



# Model Parts and Assembly

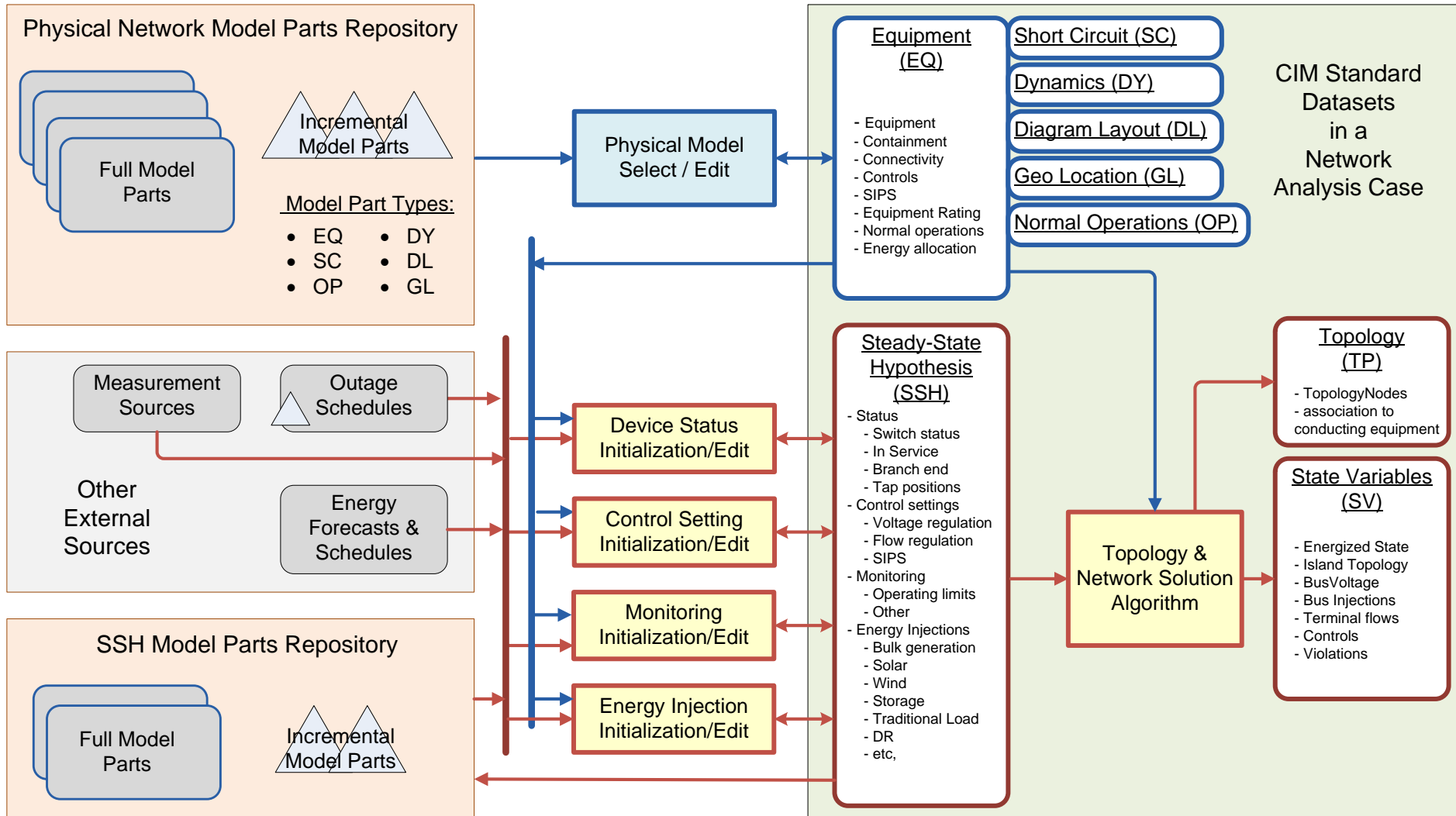
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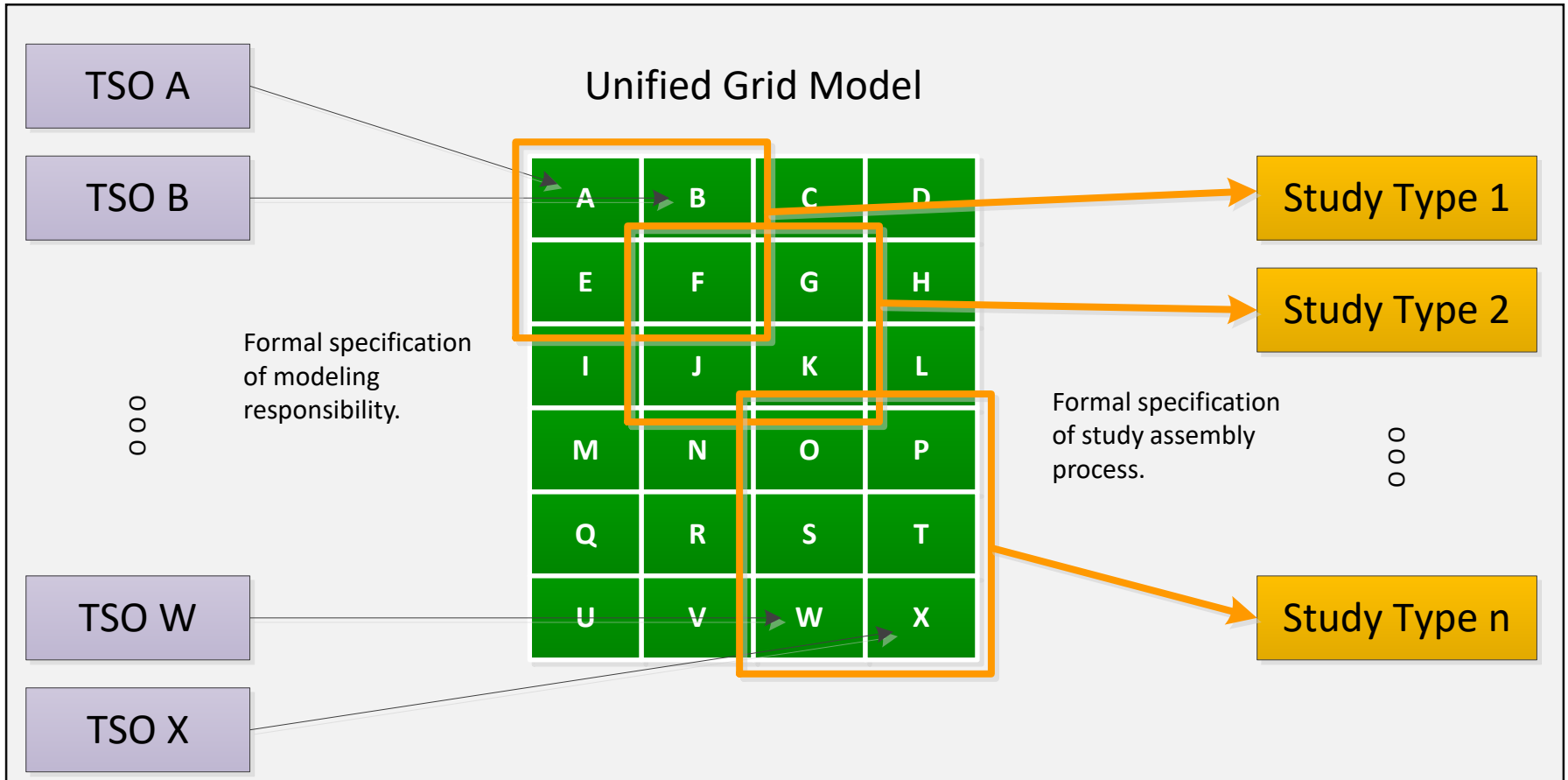


# WG13 Ref Model for a Network Analysis Case



# The Goal: Many Cases from Common Parts

Model parts are maintained once ...



... and used in many different study case assemblies.

