



Network Model Data Management

Convergence of Planning and Operations

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Lars-Ola Österlund

Network Data Model Management, Current State

- **Multiple instance of same data**
 - Operations, sometimes more than one
 - Operational planning, e.g. congestion forecast
 - Long term planning
- **Different models cause problems**
 - Manual entry of same information multiple times
 - Labor intensive - expensive
 - Easy by mistake introduce differences causing errors

Network Data Model Management, Coming

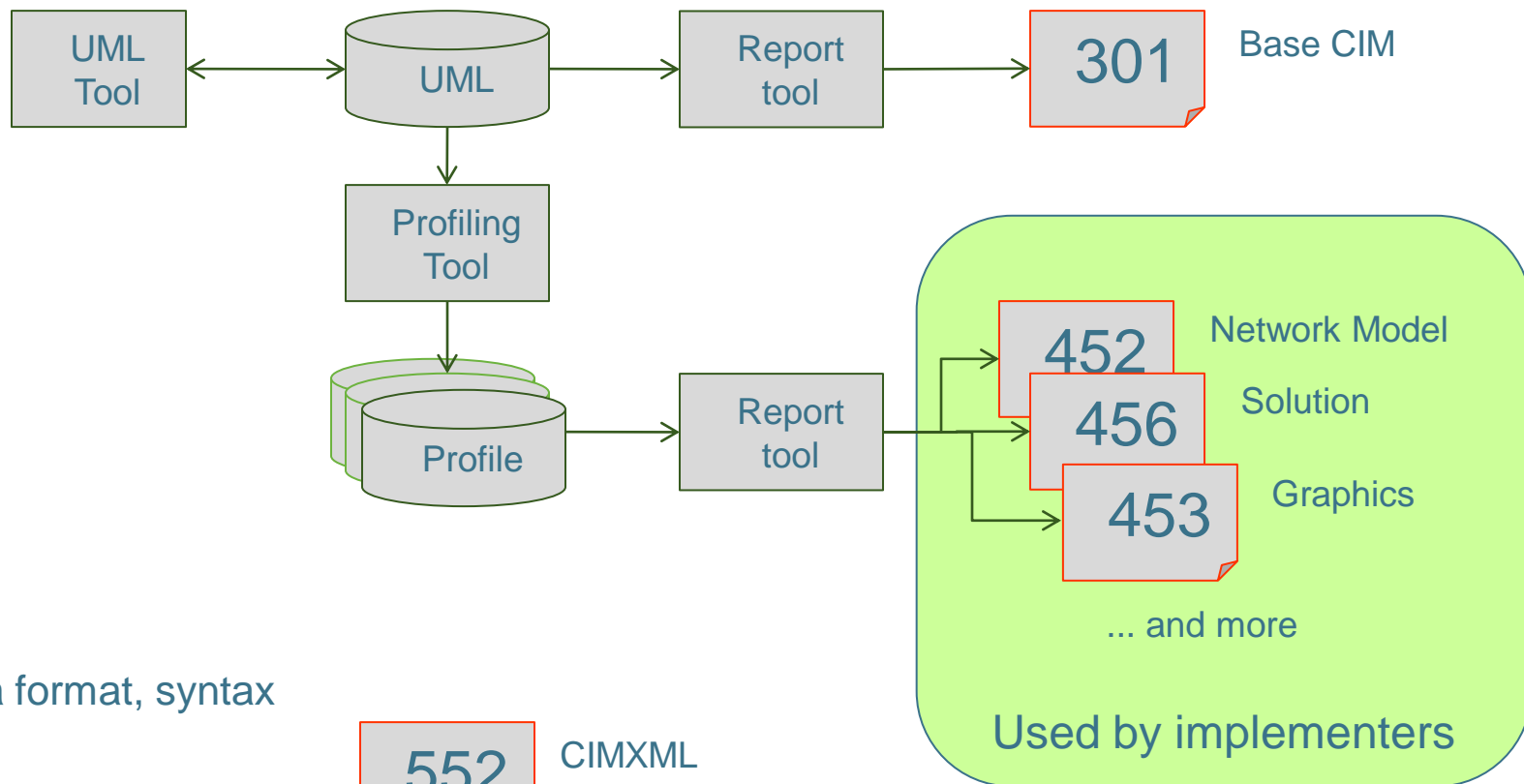
- **Single model used for multiple purposes**
 - Subsets of the model for different usages
- **Supported by recent CIM standards development**
- **CIM standards partition models by**
 - Type of information
 - Source of the data

