INDEPENDENT RTDS TESTING LABORATORY FOR DEVICE/APPLICATION
PERFORMANCE EVALUATION

RTDS is a real-time power system simulation platform for precise modeling and analysis of transient phenomena, utilizing simulation time close to the time frame of actual events. It was primarily developed and utilized for hardware-in-the-loop (HIL) testing of protective relays, digital controllers and process control devices for performance evaluation and pre-commissioning testing under real-world conditions. RTDS testing is also commonly used for prototype development and/or finalizing a new application design involving several digital control, protection and measurement devices.

Service Offering

- Test plan and model development
- End-to-end relay protection scheme testing
- Protection testing in real time to ensure dependability and security
- Interoperability and conformance testing
- Power system transient studies and model verification
- Real-time testing of RAS/SPS scheme
- Recloser control testing
- Performance validation of new relays
- Testing of PMUs/PDCs
- Root cause analysis of misoperations
- IEC 61850 simulations to test GOOSE messaging and sampled value implementations
- Testing of renewable energy controls
- Test concepts related to smart grid

Real-Time Hardware-in-Loop Simulation

RTDS testing normally involves sequence of event analysis by developing realistic test scenarios under which the application performance needs to be evaluated. In an RTDS test setup, simulated power system quantities (e.g. voltages and currents at secondary levels), status signals and control commands (e.g. circuit breaker on/off positions and tap-changers status) are exchanged with the control or protection devices in real time through several analog and digital interface cards with high precision.

Simultaneously, the processed signals and/or control commands (e.g. trip signals from protective relays and gating control signals for power electronic apparatus), representing the reaction of the devices under the test to the simulated phenomena are fed back to the real time simulator. The feedback signals and control commands from the devices are used to adjust the power system topology and change any applicable set points as typically performed by system operators or dispatch centers.

Utilities can benefit significantly by utilizing the computing power that RTDS provides. Most utilities do not own Real-Time Digital Simulators because these are expensive testing tools. In addition, utilities find it hard to maintain a dedicated staff proficient in running analysis/testing using RTDS. With this in mind, Quanta Technology has established an RTDS lab in partnership with North Carolina State University in Raleigh, NC. The lab currently performs testing/analysis for several utilities.

Quanta Technology has industry renowned power system and protection experts for consulting services related to RTDS simulation. This combination allows testing to be done without any constraints.
The precise representation of complex power system transient phenomena (faults, frequency oscillations, voltage collapse) and real-time interactions with the actual control and protective devices (rather than modeling them) are the salient features of RTDS testing. Practically unlimited number of test cases and study scenarios can be generated and used to evaluate device performance and operation under system normal and contingency (N-1/N-2) conditions.

Some of the questions that RTDS can answer for you:

- Is the logic for the RAS/SPS system sound and sturdy enough?
- How will the PMU perform within a network? Is there a need to do close loop testing and verify appropriate performance of the PDCs?
- Will the PV controls work appropriately when integrated into an existing system?
- Can actual relay hardware be used to verify the dependability and security of the relays in a critical transmission line?
- After a thorough review of the system settings, there are still some doubts about how specific logic will work. Is this something RTDS can support?

For further information about RTDS testing, please contact Ed Khan at 919-334-3065 or email EKhan@Quanta-Technology.com.