LEVERAGING RTDS FOR OPERATOR TRAINING

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SOUTHERN COMPANY

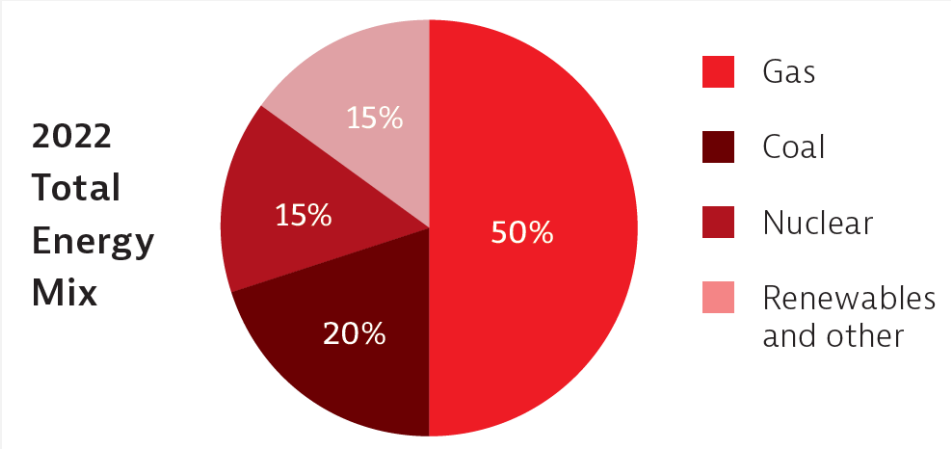
2023 North American RTDS Technologies Inc. Applications & Technology Conference

2023 NORTH AMERICAN RTDS APPLICATIONS & TECHNOLOGY CONFERENCE

RTDS Technologies AMETEK

SOUTHERN COMPANY

- Electric Operating Companies
- Natural Gas Companies
- Southern Power
- PowerSecure
- Southern Nuclear
- Southern LINC
- Southern Telecom



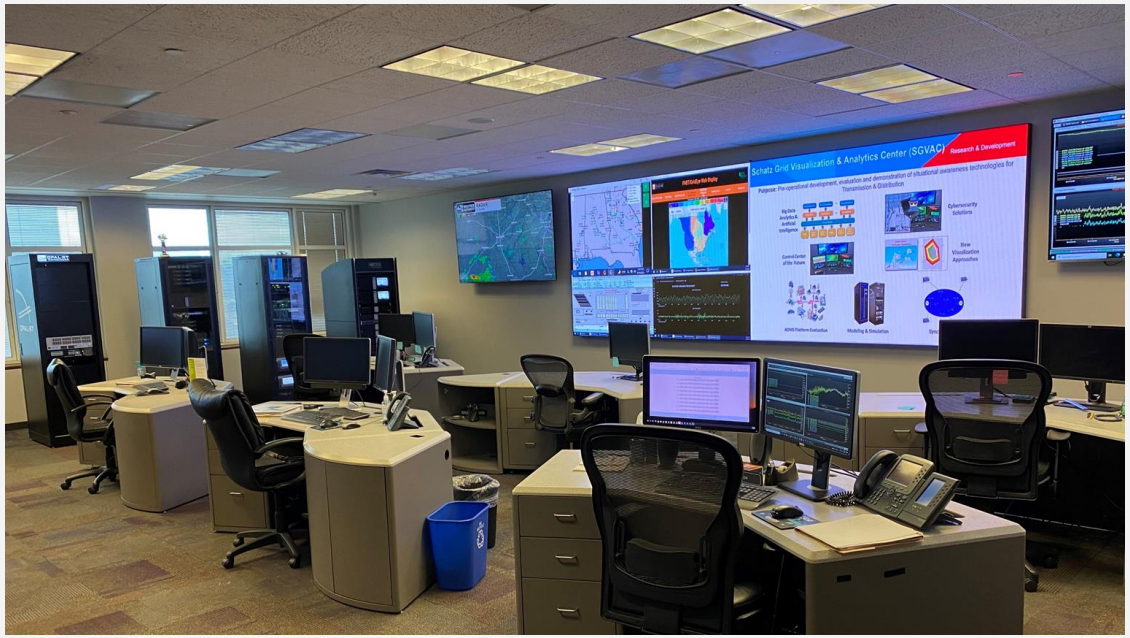
43,000 MW
of generating capacity

Capabilities in
50 States

9 Million
customers

SCHATZ GRID VISUALIZATION AND ANALYTICS CENTER (SGVAC)

