

Electricity Balancing Pilot Project 1 – Imbalance Netting, CMO/CMF for aFRR and mFRR



Reliable Sustainable Connected

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2. **mFRR-Product**
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4. **Summary**

General Framework

Technical Implementation

Control Scheme

Real-Time Data
Exchange

Optimization
Functions

Congestion
Management

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Optimisation Functionalities

Activation of Reserves

Imbalance
Netting

aFRR-
Assistance

mFRR-
Assistance

RR-
Assistance

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Imbalance Netting

aFRR-
Assistance \neq aFRR-CMO

mFRR-
Assistance \neq mFRR-CMO

RR-
Assistance \neq RR-CMO

Assistance is not related to costs!
Only improvement of frequency quality!

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aFRR-
Assistance

aFRR-CMO

mFRR-
Assistance

mFRR-CMO

RR-
Assistance

RR-CMO

Procurement of Reserves

FCR-CMF

aFRR-CMF

mFRR-CMF

RR-CMF

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Activation of Reserves

Procurement of Reserves

Amount of Reserves

Imbalance Netting

FCR-CMF

aFRR-CMF

Dimensioning

Sharing

aFRR-
Assistance

aFRR-CMO

mFRR-CMF

RR-CMF

mFRR-
Assistance

mFRR-CMO

RR-
Assistance

RR-CMO

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FCR-CMF

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Dimensioning

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mFRR-CMF

RR-CMF

mFRR-
Assistance

mFRR-CMO

RR-
Assistance

RR-CMO



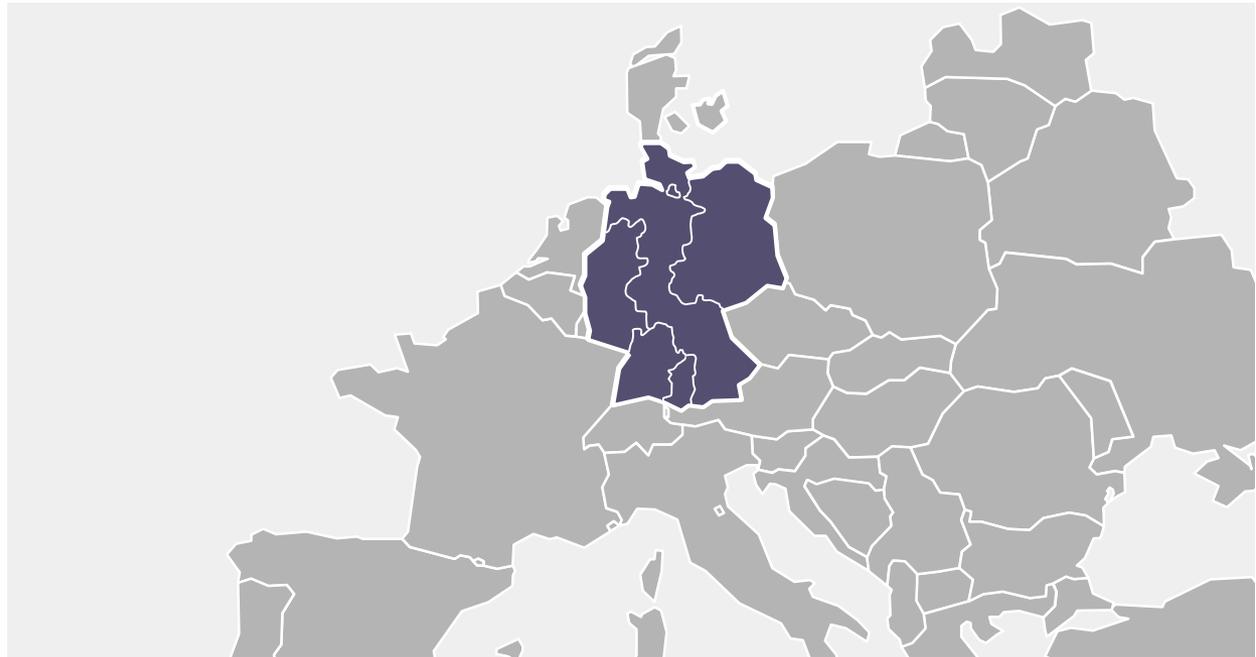
Pilot Project 1 - implemented

Pilot Project 1 - implemented but not submitted

(▶ Pilot Project on FCR)

