Spectrum Power™ Distribution Network Applications (DNA)

The Siemens suite of Spectrum Power™ Distribution Network Applications (DNA) provides the tools needed to monitor, analyze and optimize distribution network operations. These tools simplify and improve network analysis, providing more reliable network status information to focus control center and field activities for both unplanned situations and planned activities. Spectrum Power DNA helps reduce outage durations from unplanned incidents and helps improve work efficiency.

Spectrum Power DNA:
- Assists in the management and optimization of distribution network operations for reliability and economic purposes
- Can be configured as stand-alone system or integrated with distribution SCADA and/or outage management systems for full distribution management system (DMS) capabilities
- Utilizes all information available from distribution automation and automated metering to improve feeder load models and operations solutions
- Is based on modular state-of-the-art components using the latest hardware and software technology
- Is designed to meet current and evolving industry standards and satisfy regulatory requirements.

Benefits
Spectrum Power DNA can provide benefits, such as:
- Accurate, real-time modeling for better monitoring and control of the distribution network
- Ability to assess network state in real time, identifying equipment overloads, voltage limits, losses, loop and parallel conditions
- Evaluation of network control actions under a wide variety of hypothesized conditions and optimizes restoration and work activities
- Ability to locate and isolate faults and efficiently restore service.

Key features
Key features of Spectrum Power DNA include:
- All applications available in real time and/or study modes
- Field-proven application suite used on distribution networks of all sizes
- Utilization of information from distribution automation and automated metering devices
- Improved distribution transformer load model
- Automatic isolation and restoration service based on automated device controls
- Optimization of voltage range, losses and service restoration
- Interactive and automated creation of switching plans to support work and restoration activities
- Effective integration with existing/planned outage management, mobile workforce management and distribution SCADA systems.

Control center and energy management solutions

Answers for energy.
Architecture and model building tools to support general enterprise integration with geographic information system (GIS), customer information system (CIS), interactive voice response (IVR), maintenance and other systems

Ability to implement as a standalone application suite with its own user interface or integrated within a consolidated (single) user environment for the distribution network operators and dispatchers

Operational model editing to support jumper, cut and grounding field activity

Ability to support multiple simultaneous study users as well as multiple distribution network model versions.

Package options
The Spectrum Power DNA suite is comprised of a base package and options within two main functional areas:

- Distribution network analysis applications
- Distribution network optimization planning applications

Distribution network analysis applications
The distribution network analysis base package includes the applications required to determine the state of the distribution operating model and perform fault management. The applications that comprise the base package are:

- **Distribution system state estimation** - mathematically robust tool for augmenting the set of distribution system operation information needed in subsequent analysis functions, substituting the missing measurements and filtering out the measurement errors. The results are statistically improved magnitudes and angles of voltage vectors in electrical nodes.

- **Distribution system power flow** - an efficient and intelligent operator tool to monitor the real-time network situation, as well as to study planned configurations under different load conditions in the distribution system. It estimates the current state of the distribution network elements to detect potential equipment loading and voltage limit violations.

- **Fault location** - used to quickly determine the most probable location of electrical faults in the distribution network. It evaluates real-time data received from the feeder breaker or recloser, fault relays, and the feeder breaker’s response to trial switching operations.

- **Fault isolation and service restoration** - defines switching actions to enable the operator to efficiently isolate faulted areas of the network and to restore service to customers on unfaulted feeder sections - even before repair work begins.

- **Volt/VAr control** - provides recommendations to control positions of transformer tap changers (LTC, line voltage regulators) and switchable shunt reactive devices (typically capacitors) to keep distribution feeder equipment loading and voltage within defined limits. In addition, Volt/VAr control provides the following choices for optimization: minimization of reactive power generated, minimization of real power demand or maximization of revenue. It can be used in an automated or user-interactive mode to achieve a global versus local optimization.

Distribution network optimization and planning applications
The optional optimization and planning applications are used to maximize system operation while avoiding potential system limit violations. These applications use cases from the distribution network analysis package to assess how the distribution network can be better utilized and provide recommendations/plans to restore service to customers. The available applications include:

- **Short-circuit calculation** - calculates fault currents in the distribution network to determine potential operating conditions and network configurations that may exceed circuit breaker rating(s). It can also be used to verify the circuit breaker capacity and protection settings.

- **Optimal feeder reconfiguration** - determines switching plans and options for feeder reconfiguration accounting for equipment loading limits, voltage limits and feeder losses. It can supply multiple prioritized plans to the operator and is particularly effective in reconnecting large areas after an outage.

- **Optimal capacitor placement** - determines optimal size and location of the capacitors in the distribution system network in order to minimize power loss, under-voltage and power factor constraints. It is used for distribution system planning and design.

- **Switching plan management** - provides a control/execution engine for switching operations required by the DNA functions. It provides simulation of all switching actions with power flow checks and automatic documentation/record keeping.

For more information, please contact your local Siemens representative.