Avista's Distribution Management System (DMS) Integration Experience

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Avista Overview

Established 1889

355,000 Electric Customers

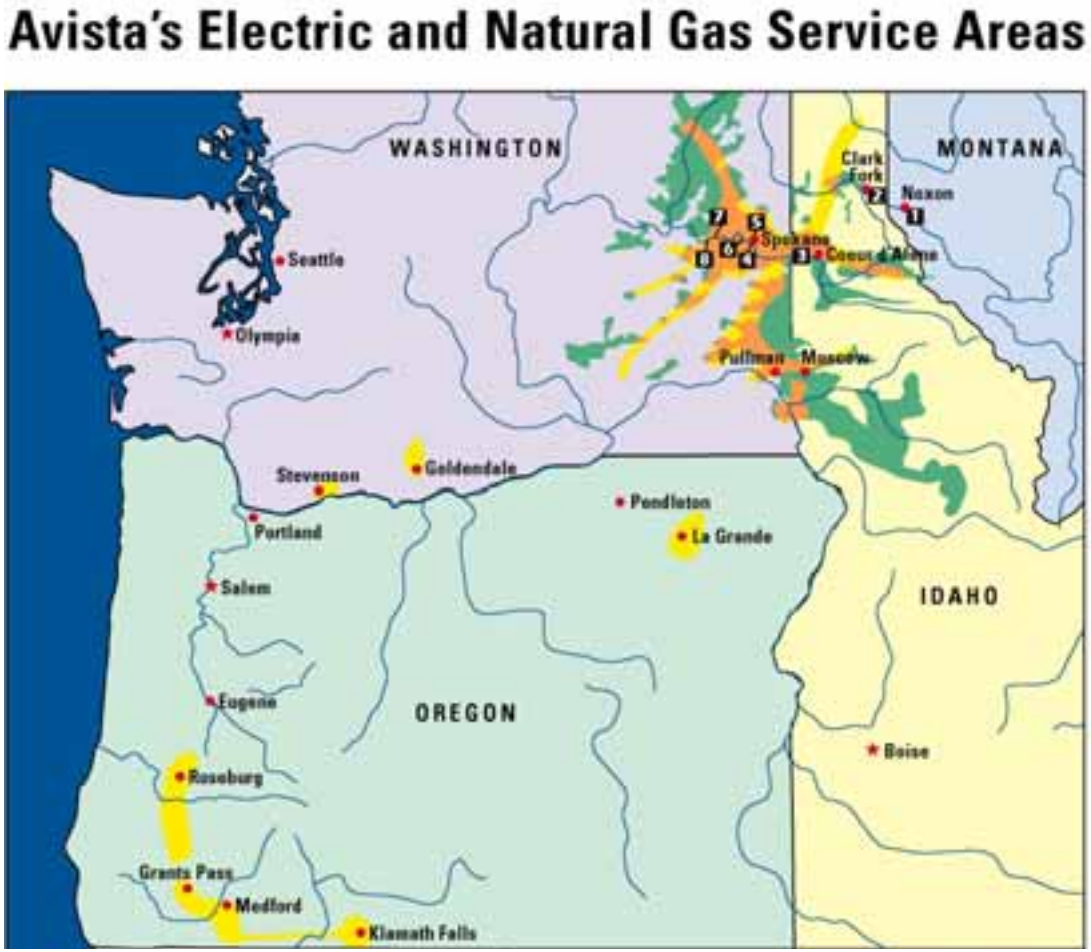
314,000 Gas Customers

26,400 Sq. Miles

8 Hydro Facilities

Customers

- Electric
- Gas
- Both



Avista's Smart Grid Grants

SGIG – Smart Grid Investment Grant

Spokane, WA

SDGP – Smart Grid Demonstration Project

Pullman, WA

What is a DMS?

