VXIbus 4.0 Specification: Becoming a Reality

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VXIbus 4.0 is poised to become the ultimate system platform specification that provides broad solutions for military and aerospace test systems, including communications, digital I/O, synthetic instrumentation, and high channel count data acquisition and control. At AUTOTESTCON 2008, the VXIbus Consortium proposed enhancements to the VXIbus 3.0 specifications that would dramatically extend the life and performance of VXI test systems. That new specification is becoming a reality with the VXIbus 4.0 draft standard targeted for AUTOTESTCON 2009.

VXIbus 4.0 is focused on three areas: throughput, increased power, and better synchronization. These are achieved primarily by adopting VME enhancements and VITA 41 (VXS) for high speed serial. VMEbus has evolved to meet application needs by increasing its parallel data transfer rates and adding serial fabric connectivity while maintaining backward compatibility at the pin level to preserve VME legacy functionality and investment. VXIbus will extend its life and performance well into the 21st century by adding the following key VMEbus and other VITA standard enhancements: ANSI/VITA 1.1-1994 (VME64), ANSI/VITA 1.1-1997 (VME64x), ANSI/VITA 1.5-2003 (2eSST), ANSI/VITA 41.0x-2006 (VXS Core), and VITA 41.6 (Control Plane on VXS).

High speed applications such as Digital I/O, communication between Synthetic Instrument modules, Video/Data streaming, and high channel count-density-speed Data Acquisition require large backplane bandwidth. These applications need a hybrid backplane with both high speed parallel and serial communication. Adding the 5-row P1/P2 connectors and Two Edge Source Synchronous Transfer (2eSST) improves upon 2eVME to drive the parallel bus to a theoretical rate of 320Mbytes/second. 2eSST alone can enable new high-performance applications with minor tweaks to existing VXIbus modules.

Throughput can be increased an additional 10x with the addition of VME Switched Serial, or VXS. VXS introduces new features into the existing VXIbus technology base and offers distinct improvements to the architecture for new system designs. It adds high speed serial fabric technology in a fashion that does not require a revolutionary change in VXIbus system architecture. This allows the VXIbus to remain backward compatible with previous VXIbus modules. The extension of the existing bus with the MultiGig P0/J0 connectors allow the usage of high-speed serial buses like Gigabit Ethernet or PCI Express for high-speed module-to-module communication in a VXIbus system. These capabilities are important for next-generation applications such as a Down Converter and Digitizer communicating directly with each other instead of through the Slot 0 controller.

Increased power, additional power supply voltages, greater signal integrity, and synchronization are achieved with the extension of the existing 3-row connectors to 5-row. More pins mean more current for existing supplies. Additional ground returns can lower signal coupling/interference and achieve better impedance control. The addition of 3.3V and other eight external auxiliary supply lines avoids using precious module real estate for power supply generation. Local bus is expanded and I²C signal lines permit control of backplane resources. Synchronization is achieved with the addition of 100MHz Clock and Sync lines that are backplane buffered and provide a low inter-module skew of 1ns.

Although significantly improved bandwidth, increased power, and triggering/synchronization are essential to new high speed applications, maintaining backwards compatibility with existing VXIbus modules is of critical importance. The inner three rows (A-C) of P1 and P2 will not change, and the new 5-row connector will not interfere with legacy three-row connectors on
legacy VXI modules, unless those modules currently make use of specialized shielding. The new P0 connector fits between P1 and P2 without interfering with the fit of pre-VXIbus 4.0 modules.

Expect to see a draft of the new VXIbus 4.0 standard at AUTOTESTCON 2009.

For more information, go to the VXIbus Consortium website at http://www.vxibus.org.