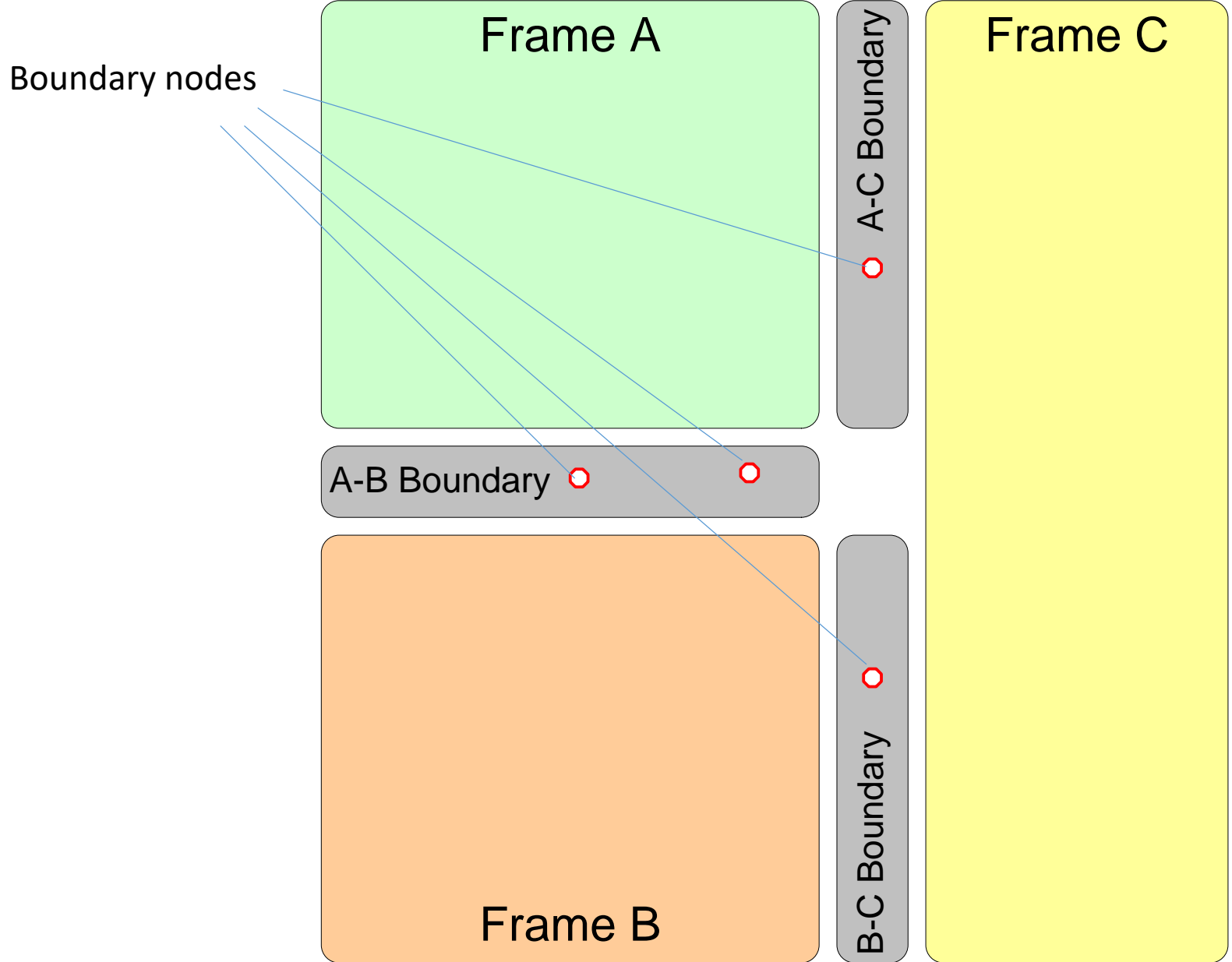
A '**Model Part**' is a set of CIM data that can be composed with other model parts to create a complete model.

- There can be any number of instances (versions) of a given model part.
  - Versions are often used to track the 'as-built' state of the network as the network evolves over time.
- A model part has a 'model part specification'. This describes:
  - Model part name
  - Model part relationship to a framework part
  - Model part data type – i.e. information model
  - Model authority – who is responsible for the content?
  - Model part location – e.g. is it in the ENTSO-E repository, my local repository, or ... ?

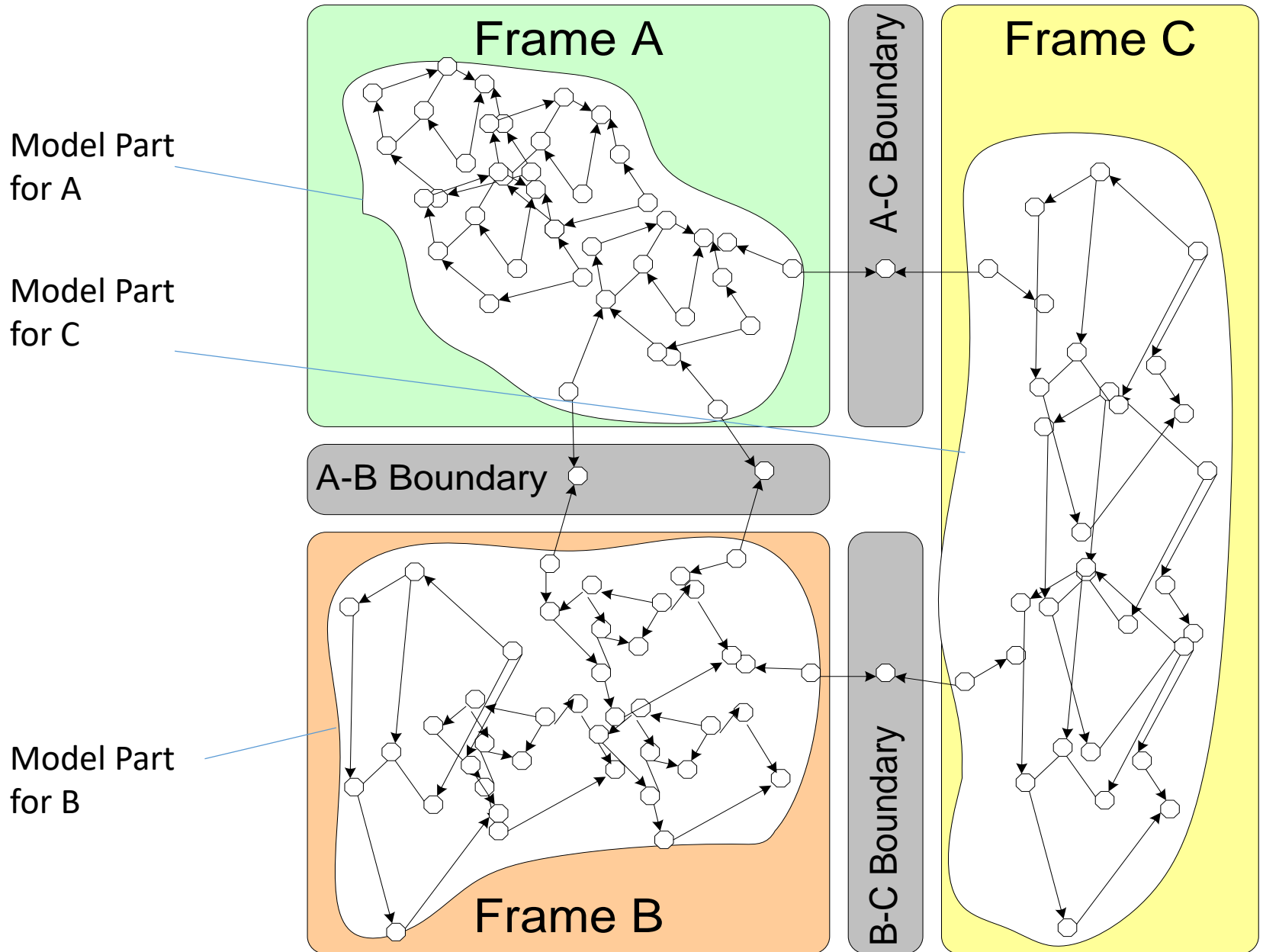
A '**Framework**' is a set of Framework Parts that define how Model Parts fit together.

