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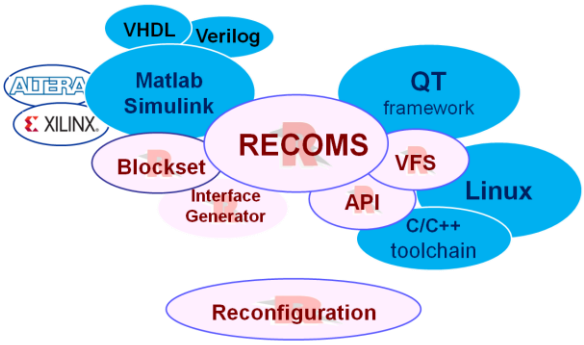

RECOMS

Reconfigurable Embedded Configuration System

Project abstract

Embedded system generally includes several radio communication peripherals associated with a processor. Communication functions are buried in silicon and cannot be modified. Proposed alternate architecture associates minimal analog front-end, reconfigurable components (FPGA) and processor. As digital signal processing is performed inside FPGAs, major changes of the communication function can be done near instantaneously by instantiation of virtual peripherals. Project aim is the development of a hardware platform and a virtual peripheral framework – software and interface blockset - designed for supporting quick and efficient virtual peripheral developments.

The hardware platform is composed of a digital processing board supporting analog front-end modules. Processing board will be designed as both a stand-alone board and an add-on board of HCB (a ReDS previously designed communication system). Processing board includes a DSP oriented FPGA, an optional processor, high-speed AD/DA converters and slots for receiver, transmitter or transceiver (COTS or custom) analog modules. Board processor and HCB processor are running Linux OS with real-time enhancement.
The virtual peripheral framework (VPF) provides a Matlab/Simulink block library that manages data transfers between FPGA and processor. VPF blockset includes streaming sink/source, control registers and probes for monitoring and debugging. The VPF provides also an API for implementing (and instantiating) virtual peripheral services under Linux, and a GUI library including control and monitor objects.

Valorization

Development of a software defined radio or communication peripherals in an embedded system can be a laborious work. The objective of the project is to provide a hardware platform and a framework that allow the developer to focus on signal processing design and peripheral specific software development. Thanks to the high abstraction level of the VPF, the complexity of the Hw/Sw co-design is masked to the developer while providing a high data rate path between the signal processing hardware and the upper software layers. Applications include upgrade to new standards, cognitive radio, support of heterogeneous communication environment, R&D prototyping, and measurement operations. Instantaneous reconfiguration is the key feature of many potential applications.

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