

Testing in IEC 61850 Systems

Focus on Maintenance Testing of Protection Automation
and Control Systems in a Live Power System

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Overview – Testing of IEC 61850-based protection, automation and control systems

Safe, secure maintenance testing is critical to and adoption of IEC 61850

- 2 hour presentation session
- 2 hour session on live demonstrations
- How to achieve test isolation for normal in-service systems
 - Conventional P&C systems
 - New digital systems based on IEC 61850
- Requirements for testing tools

Overview –

Testing of IEC 61850 protection and automation systems (PACS)

- Tools required for
 - Placing the devices in a state to ensure safe and secure testing
 - Monitoring the status of IEDs and essential logical functions before and during testing
 - Monitoring the status of functional elements of interest during testing
- Testing tools to
 - Simulate power system conditions –voltages/currents under normal loads and faults
 - Simulate digital inputs to the devices
 - Monitor and measure the operation and performance of the functional elements under test

Conventional PACS

- Designed with safe and secure testing in mind
- Device under test is physically isolated from the normal system
 - Trips, BF initiate and other outputs are isolated by opening switches or links
 - Current circuits are shorted before disconnection
 - Voltages circuits are opened
 - Use of test plugs can perform above in proper sequence and automatically
 - Interaction with other IEDs while testing is reduced
- Test sets can inject simulated voltages and currents and binary signals without affecting the rest of the PACS in normal operation
- Protection devices are generally standalone with a single or limited functionality
- Test steps are simple enough



IEC 61850-based PACS

- Connectivity is done through network communications
- No wired inputs and outputs from the IEDs, with very few exceptions
- PACS functions are distributed in multiple devices
- Physical disconnection of the device under test from the network is not desired. This causes unnecessary alarms and possible disabling of other functions.

How can we securely perform maintenance testing?

IEC 61850-based PACS

How can we securely perform maintenance testing?

The solution:

IEC 61850 Test and Simulation features

Testing Demonstration System