Pre-operational development, evaluation and demonstration of situational awareness technologies for Transmission & Distribution

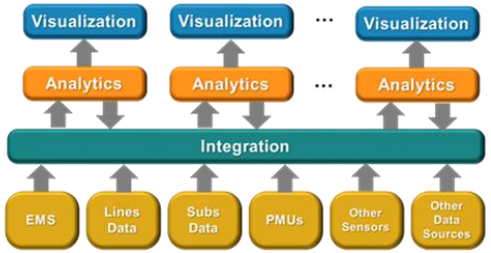


Benefits:

- Test and validate before implementation
- Evaluate technology with real-world data
- Test “control center of the future” functionalities
- Quickly stand-up pilot assessments
- Collaborate with industry partners
- Train control center operators

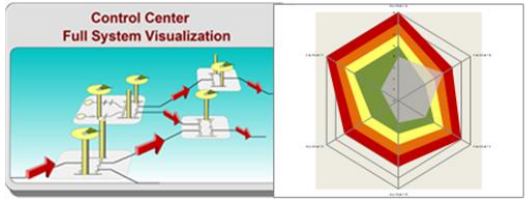
SGVAC FOCUS AREAS

Big Data Analytics & AI



Cybersecurity Solutions

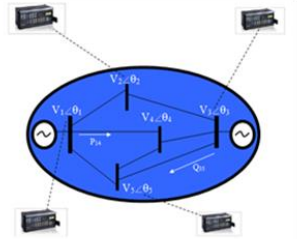
Control Center of the Future Functionalities



New Visualization Approaches

DERMS Platform Evaluation

Modeling & Simulation



Synchrophasors

OPERATOR TRAINING WITH RTDS

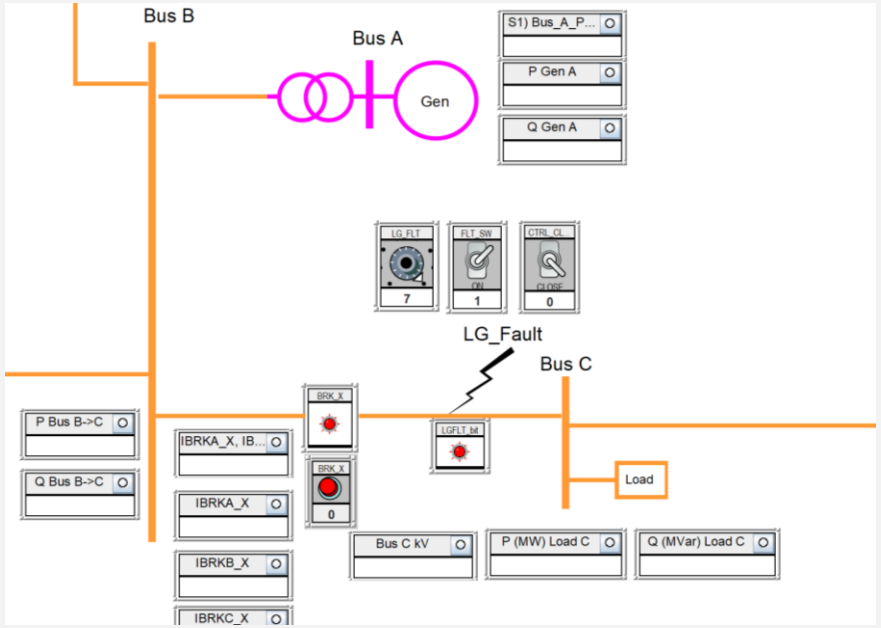
- Goal
  - Evaluate the feasibility of leveraging RTDS for transmission operator training
- Motivation
  - Supplement current training capabilities
    - New phenomena due to changing energy landscape
  - Develop models with more realistic system responses to contingency events and operator actions
  - Generate displays that replicate the operator user interfaces

PROCESS

- Coordinated with our internal training team to determine simulation scenarios of interest
- Created models based on our PSS/E transmission model
- Appropriately scaled simulations for study scenarios
- Developed training views in RSCAD runtime

