

RT-LAB Application Example

Simulating a 10-turbine wind farm connected to a power grid

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In this example, ten, fully detailed, doubly fed induction generator (DFIG) based wind turbine generation system (WTGS) models, were connected to a three-section transmission system through a transformer. All turbines were modeled with individual power electronics components. Each WTGS had its own distribution transformer, connected to the sub-collector bus (cBx).

In order to form a high-resolution benchmark for the design of a protective device and power electronic controller, we investigated fault responses of the wind farm, when running at a time step of 50 μ s. During the 100 second simulation, three kinds of grid faults were introduced: single-line-to-ground, two-phase-to-ground, and three-phase.

The simulation performed on a quad-core, dual-CPU Xeon 2.2 GHz PC running 6-CPU and the RT-LAB simulation platform.

The results demonstrated that using a high-fidelity simulation of all doubly fed generators and power electronics IGBT switching, this complete model was able to execute with a step size of **28 microseconds**.

Figure 1. 10-turbine wind farm in a 6-CPU configuration

System configuration	
Hardware used	8-CPU HILBox outfitted with a dual quad-core Xeon PC running at 2.2 GHz
Software included	RT-LAB, RT-Events, ARTEMIS
Solution package	eMEGAsim

