



## Webinar and Demo: Introduction to Real-Time Simulation and HIL Testing for Power System Innovators

Wednesday, May 11, 2022

### **Questions and Answers**

#### **Q1: Will the webinar recording and slides be made available?**

Yes. The webinar recording and slides are available to all registrants. A link has been included with this document in the post-webinar email. If you would like to refer a colleague to this webinar, it can be accessed later On Demand, after having been aired, at <https://www.rtds.com/events/introduction-to-real-time-simulation-and-hil-testing-for-power-system-innovators/>.

#### **Q2: How can we confirm the Load flow results for unbalanced networks as RSCAD supports only balanced network load flow?**

The RTDS Simulator includes built-in load flow facilities in the RSCAD software. The program runs an offline load flow on the user's PC prior to the use running a real-time simulation. Typically it is used to initialize networks with a large quantity of generators prior to starting the simulation. Once the user starts the real-time simulation, it is an EMT simulation running in real time, meaning that unbalanced networks can be represented (indeed, this is often the focus of studies/tests done on the RTDS Simulator).

#### **Q3: Is it possible for the user to create a Substep component using CBuilder? If not available presently, will it become available in near future?**

Yes. Using RSCAD's ComponentBuilder (CBuilder) module, the user can create custom power systems and control components that run alongside RSCAD library components in real time. As almost every Mainstep component can theoretically also be run in the Substep environment, CBuilder models can therefore also theoretically be run in Substep. It would just be a matter of ensuring that the component code is lean enough to run at the user's desired timestep within the Substep environment.

#### **Q4: Does RSCAD FX have 3-phase display?**

By default, circuits are drawn in single line diagram mode in RSCAD FX. However, a breakout component can be used to work on a three-phase (or other multi-phase) basis.



**Q5: Is there a trial version of RSCAD?**

The RTDS Simulator is a combination of software and processing hardware. The RSCAD software runs on the user's PC and allows the user to build and compile the simulation case, and to interact with the simulation in real time. However, the actual executable code for the simulation runs on the dedicated parallel processing hardware which is an essential part of the RTDS Simulator. The software must be paired with this hardware in order to run the simulation. So, trial versions of RSCAD are possible in order to familiarize users with the graphical user interface and browse the component library, but in order to actually compile and run the simulation, the hardware is required on site.

**Q6: In regards to cybersecurity, can only Denial of Service and Man in the Middle attacks be simulated? What about the other types of attack?**

Typically for cybersecurity testing, a third-party communication network simulation program is connected to the RTDS Simulator's power system simulation in real-time. The cybersecurity attacks are initiated/simulated using the network simulator. We used DoS and MitM attacks as examples in this presentation as they are well-known attack types that can be simulated with NS-3, which is one of the communication simulators that has been connected to the RTDS Simulator, but other attacks can be simulated as well depending on the capabilities of the network simulator.

**Q7: How can we compromise between detail and processing load when it comes to choosing a simulation timestep?**

The typical timestep for an EMT simulation is in the 25-50 microseconds range, with timesteps in the 1-4 microsecond range common for power electronics applications. Lower timesteps generally require more processing resources, which is particularly important to keep in mind for real-time simulation, where the user usually has a fixed configuration of simulation hardware to work with. If the user's network of interest cannot run in real-time on their simulation hardware configuration with their desired timestep, they can attempt running at a slightly larger timestep, or judiciously reduce the network size/complexity (the latter being necessary if the larger timestep is unacceptable for their studies). Network reduction can be done using dynamic equivalents, transient stability analysis co-simulation, simplifying certain components, etc.

**Q8: Can you please demonstrate how to configure PMUs and run EMT simulations?**

There is no demonstration in today's webinar, but we are planning on hosting a webinar on PMUs and wide area control testing later this year.





*If you have any further questions, please contact [marketing@rtds.com](mailto:marketing@rtds.com).*



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