



4M Market Coupling

Prague, 25/09/2014

Agenda

I. Czech-Slovak-Hungarian-Romanian Common Parts

1. Market Coupling Theory and Practice
2. Where do we come from
3. Operational overview
4. Detailed Procedures and Timings with MPs Communication
5. Decoupling and Fallback Solutions
6. Member test phase and launch dates
7. Contacts

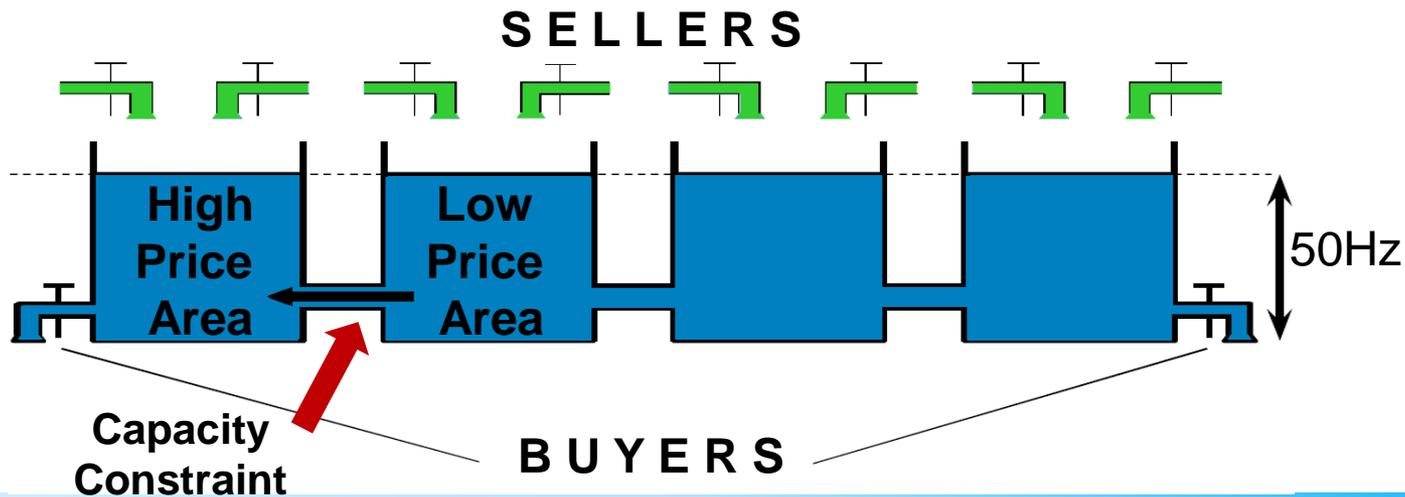
II. Further Information on the Czech Market – New types of orders on OTE day-ahead market

Market Coupling Theory 1/2

Market Coupling (MC) = Implicit Auction: optimal allocation of energy and cross-border transmission capacity rights in one common process. All inputs (bids and capacity data) are taken into account together.

Method: almost the same as local matching of bids but using cross-border profiles as constraint of trade between market areas.

Energy, maximised by cross-border capacity, flows from low price area to high price area in order to try to balance the market prices.



Market Coupling Theory 2/2

In case of price difference between two neighbouring areas, congested border in the direction of the high price area.

In case of equal prices of two neighbouring areas, transmission capacity was enough for the market.

Price difference (spread) between neighbouring market areas' prices = Capacity auction price

Capacity auction price multiplied by cross-border flow = TSOs' Congestion Revenue

Implementation of MC requires close TSO-PX cooperation and NRA support.

Operation of MC is daily common process operated by the involved TSOs and PXs.

Market Coupling in Practise

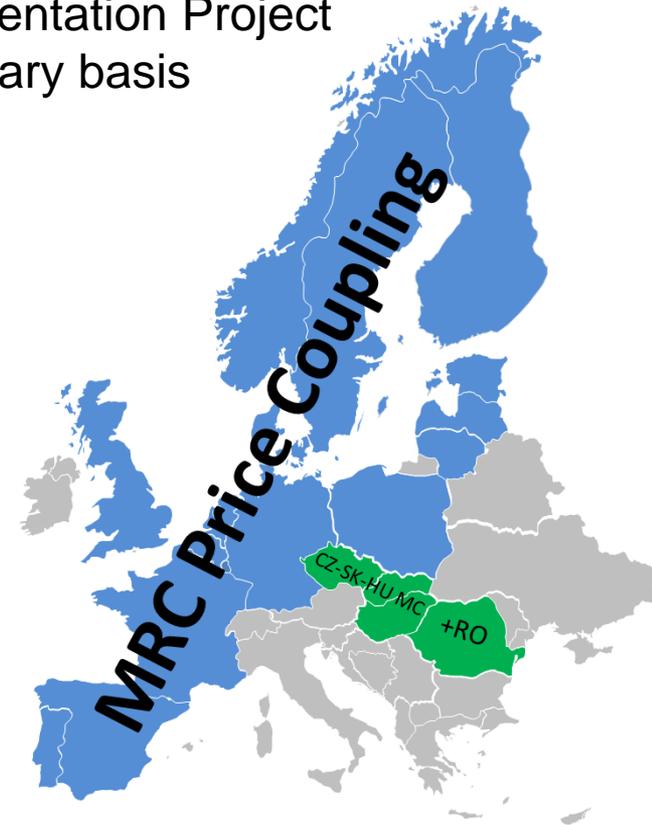
Theoretically Proved Optimal
Day-Ahead Trading Form

Several Implementation Project
on voluntary basis

Flow-Based MC defined as
day-ahead Target Model

Elaboration of harmonized
EU legal background

Implementation of European Price Coupling as soon as possible and involving at least all EU Member States

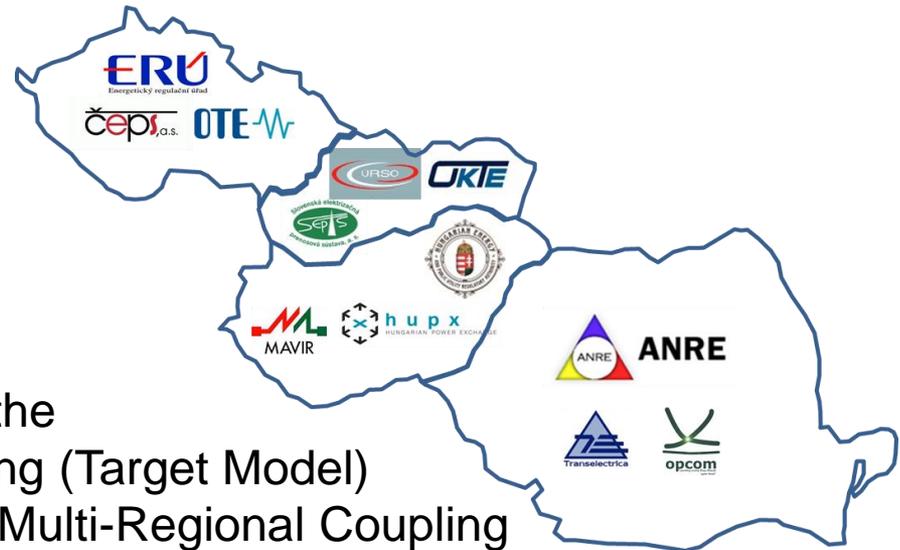


Where do we come from?

30 May 2011 Memorandum of Understanding among CZ, SK, HU Parties
 11 Sept 2012 Launch of CZ-SK-HU Market Coupling
 Meanwhile Romanian and Polish Letter of Intent on participating
 July 2013 Memorandum of Understanding among 5M
 (CZ-SK-HU+RO+PL) Parties
 August 2013 Decision on starting 4M MC Project with the goal to implement
 CZ-SK-HU+RO MC; Polish parties in observer status

Tomorrow Launch of
 4M Market Coupling

Near Future Further steps towards the
 European Price Coupling (Target Model)
 via CEE project to join Multi-Regional Coupling



4M Market Coupling Project

- Day-ahead ATC based price coupling covering Czech-Slovak-Hungarian+Romanian market areas



- **Members:**
CZ-SK-HU-RO TSOs & PXs & NRAs
- **Observers:** Polish TSO & PX & NRA

Project goals

Main goals:

- Extension of CZ-SK-HU MC to Romania
- 4M countries wish to introduce benefits of market integration to market participants as soon as possible
- Get prepared for joining European Price Coupling – implement MC based on PCR solution

Context:

- Stepwise market integration is the only way forward due to a **blocked situation and slow progress in the CEE region**
 - Flow-based capacity calculation methodology
 - Overlapping regions and other integration activities
- CEE regional solution is not agreed yet
- The extension does not hinder the regional development as it is an intermediate step towards European Price Coupling

MC from Market Participants' point of view

Main characteristics:

- Market Participants will be in contact only with those PXs where they are registered members.
- In order to participate in 4M MC there is no need to be registered on all PXs, but only on the local one.
- Market Participants will use front end trading platform of its local PX for the bid submission and for receiving the results.
- After launch of MC, daily explicit capacity auction will be closed down, day-ahead OTC trading on HU-RO border will become impossible. Only long term and intraday cross-border transmission capacity will be available for OTC trade.
- When transfer of electricity is requested, MP has to be registered in seller PX and buyer PX.

