
Contribution ID: **261** Type: **Oral presentation**

# Distributed Real-time control software at ITER

*Thursday, June 9, 2016 8:30 AM (30 minutes)*

This paper will provide an overview of the various real-time software processes which are distributed across ITER. This begins with the software processing done at a diagnostic level to process the initially acquired data and produce a meaningful signal for plasma control, which is typically a physics measurement (e.g. the plasma current). These signals are used -among many others- in central plasma control where they will be processed and control algorithms will be applied. The final aspect is the processing in the actuator systems to actually produce the desired control behavior. ITER CODAC has a varying degree of responsibility in all of these areas. Generally speaking, the responsibility for I&C functions is within the procurement packages and ITER CODAC supports the activities by setting standards, providing tools and advice. In case of diagnostics, CODAC and the ITER diagnostic division collaborate closely to provide a common solution for real-time processing (both CPU and FPGA/GPU-based). This solution will be used by the diagnostic plant systems in order to implement real-time functions in their scope as well as by CODAC to implement the central control tasks (e.g. the Plasma Control System). Work is ongoing to provide the appropriate software infrastructure to achieve the requirements. This paper will present an overview of the collected functional and performance requirements for the global real-time infrastructure and illustrate based on a few selected use cases the measures taken to implement these tasks. The focus will be on the diagnostic/central control interface as this more complex than initially foreseen, due to the highly non-diagonal coupling between physics measurement and contribution by the various diagnostics. An update of the ongoing design work for the CPU-based real-time infrastructure will also be presented.

**Primary author:** Dr WINTER, Axel (ITER Organization)

**Co-authors:** Mr BAUVIR, Bertrand (ITER Organization); Dr VAYAKIS, George (ITER Organization); Dr ZABEO, Luca (ITER Organization); MAKIJARVI, Petri (ITER Organization); Mr LANGE, Ralph (ITER Organization); Dr SIMROCK, Stefan (ITER Organization)

**Presenter:** Dr WINTER, Axel (ITER Organization)

**Session Classification:** DAQ 3 / Fusion

**Track Classification:** Real Time System Architectures and Intelligent Signal Processing