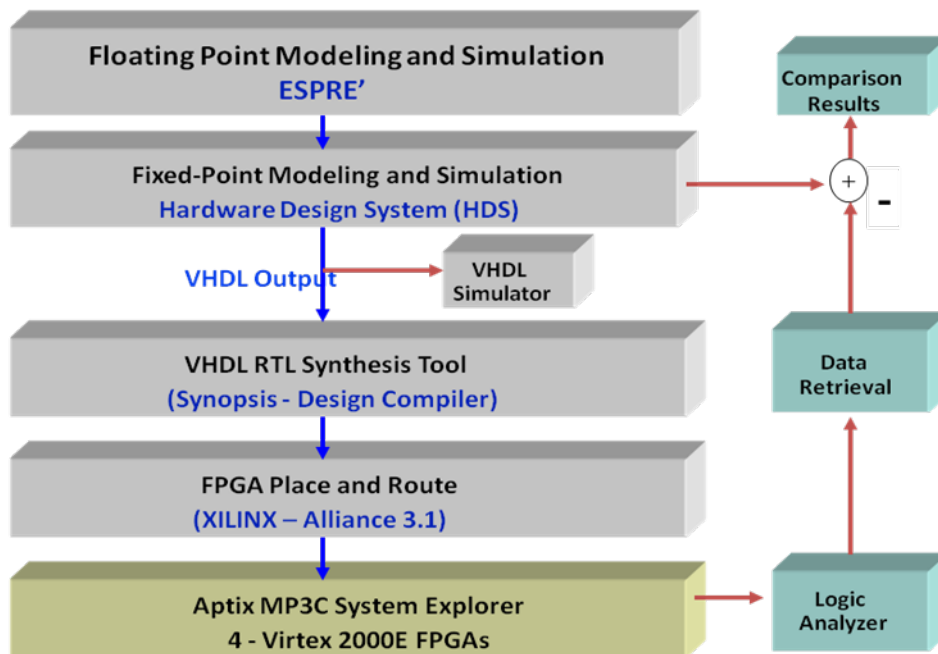


## TCI Software Defined Radio (SDR) Design Flow Summary

TCI team members and consultants have a proven track record on transitioning software radio concepts to hardware implementation. Dr. Terry, the principal investigator, has demonstrated his leadership in this area, which has led to eight issued patents and another ten pending. While at Nokia Research Center, Dr. Terry led a team of researchers that generated the MATLAB code for a 5 GHz WLAN OFDM modem prototype design in FPGA hardware, which was later used in some of their IEEE 802.11a WLAN products. Much of this work is highlighted in Chapter 8, “Rapid Prototyping for WLAN” in the book *OFDM WLAN: A Theoretical and Practical Guide*, co-author by Dr. Terry. Figure 1 and Figure 3 are reproduced from the book.

The design flow after floating point modeling with Espre’ involves a fixed point design HDS via interim C++/C conversion step not shown in the flow diagram below. The fixed-point design is synthesized in VHDL targeted for FPGA prototype platform. As multi-core general purpose processors (GPP) evolve and improve, the design can be target run directly based on the C++ library. The software defined radio (SDR) paradigm offers open source techniques to help with this design option. In particular, software compatible architecture (SCA) implements a set of clearly-defined standard APIs for DoD and federal agency compliance that reside on top of a flexible hardware and software platform such as Espre’.



