RFSoC versus VPX3-530

Curtiss-Wright(I)

Executive Summary
RFSoC is an emerging technology with the potential to revolutionize how the world deals with signals and systems. Currently in development by Xilinx, these hybrids of FPGA design and RF processing capability bring the low latency of hardware with the reprogrammability of software into one surprisingly compact package. We conducted research on the potential uses of this technology, and how it can be compared to the current VPX3-530 board in terms of latency, synchronization, board size, and ruggedness.

List of Objectives
- Research Curtiss Wright’s VPX3-530 Board
- Research Xilinx’s UltraScale+ RFSoCs
- Write a research paper comparing the two in terms of:
  - Multi-channel Synchronization & Latency
  - Ruggedness & Board Size

Summary of Approach
We began by reading over all available documentation on both the VPX3-530 and RFSoC. Curtiss Wright gave us access to their documentation suite, and we were also granted partial access to Xilinx’s WIP documentation. We split the four subject areas among the four members in our group and got to work.

Project Outcomes
We determined that there are many exciting advantages to utilizing an RFSoC over a normal FPGA like the VPX3-530 does. On board real estate alone, using even the largest RFSoC chip saves approximately 1527.25 mm² due to external components being integrated into RFSoC. This lead way to the possibility of placing multiple RFSoC chips on one board to allow for more ADCs and DACs per card. With the VPX3-530, you can add more to a system, but you require multiple boards. RFSoC devices also boast internal Forward Error Correction modules which can error correct on the ADCs / DACs. The RFSoC has been tested to operate in the Extended and Industrial standards and may need additional hardening for use in special projects. An example would be radiation hardening in a satellite to protect against bit flips from the cosmic radiation.