New Controller Options for VXI

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The VXIbus has been a well-supported platform for instrumentation systems since its inception in 1987. Being an open industry standard, the VXIbus has been an ideal platform for automated test equipment (ATE) applications because it maximizes reliability and test system life cycles. As advancements are made to processors for direct embedded control and PC technology continues to evolve, new control options are introduced for VXI-based systems. With the numerous options available to control a VXI system, including high-performance embedded controllers and low-cost remote controllers, engineers can use the latest PC technology to control their systems.

PCI Express is the latest evolution in PC technology. PCI Express is a point-to-point bus topology, which provides each device its own direct access to the bus. PCI Express dramatically improves data bandwidth compared to the PCI bus. PCI Express was originally designed as both an internal and system-to-system interconnect. The PCI Special Interest Group (PCISIG) defined cabled PCI Express, which extends PCI Express from box-to-box and over longer distances. National Instruments used its experience with cabled PCI Express to develop an interface that allows external PC control of VXIbus systems through this exciting new technology.

PCI Express was introduced to improve upon the PCI bus platform. The shared bus used for PCI is replaced with a shared switch, which provides each device its own direct access to the bus. Unlike PCI, which divides bandwidth between all devices on the bus, PCI Express provides each device with its own dedicated data pipeline. Data is sent serially in packets through pairs of transmit and receive signals called lanes, which enable 250 MB/s bandwidth per direction, per lane. Multiple lanes can be grouped together into x1 ("by-one"), x2, x4, x8, x12, x16, and x32 lane widths to increase bandwidth to the slot. Compared to PCI buses, PCI Express dramatically improves data bandwidth, minimizing the need for onboard memory and enabling faster data streaming. For instance, with a x16 slot, users can achieve up to 4 GB/s of dedicated bandwidth as opposed to the 132 MB/s shared across all devices of the 32-bit, 33 MHz PCI.

The NI VXI-MXI-Express remote controller extends the PCI Express bus to the VXI backplane through a thin, flexible cable that extends up to 7 m. A x1 cabled PCI Express interconnect permits transfer speeds of up to 200 MBs. When connected to a VXIbus backplane, the interface can sustain up to 29 MB/s of throughput for fast remote control. Engineers can choose from a variety of PCI Express-based desktop computers, industrial computers, PXI host controllers, and laptops. By using MXI-Express as a control solution, engineers can upgrade their PC or laptop at any time to take advantage of the latest computer technology while using the same high-speed
VXIbus interface. Because the software is compatible with other NI remote controllers through the use of VISA, IVI, and NI-VXI, engineers can upgrade to the VXI-MXI-Express controller with minimal or no change to existing software.

Engineers can create multichassis VXI systems with the VXI-MXI-Express by using a star topology. With the NI PCIe-8362, a dual port PCI Express host card, users can connect two VXI systems to a computer. By using two NI PCIe-8362 cards, users can connect four VXI systems and so on.

National Instruments also recently announced the NI VXIpc-882, a two-slot VXI embedded controller featuring the Intel Core 2 Duo processor T7400. This is the industry’s highest-performing VXI embedded controller and it delivers much faster processing capabilities than typical single-core controllers.

“We use National Instruments embedded VXI controllers in our multisite test platform to test programmable magnetic sensors known as Hall effect sensors,” said Achim Lott, test engineer for Micronas, a supplier of integrated circuits and sensor systems. “With the NI VXIpc-882 controller, we can more efficiently test up to four devices in parallel. Overall, the new controller reduced our total test time by 23 percent.”

Engineers can create hybrid test systems with the VXIpc-882 by connecting external instruments to the VXI system through the high-performance peripheral I/O such as the GPIB, Ethernet, USB or serial ports, or the ExpressCard/34 slot. This makes it possible for them to maintain their investment in existing equipment but still incorporate the latest technologies. Additionally, engineers can gain flexibility by adding a second VXI chassis to their systems with the NI VXI-MXI-Express remote controller connected to the VXIpc-882 via the ExpressCard/34 slot.

The VXIpc-882 can be upgraded to include a 32 GB solid-state drive instead of the standard rotating magnetic disk drive to offer maximum performance and reliability. When paired with the 32 GB solid-state hard drive, the controller offers increased reliability and speed when reading and writing to files and streaming data. It also provides increased durability when exposed to shock and vibration because the drive has no moving parts.
Figure 1. NI VXIpc-882 Embedded Controller

These new high-performance, low-cost remote and embedded controller options will provide support for the VXIbus for many years to come and make it a viable solution for several ATE applications.

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