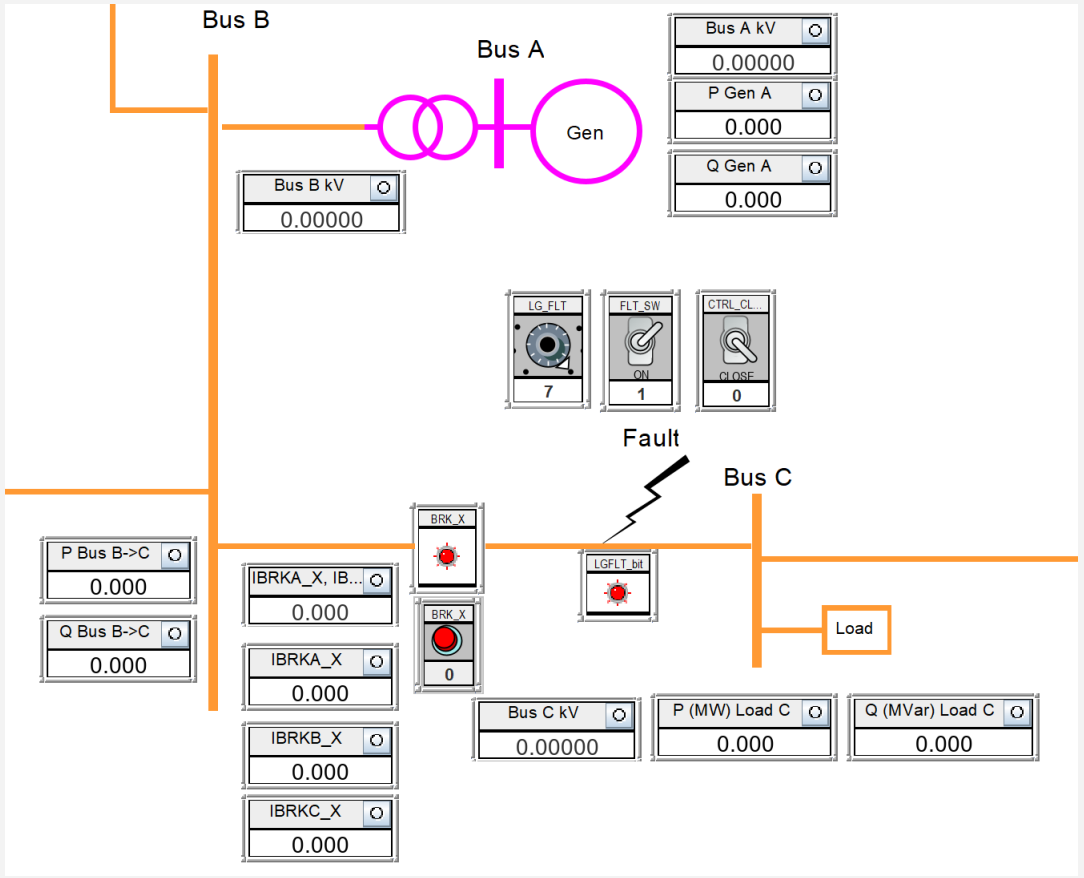
TRAINING SETUP

- Screens
  - Trainer screens show everything including controls to initiate events
  - Trainee screens show a limited number of controls and meters
- Training
  - Trainees are provided a runtime file for the specified scenario
  - Trainers implement events
  - Trainees identify the event and resolve the situation

