NASA SBIR/STTR Technologies

Proposal No. -Reconfigurable Cognitive Software Defined Radio

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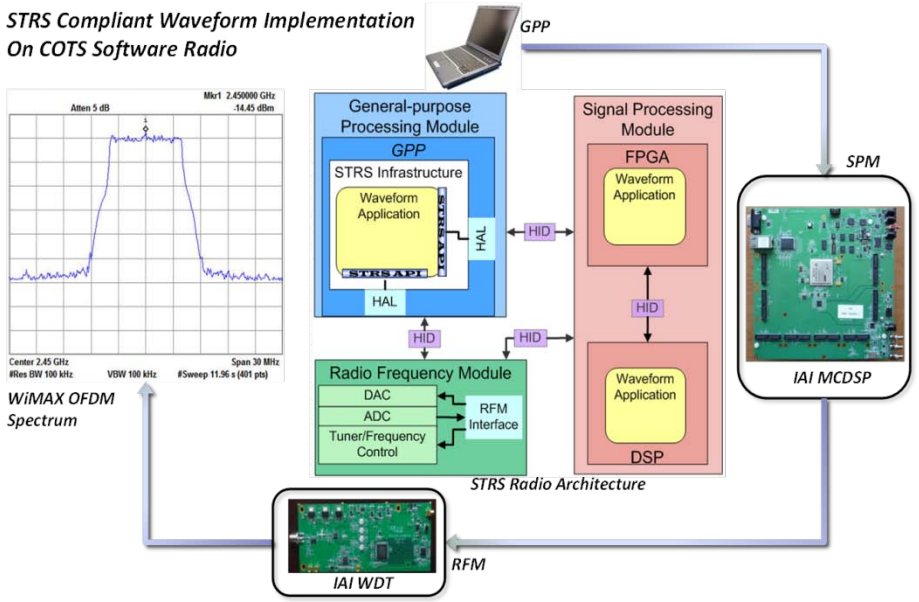
Identification and Significance of Innovation

IAI is actively developing Software Defined Radio platforms that can adaptively switch between different modes of operation by modifying both transmit waveforms and receiver signal-processing tasks on the fly. The proposed software reconfigurable radio implementation technique and the system design will leverage IAI's experience in SDRs, RF design, Signal processing and firmware design. Our innovation focuses on implementing maximum transceiver functionalities digital reconfigurable devices (FPGA), and minimizing the number of analog components. Our SDR designs are based on COTS components and are modular in nature. This makes it easier to upgrade smaller units of the design with development in state-of-the-art, instead of re-designing the entire SDR platform. The proposed innovations are:

➔ STRS implementation on COTS SDR platforms to realize NASA objectives of simultaneously capturing the benefits of SDR technology and the economies and benefits of an open architecture standard.
➔ Integration of cognitive capabilities (with focus on STRS compliant implementation) for the SDR which have been developed under the Phase-II contract. This includes Adaptive Modulation and Coding, and Automatic Modulation Recognition.
➔ Reconfigurable digital transceiver design using high-speed FPGAs. This would enable multi-mode operation and scalable architecture for SDRs

Expected TRL Range at the end of Contract (1-9): 5



Technical Objectives and Work Plan

Phase-II objectives and work plan were:

Objective 1: Demonstrate Space Telecommunications Radio System (STRS) implementation on Commercial off-the Shelf (COTS) SDR platforms to realize NASA objectives of simultaneously capturing the benefits of SDR technology and the economies and benefits of an open architecture standard.

Objective 2: Integration of cognitive capabilities (with focus on STRS compliant implementation) for the SDR, like Adaptive Modulation and Coding (AMC) and Automatic modulation recognition (AMR)

Objective 3: Reconfigurable digital transceiver design using high-speed FPGAs. This would enable multi-mode operation and scalable architecture for SDRs.

NASA and Non-NASA Applications

NASA applications

1. Cognitive capabilities for NASA STRS like AMC, AMR and Spectral sensing
2. Reconfigurable communication radios for EVA and space missions

Non- NASA commercial applications

1. Cognitive Radios for DoD applications
2. High bandwidth, plug-and-play waveform synthesizer
3. Real –time digital processors
4. UAV based applications (due to the small form factor and low power). This would include UAV based communications and radar applications

Firm Contacts

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