SIEMENS
Ingenuity for life

Integrated T&D with PSS®SINCAL

Embrace the challenges of Distributed Energy Resources (DER)

Challenge

The proliferation of distributed energy resources on the power grid has changed the fundamentals of traditional power system operations and planning. Grid reliability and optimal supply are at risk with the increase of new technologies and the industry's movement towards a smarter grid. While the grid is evolving, utilities are faced with a new challenge to remain competitive while reducing costs.

Power utilities are required by regulation (in some regions) and/or by internal processes to perform certain types of transmission and distribution analysis. These analyses typically require a dedicated tool that can perform the simulation and analysis of distribution and transmission grids to assist with capital investment decisions, ensure system reliability, and compliance with federal regulations.

With PSS®SINCAL, power utilities are able to analyze the impacts of DERs on their distribution system that can lead to reliability and economic concerns on the transmission system.

Why PSS®SINCAL?

PSS®SINCAL is a customizable solution based application that facilitates modeling and analysis of all types of power systems – balanced as well as unbalanced – ranging from high voltage to low voltage. PSS®SINCAL compliments the strong transmission planning capabilities of PSS®E by extending into areas of integrated transmission and distribution (T&D) planning, allowing users to study the combined impacts of DERs on low-medium-high voltage grids within a single system. In addition, this application combines planning and analysis for electrical as well as gas, water, and district heating/cooling systems, making it the perfect tool for handling future challenges such as hybrid systems (universal grids).
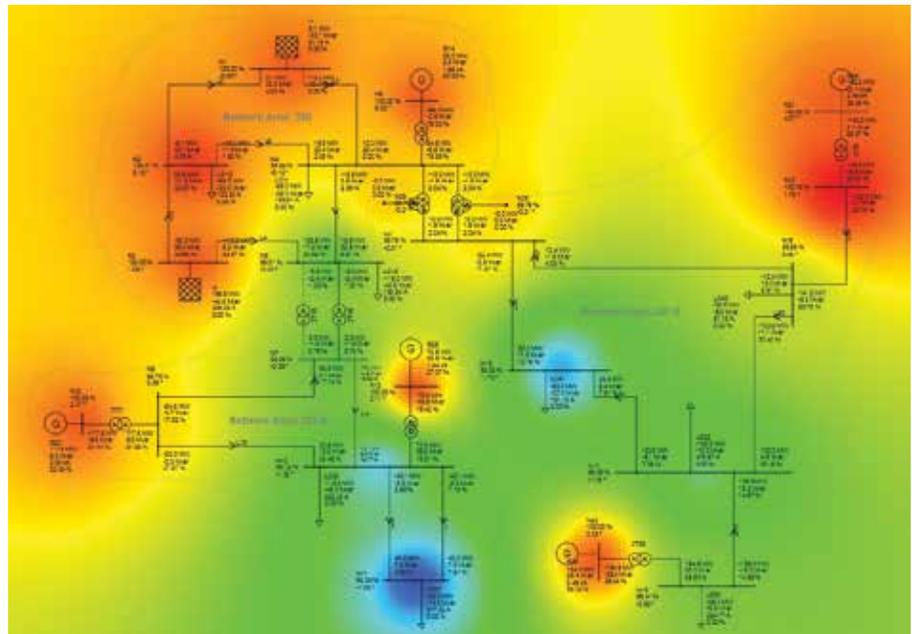
PSS®SINCAL Graphical User Interface

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Using the PSS®SINCAL application, engineers can simulate future scenarios and thus help avoid costly design errors or bad investments. It is ideal for simulating smart grids and implementation of new technologies and their effects.

- PSS®SINCAL is highly versatile with standardized interfaces for easy data import and export that allows users to maintain a variety of data on a single system.

- PSS®SINCAL is equipped with numerous interfaces allowing simple integration into most IT environments. The use of open or commercial databases permits direct data exchange with other systems such as: GIS, MDM, SCADA, Asset Management, ERP (e.g., SAP), Engine Application

- The application has an interactive visualization of network models in schematic, geographic, or multilayer diagrams.

- The application comes with a complete set of advanced algorithms, including economic and strategic planning, and dynamics.

- Programming can be done extensively with standard scripting languages such as VBA, VBS, C++, .Net, Python and Java.

- No special programming language has to be learned.

- PSS®SINCAL also provides special simulation applications for protection device management and dynamic network calculation:

  - **PSS®PDMS** – Protection Device Management System that allows for the storage and management of protection data such as settings, documents, and files. It also enables users to connect protection data from parameterization software (e.g., DIGSI®) and PSS®SINCAL's protection simulations.

  - **PSS®NETOMAC** – This expert system is an application optimized for dynamic network calculations. It provides real-time capability and interactive diagrams as well as a structured code and model management system – developed for dynamic simulation.

Market Problem	Solution	Benefits
• Engineers need to study integrated transmission and distribution systems simultaneously to accurately understand the impacts of the DER integration. The high penetration of DER on the distribution systems resulting in bi-directional power flow, increases the need to understand reliability concerns on the transmission system.	• PSS®SINCAL can link together different systems on-demand, such as: transmission and distribution systems down to the secondary systems.	• PSS®SINCAL can evaluate the impacts of DER built on the distribution systems onto the transmission systems.
• In addition to the impacts of DER on the distribution system, the disturbances on the transmission system must also be evaluated to understand overall impact on the power system.	• PSS®SINCAL supports most model imports and exports (PSS®E, CIM, CYMEDIST, etc.). • As a result of DER integration, PSS®SINCAL can simulate:	• PSS®SINCAL can show the two networks (T&D) completely separate or it can provide utilities with a combined effect of the systems simultaneously.
• Static Load flow analysis will not be sufficient; there will be a need to conduct load and generation profile simulation.	– Thermal loading of all network equipment – Load and Generation Profile Load Flow	• Allows network model management to a high extent and automate specifics.
• Optimization of operation cannot stop at the same voltage levels. Influences of the different voltage level have to be taken into consideration.	– Voltage Limits – Voltage Fluctuations – Reverse Power Flow	• With PSS®SINCAL, the power utilities can navigate the complexities of DER Integration and T&D Integrated planning to over come the challenges and to remain competitive while reducing costs and maintaining the health of the power grid.
• Engineers need to study the impacts that the reverse power flow may have on the transmission and distribution system.	– Protection Assessment – Short-circuit Assessment	