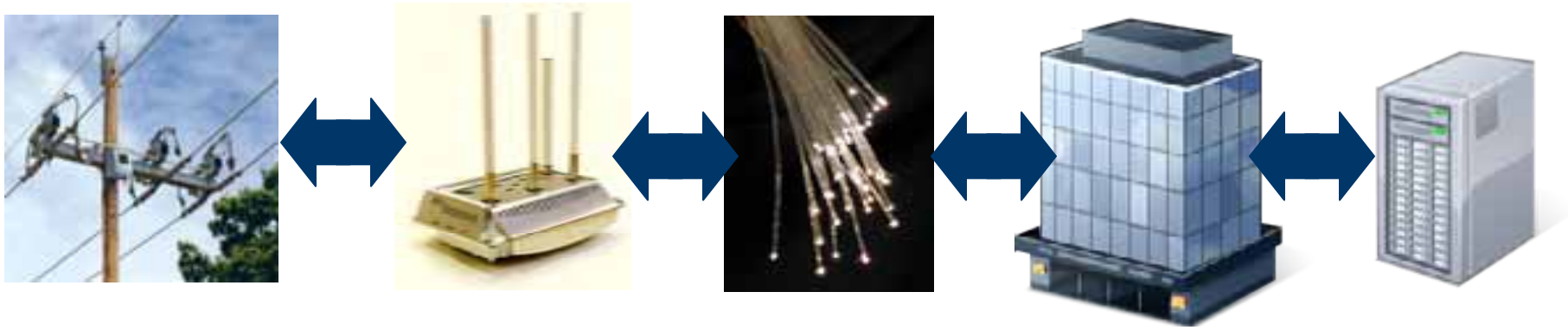
- **D**istribution **M**anagement **S**ystem

SCADA System

Simplified GIS System

Power Flow Engine

DMS Overview



Remote Switches, Breakers, & Sensors

"Radio Network"

Fiber Optic Backhaul

Avista

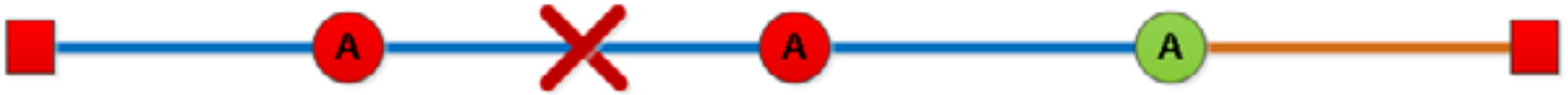
DMS Servers

- EFACEC/ACS (Advanced Control Systems) PRISM System
- Two primary applications:
  - FDIR – Fault Detection Isolation & Restoration (Switches, Breakers)
  - IVVC – Integrated Volt-Var Compensation (Capacitors & Regulators)

