Dry Run of Coordinated Flow Based Capacity Allocation in SEE – Latest Developments

Joint meeting of SETSO NACMPF SG, Balance Management SG and EFET TF SEE

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Background

- **Treaty on Energy Community sets aim of creating an international electricity market in South East Europe (SEE) in accordance with EU legal framework**
- **Among other tasks, establishing non-discriminatory, efficient and market-based procedures for cross-border congestion management (CM) is of high importance for achieving this aim**
- **TSOs put forward Flow Based Coordinated Explicit Auctions (FBCA) as best suited CM approach for SEE**
- **In 2006, Dry Run was started: simulation of FBCA on monthly basis**
- **Purpose of Dry Run: Transparency, experience, training**
  - Make development of advanced congestion management method transparent
  - Simulate technical procedures of Flow Based Coordinated Auctions
  - Allow TSOs and market participants to gain experience with method
  - Analyse influencing factors on allocation results

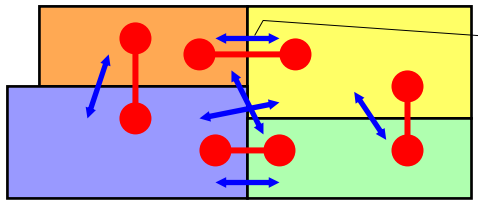
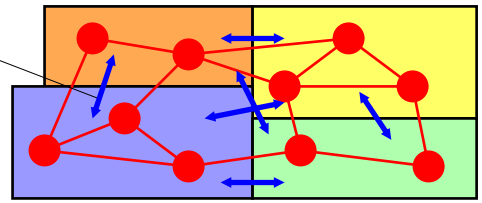
Latest developments of Dry Run

- **Extended geographical scope**
  - In 2007 HEP-TSO (HR) joined as active participant (i.e. HR as simulated market area)
  - FBCA now simulated among 9 TSOs
    - OST (AL), NOS BiH (BA), ESO (BG), HTSO (GR), HEP-TSO (HR), TSO-EPCG (ME), MEPSO (MK), TEL (RO), EMS (RS)
  - plus neighbouring TSOs in network models (APG [AT], ELES [SI], MAVIR [HU]) or as simulator of Auction Office (TEIAS [TR])
  - Further extension depends on decision on official perimeter of SEE region
- **Extended frequency of data preparation**
  - Each month, one monthly and one daily auction are simulated
  - Network models now updated prior to each auction round
    - Consider forecast evolution between monthly and daily stages
    - Aim: Achieve as realistic data quality as possible
- **Advanced concept of flow based capacity model: "MF approach"**
  - Replaced former "BC approach" at beginning of 2008
  - Further details on following slides

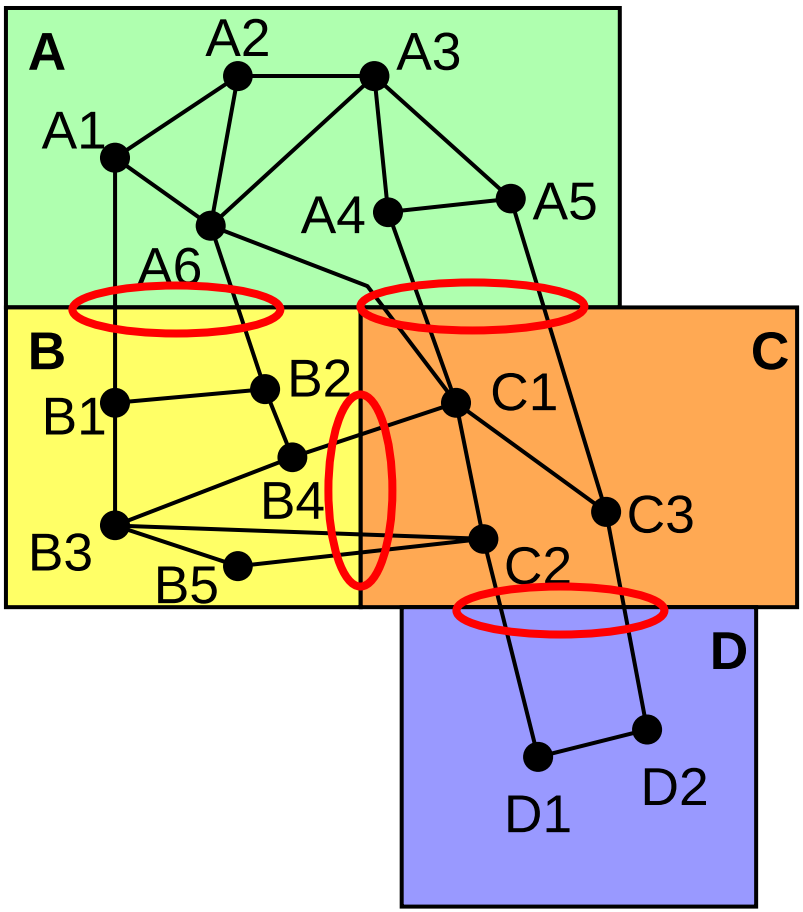
Capacity model for flow-based allocation: Different solutions are possible