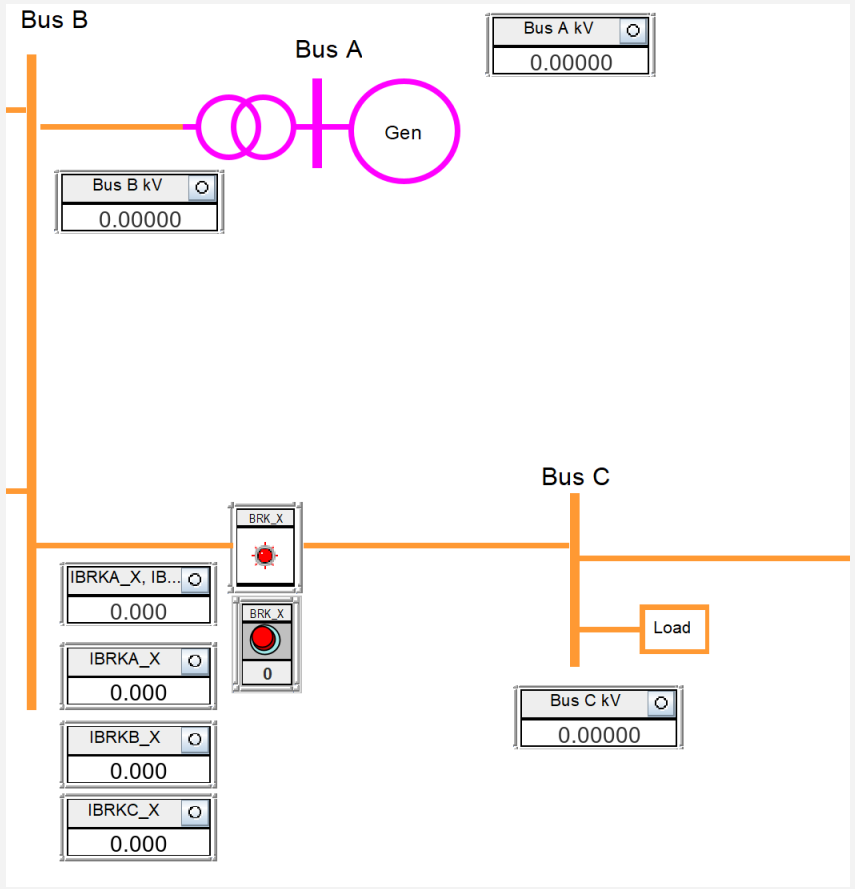


Example of trainer screen

TRAINER VS TRAINEE VIEW



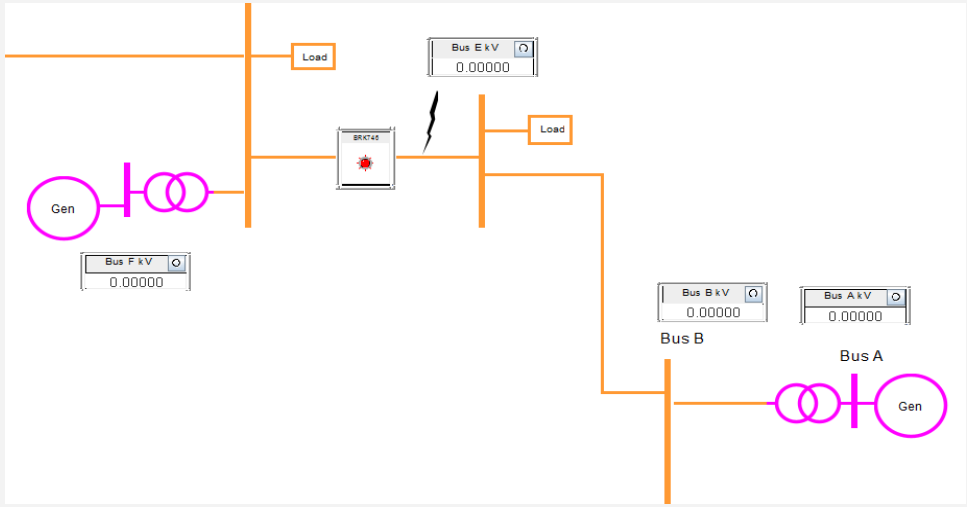
Trainer screen



Trainee screen

TRAINING SCENARIOS