FDIR

1) Normal Configuration

2) Fault Occurs



3) Protection System Operates & Fault Detection

4) Fault Isolation

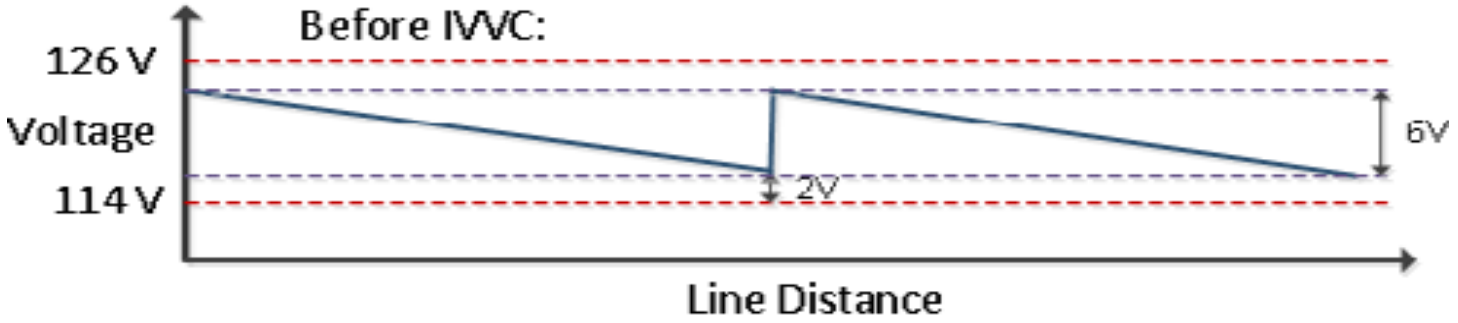
5) Upstream Restoration

6) Downstream Restoration

IVVC