CZ-SK-HU MC vs. 4M MC

- Coupled Romania means bigger liquidity via a new border (HU-RO) involved in more efficient allocation procedure
- Implemented PCR solution has no effect on PX-Market Participant communication
- No significant change in external procedures and timings
- Gate Closure Time remains at 11h00 CET
- Minimum price limit moving from -3000 to -500 €/MWh to be follow NWE/MRC benchmark

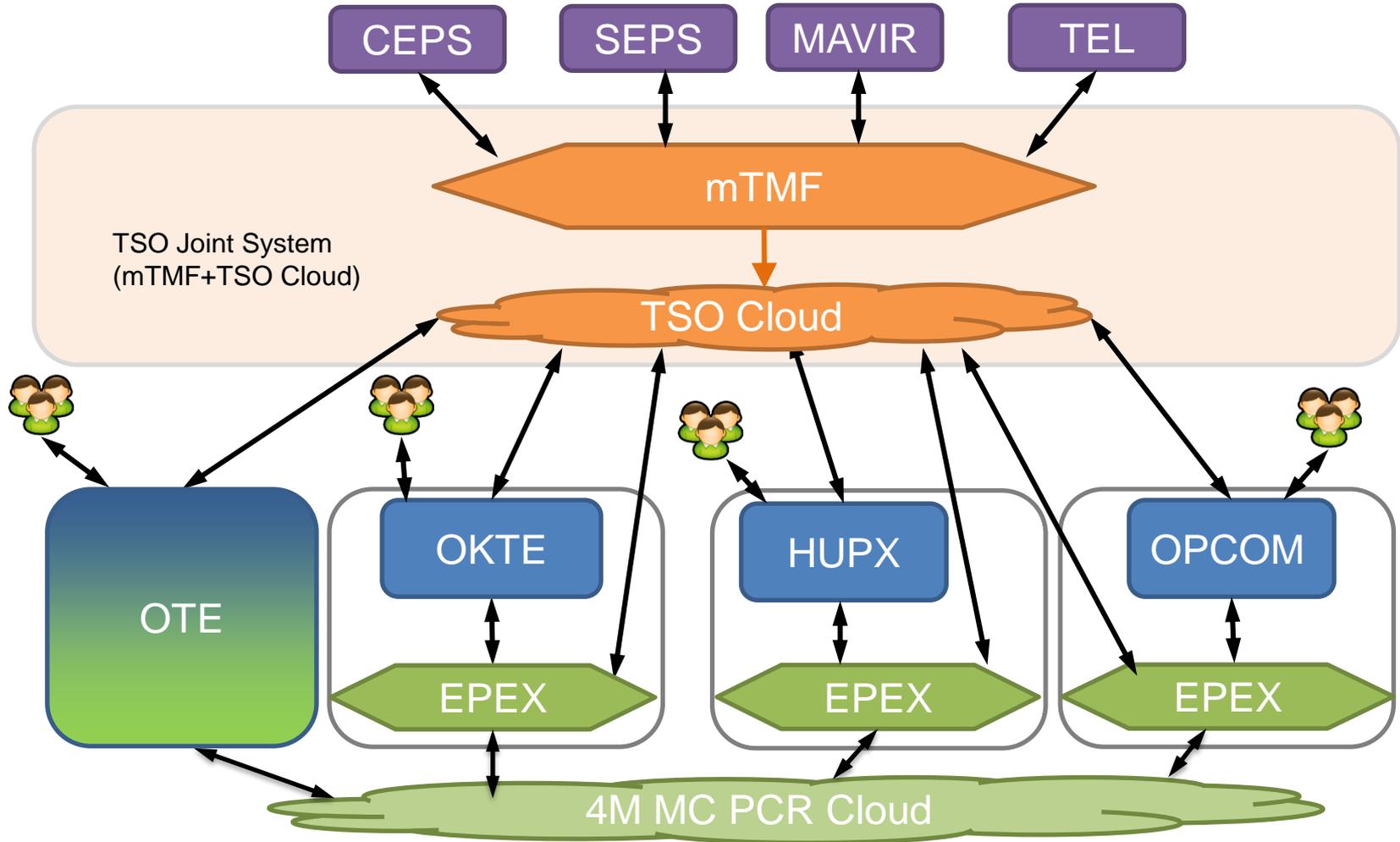
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4M MC topology



PX technical solution

- PCR implementation fully in line with the target model
 - 1 Full PCR Member (OTE)
 - 3 Serviced PXs (OKTE, HUPX, OPCOM) by EPEX SpotIn operation OTE and EPEX Spot act as Coordinator in rotation.
- PCR solution is an important step forward for further integration:
 - implemented interfaces can be reused with further extensions
 - coupling procedures compatible with MRC (except timing)
 - PCR IT solution same as in MRC
 - under implementation in CSE (IBWT Project)
 - already running in MRC

Harmonisation of market characteristics

Parameter	Value*
Time zone	CET
Standard Publication of Capacities	9:15 (by TSOs) 9:30 (by PXs)
Deadline for modification of capacities	10:30
Gate Closure Time	11:00
Standard Publication of Results by PXs** (Publication Time: Tp)	11:30-40
Standard Publication of Results by TSOs	Tp + 5 minutes
Nomination Deadline	14:30
Cross-border Flow decimals	One digit (0.1 MW)
Price decimals	Two digits (0.01€/MWh)
Min/Max prices	€/MWh -500/+3000
Second Auction Trigger	€/MWh -150/+500
Volume Tick size	One digit (0.1 MW)
Price Tick size	Two digits (0.01 €/MWh)

* The timings are subject to the procedural tests.

** Without Second Auction. In case of Second Auction or application of any backup/fallback procedure the publication time is postponed.

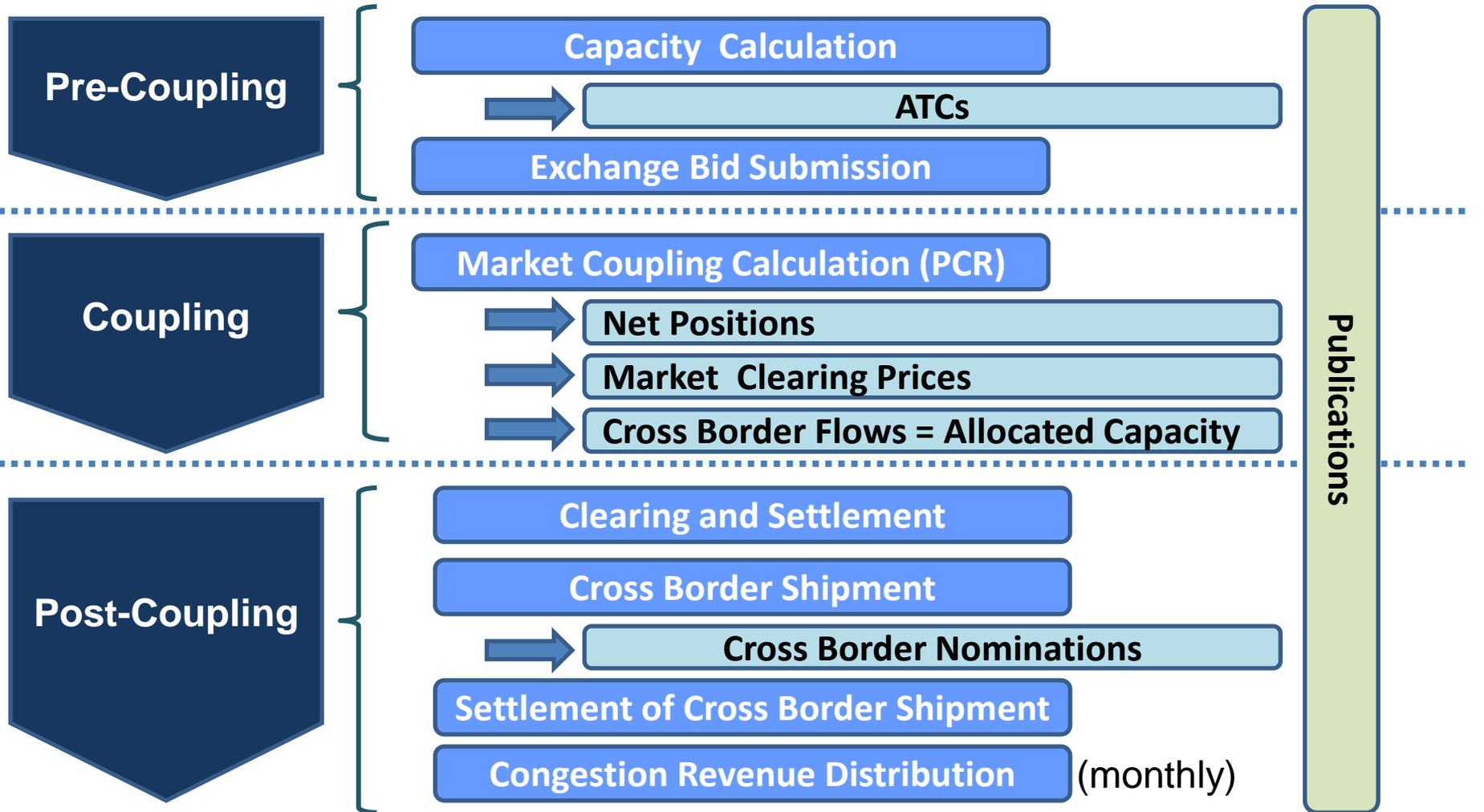
TSO technical solution

- Equal status of all connected TSOs
- The only TSO platform (no rotation, simple contract)
- Allows easy changing of PX roles (Coordinator/Non-Coordinator) via TSO Cloud interface system being a single point of contact on behalf of TSO systems towards PX side
- Excellent experiences on performance and functionalities from CZ-SK-HU MC
- *mTMF* and *TSO Cloud* systems are easily extendable
 - Unlimited number of TSOs and PXs
 - extension of the system with almost no costs

