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CIM for Unified Planning and Operations Network Model

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Problem statement

- Planning and Operations models are maintained in silos
- Application-specific data formats are barriers to data exchange
- This leads to redundant model maintenance work
- Duplicate data entry for new grid projects
- Duplicate data error identification and correction
- Model validation challenges for planning
## Model similarities and CIM support

### Planning
- Simplified network hierarchy
- Bus-branch and/or node-breaker representation
- Network connectivity
- Solution state
- Profile/schedule data
- Naming and identifiers
- Electrical equipment characteristics
- Limit sets
- One-line diagrams
- Long-term model changes
- Short circuit and dynamics data

### Operations
- Detailed network hierarchy
- Node-breaker representation
- Network connectivity
- Solution state
- Profile/schedule data
- Naming and identifiers
- Electrical equipment characteristics
- Limit sets
- One-line diagrams
- Short-term model changes
- Measurements

### IEC CIM 61970
- Detailed network hierarchy
- Bus-branch and/or node-breaker representation
- Network connectivity
- Solution state
- Profile/schedule data
- Naming and identifiers*
- Persistent URIs
- Electrical equipment characteristics
- Limit sets
- One-line diagrams
- Incremental model changes
- Short circuit and dynamics data
- Measurements

*CIM can be extended as needed!
CIM as a data bridge

Operations

CIM

Planning
Concrete example solution

- Initiate data transfers
- Manual consolidation/enrichment
- Independent validation

EM

NMM tool

Planning tool(s)

EMS  \[\text{CIM/XML}\]  NMM tool  \[\text{App-specific data interface}\]  Planning tool(s)

CIM data store & object registry
Key guiding principle

Avoid traffic jams by leveraging *incremental* data exchange!
Example workflow 1 – Planning to Operations data transfer

1. Initial data entry
2. Extract & import model changes
3. Initial validation
4. Model enrichment
5. Publish model changes
6. Import model changes
7. Final validation

Planning tool(s)

Converter

NMM tool

EMS

App-specific data interface

Incremental CIM/XML
Example workflow 2 – Operations to Planning data transfer

1. Initial data entry
2. Extract and import model changes
3. Initial validation
4. Model enrichment
5. Publish updated Planning model
6. Import updated model
7. Final validation

EMS → NMM tool → Planning tool(s)

CIM/XML → App-specific data interface → Converter
Deployment

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Utility/ISO</th>
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<tr>
<td>Off-the-shelf Software</td>
<td>Planning-Operations model alignment</td>
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<tr>
<td>Deployment / integration services</td>
<td>Updated business processes</td>
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Working Solution
Solution extensibility

- Initiate data transfers
- Manual enrichment
- Independent validation

EMS

CIM/XML

NMM tool

CIM data store & object registry

App-specific data interface

Planning tool(s)
Solution extensibility

- Initiate data transfers
- Manual enrichment
- Independent validation

EMS

NMM tool

Planning tool(s)

CIM/XML

CIM data store & object registry

App-specific data interface

Asset Management
Solution extensibility

- Initiate data transfers
- Manual enrichment
- Independent validation

GIS
EMS
Asset Management

CIM/XML

NMM tool

CIM data store & object registry
App-specific data interface

Planning tool(s)
Solution extensibility

- EMS
- NMM tool
- Planning tool(s)
- GIS
- Asset Management
- Other...

- CIM/XML
- CIM data store & object registry

- Initiate data transfers
- Manual enrichment
- Independent validation

- App-specific data interface
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