Two Pilot Projects in Two Bullet Points

Participants



Focus

- Demonstration of full optimisation potential of a TSO-TSO cooperation in **all fields** of balancing
- Cooperation with other Pilot Projects (NORDIC, BE/NL, CH/AT)

Content

1. **Scope of the Pilot Project 1**
2. **mFRR Procurement and Activation**
3. **IT-Implementation of the mFRR-CMO**
4. **Summary**

mFRR – Procurement

Dimensioning and Procurement

- German TSOs **jointly** dimension and procure mFRR (and aFRR)
- Indicative reserve amounts: aFRR \approx 2.2 GW, mFRR \approx 2.5 GW
- Fully harmonised requirements and market frameworks

Bids for mFRR

- are submitted **day-ahead** for 4h validity blocks (e.g. 4:00 – 8:00)
- consist of a **capacity price and a energy price**
- have **minimum size of 5 MW** (increment 1 MW)
- may be indivisible (as long as \leq 25 MW)

Bid Selection

- mFRR capacity - daily auction (at 10:00) for all German TSOs – the bids with the cheapest capacity price are selected
- mFRR activation - selection of the cheapest energy prices among the bids accepted in the auction

mFRR – Main Technical Requirements

Pooling

- **Pooling of single units located in one LFC Area is allowed**
- One provider can operate more than one mFRR pool
- The providers have to provide information on planned “location” of capacity

Full Activation Time and Delivery

- **Capability to fully activate or deactivate the bid capacity within 15 min at any time** (within the validity period of the bid)
- Capability to deliver the full bid capacity during the whole validity period of the bid

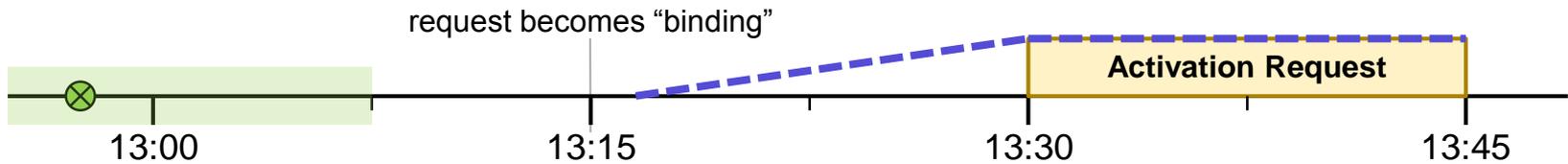
Activation and Settlement

- mFRR **activation can be triggered immediately** (UCTE terminology - “direct tertiary control”) **or for specific quarters of an hour (usual case)**, regardless of that,
- the activation request and settlement are based on schedules

mFRR – Request and Physical Activation



Case 1) Activation request received >22,5 minutes in advance to the activated quarter hour



