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Importance of object middleware on a digital signal processor for SCA type architectures

- a power/cpu management perspective

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Agenda

- Introduction
- Importance of middleware on DSP
  (S. Aslam-Mir)
  - Motivations
  - CPU use optimization
  - A step in controlling power consumption passively in the infrastructure of an SDR – low cpu
- Active power management aspect in SDR as part of a future Core frameworks resource management infrastructure –
  (Max Robert, Jeff Reed)
- Conclusions

Details of DSP middleware

Downloadable paper gives a fuller discussion

http://www.prismtechnologies.com/section-item.asp?id=306&sid=29&sid2=14

Introduction

- Soft-radio is one step in the journey to achieving a nirvana of wireless communications; in which each device is an intelligent “cognitive radio”.

- In building such a device in the future that is smart and spectrum cognizant we need to start out addressing some of what are thought to the most crippling problems to attain this goal viz.
  - The highest degree of flexibility and openness programmable software architecture supporting the ability to support wide and diverse waveforms.
  - In providing such a a soft-infrastructure (especially on the mobile SDR terminal) active management of radio resource.

Introduction

- However CORBA in SDR has traditionally been ‘confined’ or ‘detained’ on the GPP in SDR solutions that are using SCA. DSPs and FPGAs were viewed as non-CORBA platforms.
- Use of DSPs is generally governed by power consumed algorithm vs computational complexity considerations traditionally.
- Traditional thinking is that MIPs budget on the DSP is generally too restrictive to permit the existence of such middleware on the DSP.

Importance of DSP middleware

- Show how new DSP middleware is one step towards a lower power device from the point of view of the software infrastructure.
  - *Extending the Core framework all the way to the DSP we have greater control of the device and radio resource management*
- The next step should be intelligent insertion of active power management via a radio resource management infrastructure in the core framework and perhaps this can be considered for the future versions of SCA specifications and architecture

DSP CORBA with SDR-OE

- An important aim of taking the SDR OE to all the underlying hardware elements of a radio is to unify to a greater extent radio resource management.
- To achieve this aim, new classes of SDR OE middleware are needed that aim to harmonize, unify and level various radio hardware platforms via software.
- In the case of JTRS, this goal is met by making the DSP, GPP, FPGA all “first class” SCA citizens. Why? Because only an over-arching, ubiquitous unifying framework can achieve a generic radio engineer’s goals of:
  - intelligent power management of the end to end signal processing subsystem (SPS) chains,
  - rich multi-mode,
  - multi-technology,
  - multi-standard, waveform hosting capability,
- And thus a truly “open” radio platform.

Some potential benefits of DSP middleware

- The ability to optimize the power consumption profile in battery-operated devices; as tasks can be allocated/balanced for maximum efficiency between the GPP(s) and DSP(s).
- Lower costs, as design decisions that previously locked radio developers into high-cost implementations and test cycles may now be revisited and revised “on the fly”.
- Acceptance testing and hence delivery time is reduced due to easier integration and (re)configuration due to CORBAs location transparency capability.
- So – implementing a power/cpu cognizant software infrastructure at multiple levels is of benefit to future core SDR infrastructure models – power management is key at various levels

SDR architecture for an all encompassing core framework.