- **I**ntegrated **V**olt-**V**ar **C**ompensation

$P = V^2 / Z$  = Constant Z V ~ P



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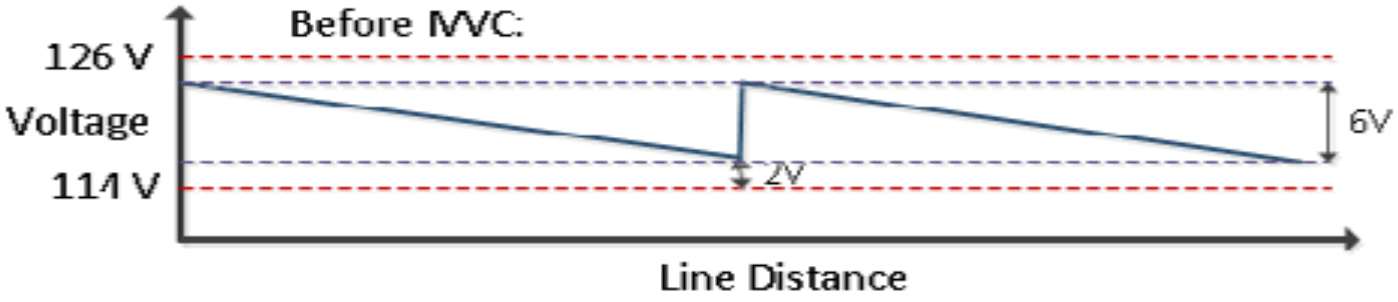
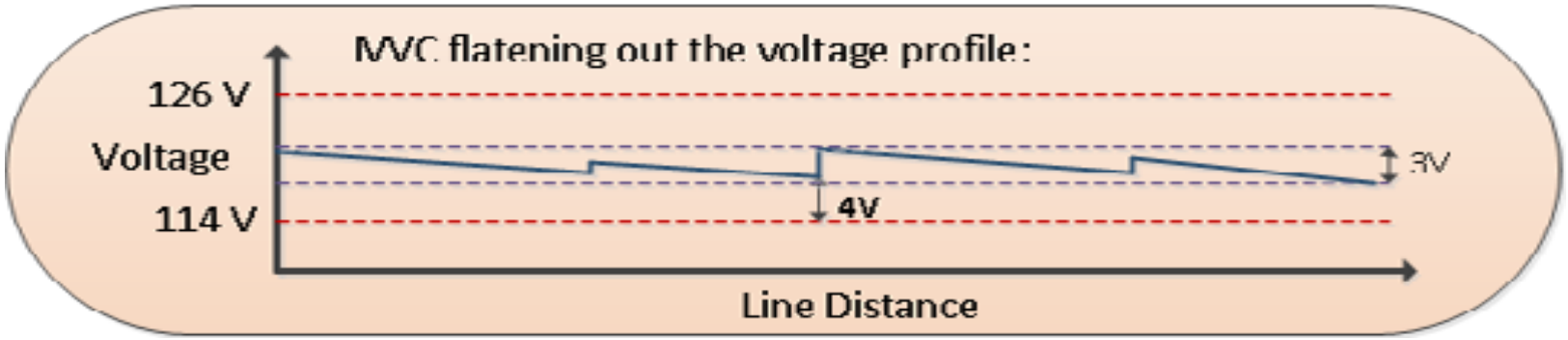
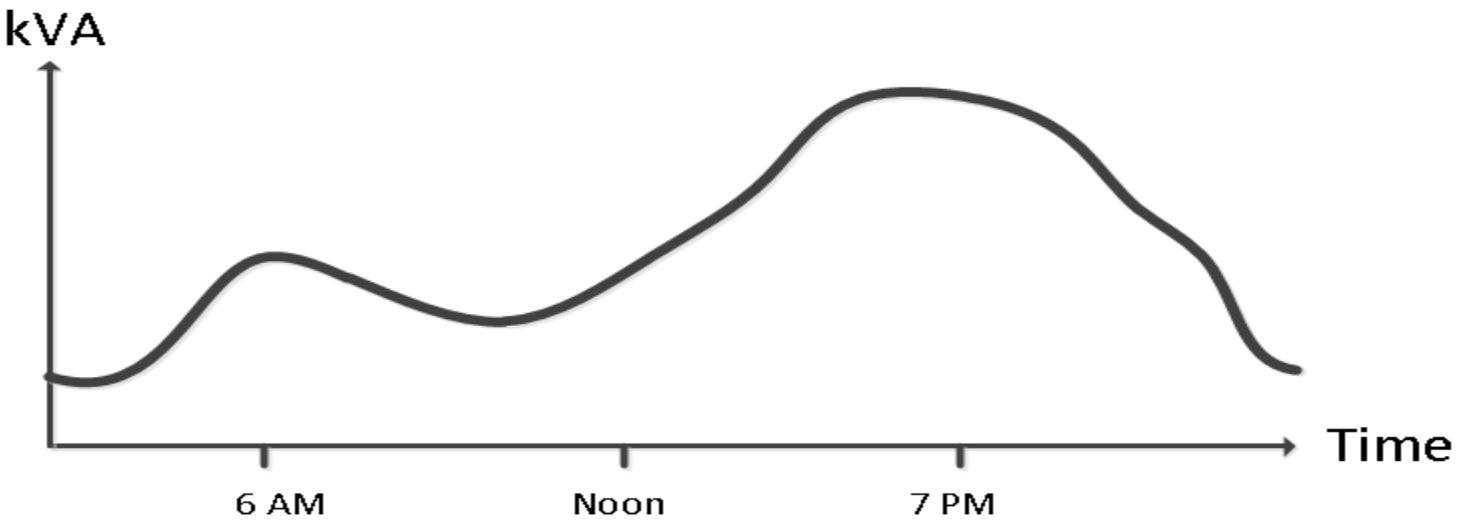