 Time stamp of the mFRR request

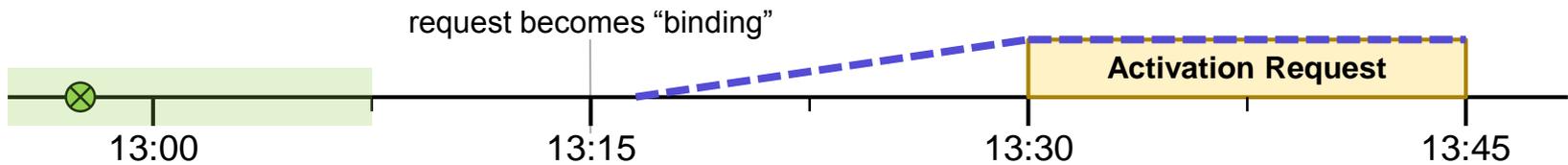
 Requested energy

 physical activation

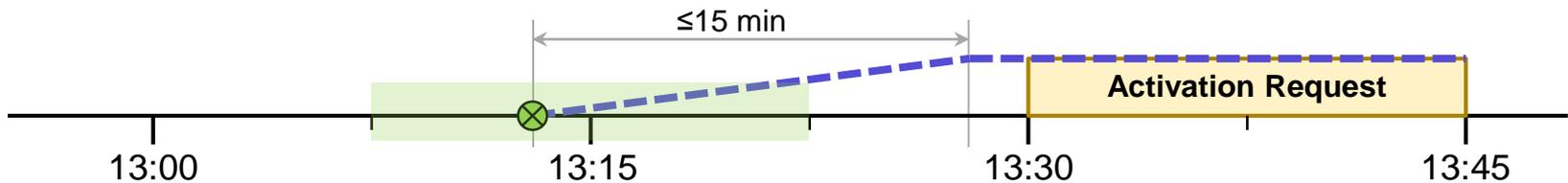
mFRR – Request and Physical Activation



Case 1) Activation request received >22,5 minutes in advance to the activated quarter hour



Case 2) Activation request received between 22,5 and 7,5 min in advance to the activated quarter hour

