

Signal Acquisition in Aerospace & Defense

Submitted by [Keysight Technologies](#)

Test systems' acquisition of signals related to potential threats in aerospace and defense applications require large time windows of continuous and simultaneous signal acquisition and readout. Massive amounts of megahertz and gigahertz instantaneous bandwidth of data must be acquired, stored and processed for signal acquisition in radar, signal intelligence (SIGINT), and electronic warfare (EW). Often times, multiple channels are used for the signal acquisition and measurement, so even minutes of acquisition time creates large amounts of data. Data must be stored in a way to ensure recovery of the best signal fidelity possible, while guaranteeing no loss of data.

This article describes the challenges of RF/microwave signal acquisition and provides recommendations for effectively acquiring, storing and retrieving large amounts of data. These signal acquisition systems require an uninterrupted stream of samples at the highest possible data rate while guaranteeing no loss of data. They are fully integrated, multi-channel solutions which include several subsystems such as analog frequency downconverters, high-speed digitizers and data recorders. And collectively, they can be very expensive.

To help engineers meet their test goals, solution providers are introducing new signal-acquisition systems based on commercial-off-the-shelf (COTS) components. Lower cost systems include AXIe digitizers with the required data processing and smaller form factors. Continuous signal acquisition and readout across multiple channels can be achieved on these lower cost systems to provide viable data streaming and recording.

An AXIe RF/microwave signal acquisition system, consisting of a wideband digitizer, personal-computer (PC) workstation with a solid-state-drive (SSD) memory storage device, provides a digital downconversion process and simultaneous data acquisition and read-out process. A digitizer with high-speed sampling rates, gigasamples-per-second, real-time processing and on-board field programmable gate arrays (FPGAs) which is also capable of digital downconversion (DDC) is needed. The M9703B AXIe high-speed digitizer/receiver from Keysight Technologies is an example of a commercial solution for wideband signal acquisition and data streaming. Synchronization of multiple signal acquisition channels can be achieved with the M9703B using a common reference clock oscillator with outputs distributed to each downconversion module ensuring synchronous clocking of each ADC channel. Phase coherency of the DDC local oscillator is managed by the FPGA and a controls synchronization of all FPGA channels on each module.

Read more on how a modular digitizer/receiver can simplify the implementation of multichannel signal-acquisition systems with continuous data recording and display: <http://mwrf.com/systems/managing-multichannel-signal-acquisition-data>