- Two main kinds of Framework Parts:
  - **Frames** define the regions (like TSOs) that are the responsibility of one model authority.
  - **Boundaries** define the set of objects that the model authorities of two adjacent frames agree to maintain in common.

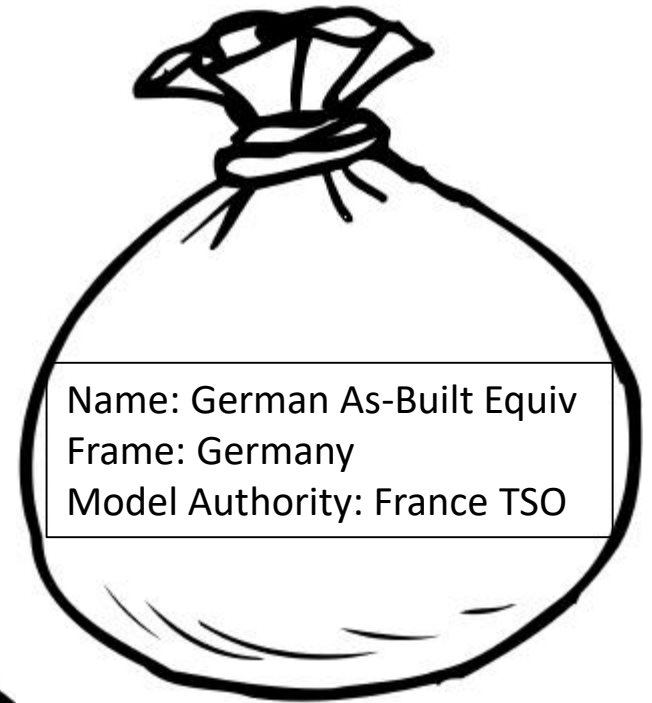
# Framework



# Framework

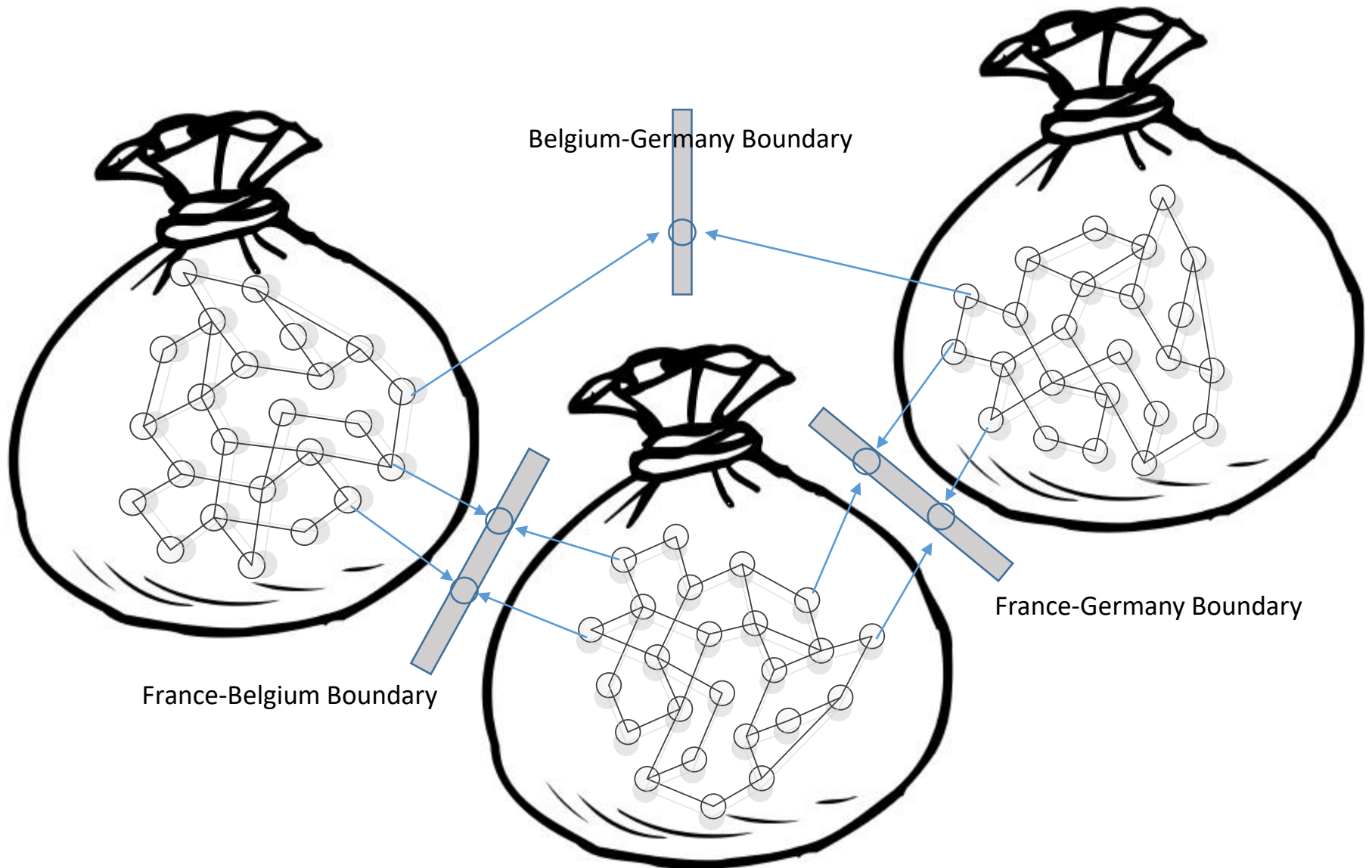


# Model Part Envelope Information





# Model Part Content



# Assembling Model Parts

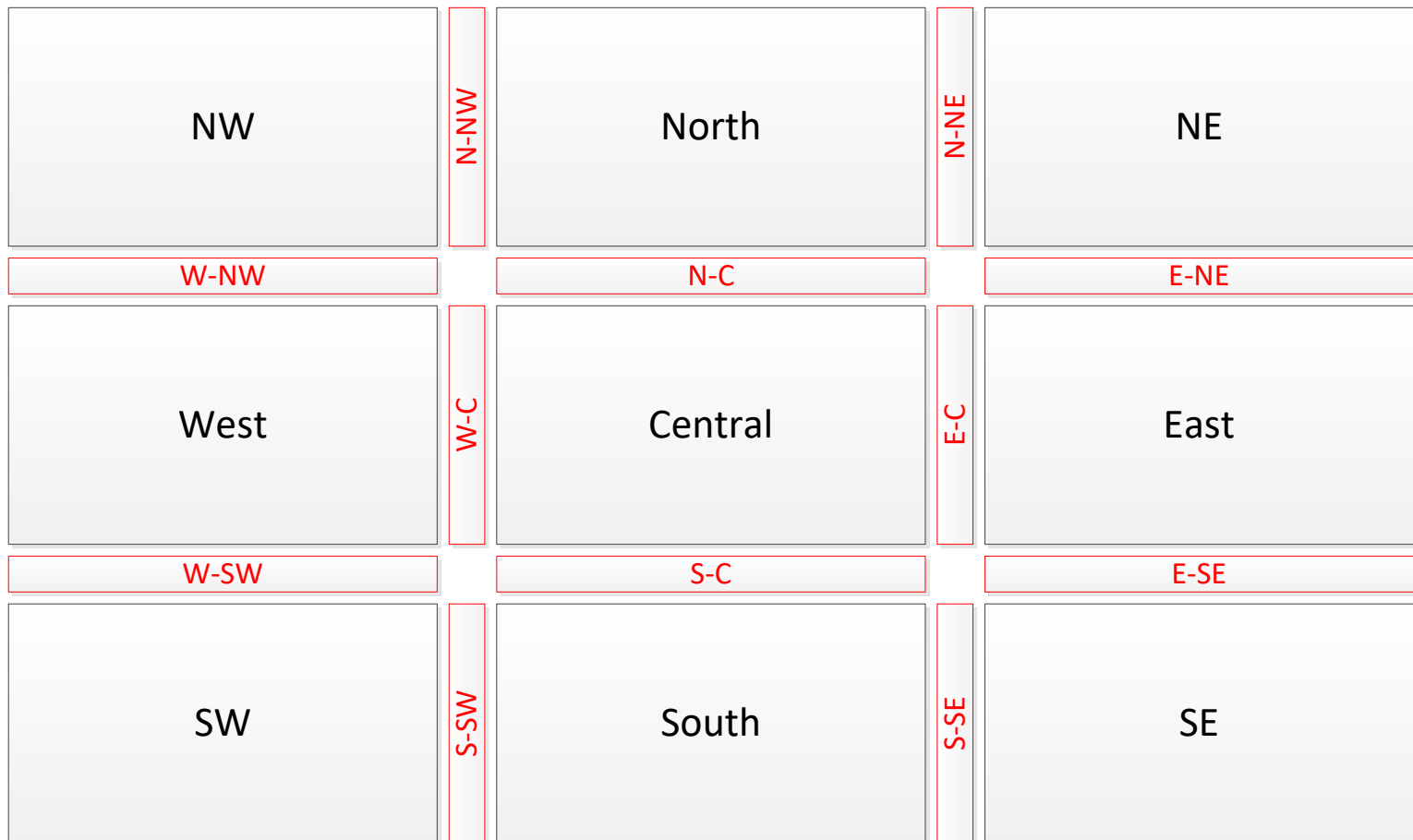
- Dump selected model part bags onto the magic table – i.e. a workspace.
  - The dangling references resolve.
- Dump in selected incremental model parts.
  - The dangling references resolve.
- When all dangling references resolve, you have a complete case.