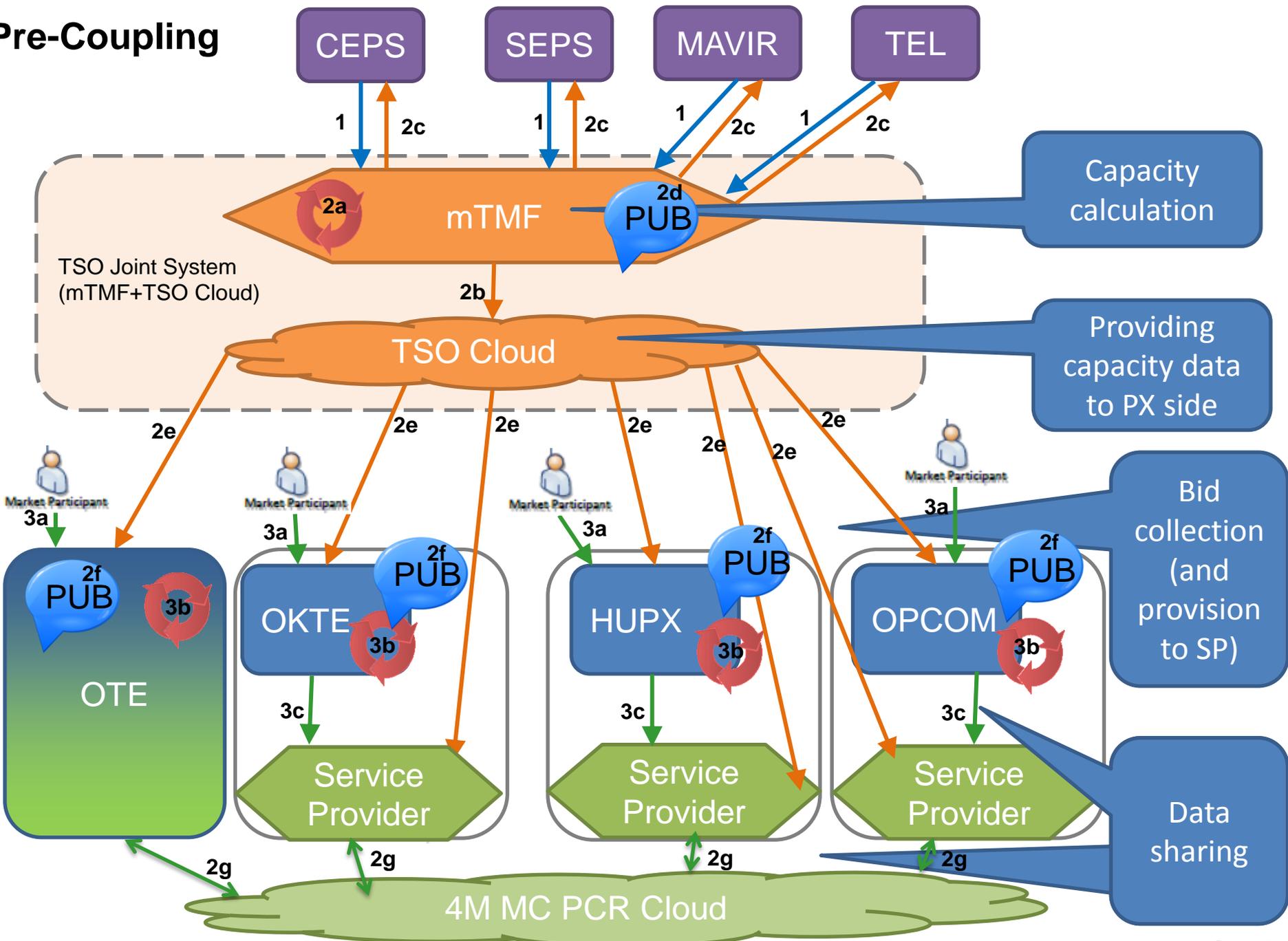
Coordinated ATC Calculation

- Introduction / Extension of MC will not change the capacity calculation method.
- For a given border both neighbouring TSOs calculate ATC and the lower value is used for Coupling Calculation and is published
- Coordinated Capacity Calculation will be done by SEPS for CZ-SK, SK-HU and HU-RO borders as well.
- Long term and intraday allocation procedures remain

4M Market Coupling: Role model

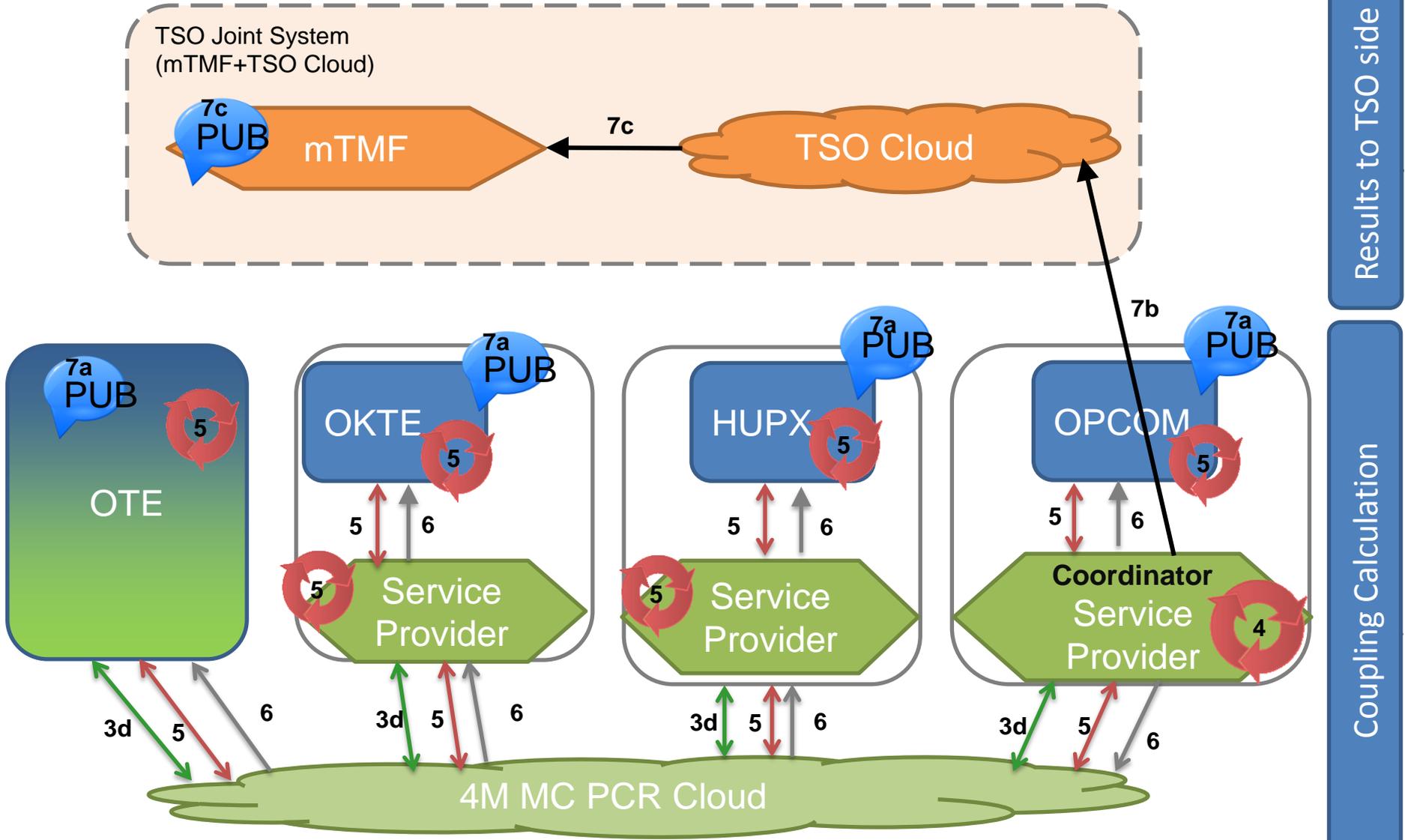


Pre-Coupling



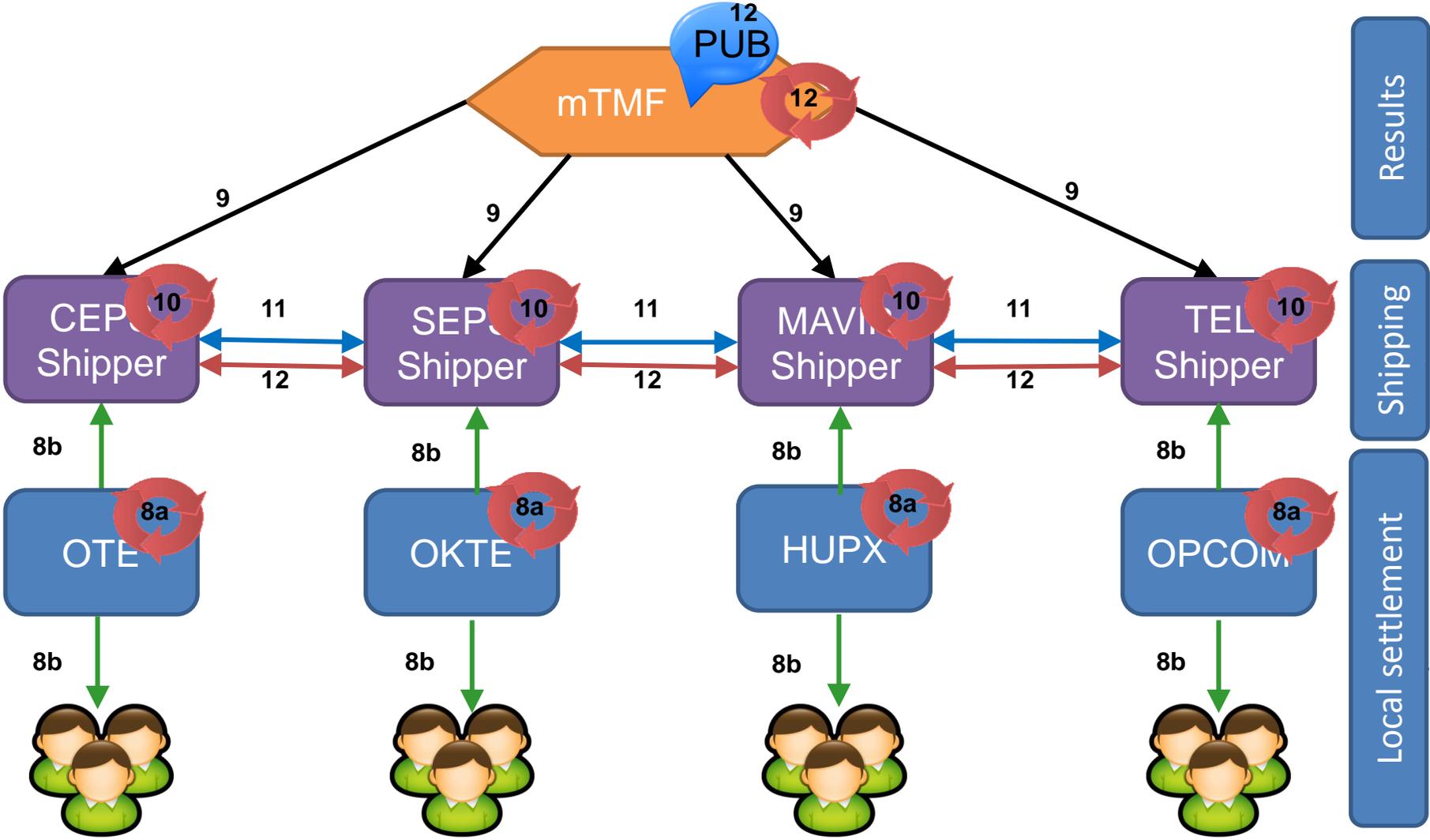
Note: number of SPs is to be at least 1 and at most 3

Coupling



Rotation of Coordinator role will be applied.

