Rapid Prototyping for SCA Development

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- The problem: The Software Communications Architecture (SCA) is a Software Defined Radio (SDR) standard. Designing an SCA compliant waveform not only requires knowledge of signal processing, but also a variety of other skills including C/C++, an HDL, platform specific implementation issues, and the evolving SCA standard.

- Our solution: A model based design flow for developing SCA compliant waveforms using automatic code generation.
  - Model based design allows for increased productivity by raising the level of abstraction used to design and implement a system.
  - This allows a system architect to design and implement SCA compliant waveforms at a high level of abstraction without requiring detailed knowledge of the SCA standards or the implementation details for each target platform.
  - Using automatic code generation, a hardware implementation may be derived directly from the high level system model.
  - Use existing tools when possible, identify and fill in the gaps.

- Proposed Design Flow -
  - Model the functionality of the system in Simulink
  - Generate implementation code with Real-Time Workshop or System Generator
  - Model the SCA aspect of the system using Zeligsoft Component Enabler
  - Generate wrapper code to combine the functional implementation with the SCA skeleton produced by Component Enabler
  - Run the components within an SCA framework such as OSSIE

- The SCA documentation does not provide clear guidelines for DSP and FPGA targets.
  - We have begun working with General Purpose Processor targets so that we may take advantage of CORBA for communications between components and gain experience in an area the SCA has clearly defined.
  - We are investigating alternatives for handling the specialized hardware targets include the use of COTS board support packages, change proposals to the SCA including CP237 and CP289, and M-HAL.

- A recent BAE study found a 10:1 improvement in design time when comparing a model based flow to a traditional RTL approach for the development of a non-SCA compliant SATCOM waveform.
  - Extending this model based design flow to the SCA will provide further improvements in development time.