Common features of capacity models for flow-based allocation

- Transmission rights are transformed to flows (by PTDF factors)
- Allocation is restricted by flows (not by amount of exchange)
- Amount of transmission rights between two areas is result of the allocation

Differences	Border Capacity (BC)	Maximum Flow (MF)
Constraints	 Allocation is constrained by the flow on tie lines, aggregated per border	 Allocation is constrained by the flow on individual lines/transformers
Structure	Two constraints per border (one per direction)	Two constraints per critical branch and topology
Consideration of network security	Most critical outage topology for each border is estimated at time of capacity calculation. Details are only known to single TSO.	All potentially critical outage topologies are contained in the model. Most critical one is determined at time of allocation.

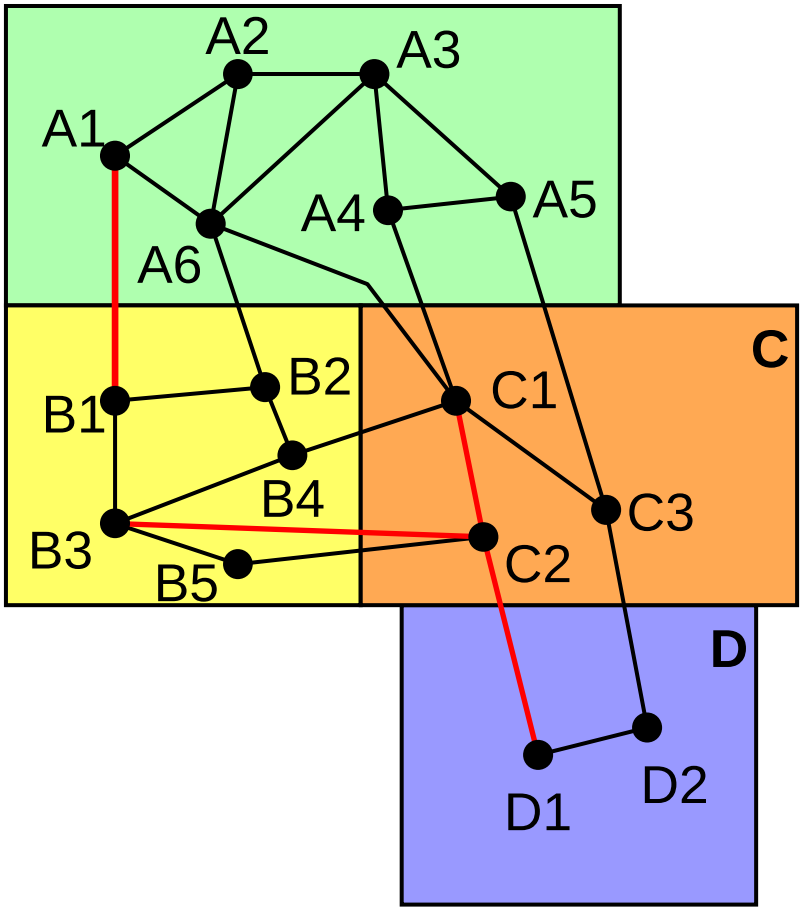
Model structure: BC (border capacity)



