Reconfigurable Radio Hardware & Software Integration and Testing

Section 7.2

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Abstract

Software Defined Radio efforts are focused in both software and hardware areas. Nowadays software products are designed to allow newer and better software radio products for a quick reconfiguration and adaptation to new challenges. With the proliferation of reconfigurable radio software, having a complete SDR system has never been as approachable/accessible.

This paper focused on the integration and testing efforts of a RF front-end with the existing reconfigurable radio software called IRIS [1] (Implementing Radio in Software) developed by CTVR (Centre for Telecommunications Value-Chain Research). Several papers were presented at SDR'07 Forum in Denver (CO) [2][3] regarding this RF front-end and its low-level software elements.

The RF front-end consists of four hardware elements, namely a radio transmitter, a radio receiver, a baseband interface and a PC to perform signal processing and configuration. Additionally, there is a substantial software element to configure the hardware and to receive/transmit data via a USB 2.0 interface.

The IRIS system is a component framework for building radio systems, which integrates a great variety of signal processing components. In order to integrate our RF front-end with IRIS two new IRIS components were written in C++: one for transmitting and another for receiving. This integration was possible thanks to the high quality of both software elements: IRIS and the RF front-end software elements (USB driver, embedded code and additional API libraries). High quality measured in terms of reusable, maintainable, modifiable and extendible.

The full paper version will include a demonstration of the complete SDR system: IRIS and RF front-end working together. This demonstration consists of building two radios in IRIS, one for transmission and another for reception of an image file using DBPSK modulation. This radio makes use of the two new IRIS components that communicate with our RF front-end.

Integrations with other software systems for building radios are planned for the near future, such as OSSIE system by Virginia Tech. All this work will lead us to a better understanding about these systems, which will help us to face the challenge of building an improved one.

References

[1] P. MacKenzie, "Software and reconfigurability for software radio systems", Ph.D. dissertation, Trinity College Dublin, Ireland, 2004.

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