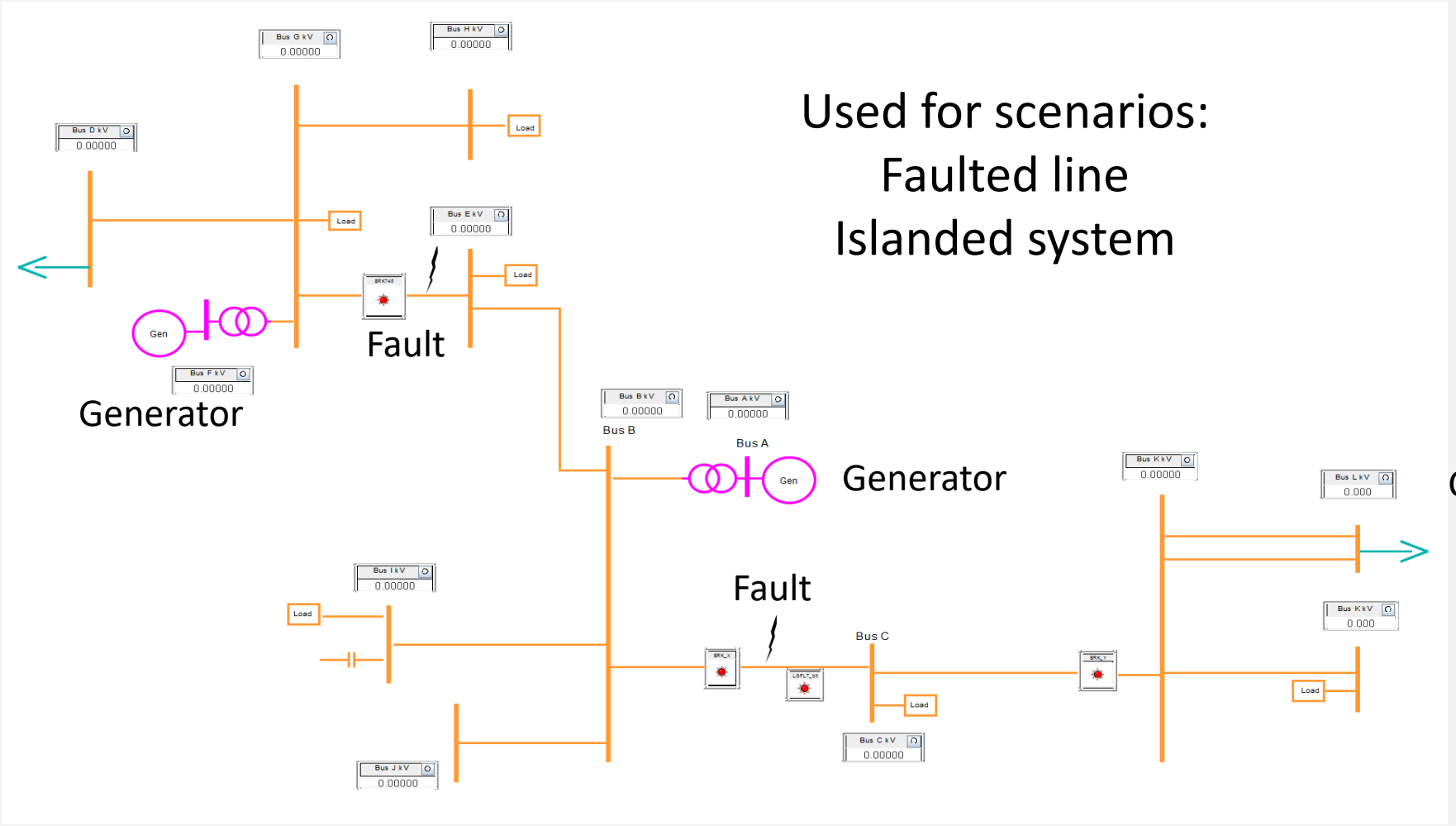
- Conditions
  - Faulted line
  - Islanded system
  - Lost load
- Operator actions demonstrated
  - Clear faulted line
  - Resynchronize islanded system
  - Restore load



