Abstract

Remedial Action Schemes (RAS) is an automatic special protection system (SPS) designed to detect abnormal system conditions and to take a corrective control action to avoid impact on the electric power grid. These control actions are generally predetermined and may result to maintain system stability, desired voltage level, or power flows by switching actions, adjusting demand, generation, or system configuration. The RAS is designed to minimize the impact of higher order critical Contingencies.

Focus

Our project focuses on the following contingencies:
- Over current conditions
- Over/under frequency conditions
- Generation drifting

Hardware and software used for simulation:
- SEL-3530 RTAC
- OPAL-RT
- AcSELerator RTAC

The simulation was performed on the IEEE 14 bus system.

Impact Analysis

Ethical
- False positives could result in unneeded load shedding
- Unforeseen results could result in injury
- Efficiency and reliability are important
- People are more open to new technology

Global Impacts
- With more renewable energy resources, PMUs and RASs are needed
- Rising demand of Renewables
- RASs are more manageable

Social Impacts
- Consumers benefit
- People could receive email or text notifications
- When at work, you could be alerted of an outage at home
- On call line technicians could be quickly notified

Economic and Environmental
- More efficiency would lower power lost
- $1m RAS system could replace $50m - $250m worth of TL's
- One of the Biggest barriers is the startup cost
- RASs could provide a platform for renewable energy

Recommendations

- Expand to larger test grid
- Continue research on remaining contingencies
- Improve accuracy and speed of current RAS

Glossary

Remedial Action Scheme (RAS): an automatic special protection system (SPS) designed to detect abnormal system conditions and to take a corrective control action to avoid impact on the electric power grid.

Synchrophasor Data: provides real-time voltage and phase angle measurements at a rate of up to 60 Hz.

Contingency: a future event or circumstance that is possible but cannot be predicted with certainty.

Real Time Automation Controller AcSELerator (RTAC): a computer that we programmed our RAS, produced by Schweitzer Engineering Laboratories.

TL: transmission line

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