The complete training and system validation tool

Alstom Grid’s Network Simulator is part of the e-terradistribution suite of applications. Network Simulator allows dispatchers to be trained in both routine and emergency procedures in an environment that accurately represents the behaviour and response of the real system. It utilises the same software components, interfaces and user interface as thee-terradistribution Real-time Network Management system.

In addition, the Network Simulator can be used to validate new applications and network models. Because of the thoroughness of the replication provided by the Network Simulator, it can also be used to evaluate business processes such as storm restoration programs.

The Network Simulator provides an important support tool for ALSTOM Grid’s e-terradistribution real-time network management system. The implementation of a comprehensive simulated network model provides a very effective environment for the training of users as well as for testing the system.

The simulation engine supports the complete user interface of e-terradistribution. The simulation engine is able to exchange status and measurement data with a SCADA simulation. This provides the ability to feed power flow-related data points to the SCADA system.

The Network Simulator provides an environment for the following types of operations training:

- User Interface presentation and navigation
- Tagging
- Switching operations (manual and supervisory)
- Topology Processing including feeder colouring and tracing
- Annotations
- SCADA operations and alarms
- Network analysis
- Network optimisation
- Real-time and Study Mode operations

Full-functionality simulation and total control

Outage Management

The simulation engine is capable of providing a full OMS simulation including the more advanced Distribution Network Analysis functions along with the relevant interfaces (IVR, AMI, etc.). This functionality includes:

- Outage Management System
- Trouble Order Message Simulation based on location of fault placed via event scripts
- Fault location
- Switching operations including interface to receive requests
- AMI interface simulation
- Automated crew assignment and fault restoration to simulate large-scale storm activity

Event Scripter

The trainer can create, save and edit time-based event scripts. Supported actions within the event scripts include fault placement, switch open/close and introduction of measurement errors. Complex scenarios can easily be developed that simulate the effect of major storms over any part of the distribution network.

Customer benefits

- Training on the actual operating environment
- Does not require additional specialised training facilities
- Validate and review operational procedures
- Test system changes prior to going online
- Does not require separate model maintenance GRID

Customer benefits

Simulator Instructor view of network and Event Scripter control panel
Real-world training scenarios

The diagram below shows how the Network Simulator is used to build an e-terradistribution training system. The Network Simulator provides an instructor interface that is based on the standard e-terradistribution user interface. The instructor is able to view and navigate through the simulation of the physical network in the same way as in normal real-time operations. In this way the instructor can make changes to the physical network independent of the operator’s real-time network views.

When a fault is placed on the simulator view of the network, the simulator traces upstream to the first protective device (fuse, circuit breaker etc.) and causes it to operate. The de-energised customers (and/or their AMI meters) will generate trouble calls in accordance with call-response parameters that have been set. If the outage affected any SCADA controlled devices, then the appropriate messages will be sent to the SCADA simulation. In this way a truly realistic representation of network events is provided to the operators.

The simulation instance of the network model is automatically created as part of the standard modelling update process, meaning that no additional work is required to create the simulation and the training simulator is always up to date with the real-time network model.

Alstom Grid’s integrated solution for real-time management of distribution networks

Advantage

- Alstom Grid Energy Management and SCADA Systems are used by electricity utilities throughout the world. Alstom Grid employs industry experts to meet customer requirements.
- e-terradistribution Network Simulator has been specifically designed to meet the needs of all sizes of distribution utilities.
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