HiPAS GridLAB-D
Final Report Validation Models Addendum

The `gridlabd-models` repository contains the test networks used to validate the powerflow solvers and analysis templates for the various use-cases for HiPAS GridLAB-D. Three classes of test networks were adapted from previously published network models for use in validating HiPAS GridLAB-D.

IEEE Standard Test Networks

The IEEE network models are static GridLAB-D versions of the standard IEEE networks[1]. These models do not include features that cause the GridLAB-D clock to advance and are consequently suitable for validating static solver solution and use-case results. In particular,

1. All device controls are set to `MANUAL`.
2. No recorders, players, schedules, or climate objects are included.
3. No clock directive is included.

13.glm	This circuit model is very small and used to test common features of distribution analysis software, operating at 4.16 kV. It is characterized by being short, relatively highly loaded, a single voltage regulator at the substation, overhead and underground lines, shunt capacitors, an in-line transformer, and unbalanced loading.
37.glm	This feeder is an actual feeder in California, with a 4.8 kV operating voltage. It is characterized by delta configured, all line segments are underground, substation voltage regulation is two single-phase open-delta regulators, spot loads, and very unbalanced. This circuit configuration is fairly uncommon.

[1] See IEEE PES Test Feeders, URL: https://cmte.ieee.org/pes-testfeeders/resources/

123.glm	The IEEE 123 node test feeder operates at a nominal voltage of 4.16 kV. While this is not a popular voltage level it does provide voltage drop problems that must be solved with the application of voltage regulators and shunt capacitors. This circuit is characterized by overhead and underground lines, unbalanced loading with constant current, impedance, and power, four voltage regulators, shunt capacitor banks, and multiple switches.This circuit is “well-behaved” with minimal convergence problems.
342.glm	The majority of end-use customers in North America are served by radially operated distribution feeders. But in areas where there is a high load density and a need for very high reliability, Low Voltage Network (LVN) systems have been built. LVNs are fundamentally different in design and operation from typical radial distribution feeders and these differences require different methods for computational analysis. The network test system is representative of low voltage network systems that are deployed in urban cores in North America. The power system is an urban core and can be a combination of spot networks and grid networks. Note that this system is NOT an actual circuit, but rather representative of the LVN systems.
8500.glm	Large test feeder to verify whether an algorithm scales up. 2500 primary (MV) buses, 4800 total buses including secondaries (LV) and loads. 1-, 2-, 3-phase and split-phase circuits yielding over 8500 total node points.

PG&E Taxonomy Feeders

These feeder models wer made publicly available by the California Energy Commission (CEC) and Pacific Gas and Electric Company (PG&E) pursuant to a computer modeling project undertaken by PG&E and financed by the CEC under Contract #500-11-018. The project modeled the potential voltage impacts to postulated types of electric distribution circuits as hypothetical amounts of photovoltaic systems increase. This work was conducted from October 2012 to March 2015. Under the modeling activities for the project PG&E’s CYME-based feeder models were translated into GridLAB-D file format using an open-source Python scripting language. No private customer data is contained in the information being made available. This information was made available without any warranty of any kind.

North American Taxonomy Feeders

The taxonomy feeder network models are static GridLAB-D versions of the DOE Modern Grid Initiative taxonomy of North America Feeders[2]. They do not include features that would cause the clock to advanced and are consequently suitable for validating static solver solution and use-case results. In particular,

1. All device controls are set to `MANUAL`.
2. No recorders, players, schedules, or climate objects are included.
3. No clock directive is included.

The feeder models in Region 1 apply to the west coast. Region 2 covers northern states. Region is for the desert southwest. Region 4 is for the mid-Atlantic and subtropical states, and region 5 is for the gulf coast states and tropical regions.

[2] Schneider et al, "Modern Grid Initiative Distribution Taxonomy Final Report," PNNL Report No 18035, November 2008. URL: https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-18035.pdf