Post-Coupling

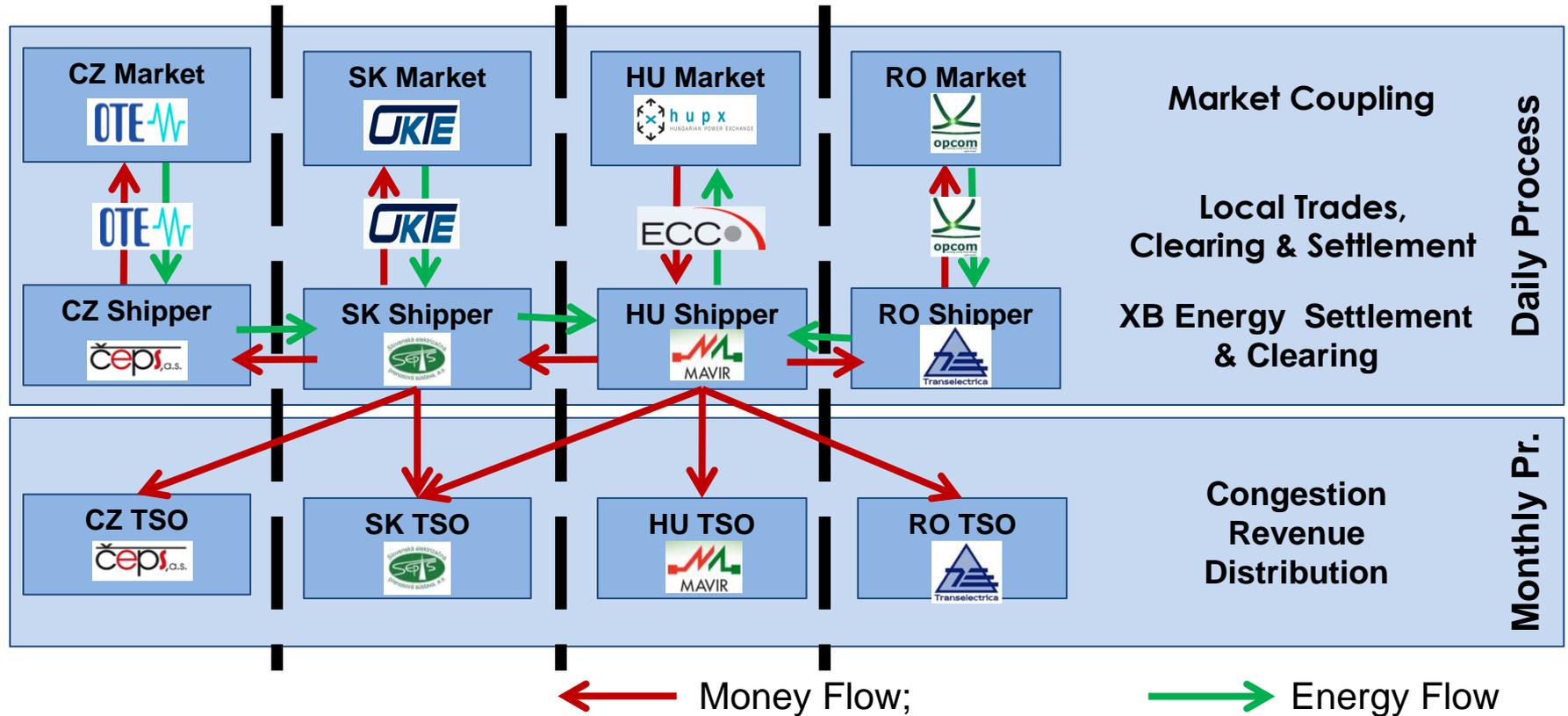


Cross-border Shipping

- Each TSO acts as Shipper on its local market mediating/transmitting electricity between neighbouring market areas in a centralized way.
- Shippers must respect Market Coupling Result: allocated capacity rights = cross-border flows.
- Cross-border trade on a given border is settled between neighbouring Shippers on the price of exporting market area (lower price).
- Internal trade between Shipper and local market is settled on local market area price.
- Importing Shipper receives the Capacity Right, collects the Congestion Revenue and distributes it to the relevant TSOs.

Cross Border Shipping

For example if the energy flows from CZ to SK, and from SK & RO to HU:



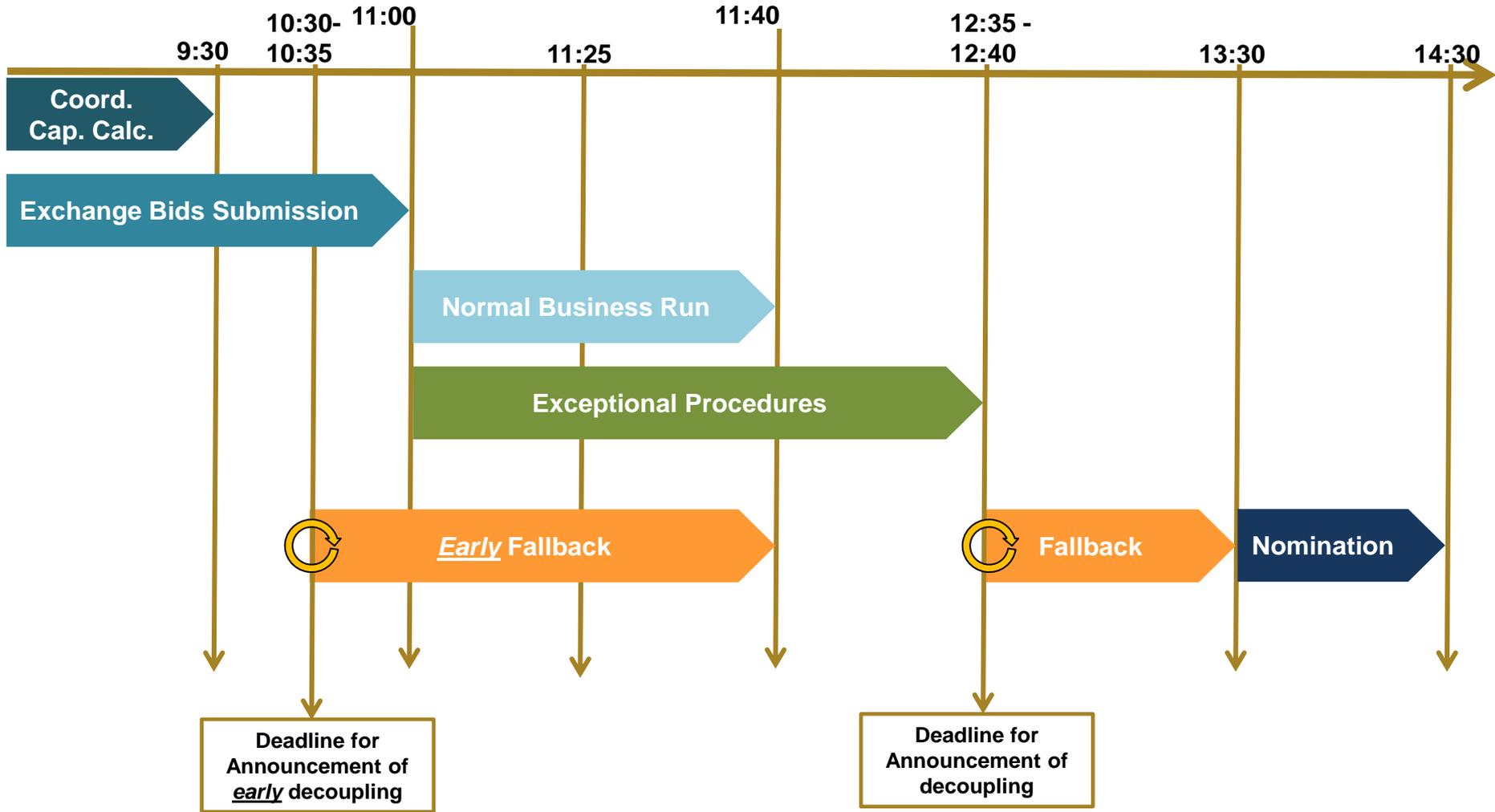
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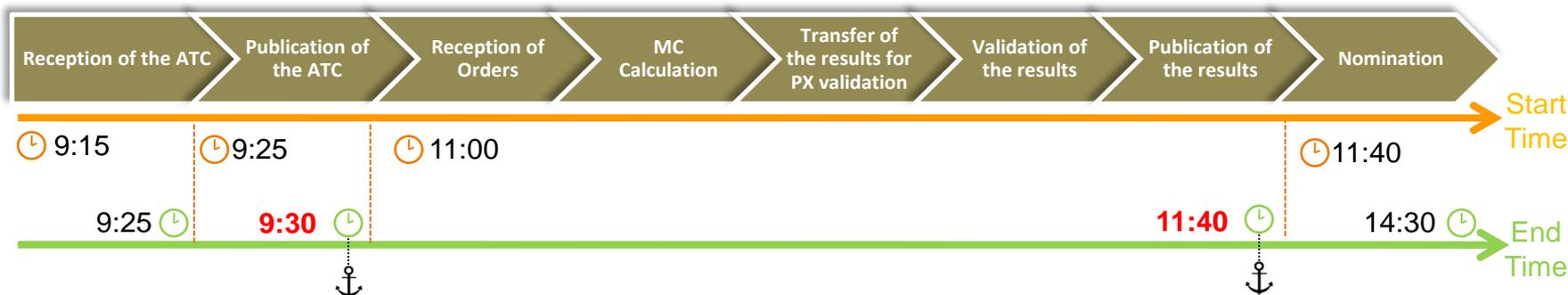
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Operational Processes and Timing - Overview



Normal Process

Timing of normal mode



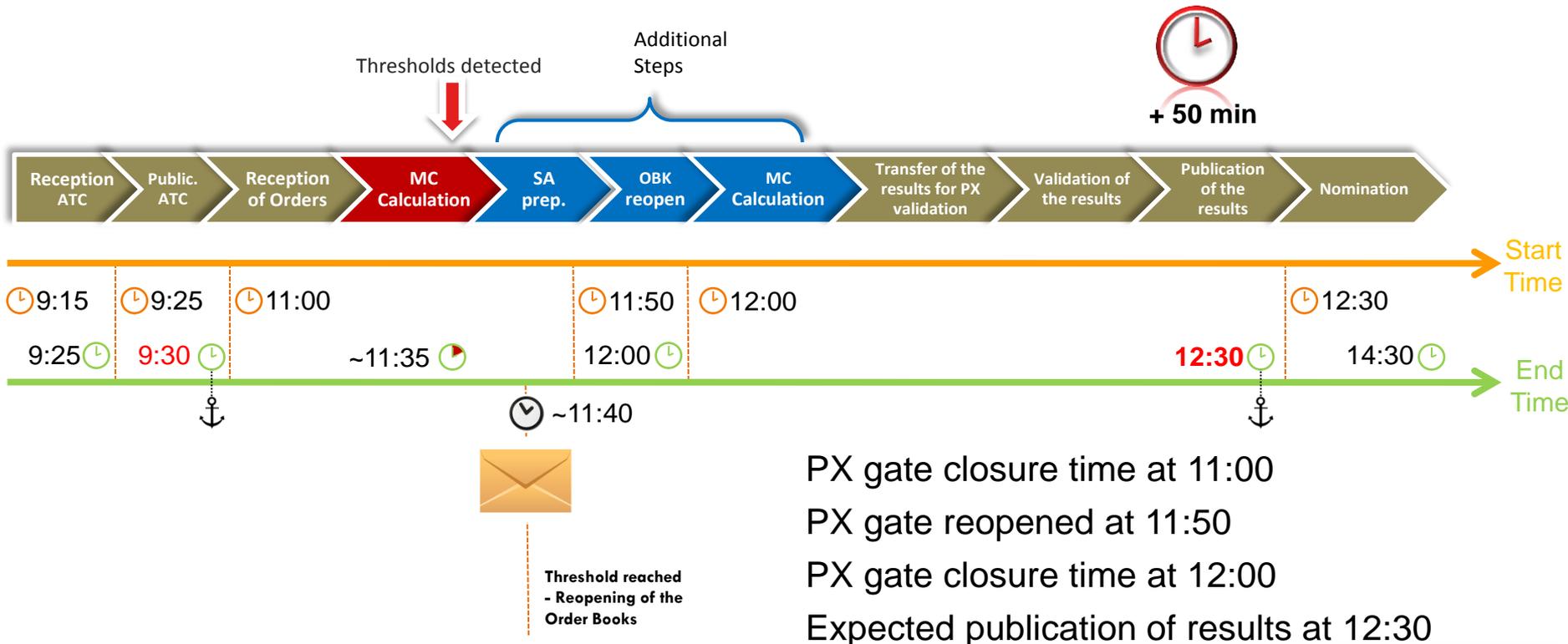
- ATC will be published at **9:15** on mTMF homepage (www.sepsas.sk) and on each website of PXs at **9:30**
- ATC could be modified till **10:30** by mTMF and updated on each website of mTMF and PXs
- PX gate closure time at **11:00**
- Publication of market results at **11:40**
- Nomination deadline at **14:30**

Second Auction

Procedure and Timings publications

Due to thresholds detected in CZ, SK, HU, RO prices after MC calculation, all order books are reopened to market parties **for 10 minutes** and a 2nd calculation is performed.