Safety

DMS Data Model Requirements

- Topology Model w. **GOOD** data
- Asset Data / Nameplate Ratings
- Electrical Parameters
- Load Curves



Data Mapping Preparation

- Hardware 
- Network Access/Firewall Ports 
- Support Software & Licenses
- Source DB Role Security & User ID
- Unix/Linux Commands & Environment
- Inform DBA(s) of possible incoming requests
- Get the DMS Model Schema & Field Definitions from Vendor
- Know your GIS model inside & out!

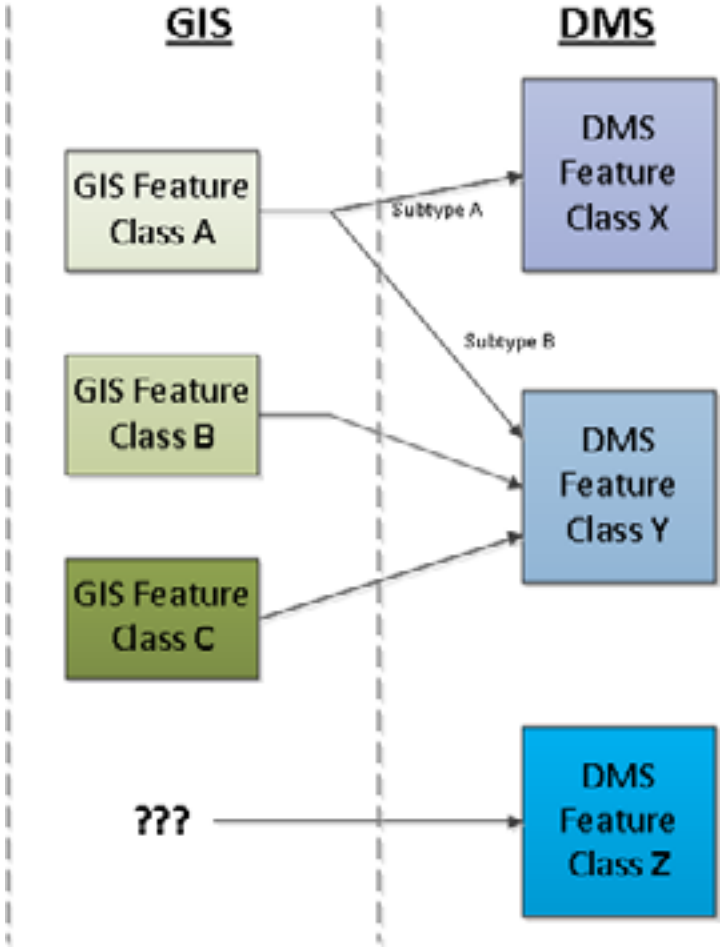
Angry DBA

Data Model Mapping Session

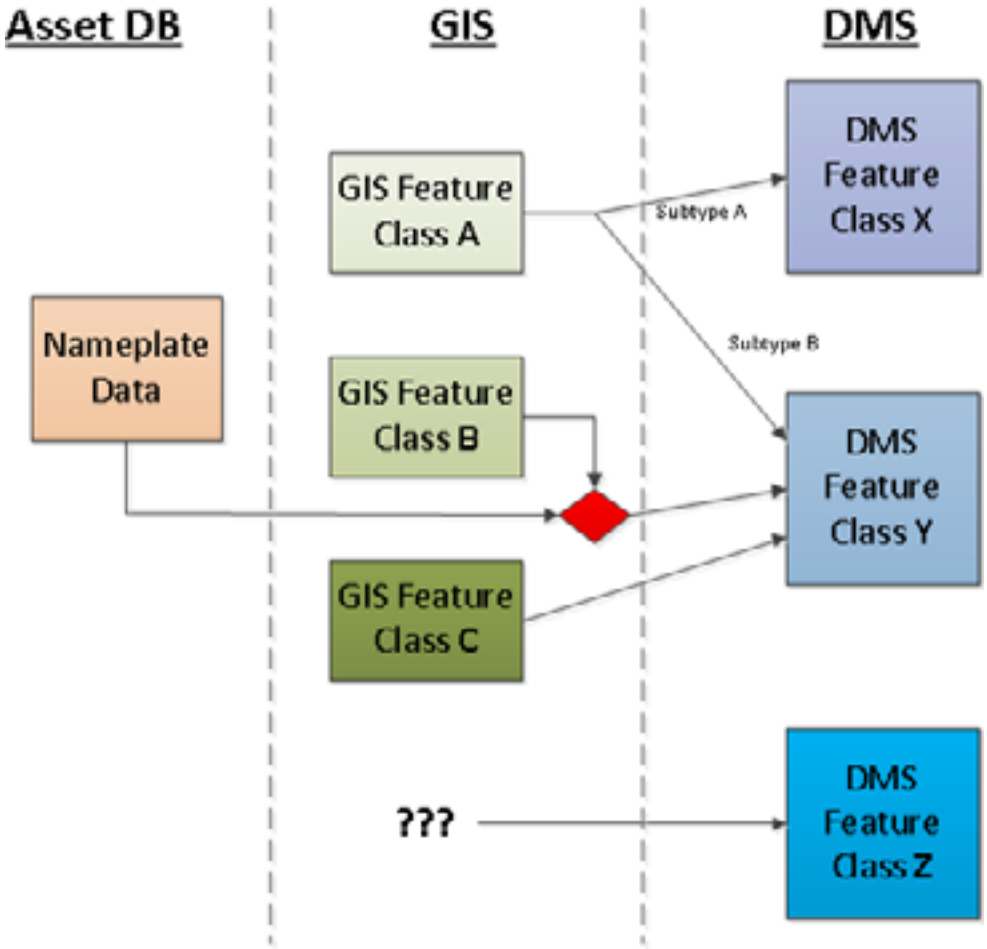
- FeatureClass → Feature Class
- Data Field → Data Field
- Missing Data, Constants
- Identify Model Discrepancies
- Post Process SQL Scripts to “massage” data once imported

“Cook” that data!

