WASHINGTON STATE UNIVERSITY

Multi-Period Optimization

for Active Radial Power Distribution Systems

as part of the Connected Communities Project in collaboration with Avista, Edo Energy, OpenEnergySolutions and PNNL.

Notes on the IEEE 123 Bus OpenDSS Model

Team WSU

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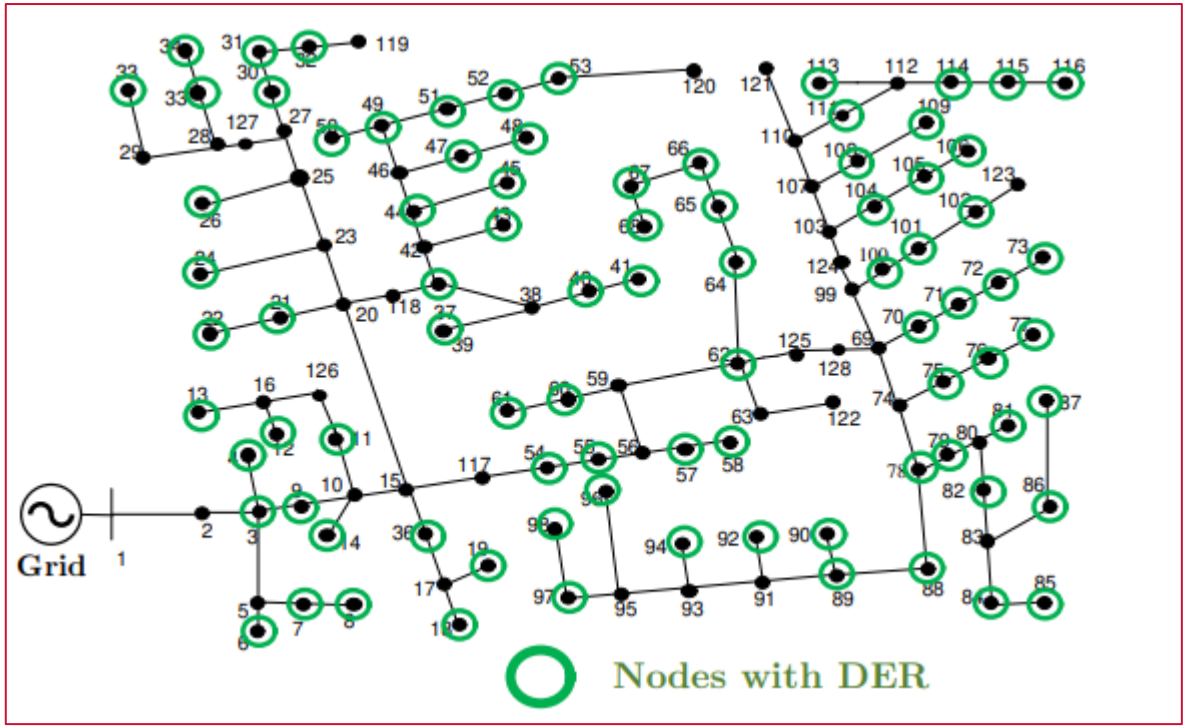
Network for the OpenDSS Model

Test Case: IEEE123 Node System with photovoltaics (PVs)