Due to this second calculation Market Results are **delayed around 50 minutes**.



Note: This timing could be changed in specific case

Second Auction

Procedure and Timings publications

Timing	Message	Additional Actions for MPs	Market Results Publication	Nomination Deadline
~11:40	Reopening of the Order Books	OBKs reopen for 10 minutes	12:30	14:30

Example Message for „Reopening of the Order Books”:

Threshold reached - Reopening of the Order Books

2nd auction for delivery day **05.12.2014** has been called:

Opening of 2nd auction session: **11:50**

Closing of 2nd auction session: **12:00**

The results are expected around: **12:30**

Note that you can also bid on market areas that are not concerned and that the order book will reopened for buy and sell bids.

Market SK:

Upper threshold exceeded for hours **19, 20, 21** - Seller required

Lower threshold exceeded for hours **22, 23, 24** - Buyer required

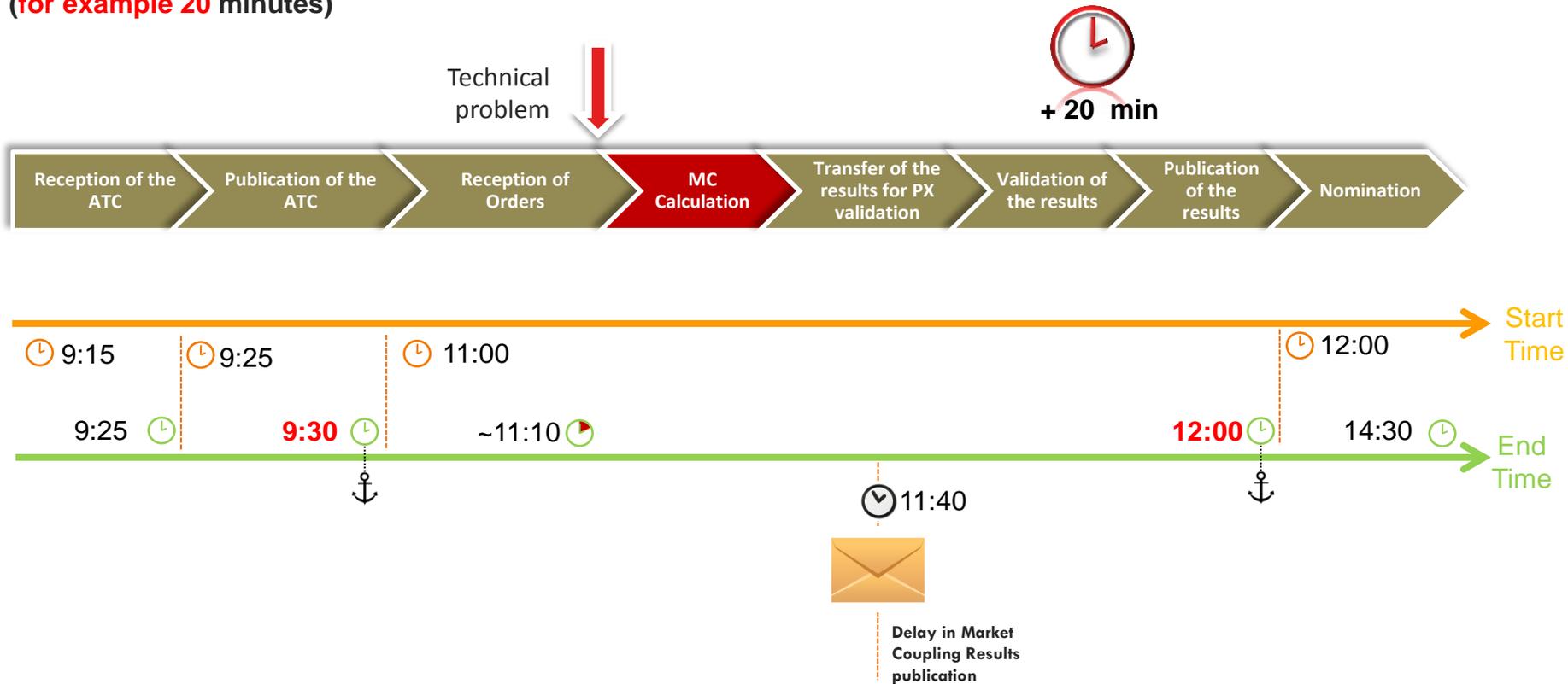
Please note that all bids already received before will also be included the Second Auction calculation provided that they will not be changed/deleted during the reopening of the order books now.

Please be aware that the second auction procedure follows the local market rules.

Coupling Process delayed

Slight delay

Due to technical problems in the coupling process, the process remains the same but actions are delayed in time (for example 20 minutes)



Coupling Process delayed

Slight delay

Timing	Message	Additional Actions for MPs	Market Results Publication	Nomination Deadline
11:40	Delay in Market Coupling Results publication		12:00	14:30

Example Message for „Delay in Market Coupling Results publication“:

Delay in Market Coupling Results publication

The Market Coupling process is delayed due to technical reasons or market issues.

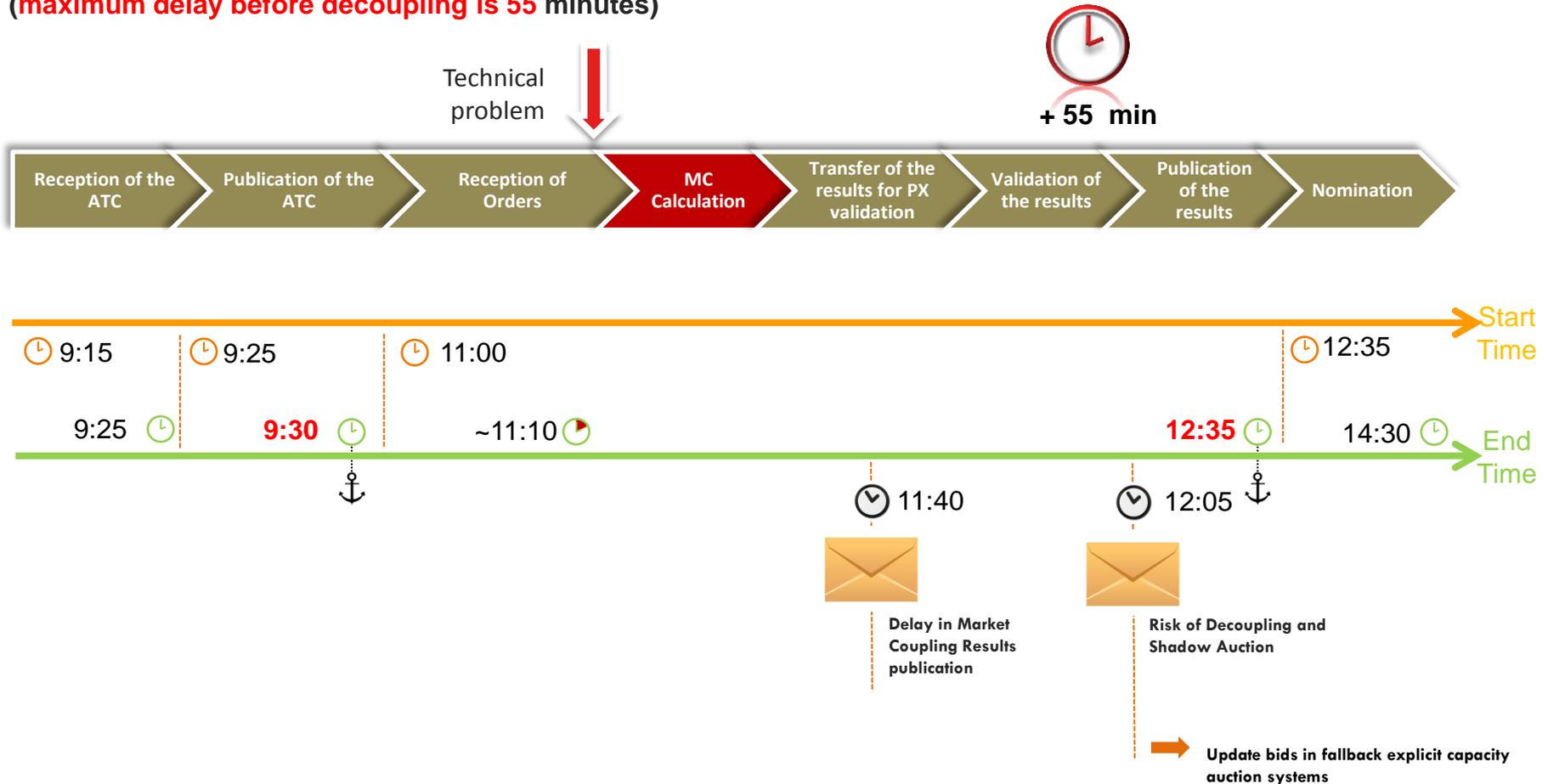
Therefore, the publication of the Market Coupling Results is delayed.

We will keep you informed as soon as new information is available.

Coupling Process delayed

Critical delay (scenario with an avoided decoupling just in time)

Due to technical problems in the coupling process, the process remains the same but actions are delayed in time (**maximum delay before decoupling is 55 minutes**)



Coupling Process delayed

Critical delay (scenario with an avoided decoupling just in time)

Timing	Message	Additional Actions for MPs	Market Results Publication	Nomination Deadline
11:40	Delay in Market Coupling Results publication			14:30
12:05	Risk of Decoupling and Shadow Auction	Bids update in Shadow Auction systems	12:35	14:30

Coupling Process delayed

Critical delay (scenario with an avoided decoupling just in time)

Example Message for „Risk of Decoupling and Shadow Auction“:

Risk of Decoupling and Shadow Auction

Please be aware that the calculation of the CZ-SK-HU-RO market results is severely further delayed due to ongoing technical reasons or market issues.