Model Mapping

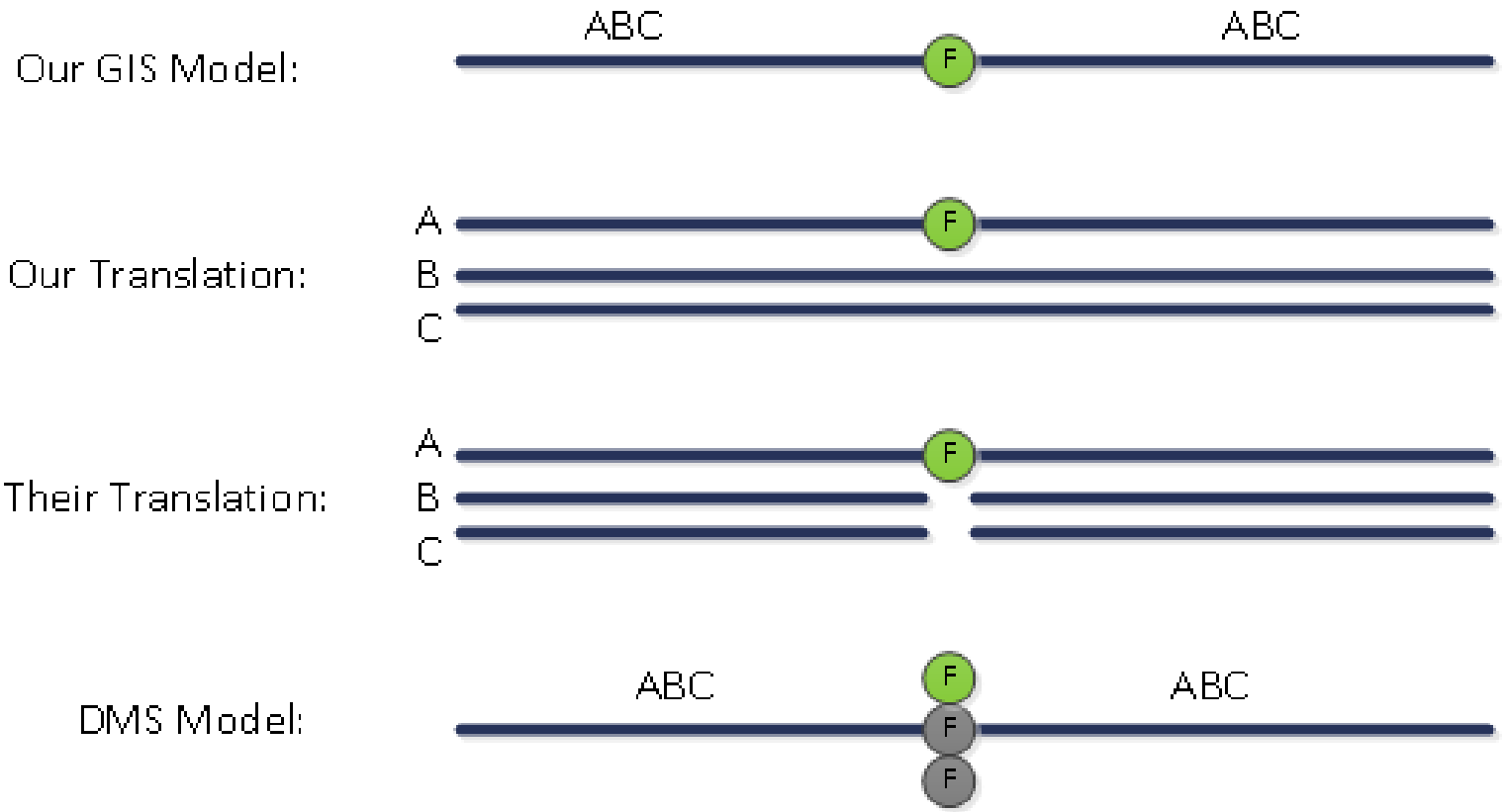


Model Mapping



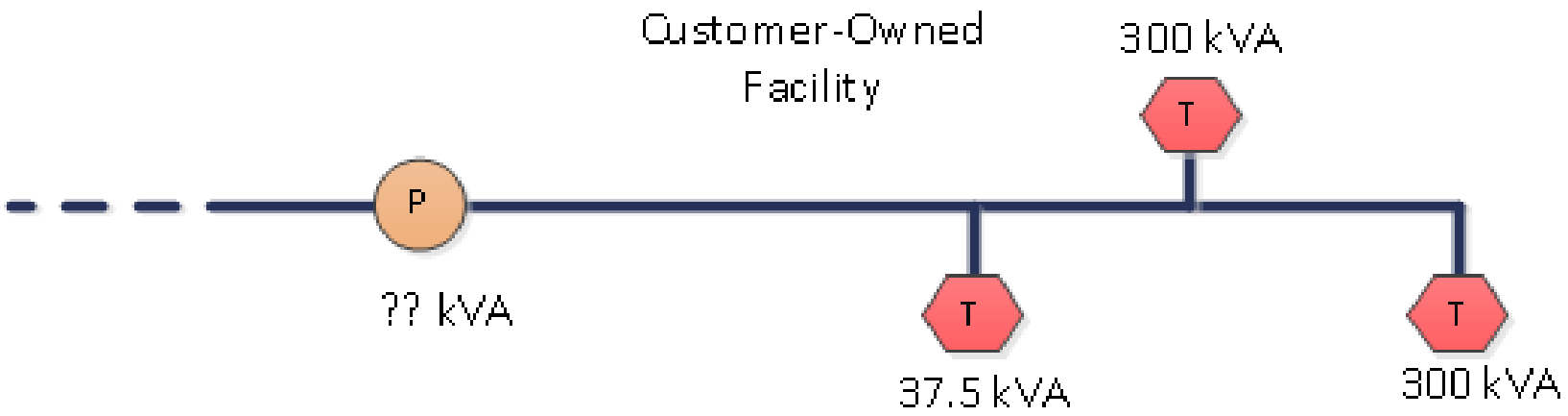
Avista's Issues

- Unganged devices



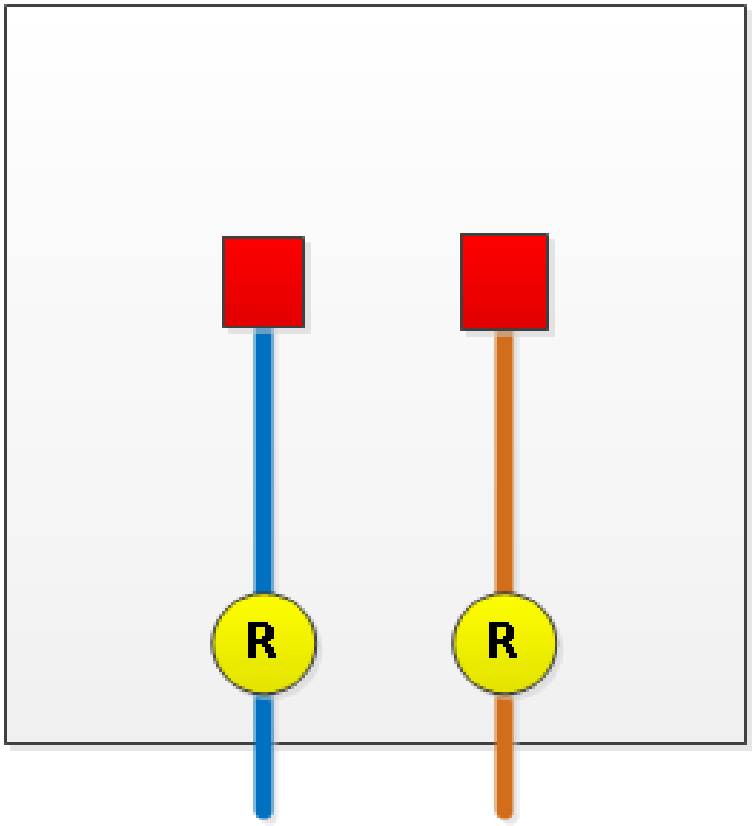
Avista's Issues

- Primary Meters & Downstream Loads

