Satellite Communication Waveform

SwRI demonstrated successful intermediate frequency (IF) transmission of a satellite communication waveform using an SCA-compliant reconfigurable platform. Waveform development and integration was achieved through the design of a combination of software and firmware resources.

Beginning with a model constructed in Simulink®, firmware was generated to perform modulation of the data packets generated by software. Performance verification was accomplished by mixing the transmitted IF signal using a local oscillator (LO) and inputting the collected data into MATLAB® for demodulation and data analysis.

Reconfigurable Platform

We welcome your inquiries. For additional information, please contact:

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Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,000 employees who perform contract work for industry and government clients.

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NETWORK-CENTRIC WARFARE

Network-centric warfare (NCW) is defined as "An information superiority-enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo of operations, greater lethality, increased survivability, and a degree of self-synchronization. In essence, NCW translates information superiority into combat power by effectively linking knowledgeable entities in the battlespace." – D.S. Alberts, J.J. Garstka and F.P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority,* 2nd edition (revised), 1999.

Southwest Research Institute® (SwRI®) has successfully implemented the Data Link as an integral portion of NCW. SwRI's **software-defined radio** will provide the communications and networking capability for mobile forces that, together with the **global information grid and communication satellites**, will enable robust enterprise-wide networking. SwRI has demonstrated that a **shared resource model** can be used to integrate and deploy multiple **software communications architecture** (SCA)-enabled waveforms on a single reconfigurable platform. This unique approach has the potential to greatly reduce the power, size and cost of radio platforms used to operate software-defined waveforms under SCA.

Additionally, the advanced technology of **partial reconfiguration** has the ability to greatly improve platform capabilities, and to successfully address SCA interface requirements for programmable hardware. SwRI has proven that new technology advancements have enabled incorporation of Field Programmable Gate Array (FPGA) waveform programming into the design process. SwRI has presented evidence of how the overhead associated with creating and operating an SCA-enabled radio can be mitigated by programming the hardware to execute a majority of the baseband signal processing, thereby increasing overall speed and minimizing the number of resources needed.

Software Communications Architecture

- SCA approaches software-defined radio using an object-oriented methodology.
- The core framework is central to the SCA concept.
- Software components are configured and deployed using application-layer interfaces to abstract software and hardware components.

System Engineering

SwRI provides system engineering assistance for integration of new radios and data links on the A-10 platform, such as:

- Joint Tactical Radio System (JTRS)
- Situation Awareness Data Link (SADL)
- Communication Navigation Surveillance/Air Traffic Management (CNS/ATM)
- ARC-210
- Improved data modem (IDM)
- Support equipment updates

Technology Capabilities

- ISO 9001:2000
- SCA-compliant waveform
- CORBA ORB middleware
- Integrity RTOS
- Advanced FPGA design
- System engineering
- Radio integration
- Support equipment

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