In case of decoupling another message will be sent shortly after **12:35** to announce the decoupling.

Please be aware that in case of decoupling becomes necessary, order books will be reopened at short notice for 20 minutes after the announcement of decoupling and for all four markets local calculations will be run separately by HUPX, OKTE, OTE and OPCOM. Please be prepared in case you intend to modify your bids in case decoupling occurs.

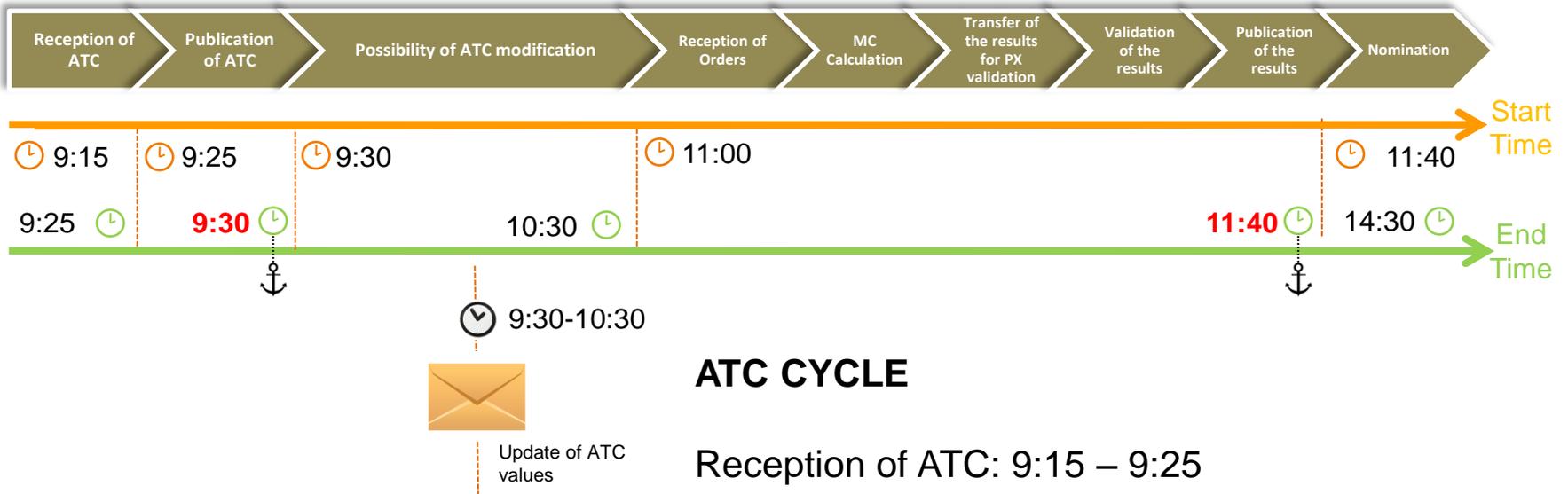
In case of CZ-SK-HU-RO decoupling ATCs for SK-HU border, CZ-SK border and HU-RO border will be allocated explicitly via Shadow Auction. Please be aware that the Shadow Auction gate will close at 12:35 to run in parallel.

If CZ-SK-HU-RO is decoupled Shadow Auction results will be published as soon as possible but at the latest at 12:45.

Therefore, we strongly advise you to update your shadow bids at MAVIR KAPAR system for SK-HU border and HU-RO border and/or ČEPS DAMAS platform for CZ-SK border before the Gate Closure of the Explicit shadow auction at 12:35.

ATC Modification

PX gate closure time unimpacted



ATC CYCLE

Reception of ATC: 9:15 – 9:25

Publication of ATC on PXs: 9:30

Possibility of ATC modification: 9:30 – 10:30

PX gate closure time at 11:00

ATC Modification

PX gate closure time unimpacted

Timing	Message	Additional Actions for MPs	ATC Publication	PX Gate Closure
9:30 - 10:30	Update of ATC values	Exchange bids update (based on the updated ATC values)	As soon as ATC are published, but at the latest at 10:30	11:00

Example Message for „Update of ATC values“:

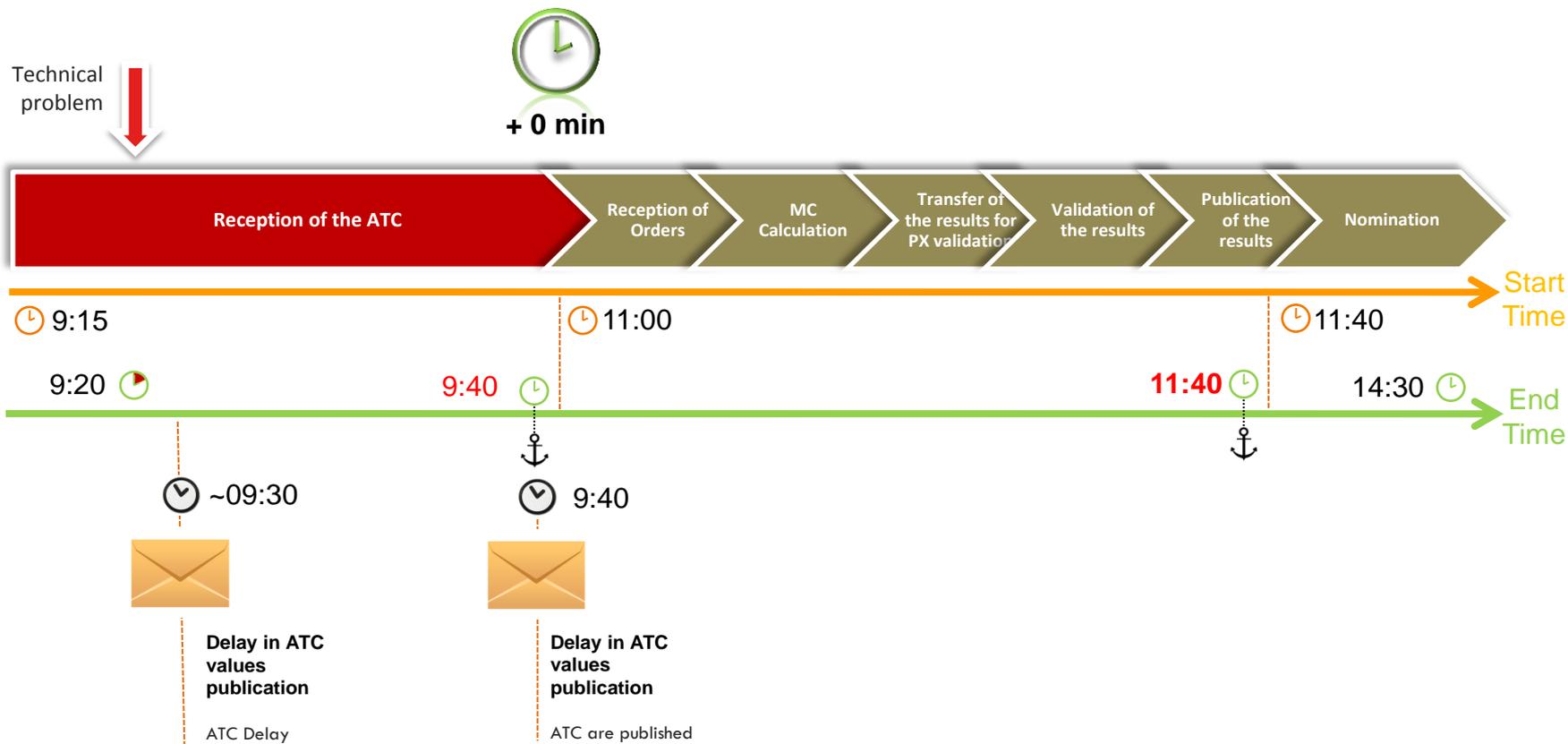
Update of ATC values

Please note the ATC values were modified.

ATC Process delayed

Slight delay

Due to technical problems in the ATC cycle, the process remains the same but actions are delayed in time (for example 10 minutes)



ATC Process delayed

Slight delay

Timing	Message	Additional actions for MPs	ATC Publication	PX gate closure
~ 9:30	Delay in ATC values publication: ATC Delay		As soon as ATC are published, but at the latest at 10:30	11:00
9:40	Delay in ATC values publication: ATC are published	Exchange bids update (based on the updated ATC values)	As soon as ATC are published, but at the latest at 10:30	11:00

Example Message for „Delay in ATC values publication“:

Delay in ATC values publication

The publication of the ATC values of the 4M MC region is delayed due to technical reasons. We will inform you as soon as the ATC values are published.