Island Scenario

TRAINING MODEL: TRANSMISSION SYSTEM

Connection to system outside of study



Used for scenarios:
Faulted line
Islanded system

Connection to system outside of study

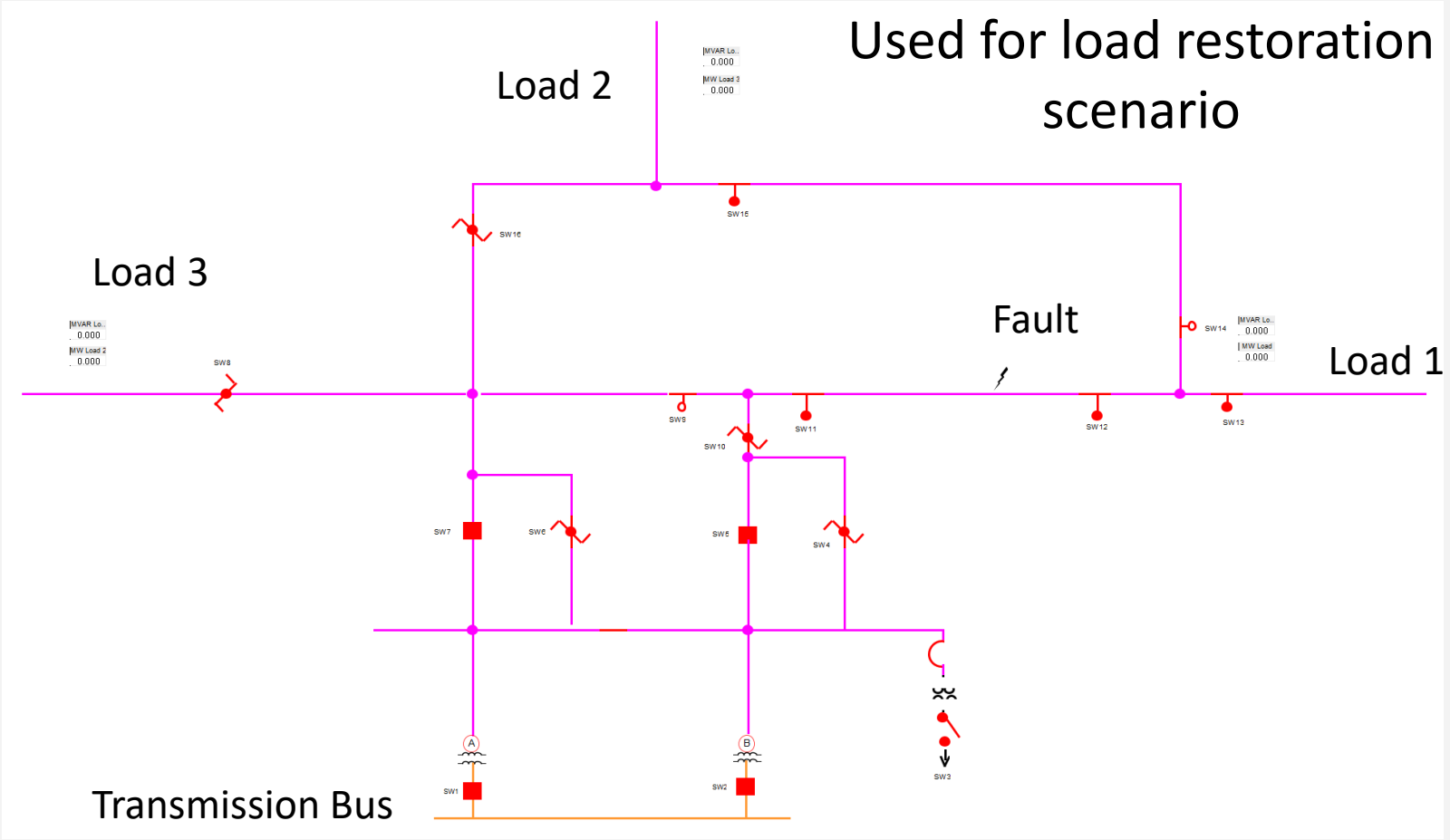
SCENARIO: FAULTED LINE

- Situation
  - Fault causes a set of breakers to trip a line
  - Fault persists on the line
  - One breaker recloses on the line
  - Remaining breaker will not close until the fault is cleared
- Required operator action
  - Identify location of fault and clear it
  - Reclose breaker to restore the line
- Takeaway
  - RTDS provides accurate system response to trainee's control actions

SCENARIO: ISLANDING

- Situation
  - Fault islands the system
- Required operator action
  - Recognize the event
  - Resynchronize the islanded system
  - Close breaker to reconnect islanded system
- Takeaway
  - RTDS facilitates intuitive controls to resynchronize island and restore system

TRAINING MODEL: SUB-TRANSMISSION SYSTEM



SCENARIO: LOAD RESTORATION

- Situation
  - Fault causes automated protection to trip
    - Load is dropped
    - Line is de-energized
- Required operator action
  - Find alternate pathway to restore load
  - Clear fault
  - Re-energize line
- Takeaway
  - Flexibility to build training simulations representing a wide variety of historical grid events

RESULTS

- Successfully demonstrated a variety of training simulations
- Internal team was impressed with the ability of RTDS to generate training scenarios
- The effort illustrated the following
  - Automated grid response to operator actions
  - Flexibility to create target scenarios based upon user needs
  - Recreated similar HMIs to native operator views

FUTURE STEPS

- Develop additional scenarios based upon internal training needs
- Improve dynamic performance of the system
- Further refine runtime views to reflect operator screens
- Explore cost effectiveness of training using RTDS versus other training methods
- Investigate the level of detail to appropriately represent study scenarios

THANK YOU!

ANY QUESTIONS?