

# RTDS SIMULATION OF PV INVERTERS IN A SMALL POWER SYSTEM

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## Objective

- Develop a model of a distribution system with multiple photovoltaic inverters.
- Implement external controls to coordinate real and reactive power output from the inverters.
- Condense our findings into a lab exercise for future engineering students.

## Background

- Inverter based renewable energy sources are becoming more common.
- The introduction of these sources into the grid can cause instability in the system.

## Value Proposition

- Better understanding the effects on the power system can help us find innovative solutions to these issues.

## Key Requirements

- Complete RSCAD Model of PV integrated distribution system.
- PV output controllable through SEL RTAC.
- Working HMI for RTAC PV control.
- Lab procedure documents for students

## Design Validation

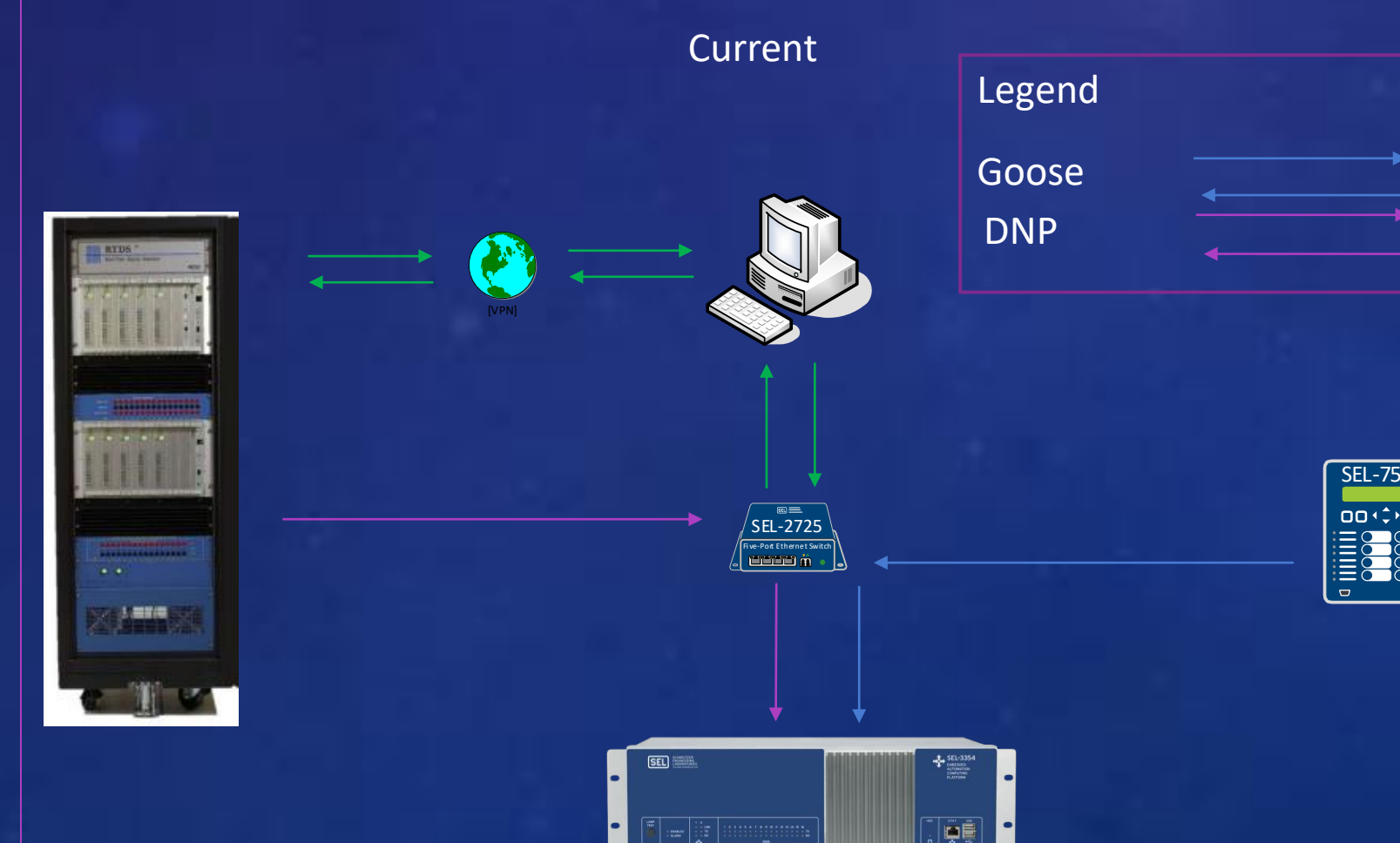
- Compiled RSCAD model of IEEE 13 bus system with 3 connected PV inverters.
  - Model runs on RTDS with expected power flow
- Controlled Power output for each PV inverter
  - Power flow adjusts as controls are manipulated in RSCAD.
- PV Inverter controlled through RTAC
  - Manipulate PV controls through RTAC and observe changes in RTDS
- Functioning RTAC HMI
  - Manipulate HMI controls and observe changes in RTDS
- Usable lab procedure documents
  - Invite EE student to run through lab procedure and provide feedback.

## Project Status

- Finalizing PV model and integrating three into the 13 bus system.
- Establishing DNP and GOOSE communications between devices.
- Creating Controls for RTDS through RTAC

## Steps Forward

- Finalize Communication between devices
  - Finish setup of comms between the RTAC, RTDS, and SEL-751.
- Create RTAC HMI for real-time control
  - Establish control schemes and integrate them into a user friendly RTAC HMI.
- Create Lab documents
  - Write up a lab procedure for future students.



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