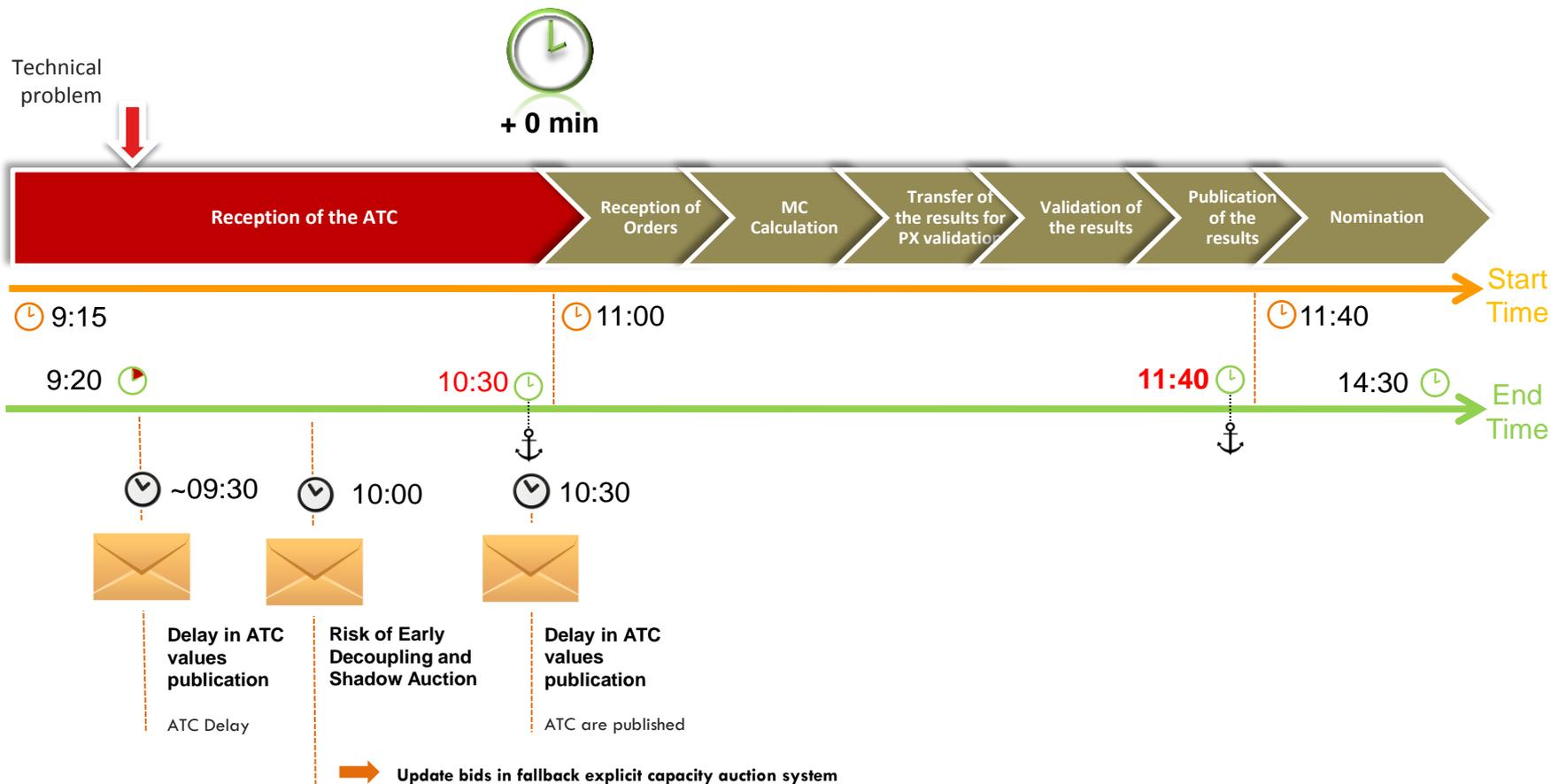
or (depending on the step)

Please note that ATC values are published now.

ATC Process delayed

Critical delay - PX gate closure time unimpacted

Due to technical problems in the ATC cycle, the process remains the same but actions are delayed in time
(maximum delay before early decoupling is 60 min)



ATC Process delayed

Critical delay - PX gate closure time unimpacted

Timing	Message	Additional actions for MPs	ATC Publication	PX gate closure
~ 9:30	Delay in ATC values publication: ATC Delay		As soon as ATC are published, but at the latest at 10:30	11:00
10:00	Risk of Early Decoupling and Shadow Auction	Shadow Auction bids update	As soon as ATC are published, but at the latest at 10:30	11:00
10:30	Delay in ATC values publication: ATC are published	Exchange bids update (based on the published ATC values)	At the latest at 10:30	11:00

ATC Process delayed

Critical delay - PX gate closure time unimpacted

Example Message „Risk of Early Decoupling and Shadow Auction“:

Risk of Early Decoupling and Shadow Auction

The Market Coupling process encounters a risk of Early Decoupling due to ongoing technical reasons or market issues. In case problems cannot be solved and decoupling becomes necessary another message will be sent shortly after 10:30 to announce the decoupling.

Please be aware that in case of decoupling becomes necessary, order books will close as usual at 11:00 and for all four markets local calculations will be run separately by HUPX, OKTE, OTE and OPCOM. Please be prepared in case you intend to modify your bids in case decoupling occurs.

In case of CZ-SK-HU-RO decoupling ATCs for SK-HU border, CZ-SK border and HU-RO border will be allocated explicitly via Shadow Auction. Please be aware that the Shadow Auction gate will close at 10:30 to run in parallel. Shadow Auction results will be published at 10:40 but only if CZ-SK-HU-RO is decoupled.

Therefore, we strongly advise you to update your shadow bids before 10:30 at ČEPS DAMAS platform for CZ-SK border and/or MAVIR KAPAR system for SK-HU border and HU-RO border .

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Decoupling and Fallback Solutions

Decoupling

Due to a technical problem in market coupling process, no market results can be provided till the critical deadline and Fallback solutions shall be applied.



Day-ahead

No partial decoupling will be applied

Decoupling and Fallback Solutions

Decoupling in CZ-SK-HU-RO MC could be announced in two cases:

1) is not possible, for a specific day, to allocate the available transmission capacity via the normal daily implicit allocation, i.e.: a critical deadline in the time schedule is reached and no solution is found before the critical deadline to publish the market results. This type of decoupling is called “Full Decoupling”.

Critical deadline for announcing decoupling is 12:35.

2) is not possible, for a specific day, to fix severe problems in TSO Management Function system and/or ATC calculation/provision process. In this case decoupling is announced early, i.e. far before PXs order book gate closure. This special type of decoupling is called “Early Decoupling”. The default timing of “Early Decoupling” aims at keeping the normal PXs order book gate closure time unchanged (11h00).

Critical deadline for announcing early decoupling is 10:30.

Shadow auction – general fallback for 4M MC capacity allocation

ČEPS and MAVIR are shadow auction organizers in CZ-SK-HU-RO MC

- ČEPS for CZ – SK border;
- MAVIR for SK – HU & HU – RO borders

Main characteristics:

- Shadow bids can be submitted for 30 consecutive days in advance;
- If decoupling is not announced, bids are not evaluated, no explicit allocation of capacity;
- By the time of announcing decoupling and switch to fallback, the bids are evaluated;
- After the publication of cross-border explicit auction results PX Order Books are still open for 20 min to update PX bids;
- There will not be any change in nomination process.

Contacts to shadow auction organizers

ČEPS

Operators

+420 211 044 507

+420 724 601 301

helpdesk.trade@ceps.cz

MAVIR

Operators

+36 1 304 1449

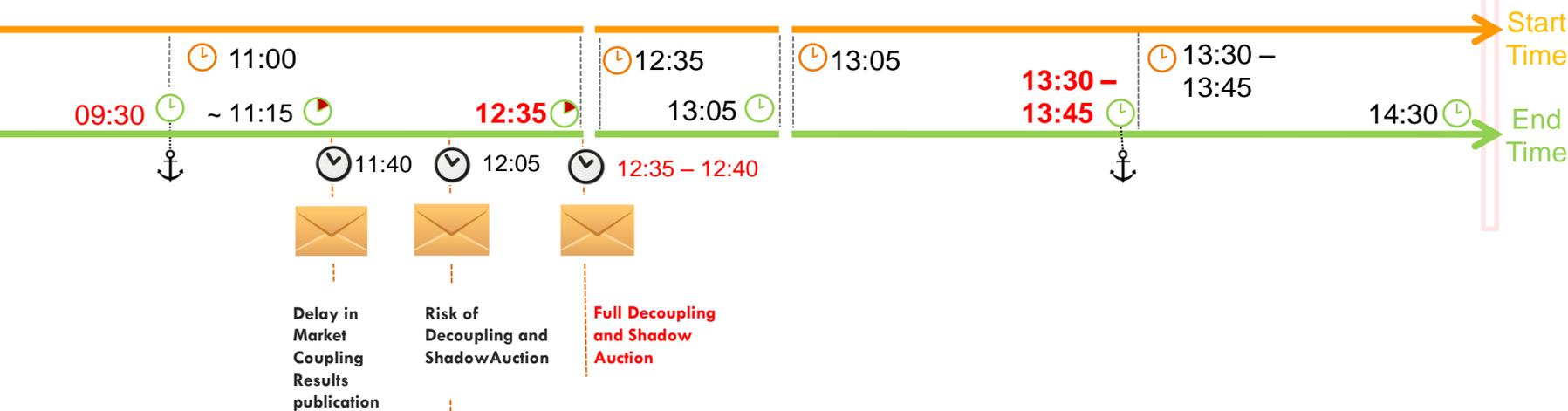
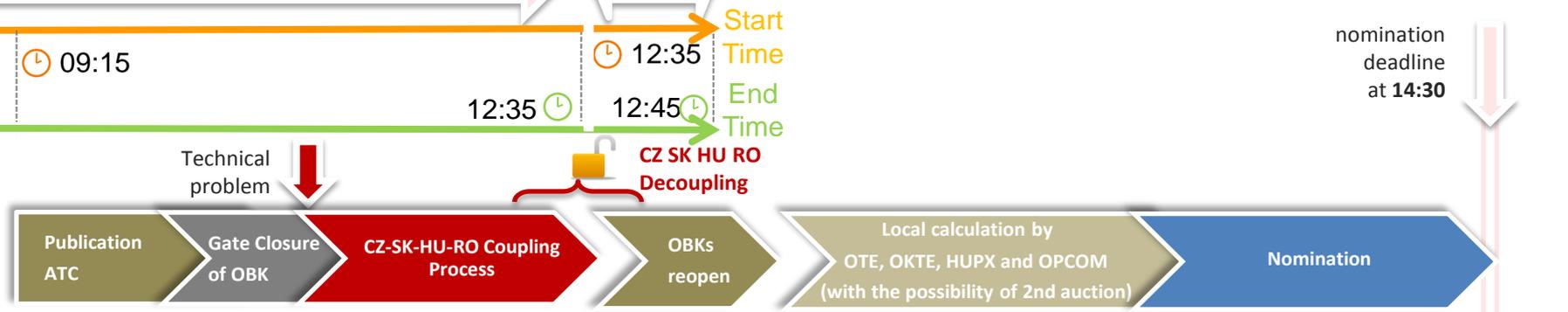
auctionoffice@mavir.hu

Decoupling

Fall-back mode

Gate Opening of Shadow Auction on CZ-SK, SK-HU and HU-RO border

Publication of Results of Shadow Auction



Decoupling

Fall-back mode

Timing	Message	Additional actions for MPs	Market results Publication	Nomination deadline
11:40	Delay in Market Coupling Results publication			14:30
12:05	Risk of Decoupling and Shadow Auction	Bids update in Shadow Auction system		14:30
12:35-12:40	Full Decoupling and Shadow Auction	Bids update in trading system of PXs	13:30 – 13:45 (or sooner, if results are available)	14:30

Decoupling

Fall-back mode

Example Message „Full Decoupling and Shadow Auction“:

Full Decoupling and Shadow Auction

Due to technical problems, the CZ-SK-HU-RO Market Coupling cannot be run for delivery date: DD.MM.YYYY

