AXIe in Military and Aerospace Applications

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While modular standards like VXI (and more recently, PXI) have been addressing service applications in aerospace and defense for over 20 years, AXIe has been gaining traction at the other end of the lifecycle in system design.

A specific application is radar and antenna development and test. The enablers for this application are high-performance AXIe data converters (digitizers and arbitrary waveform generators) coupled with FPGA-based algorithms and DSP (digital signal processing software). Since beamforming, whether for radar or communications, relies on multi-element antennas, the multi-channel aspect of the application makes it well suited for modular systems. What AXIe brings to the table is a high-performance architecture that enables coherent sampling of extremely fast digitizers and AWGs within a very compact footprint.

AXIe digitizers from Agilent and Guzik provide precision signal capture from 12 bits at 1.6GS/s up to 8 bits at 40 GS/s, with various rates and channel densities in between. Both companies include FPGA-based signal processing, such as DDC (digital down-conversion) with their digitizers. This may substitute for, or work complementary with, other down-converters to bring the signal of interest into the bandwidth of the digitizer. Agilent's recently announced reference solution for multi-channel antenna calibration adds PXI-based down-converters and attenuators to condition the signal before being digitized at 3.2GS/s on each channel. This example also shows the compatibility between AXIe and PXI to deliver a total solution.

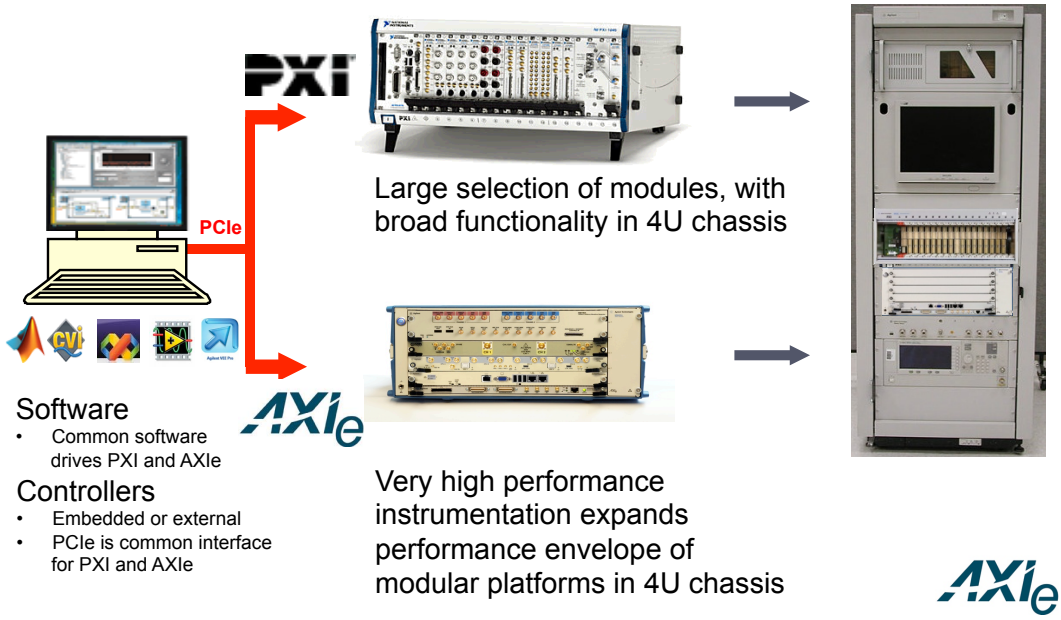
The Guzik digitizers also use DDC, which can operate up to 13GHz due to their fast sample rates. Guzik leverages the Vector Signal Analysis software from Agilent for the subsequent signal analysis.

A key enabler is the channel density a user can deploy within a single AXIe chassis. AXIe chassis can be purchased in 2, 5, and 14 slot configurations. With anywhere from one to eight channels on a single AXIe module, very high channel count systems can be created.

One the signal generation side, AWGs from Agilent can be matched with microwave up-converters from Synopsis. The Agilent AWGs can generate complex precision signals up to 12Gs/s, while the up-converters can bring the signal up to 40GHz. Applications include radar, electronic warfare, and communications. As in the digitizer case, the availability of AXIe chassis allows large phase-coherent multi-channel systems.

As these new electronic systems are developed and deployed, will AXIe join VXI and PXI in Military and Aerospace service applications? The answer is most likely "yes".

AXIe brings critical functionality to Mil/Aero systems in a dense and powerful form factor



AXIe uses a horizontal module format for two and five slot chassis, with 14 slot chassis using a vertical format. The horizontal format allows a very small amount of rack space to be deployed. In the above example, a 5-slot AXIe chassis takes up just 4U of rack space, same as its PXI counterpart, but with twice the total power or board area available. The most likely configuration would be for both formats to be deployed within the same rack, taking advantage of the breadth of PXI modules and the performance of AXIe.

An AXIe platform is a good match for many Military and Aerospace applications: large board format, high power, high cooling, high density, precision synchronization, and fast data transfer. Expect to see more applications addressed as new AXIe products are announced.