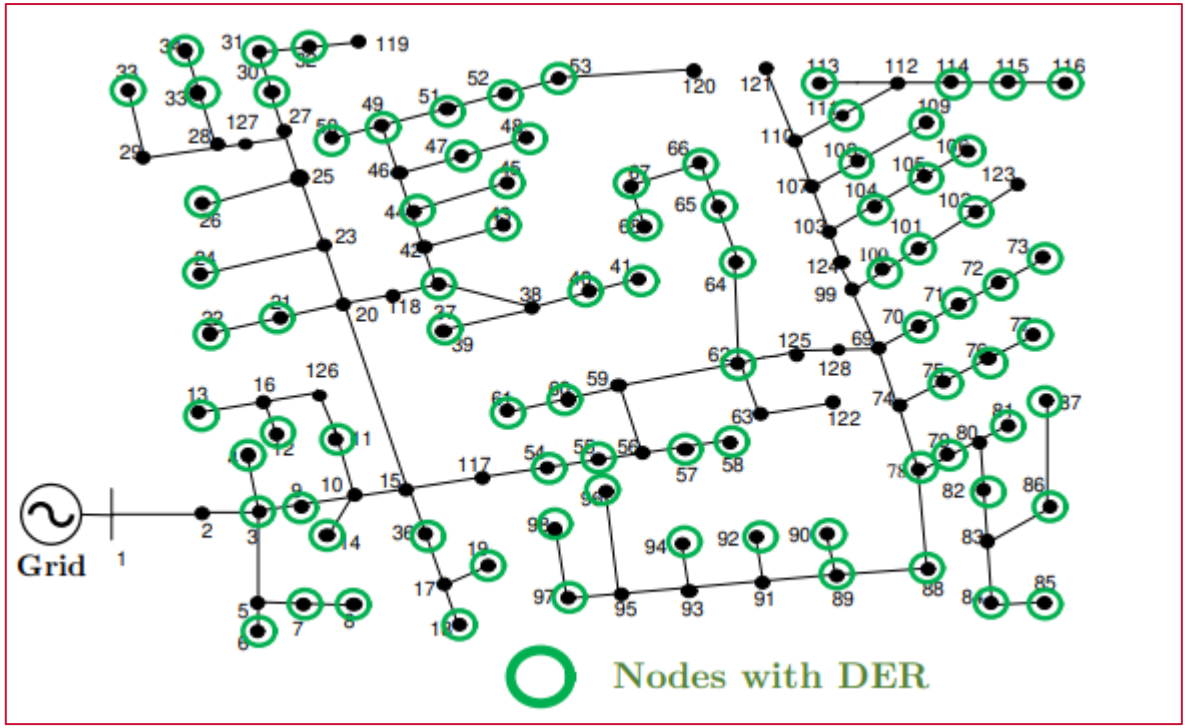
Network Model: Balanced three-phase (with no phase coupling, akin to single-phase) active power distribution network.



Network for the OpenDSS Model (contd.)

Components:

- **Loads** at $N_L = 85$ buses.
- **Static Reactive Power Support** on a very few (4) buses.
- **PVs** at (the same) $N_D = 85$ buses
- PVs have **reactive power control enabled** (two-quadrant)
- **No Batteries yet in the OpenDSS Model**. $N_B = 0$.
- **Penetration of PVs**:
  - 100% of the Load Buses in terms of number of buses. $(\frac{N_D}{N_L} = 100\%)$
  - 33% in terms of ratio of total demand real power $(\frac{\Sigma P_{D_j}}{\Sigma P_{L_j}} = 33\%)$.



Generation of the OpenDSS Model via MATLAB: *Notes*

All Optimal Power Flow (OPF) runs are being done on MATLAB, with user defined scenarios.

User has control on degree of penetration of Grid Edge Devices (GED), including PVs and Batteries and load/solar profiles.

For a given simulation, once the OPF has been run, all specified inputs, decision variables are input into a MATLAB script interfacing with OpenDSS for validation of powerflow, and the corresponding OpenDSS files are generated.

Currently this script does not model batteries, but even without them, the files give a good idea of the test system being run on MATLAB.

In the next iteration of the script, batteries and allowing for a custom percentage of penetration of GEDs will be added, which would then generate the corresponding .DSS files.

Running the Model using OpenDSS GUI

- The zip file contains several `.DSS` files and a `README` file.
- `Master-OpenDSS.dss` (or `Master.dss`) in the zip file may be run in OpenDSS for powerflow results.
- `README.md` (or `README.txt`) have more information on the files as part of the system.

Thank You.