CIM Profile Specifications

- **Equipment** IEC 61970-452 2000
- **Topology & Solution** IEC 61970-456 2009
- **Dynamics & short circuit** IEC 61970-457 2011
- **Diagram Layout** IEC 61970-453 2011
- **SCADA** IEC 61970-451 2011-12
- **CIMXML data format** IEC 61970-552 2000

How the CIM Profiles are Created

Data model, semantics



Data format, syntax



... and other XML Schema based

Equipment IEC 61970-452, Currently a single Profile

- **Network Equipment**

- Bus bar sections (physical)
- Transformers
- Synchronous Machines
- Transmission lines
- ...

- **Detailed Substation**

- Breakers and disconnectors
- Connectivity within substation
- Measurement locations
- Auxiliary equipment

- **Source or owner of data**

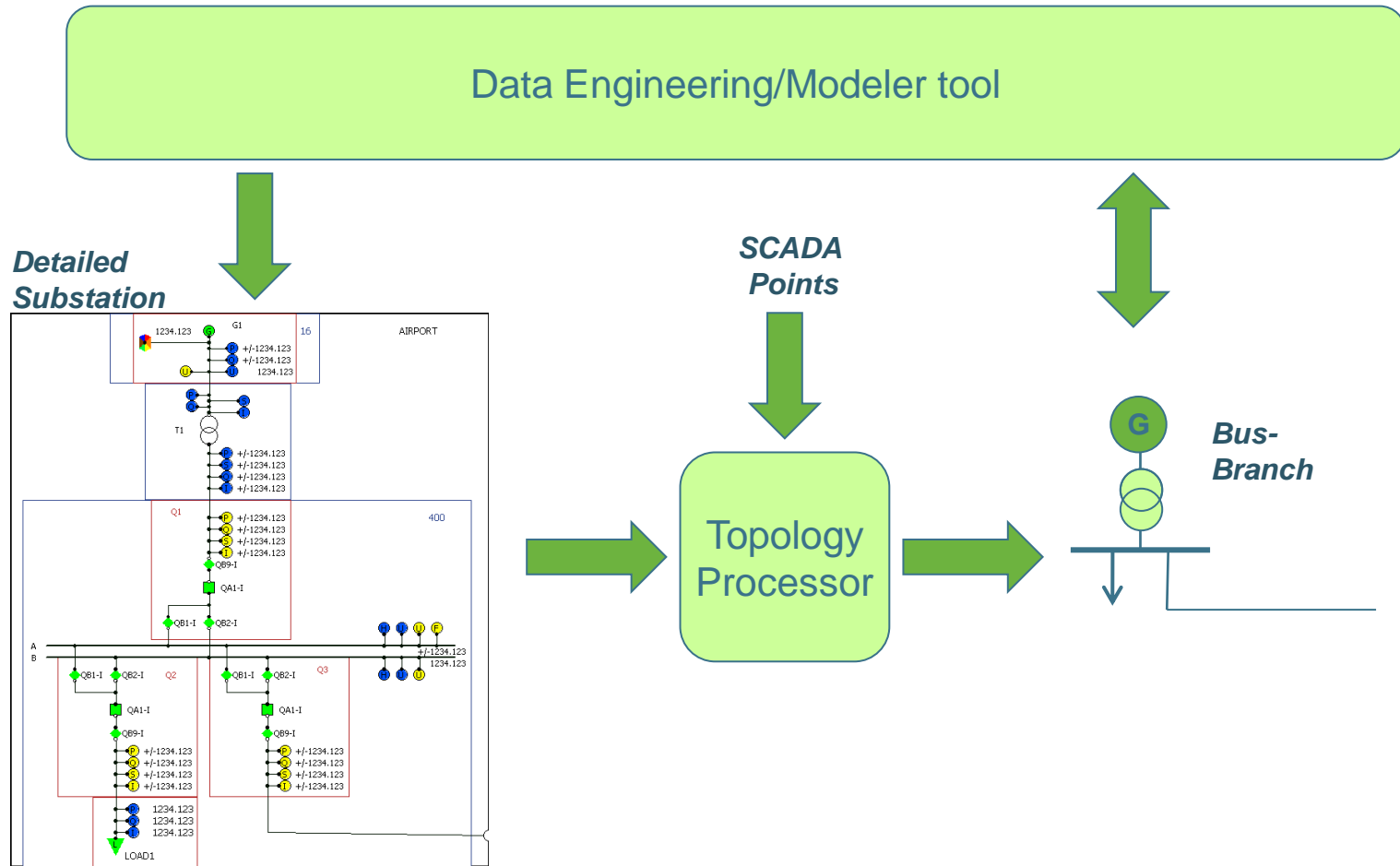
- Modeling Authority Sets (MAS)