# Incremental Model Parts

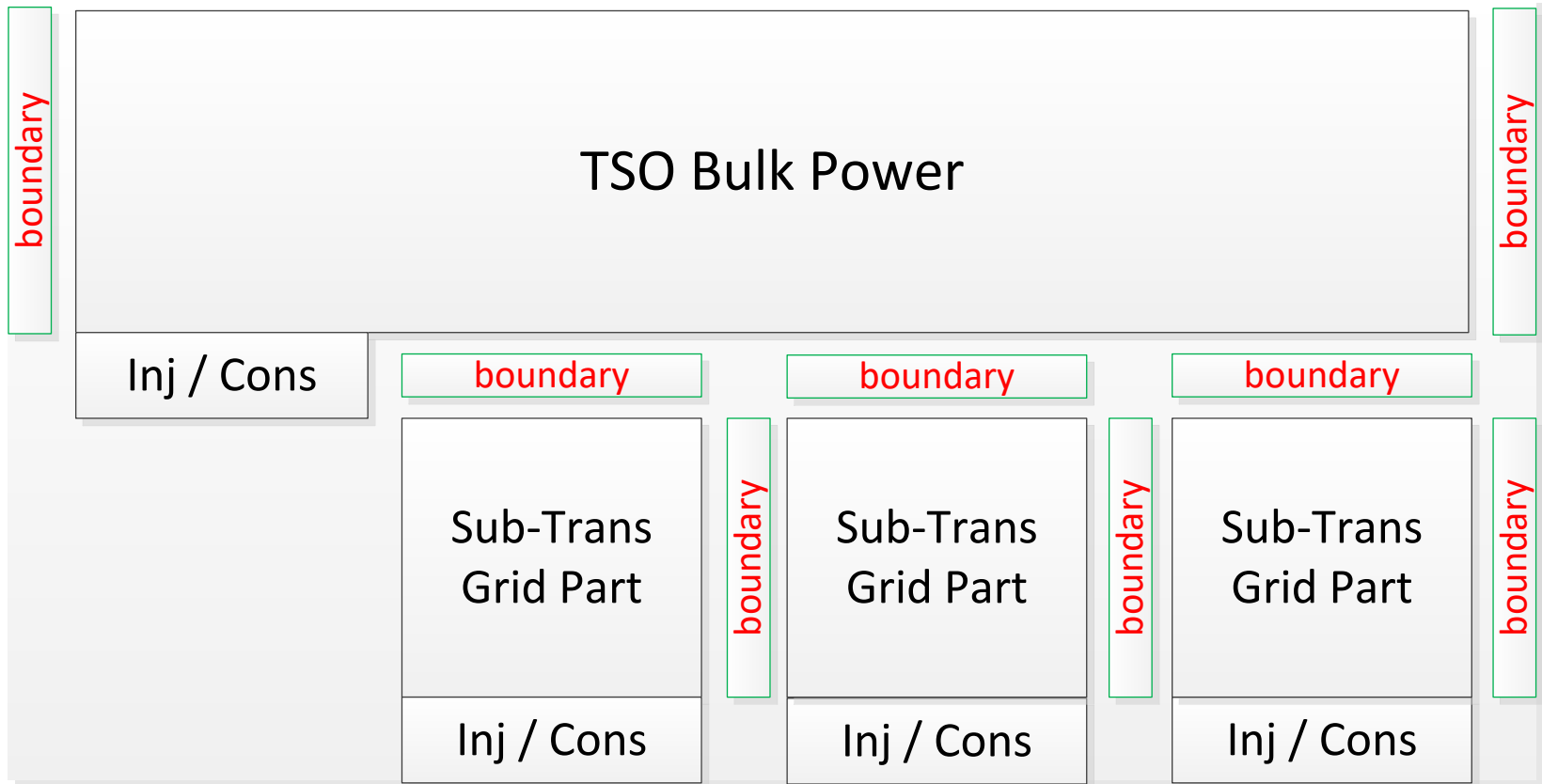
- Similar to Model Parts
  - They have a type
  - They have both envelope and content data.
- Different from Model Parts
  - They express a change to a model part:
    - Creation of objects
    - Deletion of objects
    - Modification of objects
  - External references point to the modified objects.
- Used to represent planned new construction projects, for example

# An interconnection framework example:

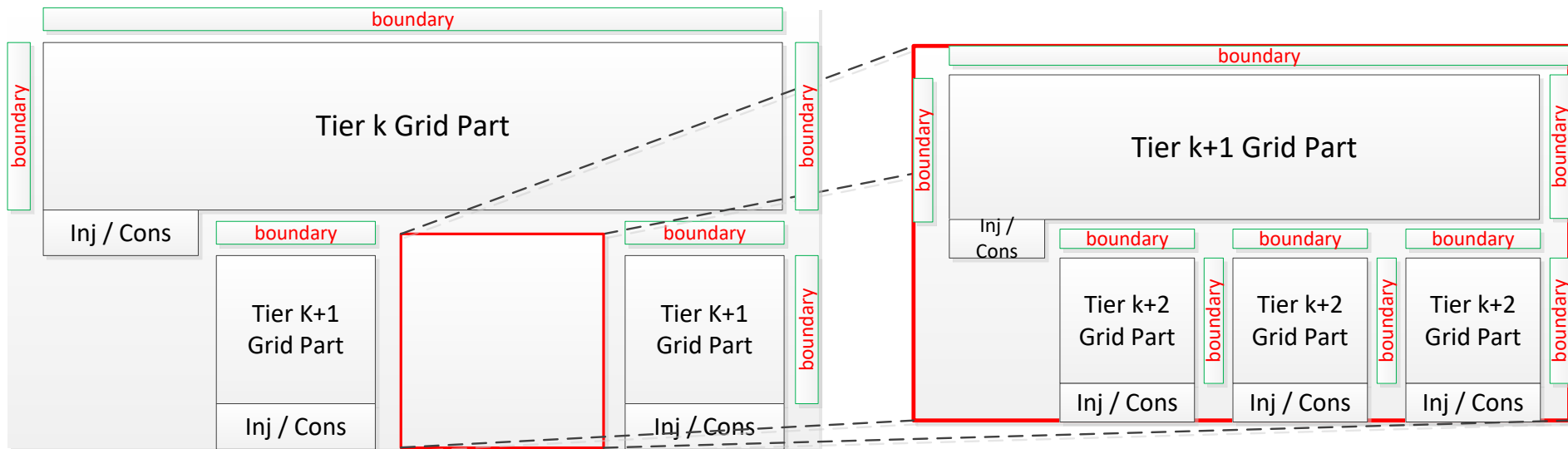
9 TSO frame parts  
12 boundary parts



Each TSO framework part can be further decomposed into other parts.