**Figure 1: Example of Rapid Design Prototyping Flow**

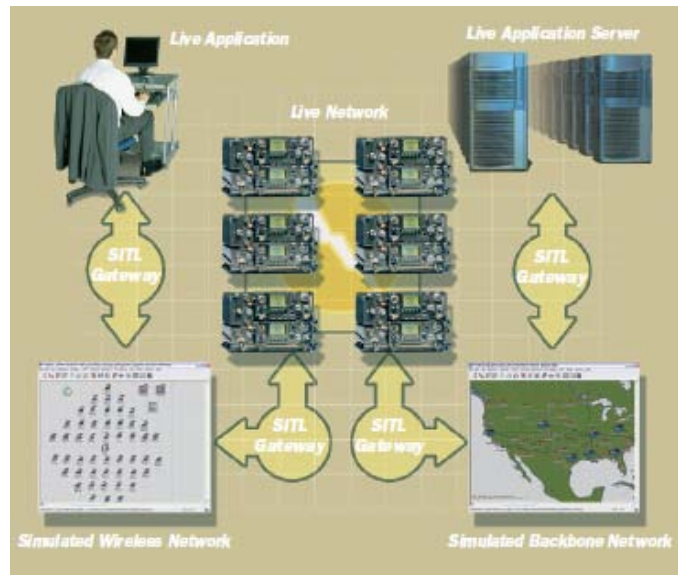


Figure 2: Example of SITL for Espre

## EXAMPLE HDS DESIGN

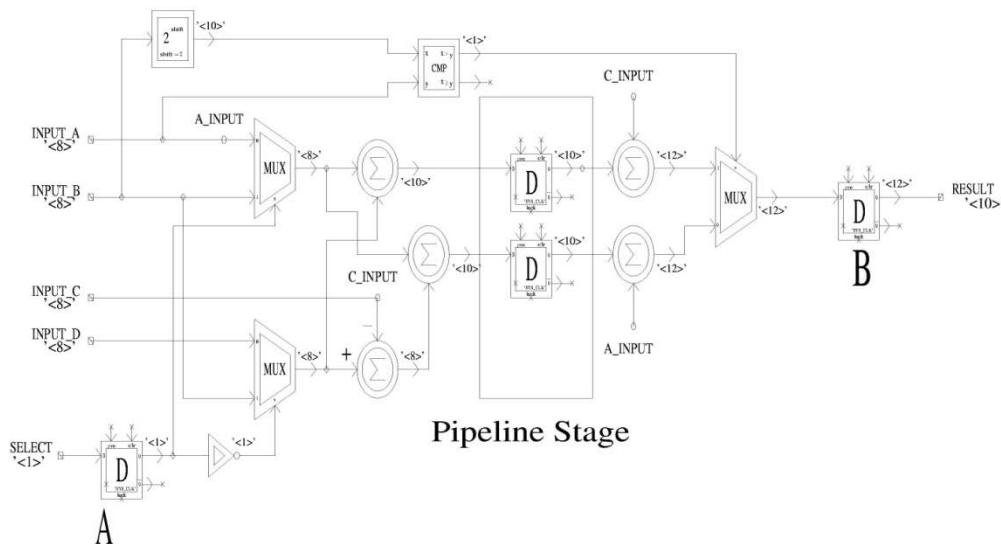
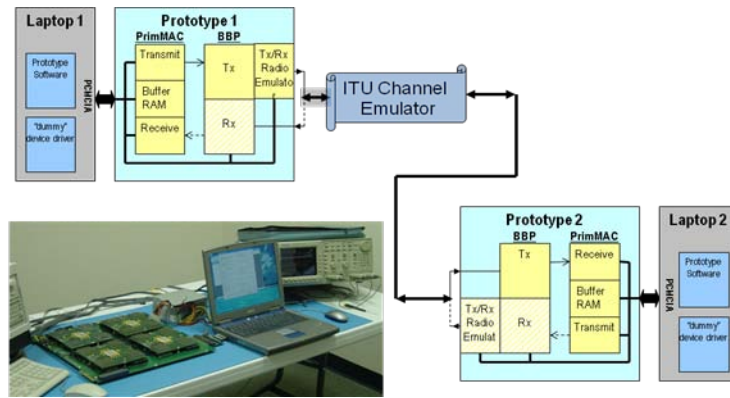


Figure 3: An Example of Pipelining

Additionally, Dr. Terry led the team that developed the world's first Gigabit UWB chipset utilizing OFDM technology. Dr. Terry worked closely with RF partner to specify the RF link impairment budget and SINAD requirements to support a Gigabit OFDM base band solution.



**Figure 4: UWB Gigabit Prototype**