Equipment IEC 61970-452, Will be divided in several Profiles

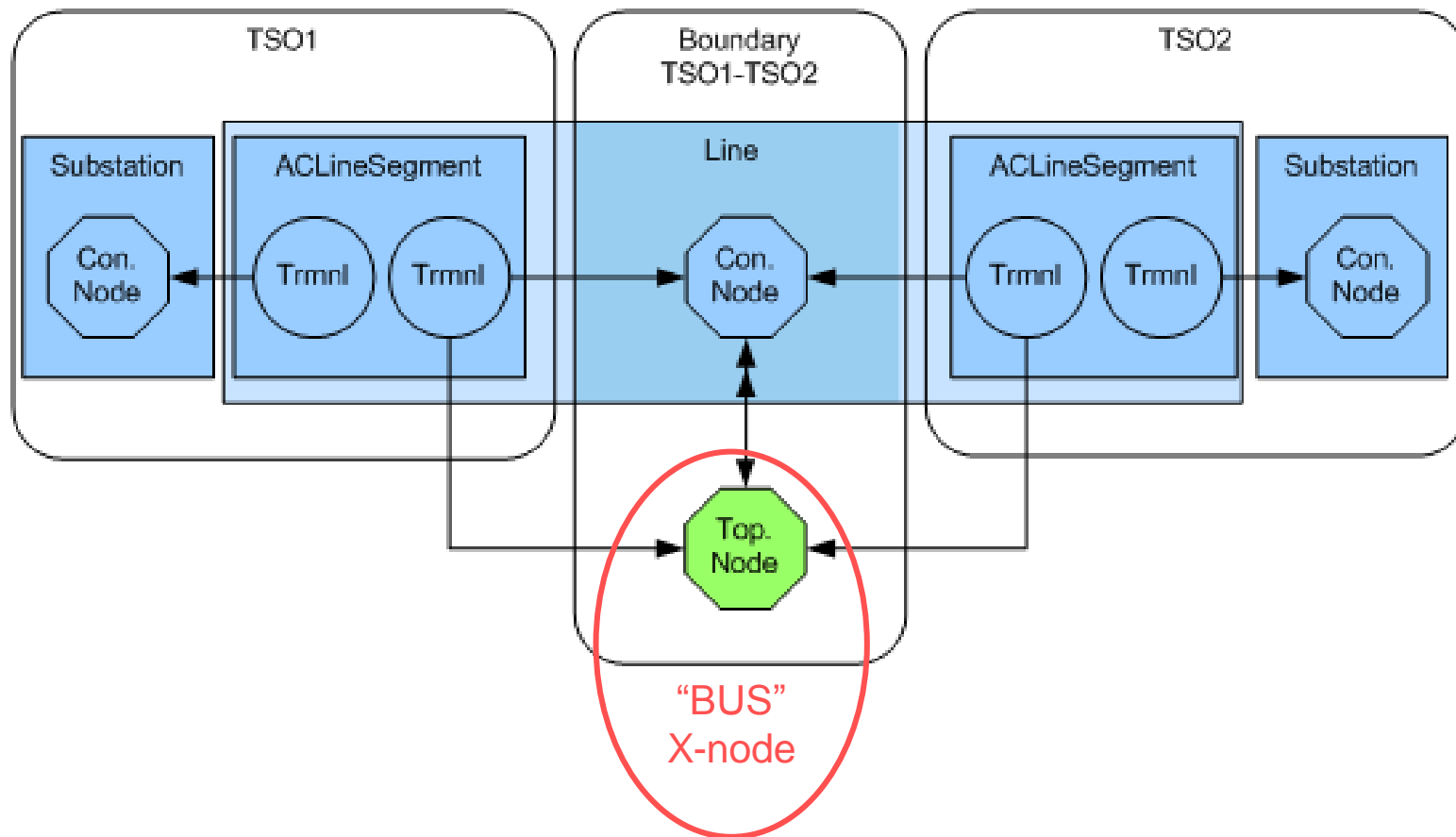
- **Common**
- **Basic Equipment**
- **Detailed Substation**
- **Schedules**
- **Short circuit data**

- **Analysis going on, may result in more profiles**

Topology Profile



How CIM Connect Substation and Bus-branch



Solution Profile

- **State variables**

- Voltages and injections
- Tap positions
- ...

