RTDS NEWS

A new simulation laboratory opens at the Moscow Power Engineering Institute

WHAT'S NEW: MARCH 2016

Cape Peninsula University of Technology grants prestigious funding to simulation laboratory

FPGA-based firmware increases IEC 61850 Sampled Values streaming capabilities of the RTDS Simulator

GUEST ARTICLE

Substation automation laboratory receives prestigious funding from Cape Peninsula University of Technology

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The Centre for Substation Automation and Energy Management Systems (CSAEMS) was established at the Cape Peninsula University of Technology (CPUT) in 2011. The objective of the CSAEMS is to carry out research and skills development needed to support the South African power industry in the adoption and application of new knowledge-based and standard-based monitoring, protection, and control technologies. The CSAEMS, headed by Professor Raynitchka Tzoneva, has been funded by the South African Department of Science and Technology / National Research Foundation Strategic Research Infrastructure Programme (SRIP), the South African Department of Trade and Industry Technology and Human Resources for Industry Programme (THRIP), and the Eskom Tertiary Education Support Programme (TESP). Most recently, the Centre has been awarded Prestigious Project Funding for five years from CPUT itself in recognition of its contributions and success since its establishment.

The research and human resource development objectives of the CSAEMS are:

- Investigation and design of modern standard-based substation automation and energy management systems (SAEMS);
- Research, experimentation, and application development of innovative standard-based solutions for SAEMS and their joint application for coordination of the functions of data acquisition, data distribution, monitoring, protection and control in the frameworks of the Smart Grid;
- Education and training through the development of research capacity and postgraduate students at the University, implementation and integration of the research-acquired knowledge for the development of training, workshops, seminars, conferences, and other structures to support personnel working with substation automation systems, and creation of a "train–the–trainer" facility for skills transfer into industry.

To this end, the CSAEMS has created a unique multi-disciplinary and multi-vendor protection, control, communication, testing, and real-time simulation environment for carrying out applied research and training in the fields of metering, monitoring, protection, automation, and control of power systems. Particular attention is paid to standardization of the control structure and communication protocols by utilization of standards such as the International Electrotechnical Commission (IEC) – IEC 61850 standard for "Communication Networks and Systems in Substations", and IEC 61970 standard for "Energy management system application program interface". These standards are used as a framework within which to develop coursework and explore experimentation and research questions, for the purposes of undergraduate and postgraduate student education, technician and engineer training as well as retraining, and undertaking of joint projects with the electric power industry.

The equipment available in the Centre, including a number of RTDS Simulator racks, allows for in-depth studies to be carried out in a range of focus areas such as hardware-in-the-loop testing of individual protective relays and full protection schemes, real-time studies on networking topology and redundancy, integration of SCADA systems, the use of parallel computation solutions for power system optimization problems, and the use of computational intelligence methods for knowledge-based decision making in power systems operation.

The RTDS Simulator installed at CPUT

Southern Africa User's Group Meeting a huge success!

We are excited to announce that the inaugural Southern Africa User's Group Meeting was a great success. Thirty RTDS Simulator users gathered at the University of the Witwatersrand in Johannesburg, South Africa, to share their work, network with others, and learn about novel applications of the RTDS Simulator.

The topics covered in user presentations included the use of a synchrophasor-based wide area monitoring, protection, and control testbed; IEC 61850 Sampled Value testing; and the use of the RTDS Simulator for undergraduate project work.

Three practical sessions which demonstrated applications of the RTDS Simulator were also offered to participants. Topics included HIL testing of fully IEC 61850-based protection schemes, the automation of conventional protection scheme testing, and HIL testing of generator controls.

A full list of presentations is available on our website, and slideshow files are available upon request.

Click here to see the list of presentations

In one research project, the RTDS Simulator has been used to conduct detailed testing and analysis of IEC 61850-9-2LE sampled value messages. A real-time model of a representative power system was used to output a stream of data in IEC 61850-9-2 sampled values format, via a GTNET card on the RTDS Simulator rack, which was then subscribed to by an external hardware IED, as well as to subscribe to a stream of sampled values data (again via a GTNET card) from an external merging unit. This approach has allowed the conformance of the fixed, varying, and data portions of the SV message structure to be confirmed, as well as the interoperability of the SV standard to be confirmed.

In other work, investigations have been carried out on the RTDS Simulator into the use of phasor measurement units (PMUs) to solve the economic dispatch problem in real time. Live data from a real-time simulation was output, in time-synchronized format, using the GTNET-PMU protocol to an external phasor data concentrator and assembled into a MySQL data base using the OpenPDC software. The time-stamped data was retrieved every five minutes from the data base by an optimization algorithm running in MATLAB, that was used to solve the optimal dispatch problem by means of Lagrange's algorithm.
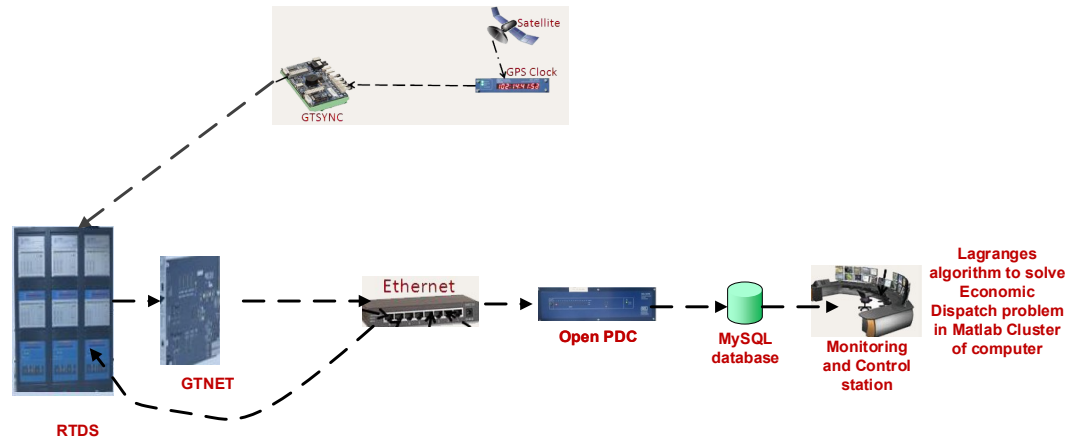

