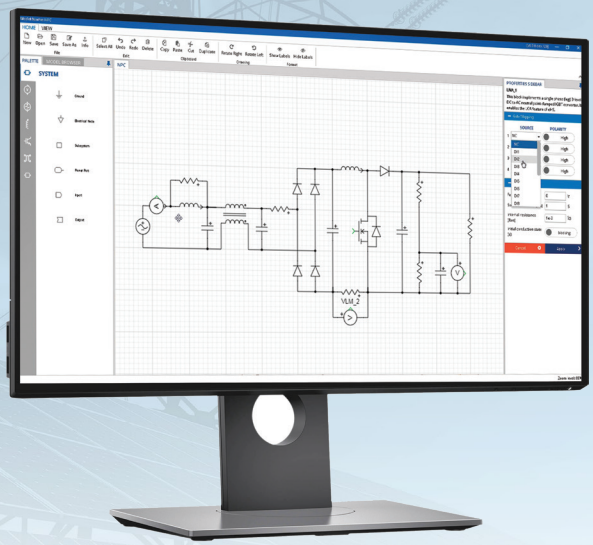
OPAL-RT TECHNOLOGIES



Real-Time Testing Solutions For Microgrid

OPAL-RT helps with challenges faced by engineers by offering advanced simulation tools for detailed Hardware-in-the-Loop studies of phenomena occurring with Distributed Energy Resources (DER). To achieve this, OPAL-RT has hybridized cutting-edge CPU and FPGA technologies, which accurately represent the behavior of both power systems and power electronics in a single simulation at very high speed.

Sub-microsecond time steps for power electronics simulations

Very large grids simulated with time steps between 10µs and 50µs

Compatibility with smart-grid communication protocols including Modbus, DNP3, IEC 61850, OPC, and C37.118

Learn more at: www.opal-rt.com/microgrid

OPAL-RT TECHNOLOGIES

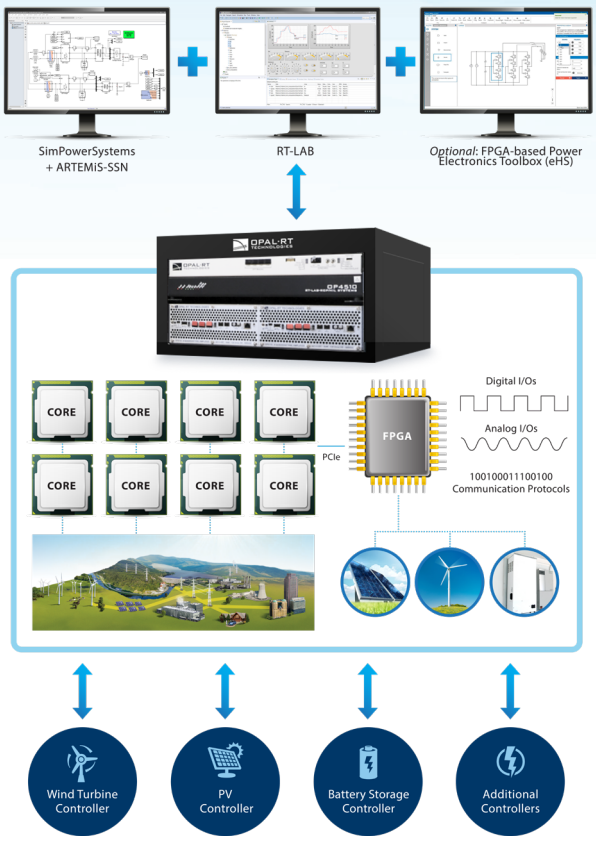
OPAL-RT's solutions enable the real-time simulation of microgrids to be performed in numerous configurations:

- Supervisory control (with a single controller)
- Power HIL (with real inverters, photovoltaic plants (PVs), and energy storage units
- Simulation Accelerator (from offline to real-time)
- Multi-agent System (with multiple controllers) solving to HYPERSIM

Benefit from:

- A simulation environment based on MathWorks' Simscape Power Systems™ (formerly SimPowerSystems™)
- A suite of fixed-step solvers and algorithms to optimize SPS-based models of electromagnetic transient (EMT) systems for high fidelity, high-performance simulation in real time
- The only solver specifically designed for microgrid distribution systems, ARTEMiS-SSN, allowing for multi-processor simulation without introducing artificial delays

Multi-agent System (MAS)



The Most Advanced Real-Time Simulation Systems Available

HYPERSIM: A dedicated, large-scale real-time simulation system developed by Hydro-Quebec, RTE and CEPRI for pre-commissioning studies and fault-event analysis

ePHASORSIM: A real-time electro-mechanical phasor-based simulation system capable of simulating thousands of buses (including unbalanced systems) and importing your PSS/E, CYME and PowerFactory models

eFPGASIM: a real-time FPGA-based power electronics, power systems, and electric drive simulation suite capable of sub-microsecond time-scale simulation for high-frequency controller development and testing. Compatible with PLECS, PSIM, Simscape Power Systems and NI Multisim.

eMEGASIM: a flexible simulation environment based on MathWorks' MATLAB/Simulink and Simscape Power Systems™ (formerly SimPowerSystems™). Includes a suite of fixed-step solvers and algorithms designed to optimize models of electromagnetic transient (EMT) systems for real-time simulation, all while retaining their high-fidelity

ABOUT OPAL-RT TECHNOLOGIES

OPAL-RT is the world leader in the development of PC/FPGA Based Real-Time Digital Simulator, Hardware-In-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems used in power grids, power electronics, motor drives, automotive industry, trains, aircraft and various industries, as well as R&D centers and universities.

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