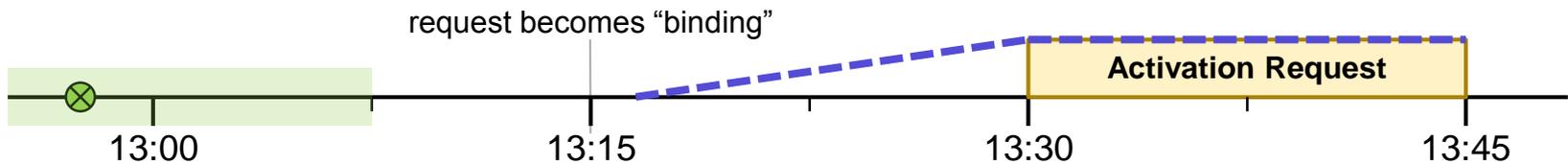


-  Time stamp of the mFRR request
-  Requested energy
-  physical activation

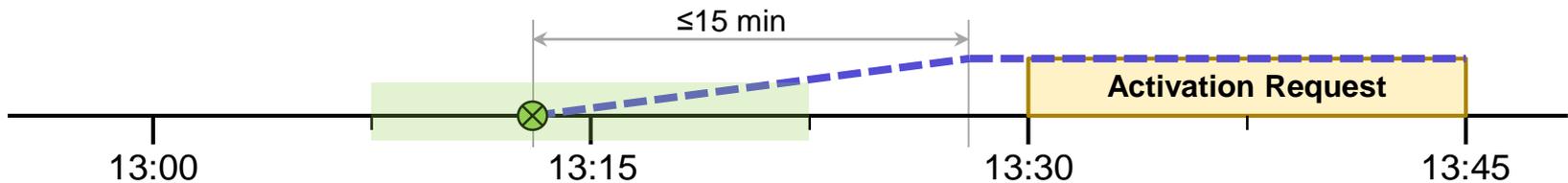
mFRR – Request and Physical Activation



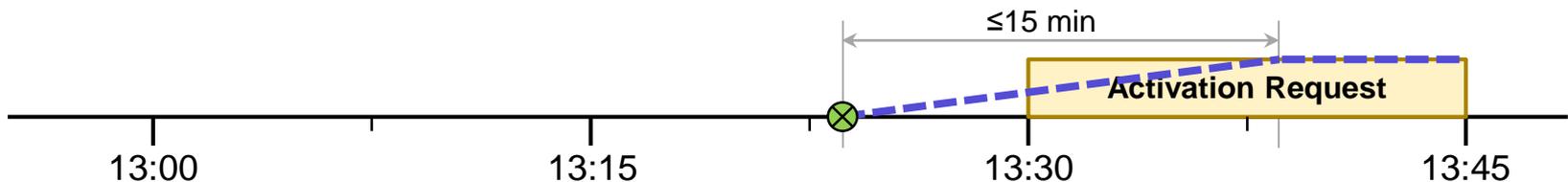
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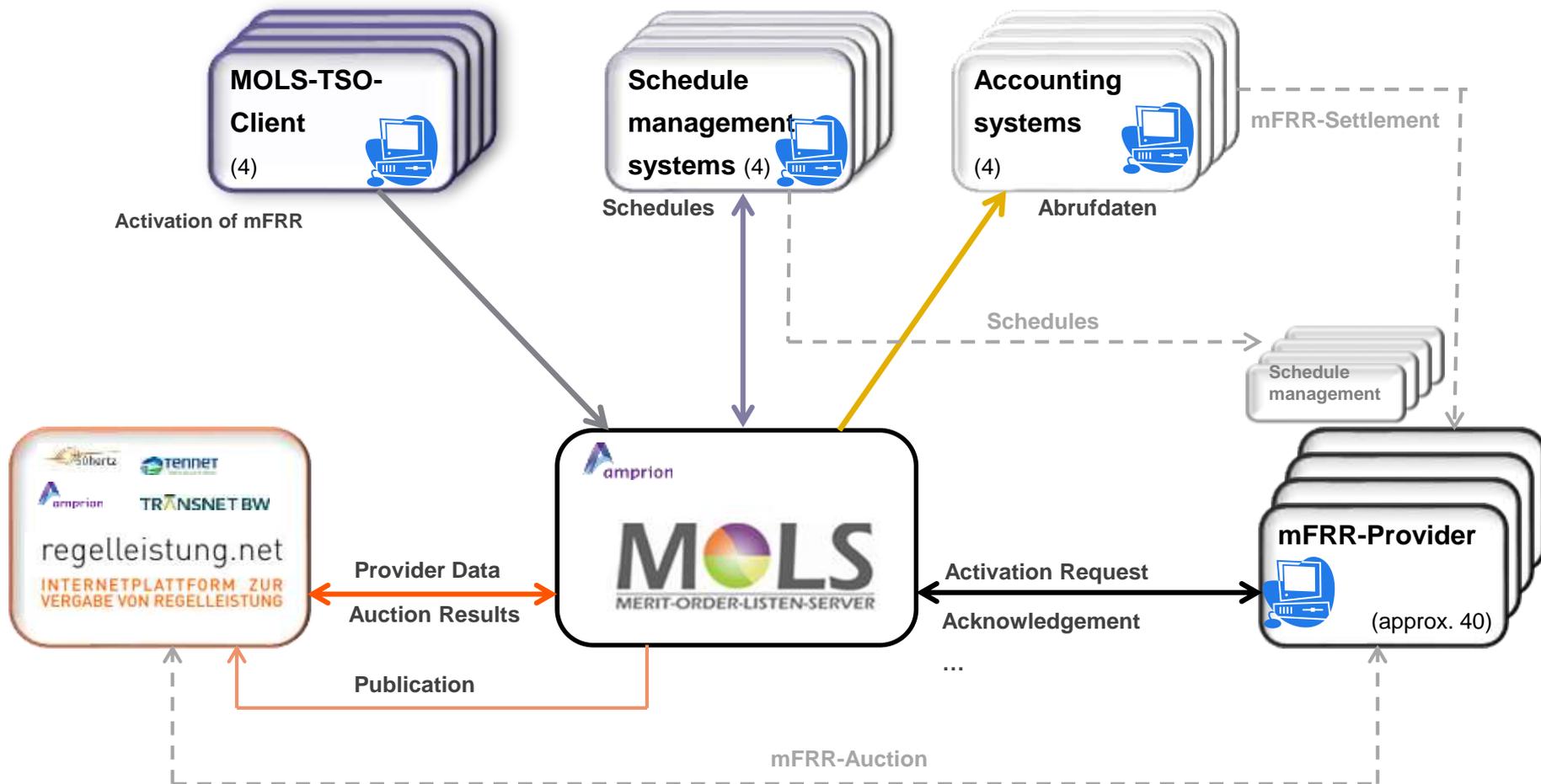
Case 3) Activation request received "too late" (special case)