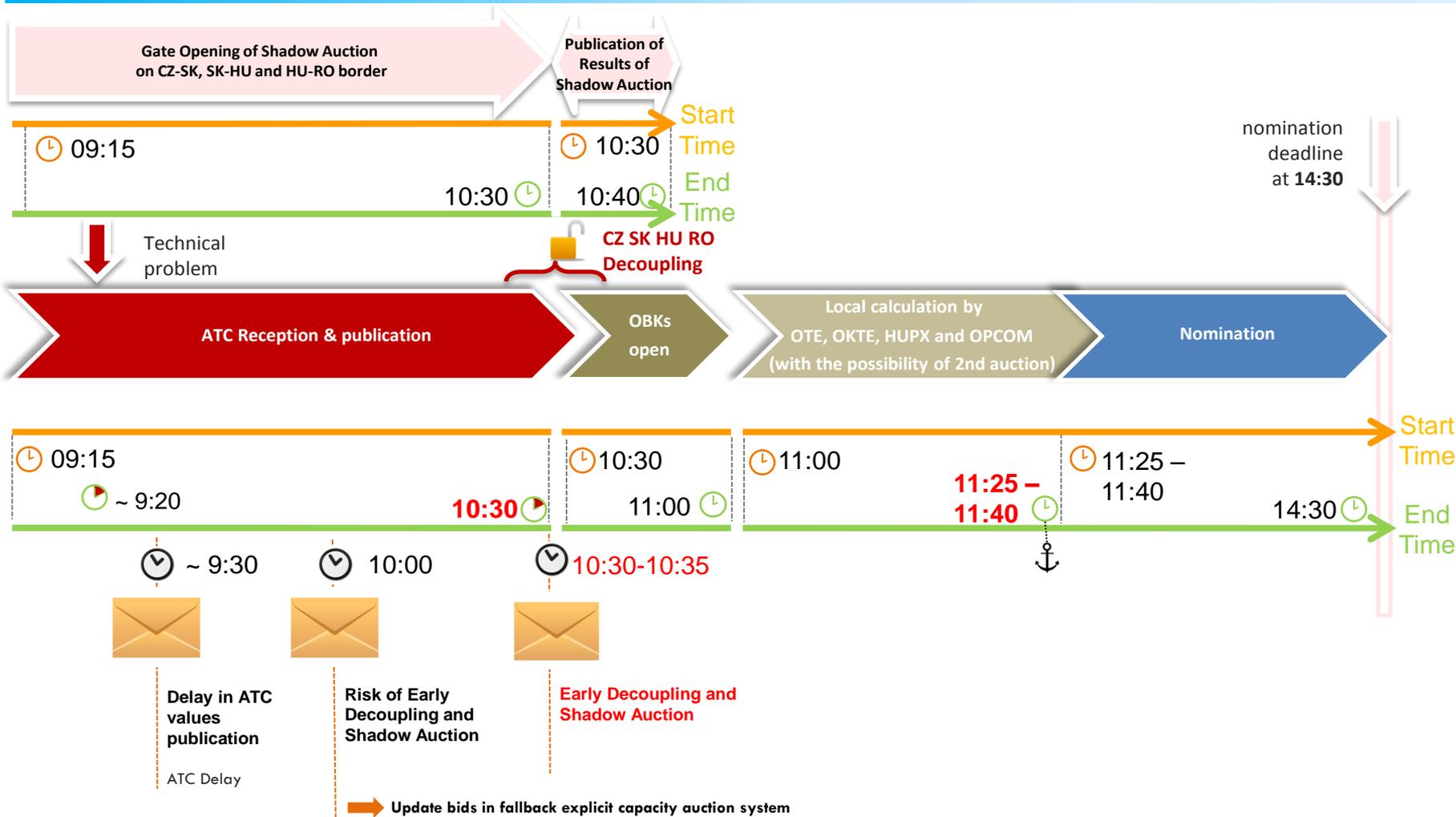
CZ, SK, HU and RO are decoupled. Local calculations will be run separately by HUPX, OKTE, OTE and OPCOM for the four markets.

As a consequence of the CZ-SK-HU-RO decoupling, the CZ-SK-HU-RO order books will be reopen as soon as technically possible (latest 12:45) and finally close at 13:05. For more information please follow the local auction rules of each PX.

ATCs for SK-HU border, CZ-SK border and HU-RO border will be allocated explicitly via Shadow Auction. Please refer to MAVIR (KAPAR system) the website of MAVIR for SK-HU border and HU-RO border and/or ČEPS (DAMAS Platform) for CZ-SK border to get the results of the Shadow Auction, which are available as soon as possible (latest at 12:45).

Early Decoupling

Fall-back mode



Early Decoupling

Fall-back mode

Timing	Message	Additional actions for MPs	Market results Publication	Nomination Deadline
~ 9:30	Delay in ATC values publication: ATC Delay			14:30
10:00	Risk of Early Decoupling and Shadow Auction	Bids update in Shadow Auction system		14:30
10:30 – 10:35	Early Decoupling and Shadow Auction	Bids update in trading system of PXs	11:25 – 11:40 (or sooner, if results are available)	14:30

Early Decoupling

Fall-back mode

Example Message „Early Decoupling and Shadow Auction“:

Early Decoupling and Shadow Auction

Due to severe issues in market coupling/ATC cycle process, the entire price coupled area CZ-SK-HU-RO MC will remain fully decoupled for delivery day DD.MM.YYYY.

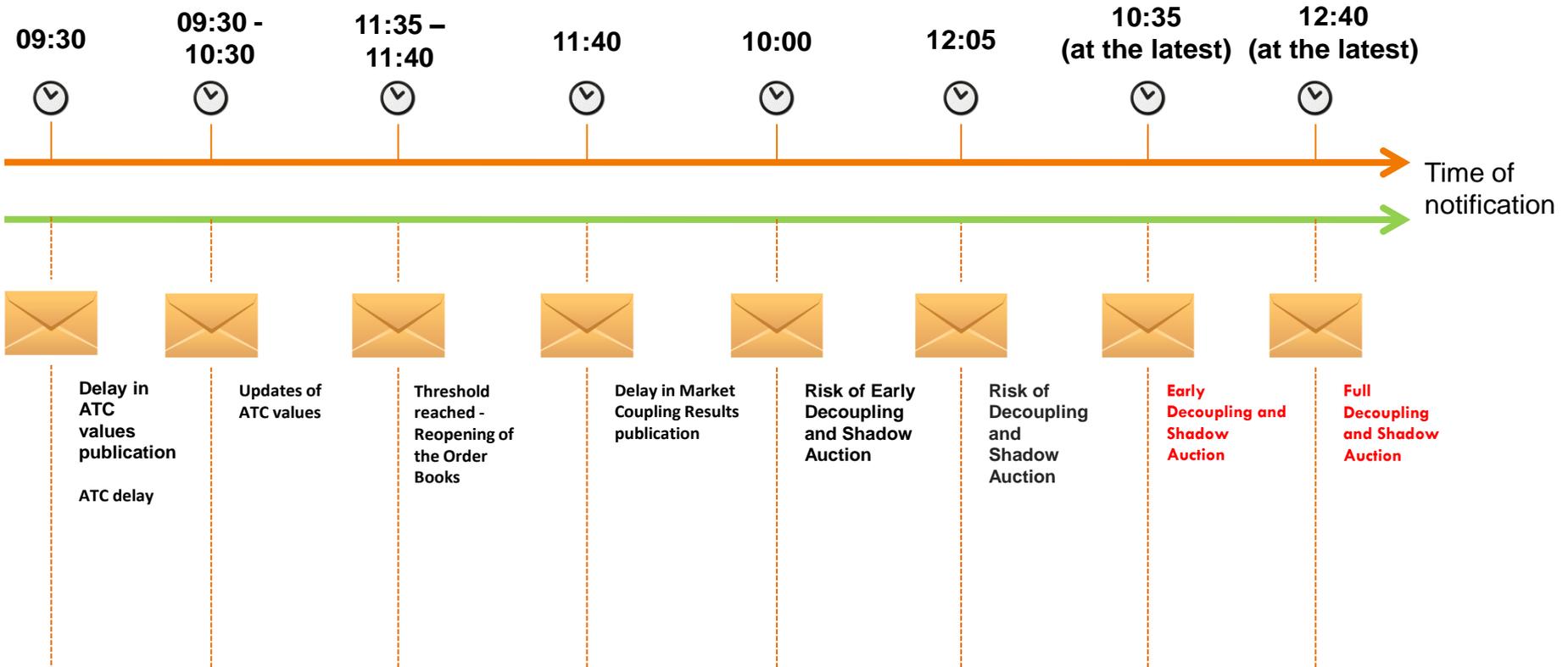
Local calculations will be run separately by OTE, OKTE, HUPX and OPCOM for the four markets.

Please be aware that order books of OTE, OKTE, HUPX and OPCOM will close as usual at 11:00. For more information please follow the local auction rules of each PX.

ATCs for CZ-SK border, SK-HU border and HU-RO border will be allocated explicitly via Shadow Auction. Please refer to ČEPS (DAMAS platform) for CZ-SK border and/or MAVIR (KAPAR system) for SK-HU border and HU-RO border to get the results of the Shadow Auction which are available as soon as possible (latest at 10:40).

Communication

before Fall-back



Legend

	Start time of one step
 	End time of one step End time of one publishing step (ATC or final results) End time of the delayed step
 	Counting of the delay for a publishing step (red = delayed, green = undelayed)
 	Time of the communication Object of the communication
	Full CZ-SK-HU-RO decoupling
	Defective step

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Member test phase and launch date

- The internal integration test is ongoing currently.
- After the internal integration test shall be successfully finished the full integration test together the PXs' Members will be conducted.
- The test period planned to be between **13/10/2014-24/10/2014**
- The exact timing of the Member test will be distributed shortly before the start of the member test phase.
- Members could participate through only those PXs where they are registered members.
- Acceptance Tests shortly before go live.
- The Launching Date is planned to be 11 November 2014 subject to successfully performed Member&Acceptance tests and final regulatory approval.

Contacts

Company	Role	Contact person	E-mail
OTE	CZ PX	Ondrej Maca	4M-MC@ote-cr.cz
OKTE	SK PX	Juraj Sedivy	okte@okte.sk
HUPX	HU PX	Dóra Mizsik	mizsik@hupx.hu
OPCOM	RO PX	Cristina Setran	cristina.setran@opcom.ro
CEPS	CZ TSO	Martin Palkovsky	palkovsky@ceps.cz
SEPS	SK TSO	Mario Turcik	mario.turcik@sepsas.sk
MAVIR	HU TSO	Réka Sárközi	sarkozir@mavir.hu
Transelectrica	RO TSO	Mircea Anton	mircea.anton@transelectrica.ro
ERU	CZ NRA	Pavel Círek	eru@eru.cz
URSO	SK NRA	Nataša Hudcovičová	hudcovicova@urso.gov.sk
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Agenda

I. Czech-Slovak-Hungarian-Romanian Common Parts

1. Market Coupling Theory and Practice
2. Where do we come from
3. Operational overview
4. Detailed Procedures and Timings with MPs Communication
5. Decoupling and Fallback Solutions
6. Member test phase and launch dates
7. Contacts

II. Further Information on the Czech Market – New types of orders on OTE day-ahead market