

System Awareness - How to detect system states

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Abstract

Since 1996 DUtrain is performing training courses for operators from control centres in the energy supply business. Therefore DUtrain operates and maintains its own training simulator which is capable to model several control centres (TSO, regional networks, production and distribution) in parallel. Specifically designed courses deal with the operation in a multi area control centre structure. Participants in the training courses are recruited from the diverse control centres to do a common training (up to now about 750 courses with some 6000 operators from control centres all over Europe).

A new challenging area has been entered in 2007 when beginning to perform simulator based training courses on Inter-TSO level. Since then DUtrain runs training sessions for operators from neighbouring TSO control centres within the eastern part of the interconnected ENTSO-E RG CE system (CEE). Therefore a system replica of this region was created for the DUtrain operator training simulator. The training goals and contents were defined referring to the ENTSO-E RG CE Operation Handbook, especially Policy 5 (emergency). For the training sessions scenarios are prepared and set up, which cover different system states, from normal to alert and to emergency.

For the system states information exchange in the TSO control centres the Regional Alarm and Awareness Tool (RAAS) is available. The individual TSO system states are displayed in one overview by a traffic light for each particular TSO. Main goal is to increase the knowledge of the state of the system and accordingly launch alarms to neighbours rapidly. These states are determined by the constrained TSO, set manually to the RAAS platform, and are distributed via electronic highway followed by an email describing the reason for manipulating the traffic light. Manipulating the traffic light should be based on operational criteria as described in the Operational Handbook Policy 5.

As a consequence for operational realistic training a platform for information exchange during the sessions had to be implemented as well, the Training-RAAS, where system statuses can be indicated manually.

As a role player for non-participating TSO during sessions the trainer has to set the states for these TSO. Further more the trainer has to observe the system states of all participating control centres. In case of status changes within the Training-RAAS the sessions can be

stopped, a common discussion can be initiated, and operational action can be retrieved.

To support the trainer's tasks a tool for detecting system states automatically for the complete system seems to be useful. Such an Automatic Training RAAS runs in parallel to the manually set Training RAS and collects information from the actual system state provided by the calculation engines within the Operator Training Simulator. This overview should deal as a trigger for the trainers to detect fast and easily in which region the system state changes from e.g. 'normal' to 'abnormal'.

These automatically generated awareness system states should be based upon operational criteria described in Operation Handbook plus additional criteria, which seem to be useful.

This contribution describes the idea and implementation-status of the the manual Training-RAAS. The idea and implementation strategy of the automatic Training-RAAS as trainer's tool in Inter TSO sessions is presented. The additional criteria are described, e.g. short circuit power, reserve power management and cross border incidents, to detect system states more objectively and to retrieve operational countermeasures.

The system awareness does not stop at the borders to the regional grids. This contribution additionally deals with application of an awareness platform for information exchange between TSO and underlying regional control centres during training sessions, including an approach on information exchange needs between these control centres.