Decomposition can be continued to any number of lower voltage levels.



An '**Assembly**' is a collection of model parts that compose to form a complete model for some purpose.

- An **Assembly Procedure** describes how to assemble a model.
- An **Assembly Audit Trail** describes the how a model was assembled.

# North Study 1: What TSO Frames to include?

NW

North

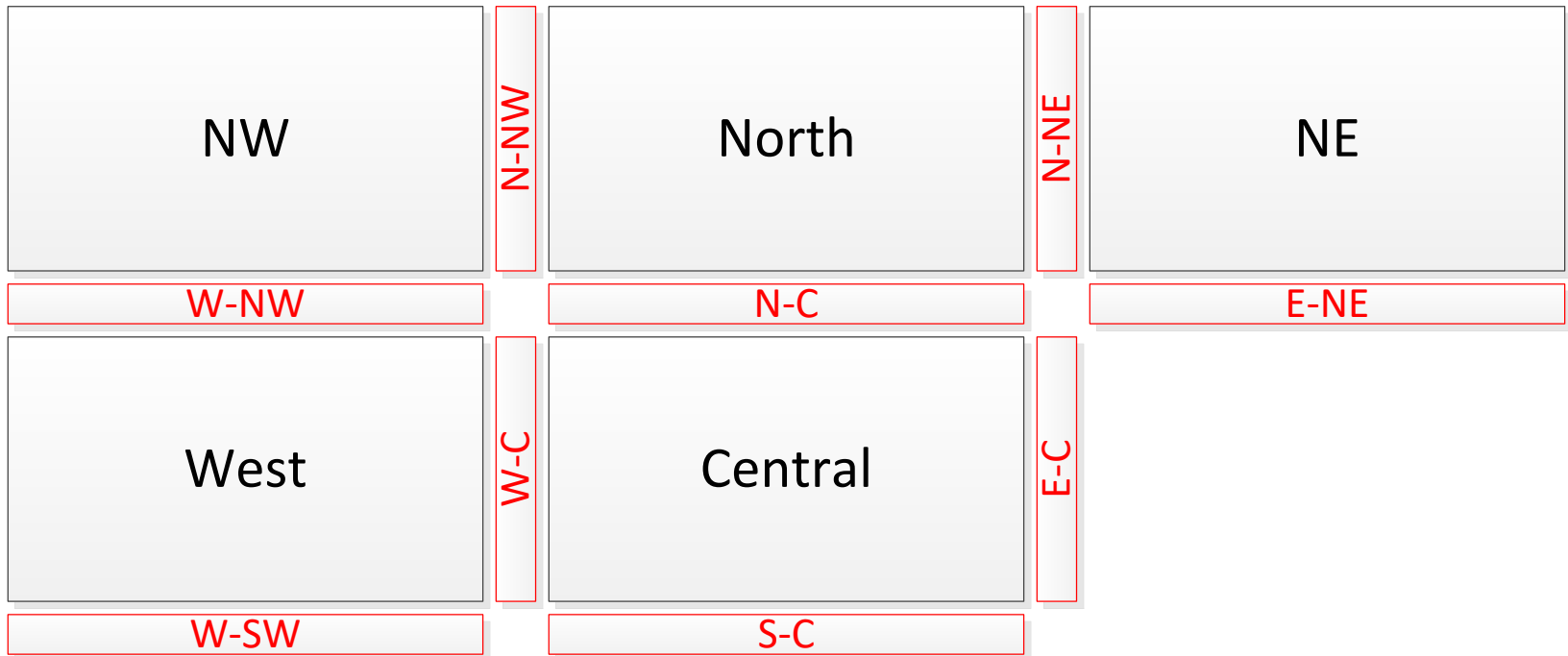
NE

West

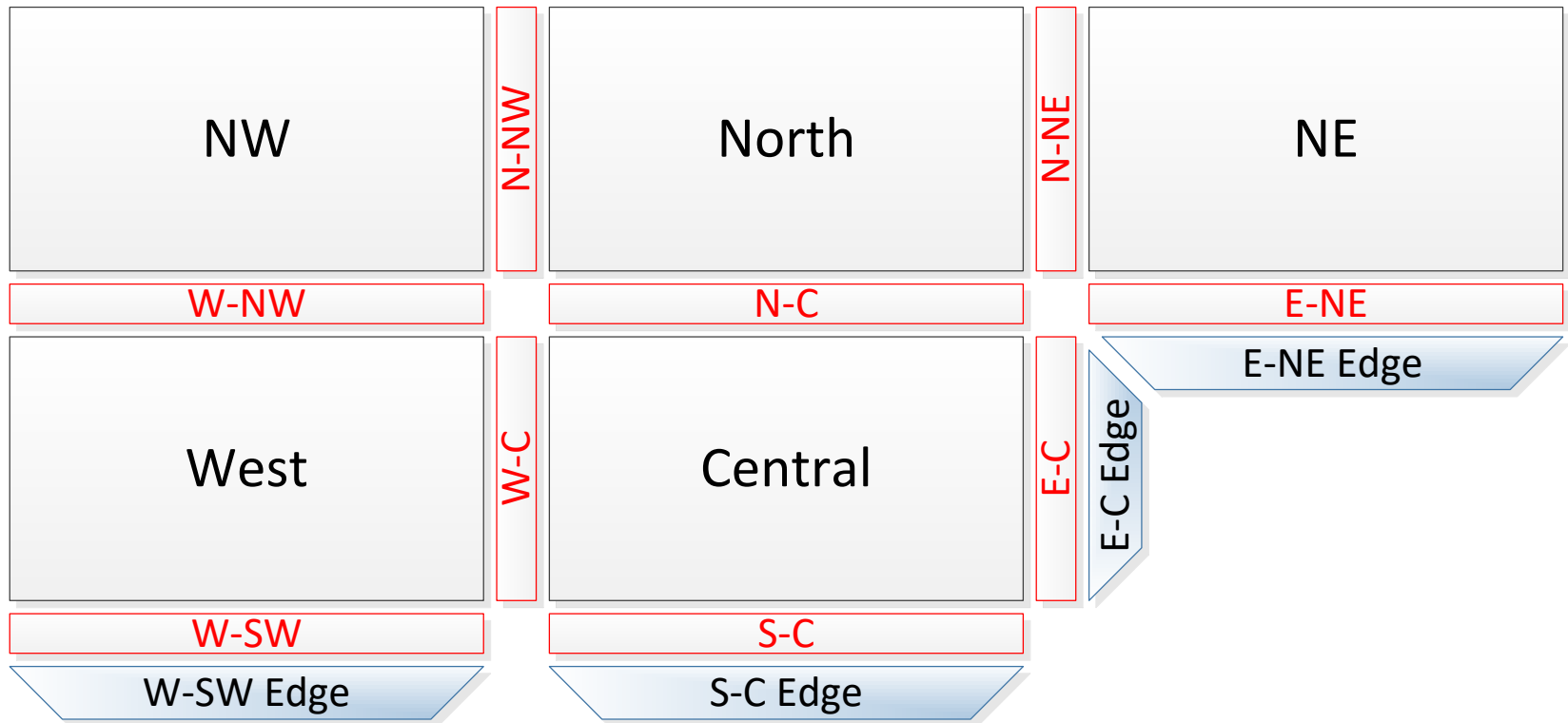
Central



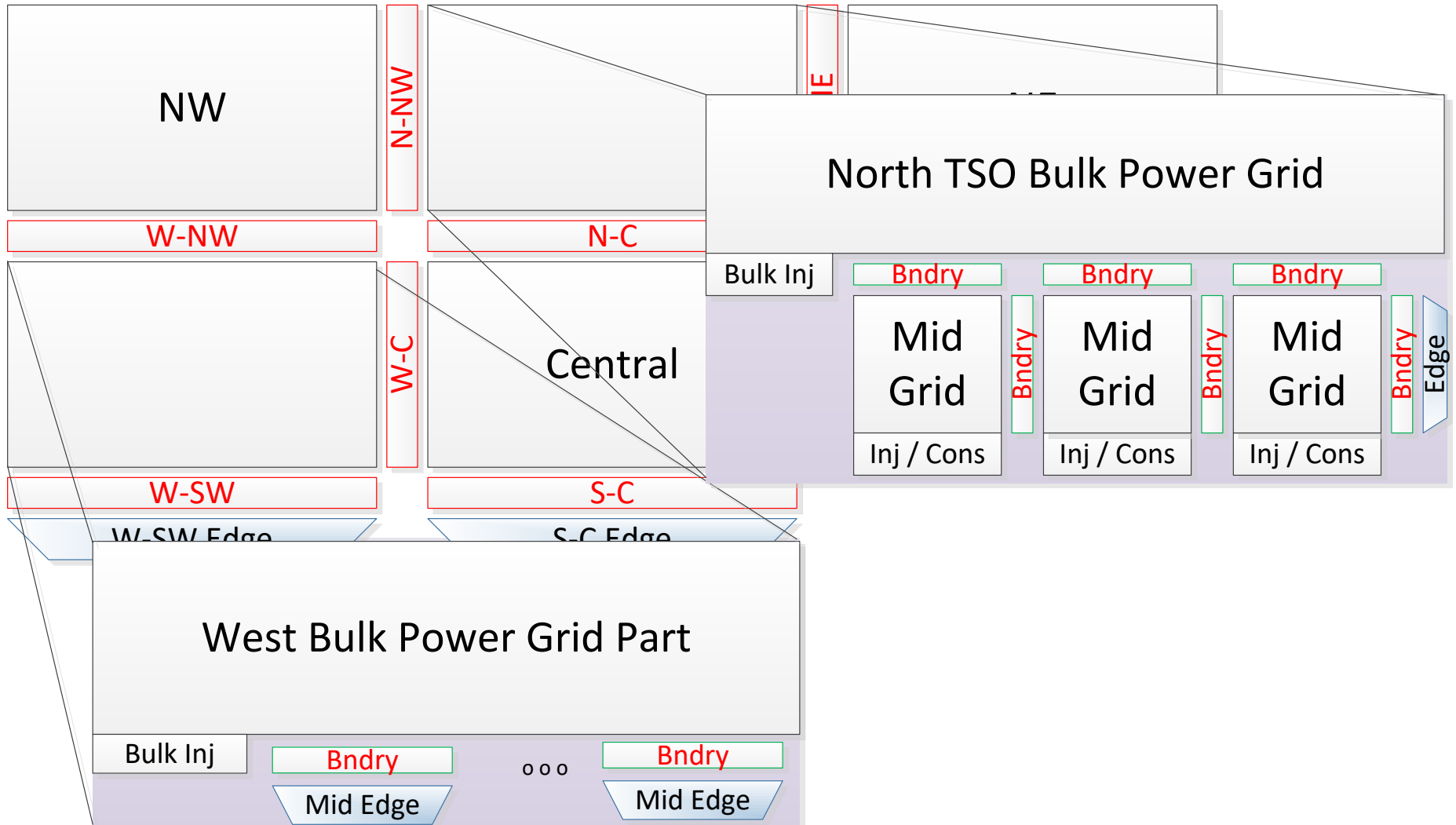
# North Study 2: Add Boundaries for the required Frames.