-  Time stamp of the mFRR request
-  Requested energy
-  physical activation

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mFRR-CMO



Communication of Activation Requests

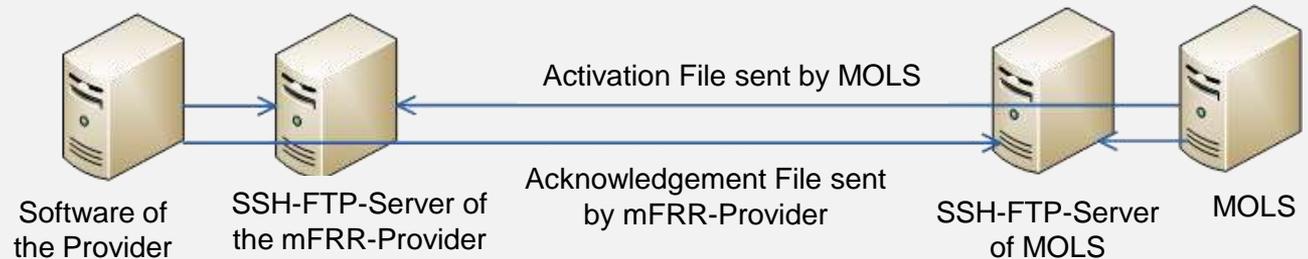
Process

- TSO enters the required power
- The MOLS determines the cheapest bids under consideration of availability and congestions and ...
- ... sends the activation orders and schedules

Experience

- The communication between MOLS and the mFRR provider is implemented via Activation Files (XML) which are **digitally signed, compressed** and **encrypted**
- The SSH-FTP protocol enables proof that a file was stored