- **Difficult to transfer Busbranch -> detailed Substation**

- **CIM has Equipment related (cim:Terminal) variables**

- Enables communication bus-branch – detailed Substation

Diagram Layout Profile

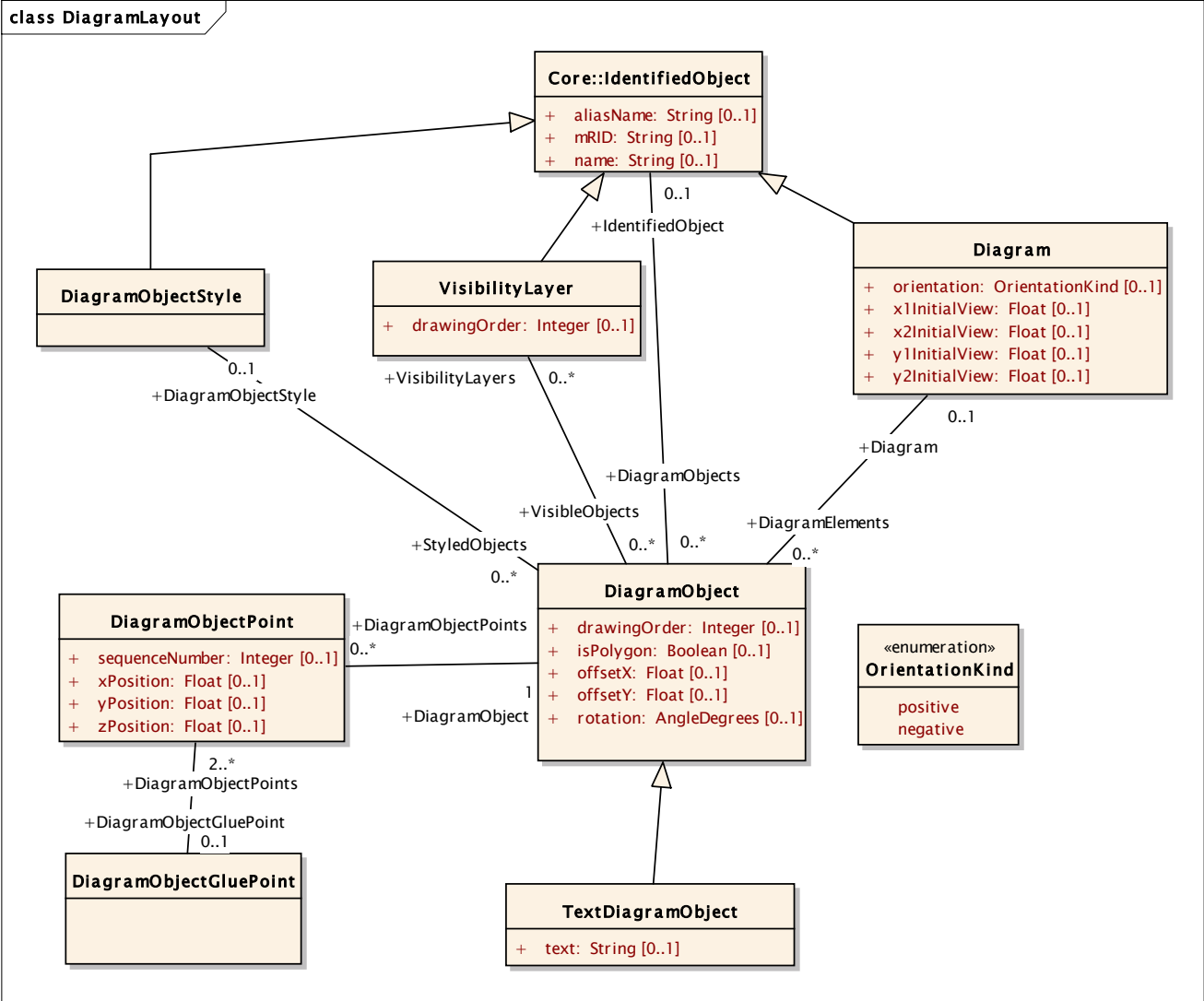
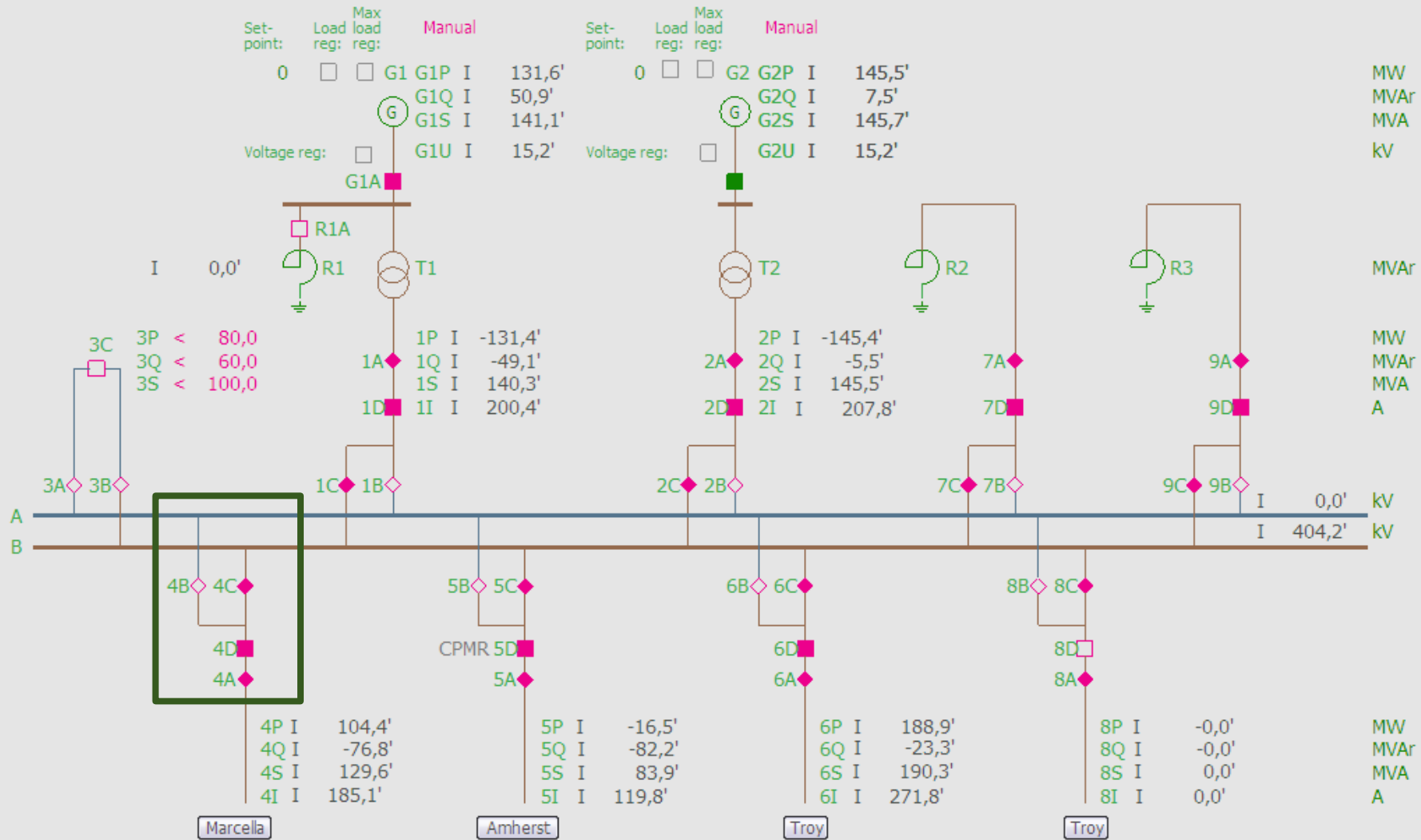


