ALSTOM Grid’s solution for preventing blackouts via enhanced situational awareness

In the 21st century, huge demands for electricity are projected for the public, commercial and private sectors. Given the critical role of electricity in society, the consequences of brownouts or blackouts cannot be tolerated. ALSTOM Grid’s e-terra vision™ is designed to help operators monitor, predict, anticipate and prevent potential problems that can lead to major power outages.

Operators and dispatchers work with and rely on new technologies to keep the lights burning bright. The power industry is being challenged by the realities of an aging workforce and T&D infrastructure combined with the operational complexity of very large T&D networks.

There is now a need for new tools and easier ways to assist operators in performing these critical tasks- enabling them to make quick, accurate decisions.

e-terra vision™ significantly improves transmission system operations and control by helping to eliminate the reactionary decisions which are being made in control centres today. As systems grow more complex – and data flow increases by volumes, control centres are moving into new operational paradigms.

e-terra vision™ supplements control rooms with higher-level decision support capability using visualisation, “smart applications” and simulation for improving situational awareness. This is an operator-friendly system that enables power dispatchers to fully visualise their networks with the right level of situational awareness and to proactively operate the grid by taking the necessary real-time corrective actions.

e-terra vision™ is the operator’s companion and can help them to:

- Monitor the transmission network using large overviews
- Assess the grid’s reliability using advanced visualisation
- Perform predictive analysis
- Prioritise corrective actions

Customer Benefits

- Task-oriented design for immediate access to critical data, minimising user actions to get the required information
- Complete view of the transmission system guarantees full awareness before making decisions
- Predictive analysis tools and simulation provide early warning alerts to plan an optimised set of actions
- Intuitive design for rapid learning curves and increased productivity
- Common standard of visualisation for a cooperative environment among utilities and faster crisis solving
Key features

Analysis of base case and post-contingency violations
One of the main tasks for transmission operators is to maintain compliance with N-1 security principles, using contingency analysis.

e-terra vision™ is delivered with an approach to analyse base case and post-contingency violations based on industry best practices. Your existing network applications provide the analytical results which are efficiently and intuitively presented to operators. The system also monitors the health of your applications and visually indicates whether the computed results are current and valid.

The main issues that e-terra vision™ can help you resolve via graphical aids are:
- voltage limit violations
- remedial VAr compensation
- thermal limit violation
- remedial switching actions
- preventive contingency analysis
- overall assessment of the network reliability with constant monitoring of past, present and future situations

Overview and reliability dashboard

e-terra vision™ is designed to present overviews of the power grid on large wallboards, as well as providing detailed drill-down capability for both operators and analysts at their workstations.

Overviews are presented either geographically or schematically. The Reliability Dashboard provides immediate and comprehensive information on key parameters that measure the health of the transmission system.

Sharing findings and working together on an emergency situation becomes much more efficient because the supported data is readily available and displayed on both wallboards and workstations.

Direct access to vital data

e-terra vision™’s architecture is designed to fetch real-time data directly from your EMS database and present it as key vital signs in a concise form.

Operators no longer have to navigate through multiple displays to get the information they need.

A single panel organised with logical tabs brings relevant data to the unique main window.
Animations and contours
Animation is a powerful tool used to rapidly detect abnormal direction of power flows or sudden changes in power across a line. Smart thresholds based on the percentage of thermal limits can be set so that flows are animated only when approaching alarm levels. MW and MVAR flows can be visualised as animated arrows in order to quickly understand looping or other unusual patterns. This is also a great tool for new operators to get familiar with grid behaviour. Another graphical aid, contours, is utilised to indicate regional issues. For example, voltage contours are graphical tools used to identify pockets of low or high voltages. This is done by extrapolating voltage levels across the map between monitored stations. Contours can be automated, filtered in and out and are supplemented by graphical queries on actual voltage values in a region.

Custom dashboards
Operators can build custom dashboards on-the-fly to assist in the assessment of a situation. From the overview display, the operator creates a combination of snapshots using drag and drop to place important information side-by-side. These dashboards are fully functional displays, with data refreshed at the same rate as the overview display. Every dashboard can be saved and recalled, thus creating a library of graphical knowledge bases for particular situations.

Graphical Authoring tool
The e-terra vision™ Graphical Authoring tool is an offline editing environment to build overview displays. The primary goal of the Graphical Authoring tool is to reduce the errors that are often introduced when drawing an operational power system diagram, without automated binding of the physical elements stored in the EMS database. Another goal is to enable further manual modifications, using familiar and powerful drawing techniques - in a WYSIWYG environment. Three types of displays are supported:

- Geographical overviews
- Schematic overviews
- Station single-line diagrams

The creation of overview displays is driven from the network model to allow for accurate data topology and linkage. The authoring tool gives you the flexibility of selecting the style of all objects with a user-configured library of templates. Upon automatic generation of the overview, you can incrementally make modifications to the display without impacting the already generated elements.
ALSTOM Grid services

ALSTOM Grid can provide assistance for installing and configuring e-terra vision™ in various forms. ALSTOM Grid can assist with:

- Complete turnkey installation, configuration, and commissioning
- Engineering services on an "as-needed" basis

A training program is offered that focuses on “train the trainer” methods. Typically, the IT Administrator and the Operations Training Manager take the e-terra vision™ training class.

To fulfill the demand for high-level situational awareness, SA Technologies has teamed with ALSTOM Grid to provide unique, custom-designed solutions for power systems operations. The experts at SA Technologies have joined with ALSTOM Grid’s experts to deliver widely used and tested solutions for improving situational awareness in control centres. A situational awareness assessment can be conducted prior to an installation of e-terra vision™. To confirm the benefits of e-terra vision™, a new situational awareness evaluation can be conducted following the training and initial use of e-terra vision™ within an actual control room.

- e-terra vision™ is a certified product of ALSTOM Grid and is supported worldwide by ALSTOM Grid technical support teams. Upon installation and commissioning, we provide the necessary services for continuous technical support and upgrades.
- e-terra vision™’s users are part of a global community, sharing best practices and actively participating in product development and innovative research projects via a dedicated user’s group and specific focus groups.