# North Study 3: Add Edge Parts to represent interchange with un-modeled parts.

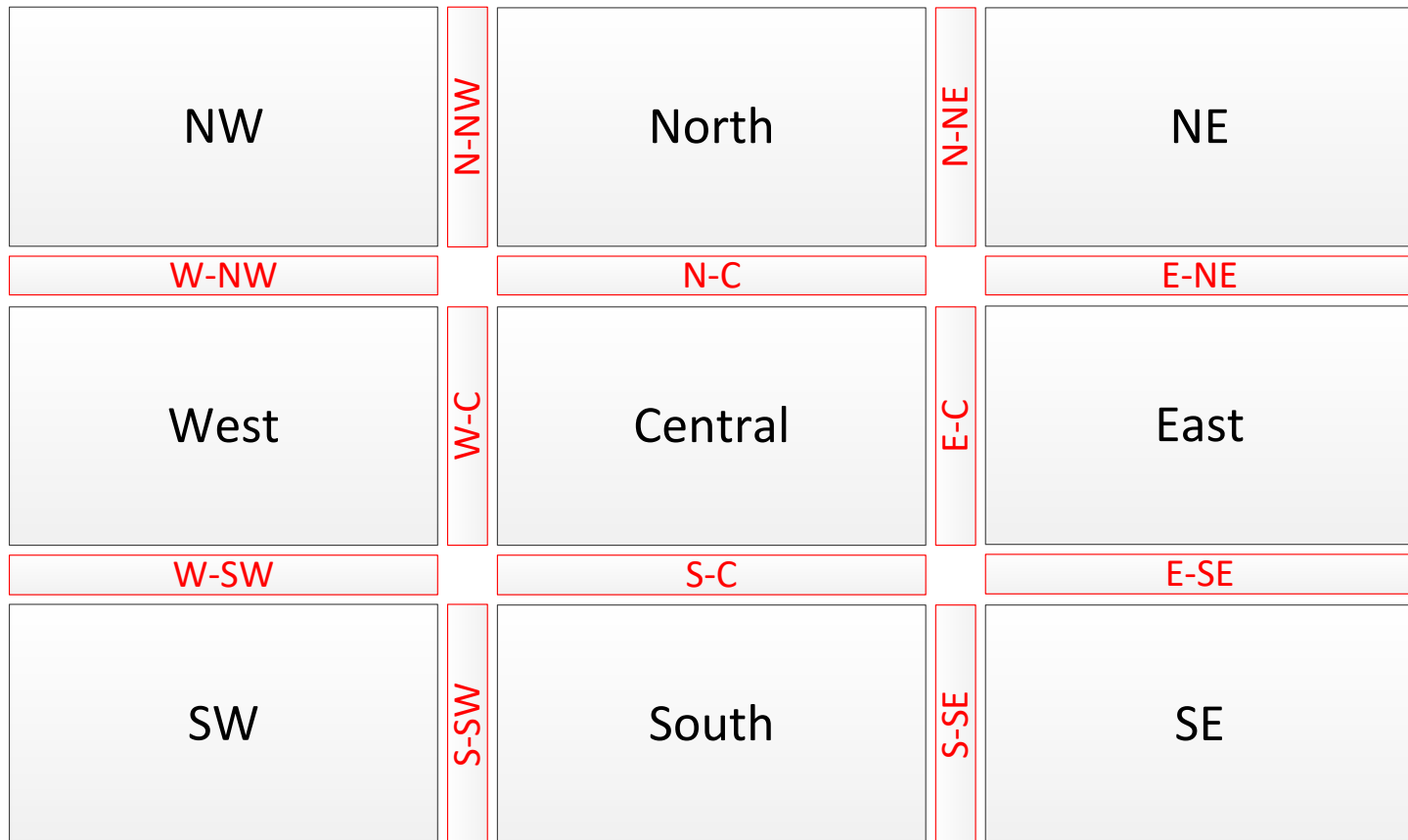


# North Study 4: Select detail for TSO Frames.



# Interconnection Base Case from Member Cases

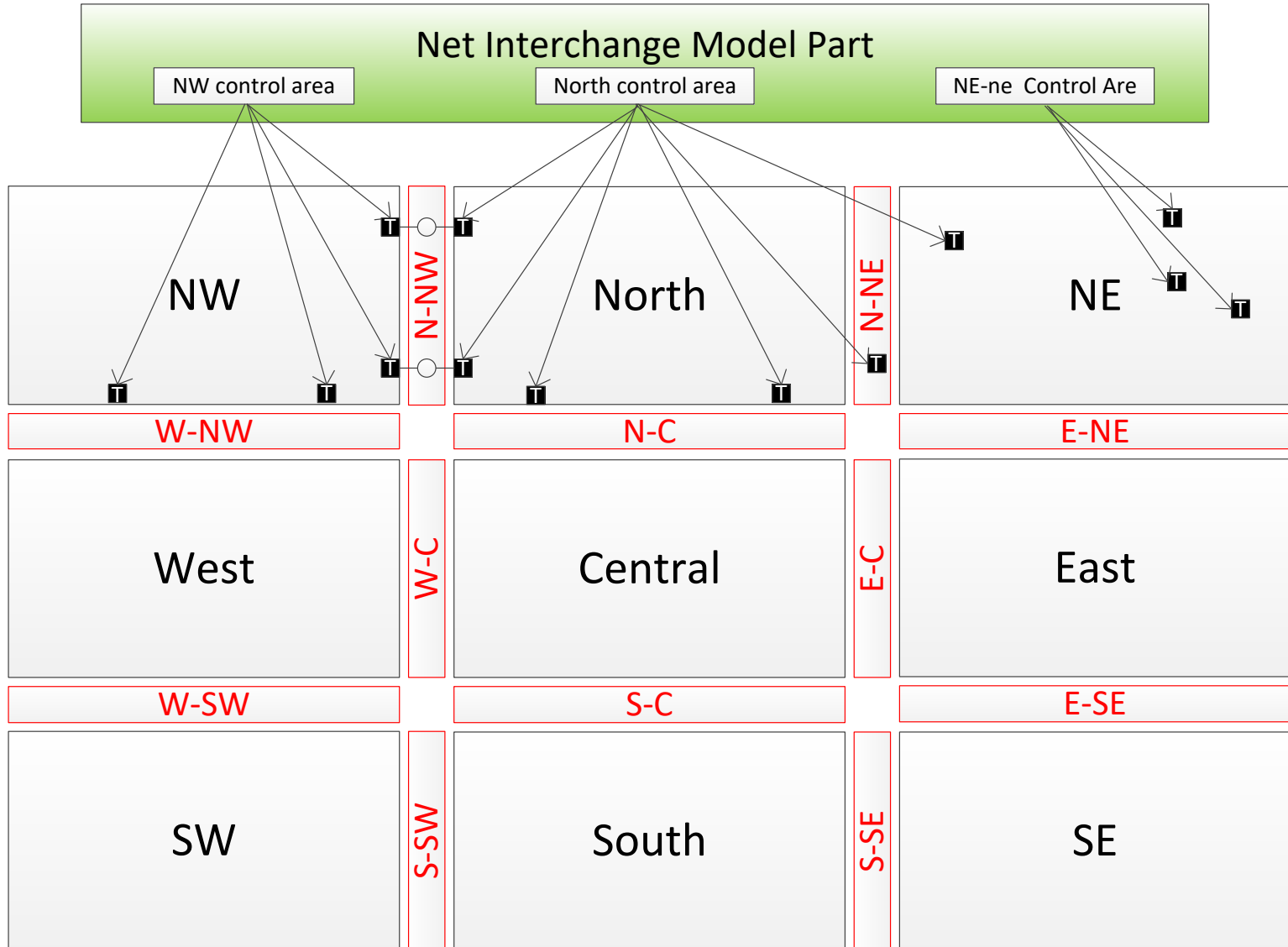
Here's the interconnection framework.



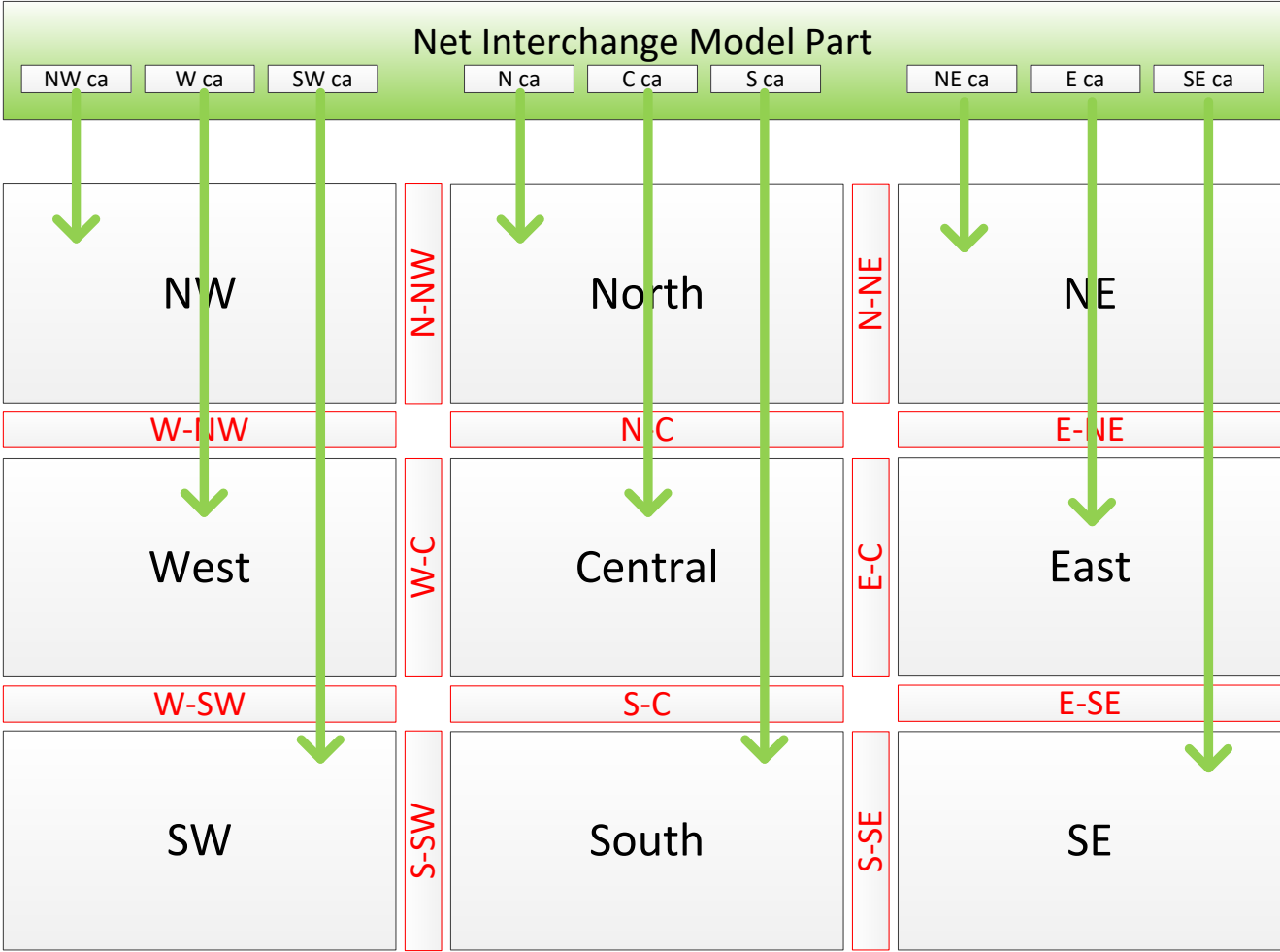
# Process Overview

1. A 'merging authority' initiates a base case process by providing the overall parameters:
  - Date/Time to be represented
  - Area net interchange – for example, derived from market
  - Applicable energy forecasts
    - E.g. area demand
  - Applicable energy schedules
    - E.g. DC ties, generators, etc. – for example, from market
2. Interconnection members prepare cases representing their territory.
3. Merging authority combines the member submissions into a single complete base case.