Basic Principle of the IT-Implementation



MOLS is Extensible

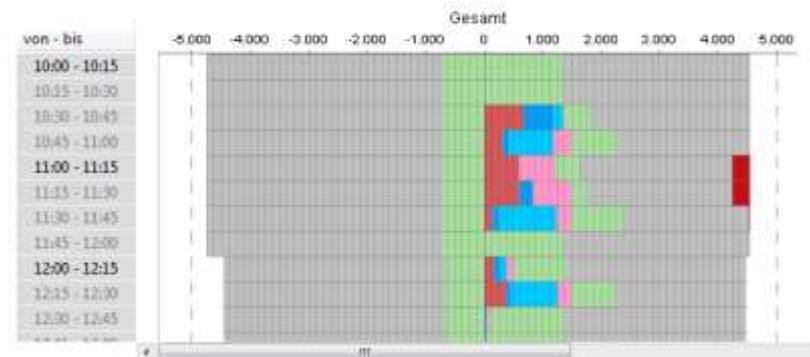
... by adding additional TSOs

... by adding additional mFRR-Providers

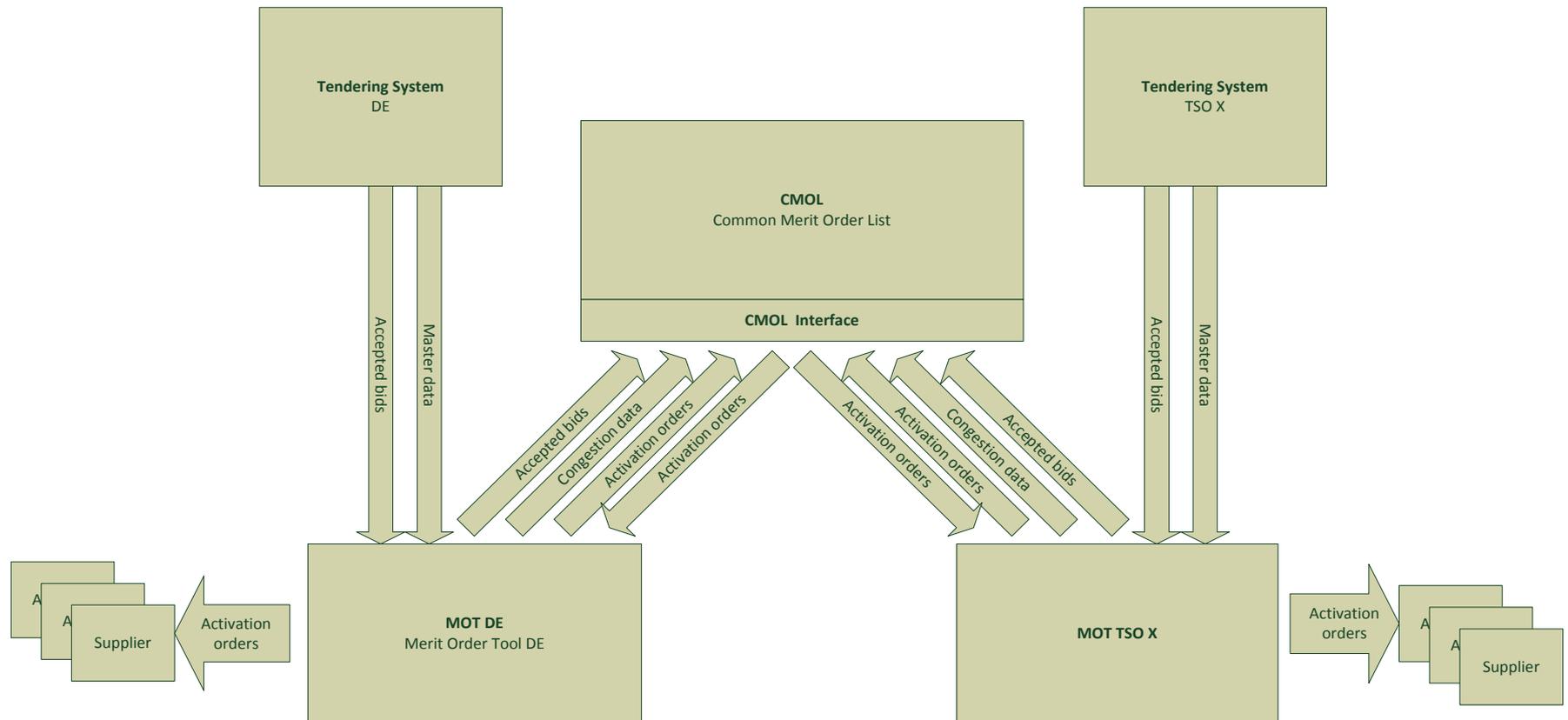
... by adding additional mFRR-Providers

Abruf aus DMOL für Regelzone

Datum	von - bis	Gesamter Abruf	Gesamt DMOL	TransnetBW	50Hertz	Amprion	Tennet	Gesamt für FP
22.05.2014	10:00 - 10:15							
22.05.2014	10:15 - 10:30							
22.05.2014	10:30 - 10:45	1373	1373	√ 350	⊕ 206	√ 600	⊕ 217	1373
22.05.2014	10:45 - 11:00	1500	1500	⊕ 321	⊕ 99	⊕ 761	⊕ 319	1500
22.05.2014	11:00 - 11:15	1200	1200	⊕ 600	⊕ 600			1200
22.05.2014	11:15 - 11:30	1500	1500	⊕ 600	⊕ 230		⊕ 670	1500
22.05.2014	11:30 - 11:45	1500	1500	⊕ 141	⊕ 99	⊕ 998	⊕ 262	1500
22.05.2014	11:45 - 12:00							
22.05.2014	12:00 - 12:15	500	500		√ 500			502
22.05.2014	12:15 - 12:30	1500	1500	⊕ 378	⊕ 92	⊕ 779	⊕ 251	1500
22.05.2014	12:30 - 12:45	100	100		√ 100			100



mFRR-CMO – Concept for further Cooperations



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Summary

CMO for mFRR in Germany

- **Example for a TSO-TSO model**
- Joint dimensioning, joint procurement and joint activation based on a CMO for all mFRR providers

Flexible Product and IT-Solution

- The mFRR product combines the possibility to activate full mFRR capacity at any time (typically not needed) and scheduled based activation
- **Simple settlement and energy exchange between TSOs**

Outlook

- Feasibility study with NORDIC
- Feasibility study with BE/NL