



Contribution ID: 613

Type: **not specified**

P2.041 DCS Satellite: Enhanced Plant System Integration on ASDEX Upgrade

Tuesday, 18 September 2018 11:00 (2 hours)

The integration of plant systems and the discharge control system (DCS) will become more important for future fusion experiments.

Whereas nowadays experiments can mostly operate with a separation of diagnostics and control, a higher level of integration of different systems is necessary in the future.

In ITER comprehensive information about the plasma system state will be required at all times.

ASDEX Upgrade is extending the integration of diagnostics, actuators and evaluation codes in a unified concept, the DCS satellite.

Within the DCS satellite, the means to share information between different systems is provided in a unified way by the DCS framework.

This allows automated configuration and identification of incompatibilities in the current plant system setup prior to the discharge execution.

During a pulse the availability of information provided by this framework enables the generation of a comprehensive plasma state which then can be used for control.

The framework is developed in C++ using Linux with real time kernel as an operating system.

This allows the best compromise between ease of use and flexibility in the choice for the diagnostic setup.

The DCS satellite concept benefits from the ability of the DCS framework to incorporate different data types and rates, which is important since not all DCS satellites can deliver their data at the same rate.

So far this concept has successfully been demonstrated for National Instruments NI-RIO based FPGA diagnostics, video real time diagnostics (VRT) using CameraLink cameras, diagnostics using IPPs inhouse standard SIO2 as well as diagnostic codes such as the equilibrium reconstruction code JANET++.

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Session Classification: P2