



OPAL-RT
TECHNOLOGIES

Success Story



**RWTH AACHEN UNIVERSITY E.ON Energy Research
Center Success Story**

Challenges

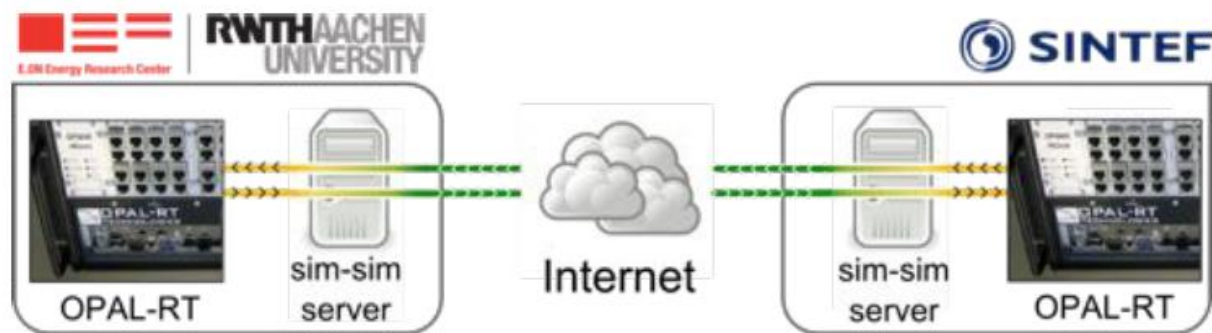
- Professor Antonello Monti's team at the Institute for Automation of Complex Power Systems focuses (ACS), focuses on the scientific and technological developments necessary for the transition to the next generation power grids. An intelligent and flexible electrical grid must allow for new ways of managing power flows at all levels, particularly at the distribution level. The team of ACS researchers is focusing on the seamless integration of the advances in power electronics, control design and communication technology, to enable this transition.
- RWTH Aachen University has set up the largest research center, with the cooperation of private companies and including various universities laboratories:
 1. ERIC-LAB, in collaboration with Politecnico di Torino (Italy), is a federation of laboratories located in various European member states, that enables cost-effective sharing of hardware and software facilities, with a special focus on real-time simulation. (<http://www.eric-lab.eu/drupal/node/2>)
 2. International Energy Cooperation Program with several partnerships between 9 institutes or universities, such as Aalborg Universities or SINTEF (Norway), to develop a geographically distributed simulation platform to operate two remote real-time digital simulators.

How OPAL-RT addresses these challenges?

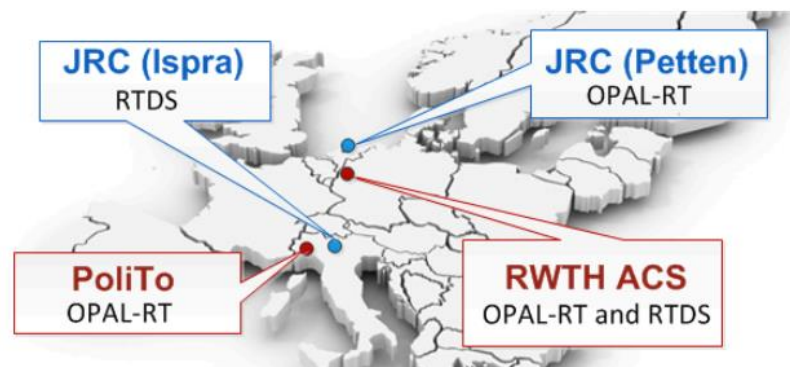
- OPAL-RT offers an open, high-performance solution.
- Flexible and powerful, our solution is fully scalable and can synchronize several models
- Our eHS generic nodal solver is optimized for detailed power electronics simulation.
- Communication between the OPAL -RT and the other platforms is achieved through a fiber optic pair connected via an SFP module, which offers lower latency.
- On the OPAL -RT system, access to the data exchanged is done through an RT-XSG design, and RT-LAB access is available via the general -purpose Data IN /Data OUT ports.

Projects

- Real-time simulation of multi-terminal HVDC grids interconnected with AC grids, generators and wind farms
 - Studies of potential interactions of the control concepts implemented in the AC grid generators and converter control strategies.



- The internet-distributed simulation platform connects two real-time digital simulators located at SINTEF (OPAL-RT) and ACS (OPAL-RT/other competitor)
 - A simulator-to-simulator server at each laboratory manages data exchange with local simulator and Internet communication with the remote server.
- Development of a framework enabling multi-terminal integration of laboratories over long distances in collaboration with:
 - Politecnico di Torino and Energy Security, Systems and Market Unit of the EC Joint Research Center



OPAL-RT products



OP5600 - 12 Cores with eFPGASIM and eMEGASIM



eFPGASIM

- Generic Power Converter solver on FPGA
- SimPowerSystems model editor interface
- Also compatible with PLECS and PSIM
- Reconfigurable from Host PC without reprogramming the FPGA



eMEGASIM

- MATLAB/Simulink/SimPowerSystems models at 50 μ s
- Real-time simulation on CPU cores
- Power Systems / Power Electronics applications
- EMT real-time simulation
- Real-time data logging
- Visualisations & fault analysis