Maintaining peak network efficiency

The e-terra distribution Network Optimizer is part of the e-terra distribution suite of applications for real-time distribution network management. It allows the operator to optimize the network configuration, improve feeder voltage profiles and automatically perform restoration switching, an essential component of any Smart Grid implementation.

- **Load and Volt/Var Management (LVM)** – optimizes and coordinates capacitors and voltage regulators to manage demand and maintain system operation within voltage limits - can be run in advisory or automatic modes
- **Fault Location, Isolation and Service Restoration (FLISR)** - rapidly generates a switching sequence to isolate faulted sections and optimally restore service to the non-faulted sections - can be run in advisory or automatic modes
- **Planned Outage Study (POS)** – a study tool that provides an automated means of preparing switching orders for planned outages
- **Automatic Feeder Reconfiguration (AFR)** – optimally restores the network to its normal configuration, unloads overloaded segments and optimizes the location of normally open points

**Customer benefits**
- Improved customer service/network performance indices
- Maximize network capacity
- Reduce voltage violations
- Faster restoration times
- Reduced dispatcher workload during times of multiple outages
- More efficient use of network equipment

**Optimization tools** are integrated with network analysis, outage management, simulator and SCADA
Real-time distribution system optimization reduces cost, increases reliability

**Load and Volt/Var Management**

The Load and Volt/Var Management function provides recommendations to improve the voltage quality, manage demand and provide reactive support to the surrounding distribution system. By using analysis of a significant portion of the distribution network and coordinating the operating commands for all active regulating devices, LVM achieves a considerable improvement over conventional load and volt/var control techniques. In demand reduction mode LVM is able to achieve a 1.5-2% improvement in reduction over conventional methods. Load and Volt/var Management may be executed in automatic (closed-loop), advisory or study modes.

**Fault Location, Isolation and Service Restoration (FLISR)**

The aim of the FLISR function is to optimally restore service to customers. Based on the predicted location of a fault, the operator can invoke the FLISR function. FLISR will create a switching plan which provides service restoration by using optimal feeder configurations, including the off-loading of neighboring feeders in order to pick up part of the load of an adjacent feeder. This optimization process considers the adequacy of alternative supplies with respect to overload, voltage drop violations, number of switching operations, and relay constraints. There are usually several valid solutions produced and they are ranked and displayed to the operator. The selected plan can then be automatically transferred to a formal switching order for execution.

Alternatively FLISR can be set to operate in closed loop mode which automatically performs the network switching to isolate the fault and restore the non-faulted feeder sections.

**Automatic Feeder Reconfiguration**

The Automatic Feeder Reconfiguration (AFR) function generates switching plans to optimally unload overloaded feeder segments and to optimize the location of normally-open points. AFR can be used to reduce overloads on both substation transformers and feeder segments. The function takes into account peak load conditions within a user-specified window.

The AFR output provides a set of recommended switching actions which can be directly transferred to a formal switching order.

AFR can be run manually on the real-time system or run in Study Mode.

AFR also includes a Return to Normal mode to generate a switching plan that restores all switches to their normal state for a given group of substations with minimum interruption of supply to customers.

**Planned Outage Study**

The aim of Planned Outage Study (POS) is to recommend switching plans for planned outages. The operator specifies the network device that is to be taken out of service and POS will generate one or more possible switching plans. POS first transfers the affected load and then isolates the specified device. If the substation is selected then POS will develop a plan to off-load all substation power transformers.

POS can only be run in Study Mode.

The POS results are shown as a tabular display giving the planned switching, statistics and performance indices. The selected plan can be automatically transferred to a formal Switching Order. This Switching Order can be executed in Study Mode to fully verify the operation.

**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-terra distribution Network Optimizer** has been specifically designed to meet the needs of all sizes of distribution utilities.

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