# Net Interchange Model Part



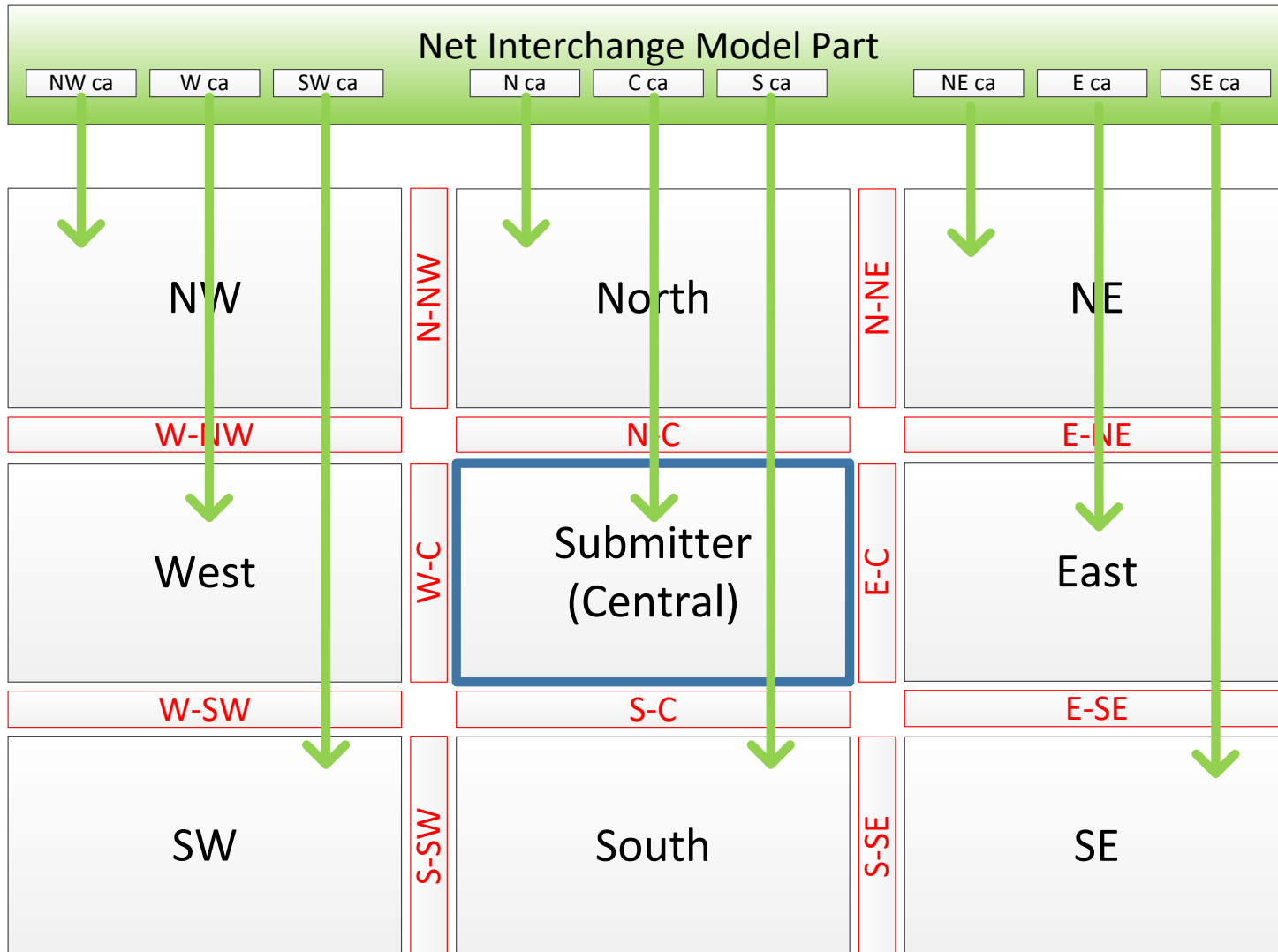
Merging authority supplies net interchange model part along with the boundary parts that define the framework.



Net interchange model part supplied by merge authority. All IGMs can use the same model part.



Submitter prepares case for its territory based on best available knowledge.

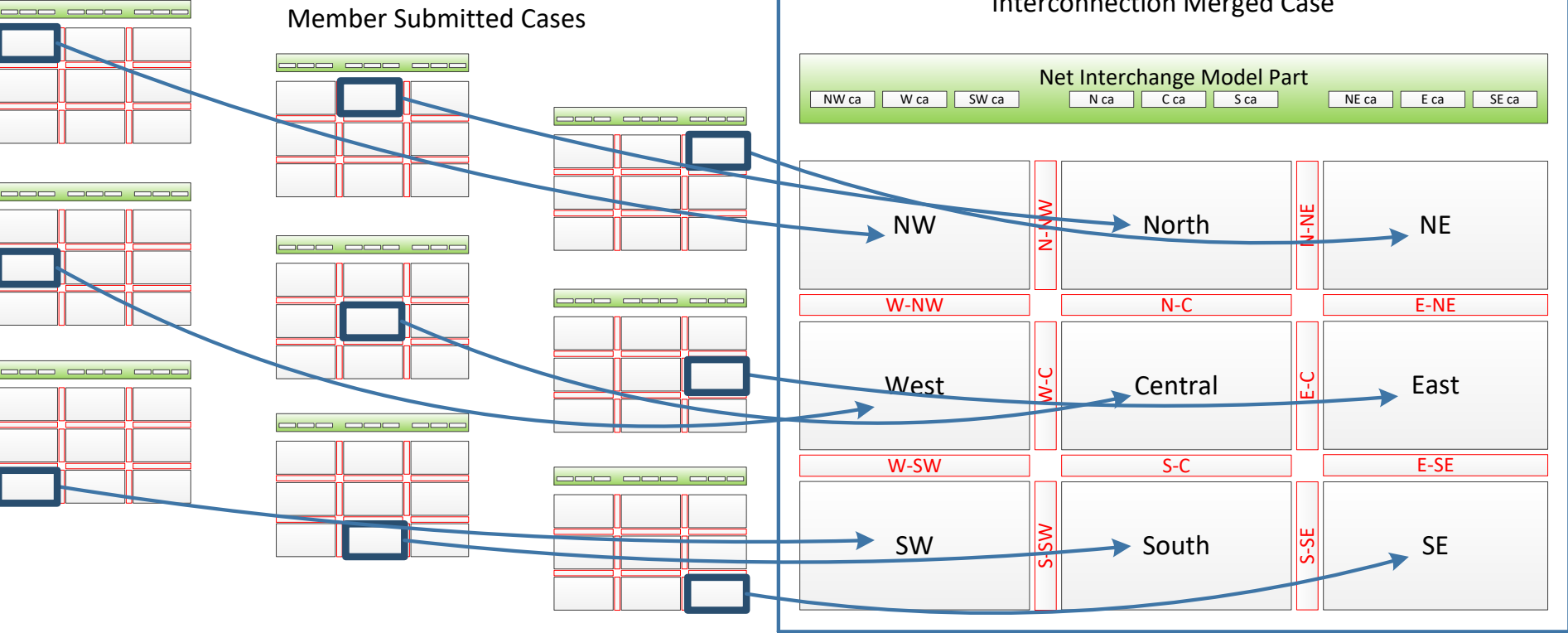


All submitters use the same net interchange model part and the same model scope.

Submitter EQ and SSH prepared by submitter.

Other TSOs are as good as the submitter can get – e.g. from a similar case.

Submitter territories are merged to form merged base case.



# Summary

- Energy exchange is modeled by net interchange constraints.
- The same constraint model part is used at all stages.
- No boundary injections are used.
- Net interchange ties do not have to correspond exactly with MAS boundaries.