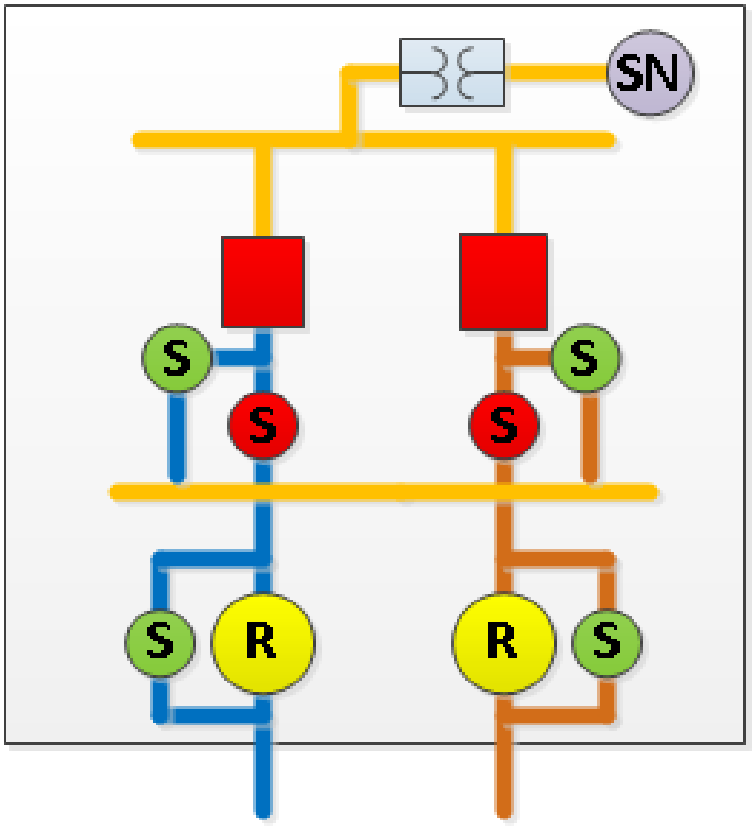


Avista's Issues

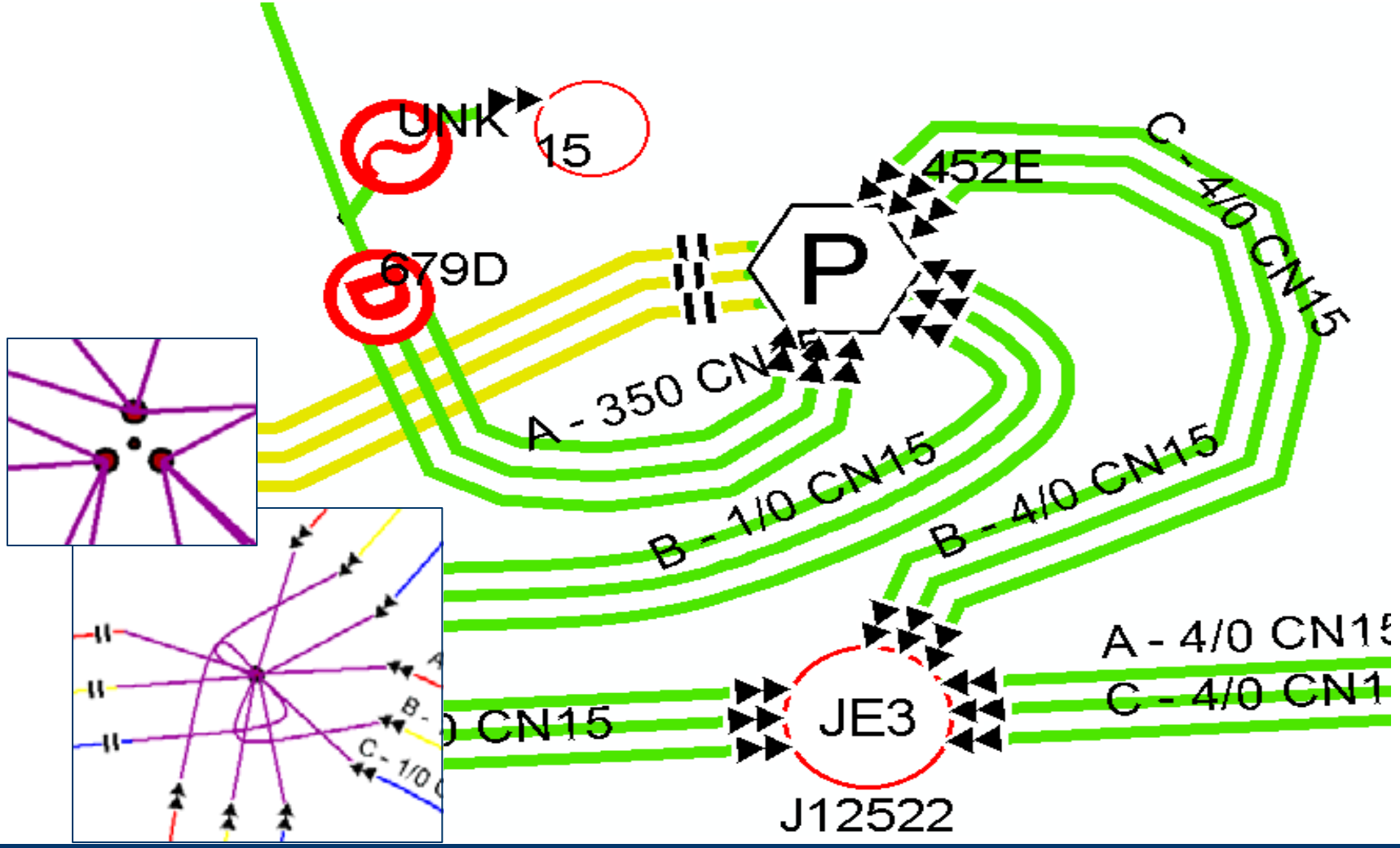
Current GIS Substation Model



Required Substation Model



Avista's Issues



Avista's Issues

- Broken Links to Asset DB

Troubleshooting

- Conversion Errors

- Loops
- **Power Flow Convergence =**

- Power Flow Validation

Data Synchronization

- Bulk Upload
- Real-time switch state synchronization to OMS
- Incremental Updates
- Non-GIS data update
  - SQL Scripts, custom process, manual
- SCADA Station/Point Cross Reference

Questions?