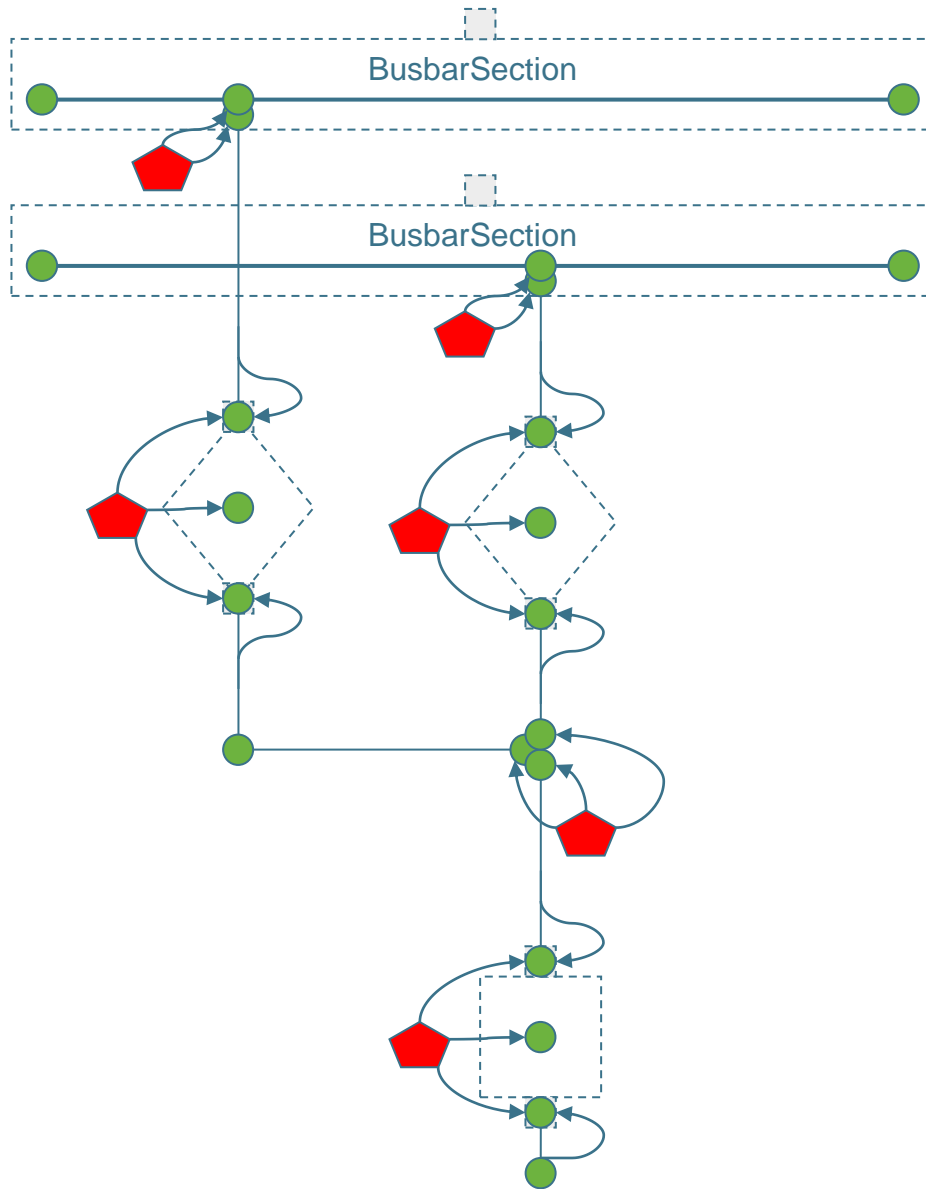
Diagram Example, ABB40Bus Bowman Substation




■ Bowman Station

Generator Trends



How Diagram Layout Works



-  Terminal (CIM Base)
-  DiagramObjectGluePoint (CIM Graphics)
-  DiagramObjectPoint (CIM Graphics)

Information Exchange

- **Bus-branch data – single file per source including**
 - Equipment
 - Topology
 - Solution
- **CIMXML data – one file per source and profile possible**
 - Enables
 - combining topology and solutions with different equipment files.
 - exchange of files with changed or new information only
 - use CIMXML incremental updates

Questions/Additional Information

• **Conclusions**

- CIM enables more flexible data exchange by use of
 - Profiles
 - Incremental changes
 - MAS
- CIM support the trend of common data repository
 - Operations
 - Operations planning
 - Long term planning
 - ...

• **Lars-Ola Österlund**

- lars-ola.osterlund@abb.ventyx.com

