ End: YYYY-MM-DDTHH:MMZ
BidTimeSeries – one or more instances		

mRID	M	Unique identification of the bid
bidDocument_MarketDocument.mRID	M	Constant value of NA
bidDocument_MarketDocument.revisionNumber	M	Constant value of 1
requestingParty_MarketParticipant.mRID	M	EIC code of Party that requested the update of bid availability
requestingParty_MarketParticipant.marketRole.type	M	A46 – Balancing Service Provider A49 – Transmission System Operator A50 – Distribution System Operator
businessType	M	C40 – Conditional bid C41 – Thermal limit C42 – Frequency limit C43 – Voltage limit C44 – Current limit C45 – Short circuit current limits C46 – Dynamic stability limit
domain.mRID	M	The EIC identification of the bidding zone where the resource is located
		A01 – EIC coding scheme
Reason – exactly one instance per time series *)		
Code	M	When business type = C40 the following reason only applies: B16 = Tender unavailable in MOL list When business type = C41 one of the following reason applies: B18 = Failure B09 = Bid not accepted When business type = C42 one of the following reasons apply: B58 = Insufficiency of reserves B59 = Unavailability of reserve providing units
text	O	May be populated to provide additional explanation in free text format
RegisteredResource (associated with BidTimeSeries) – only when BusinessType is Thermal Limit = C41		
mrID	O	EIC code of concerned network element

6.2.1 BidAvailability_MarketDocument assembly model



6.2.2 BidAvailability_MarketDocument use cases

use case	requestingParty_MarketParticipant.marketRole.type	requestingParty_MarketParticipant.mRID	businessType	Reason/Code	Reason/Text
Unavailable on BSP's request	A46 = BSP	Empty	C41 – Thermal limit	B18 = Failure	On BSP's request
Real-time connection is lost with BSP	A49 = TSO	Fingid EIC	C42 – Frequency limit	B59 = Unavailability of reserve providing units	Connection lost to BSP
Unavailable on TSOs decision	A49 = TSO	Fingid EIC	C42 – Frequency limit	B58 = Insufficiency of reserves	TSOs decision
Unavailable due to faulty bid	A49 = TSO	Fingid EIC	C41 – Thermal limit	B18 = Failure	Faulty bid

<i>Unavailable due to conditional bid</i>	A46 = BSP	Empty	C40 – Conditional bid	B16 = Tender unavailable in MOL list	<i>Due to conditional bid</i>
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6.3 Reserve allocation result document – Attributes and dependencies

To be discussed whether BSPs have need for this document or do they receive all needed information from eSett. Reserve allocation result document is thus not specified.

6.4 Acknowledgement document – Attributes and dependencies

Acknowledgement_MarketDocument		iec62325-451-1-acknowledgement.xsd – version 8.1
mRID	M	Unique identification of the document.
createdDateTime	M	Date and time of document creation (in ISO 8601 UTC format) YYYY-MM-DDTHH:MM:SSZ
sender_MarketParticipant.mRID	M	Identification of the party sending the document. See 6.5 for supported coding schemes.
sender_MarketParticipant.marketRole.type	M	<i>One of:</i> A04 – System Operator A46 - Balancing Service Provider (BSP) A39 - Service Provider (Data Provider)
receiver_MarketParticipant.mRID	M	Identification of the party receiving the document. See 6.5 for supported coding schemes.
receiver_MarketParticipant.marketRole.type	M	<i>One of:</i> A04 – System Operator A46 – Balancing Service Provider (BSP) A39 - Service Provider (Data Provider)
received_MarketDocument.mRID	M	The unique identification of the received document.
received_MarketDocument.revisionNumber	M	The revision of the received document.
received_MarketDocument.type	M	The type of the received document.
received_MarketDocument.process.processType	M	The processType of the received document.

received_MarketDocument.createdDateTime	M	The date and time of the creation of the received document.
Reason – one or more instances		
code	M	A01 – Message fully accepted A02 – Message fully rejected More specific error codes may be used.
text	O	May be populated to provide additional explanation in free text format.

Reason – zero or more instances per time series		
code	M	999 – Errors not specifically identified More specific error codes may be used.
text	O	May be populated to provide additional explanation in free text format. For rejected bids a specific reason for the rejection will be provided.

6.5 Supported coding schemes for sender/receiver identification

The following coding schemes are supported for identification of sender/receiver.

A01 – EIC

7 Appendix 2 – Examples

Example messages for this implementation guide are available for download at [Fingrid webpage](#).

Example messages for this implementation guide are available for download at [nordicbalancingmodel.net](#).

8 Appendix 3 – Testing

There are three mandatory test cases for both ECP market messaging and real time ICCP signals. These tests can be executed by the BSP at any time but formal execution tests must be agreed with Fingrid. There is also an optional set of broader market message tests which the BSP can run if they choose to do so.