Diagram of laboratory set-up for economic dispatch optimization at CPUT

The RTDS Simulator at the CSAEMS has also been used to investigate non-iterative methods and algorithms for real-time voltage stability assessment and system integrity protection schemes (SIPS). Live data from a real-time simulation model of the New England 39-bus test system was output at 60 frames per second, in time-synchronized format, using the GTNET-PMU protocol to an external wide area monitoring, protection and control (WAMPAC) testbed.

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Technologies

European UGM to take place in Scotland this fall

RTDS Technologies is pleased to present the 2016 European User's Group Meeting, which will take place at the University of Strathclyde in Glasgow, UK. The event will take place on September 15 and 16 at Strathclyde's state-of-the-art Technology and Innovation Centre, and will feature a tour of the innovative Power Networks Demonstration Centre.

Don't miss this incredible opportunity to connect with other users, explore new applications of the RTDS Simulator, and stay informed on new developments!

Abstracts due by June 1, 2016

Register to attend by August 11, 2016

Click here to register or submit an abstract

A programmable logic controller at the heart of the WAMPAC test bed was used to calculate a range of on-line voltage stability indices in real time, for comparative performance analysis, the outputs of which were passed to an under-voltage load shedding controller and then fed back, in a hardware-in-loop arrangement, into the real-time model of the 39-bus test system. The RTDS Simulator allowed experimental proof of concept of the real-time implementation of the on-line voltage stability indices and SIPS on industrial PLC hardware, as well as direct comparison between the performance of different voltage stability indices under realistic voltage collapse scenarios.
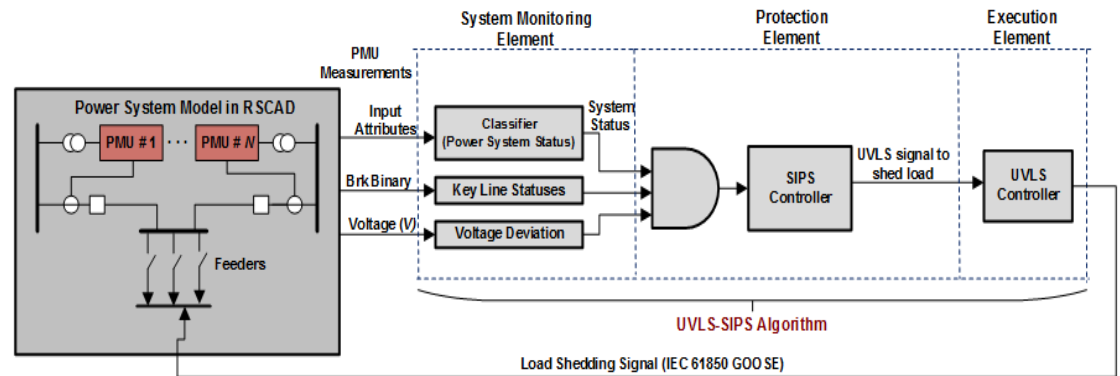
System integrity protection scheme test set-up at CPUT

FPGA-based firmware boosts IEC 61850 Sampled Values streaming capabilities

RTDS Technologies is pleased to announce new capabilities in the transmission of IEC 61850 Sampled Value (SV) compliant data streams. Our new GTFPGA-SV firmware, which is run on the dedicated FPGA-based hardware pictured here, significantly increases the number of SV data streams that can be output from the RTDS Simulator. Existing streaming capabilities are provided exclusively by the rack-mounted GTNETx2 Network Interface Card, and this new FPGA-based firmware will provide an exciting new opportunity for clients who are interested in large-scale SV streaming.

Each GTFPGA Unit features 16 Ethernet ports. In 9-2LE mode, each of the 16 ports can contain one data stream with 4 current and 4 voltage channels. In non 9-2LE mode, based on IEC 61869-9 and configurable for the Chinese National Standard, each of the 16 ports can contain one data stream with up to 24 channels of voltages or currents. The GTFPGA-SV component will be available in RSCAD shortly.

New Features in RSCAD

- A Jiles-Atherton based current transformer model that includes an MOV branch, and related documentation, is now available.

- A 2D Lookup Table component, which outputs either the nearest value or an interpolation from a table based on x- and y-axis inputs, is now available.

- The GTFPGA-SV component for providing IEC 61750-9-2 Sampled Value communication via FPGA-based hardware will be available shortly.

Click here to log in to the RTDS client area, where you can access the full RSCAD release notes.

If you have an idea for a new feature, please send it to **feedback@rtds.com**. We want to hear from you!