border	ABC+ [MW]	ABC- [MW]	PTDF [%]		
			A→B	A→C	A→D
A→B					
A→C					
B→C					
C→D					

ABC: Available Border Capacity

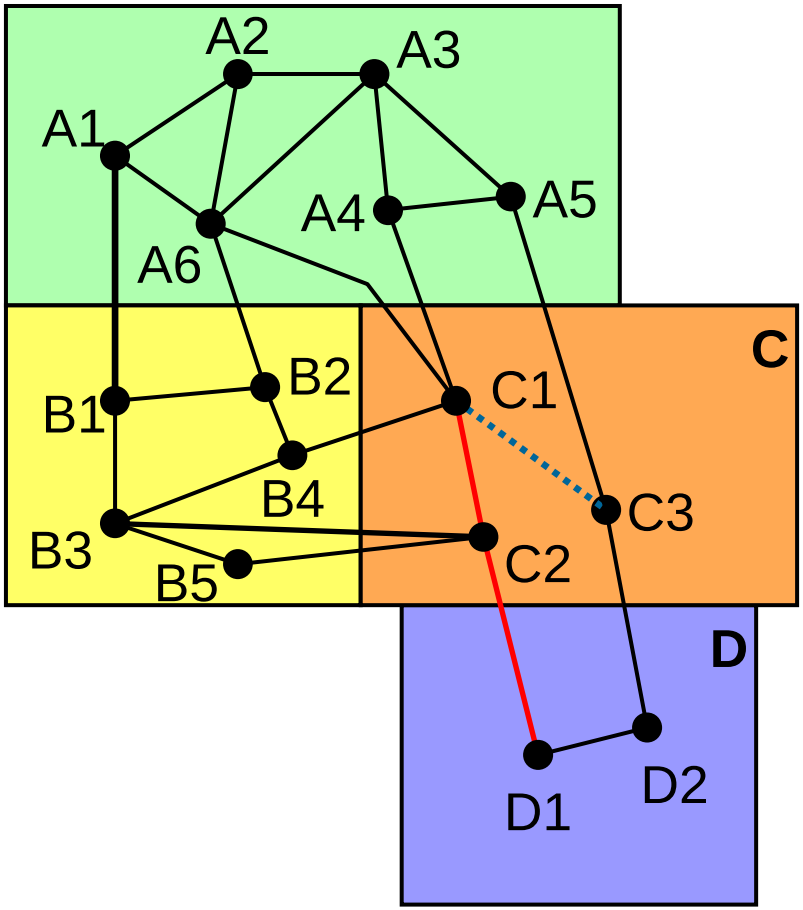
Model structure: MF (maximum flow)



critical branch	critical outage	AMF+ [MW]	AMF- [MW]	PTDF [%]		
				A→B	A→C	A→D
A1→B1	A1→A2					
	A2→A6					
	A6→B2					
B3→C2	B3→B5					
	B5→C2					
	B4→C1					
C2→D1	D1→D2					
	C3→D2					
	C1→C3					
C1→C2	C2→D1					
	C3→D2					
	C1→C3					

AMF: Available Maximum Flow

MF model: Each potentially critical topology is explicitly considered



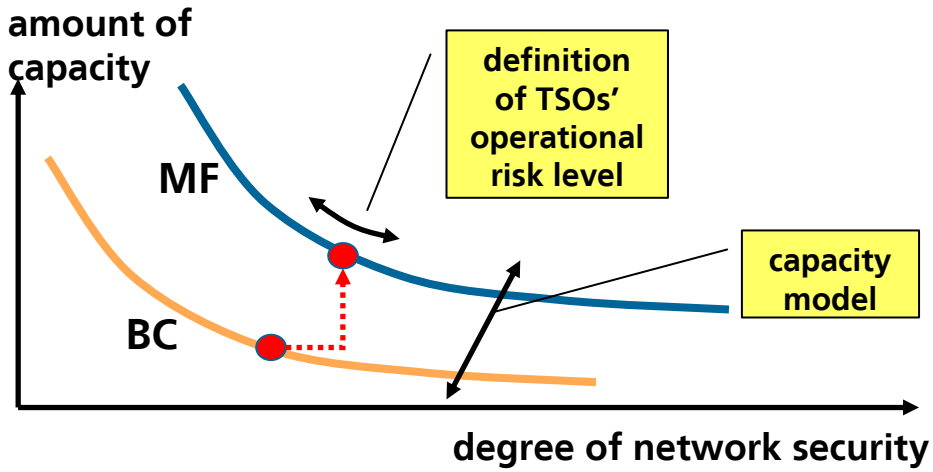
critical branch	critical outage	AMF+ [MW]	AMF- [MW]	PTDF [%]		
				A→B	A→C	A→D
A1→B1	A1→A2					
	A2→A6					
	A6→B2					
B3→C2	B3→B5					
	B5→C2					
	B4→C1					
C2→D1	D1→D2					
	C3→D2					
	C1→C3	267	-193	-14%	-6%	70%
C1→C2	C2→D1					
	C3→D2					
	C1→C3	115	-412	38%	-20%	45%

Discussion: BC versus MF

- **BC and MF approaches share many properties**
  - Structure of capacity products offered to the market
  - Numerical complexity of allocation procedure (linear programming)
  - Several assumptions/difficulties, e.g.:
    - Forecast of generation dispatch within market areas
    - Forecast of base case topology
    - Assessment of uncertainties / reliability margins
- **MF approach overcomes some weak points of BC approach**
  - See details on next slide
- **MF approach pursued in other European regions as well**
- **MF approach is an evolution from the BC approach**

Main advantages of MF approach compared to BC

- **Increased model accuracy**
  - Allows better trade-off between operational risk and capacity amount (same capacity → lower risk, same risk→ higher capacity)
- **Elimination of subjective elements**
  - Less dependency on market situation assumed in network models (avoids chicken-and-egg problem)



- **Formalisation of calculations**
  - Clear algorithm and parameters to derive AMF from common network models
  - Improved transparency, objectivity, auditability
  - Visible sign:
    Common software for PTDF/AMF calculation (developed by EKC) is used by all TSOs participating in Dry Run

Thank you for your attention!

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