8.1 Mandatory BSP market message tests

Test case name	Description	Test steps	Expected result
Submit simple bid	BSP submits a simple bid with multiple volumes/prices and up/down direction for a single validity period.	<ol style="list-style-type: none"> 1. BSP creates the bid document for a near future validity period 2. BSP sends the document via ECP to Fingrid 3. Fingrid runs a validation for the bid document (technical and business rules) 4. Fingrid sends a positive ACK (A01) to BSP 5. Fingrid checks that the bids are correctly stored and displayed in VAKSI 6. BSP checks that positive ACK (A01) is received 	Bids are visible in VAKSI and BSP has received a positive ACK (A01)
Bid exceeds portfolio limit	BSP sends a bid in which the volume exceeds the defined BSP portfolio limit.	<ol style="list-style-type: none"> 1. BSP creates a bid document with one bid exceeding the portfolio limit 2. BSP sends bid document to Fingrid 3. Fingrid sends a negative acknowledgement (A02) indicating that the portfolio limit has been breached 4. Bid is not stored to Fingrid 	Negative ACK (A02): "Over maximum quantity"
Unavailable bid	Fingrid changes an existing BSP bid to unavailable status.	<ol style="list-style-type: none"> 1. BSP creates a bid document with several bids to two next validity periods 2. BSP sends bid document successfully to Fingrid 3. Fingrid sets the status of one bid to "unavailable" 4. After the validity period Fingrid sends an unavailability document to BSP 5. BSP sends positive acknowledgement to Fingrid 	Bid is visible in VAKSI with unavailable status and BSP receives unavailability message after the validity period.

8.2 Mandatory BSP real time signal tests

Test case name	Description	Test steps	Expected result
Connectivity test	Verify that the systems are able to establish network level connection.	<ol style="list-style-type: none"> 1. Fingrid pings (ICMP) the BSP system 2. BSP pings the Fingrid system 3. Fingrid switches the operation to the secondary site 4. Repeat the test with the Fingrid secondary site system 	All pings get a reply with normal delay times.
ICCP connection test	Test that the real time ICCP connection is established between the BSP and Fingrid systems.	<ol style="list-style-type: none"> 1. Both Fingrid and BSP start ICCP on their own end 2. Verify that the ICCP link is established 3. Fingrid switches to the secondary site 4. Repeat the tests with the secondary site system 	The ICCP connection is up on both BSP and Fingrid systems.

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ICCP signal test	Test that both BSP and Fingrid systems are able to send and receive ICCP values.	<ol style="list-style-type: none"> 1. Fingrid changes one analog value and BSP monitors the change on their end 2. BSP changes one analog value and Fingrid monitors the change on their end 3. Repeat the process with status values 	BSP has received the signal values from the Fingrid system and Fingrid has received the signal values from the BSP system.
Watchdog	Verify that all the remaining signals are configured on the BSP system and test the watchdog setup.	<ol style="list-style-type: none"> 1. Check that all the defined signals are configured on the BSP system 2. Verify that the watchdog signal is updating according to the specification 	All signals defined on the BSP system and watchdog is working according to the specification.

8.3 Optional BSP market message tests

Test case name	Description	Test steps	Expected result
Submit bids to multiple VPs	BSP submits a simple bid with multiple volumes/prices and up/down direction for multiple validity periods	<ol style="list-style-type: none"> 1. BSP creates the bid document for at least two near future validity periods 2. BSP sends the document via ECP to Fingrid 3. Fingrid runs a validation for the bid document (technical and business rules) 4. Fingrid sends a positive ACK (A01) to BSP 5. Fingrid checks that the bids are correctly stored and displayed in VAKSI 6. BSP checks that positive ACK (A01) is received 	Bids are visible in VAKSI and BSP has received a positive ACK (A01)
Modify bid volume	BSP modifies an existing bid volume	<ol style="list-style-type: none"> 1. BSP creates a bid document with several bids 2. BSP sends bid document successfully to Fingrid 3. BSP sends a new bid document containing the same bids except the volume is increased for one bid 4. Fingrid sends a positive ACK and increases the version number 	Modified bids stored in VAKSI with increased version number
Modify bid price	BSP modifies an existing bid price	<ol style="list-style-type: none"> 1. BSP creates a bid document with several bids 2. BSP sends bid document successfully to Fingrid 3. BSP sends a new bid document containing the same bids except the price is increased for one bid 4. Fingrid sends a positive ACK and increases the version number 	Modified bids stored in VAKSI with increased version number
Change flow direction of a bid	BSP modifies an existing bid flow direction from up to down	<ol style="list-style-type: none"> 1. BSP creates a bid document with several bids 2. BSP sends bid document successfully to Fingrid 3. BSP sends a new bid document containing the same bids except the flow direction is changed from up to down for one bid 4. Fingrid sends a positive ACK and increases the version number 	Modified bids stored in VAKSI with increased version number
Cancel bid	BSP cancels an existing bid by setting volume to zero	<ol style="list-style-type: none"> 1. BSP creates a bid document with several bids 2. BSP sends bid document successfully to Fingrid 3. BSP sends a new bid document containing the same bids except the volume is set to zero for one bid 4. Fingrid sends a positive ACK and increases the version number 5. One bid that had the volume set to zero is removed from the bid list 	Bid is removed from VAKSI

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Modify time interval	BSP modifies time interval for an existing bid	<ol style="list-style-type: none"> 1. BSP creates a bid document with one bid 2. BSP sends bid document successfully to Fingrid 3. BSP changes the time interval for the bid and sends the document to Fingrid 4. Fingrid sends a negative acknowledgement to BSP 	Original bid visible in VAKSI and BSP has received a negative ACK (A02)
Bid submission before GOT	BSP sends a bid before gate open time	<ol style="list-style-type: none"> 1. BSP creates a bid document with one bid to a time window before GOT (+7 days before VP) 2. BSP sends the bid document to Fingrid 3. Fingrid responds with a negative acknowledgement (A02) 	Negative ACK (A02): "Message was received too early, GateOpening."
Bid submission after GCT	BSP sends a bid after gate closure time	<ol style="list-style-type: none"> 1. BSP creates a bid document with one bid to a time window after BSP GCT 2. BSP sends the bid document to Fingrid 3. Fingrid responds with a negative acknowledgement (A02) 	Negative ACK (A02): "Message was received after deadline, GateClosure."