LXI handles automotive and aerospace test

Greg Reed, Contributing Editor – Test & Measurement World, 10/8/2007 9:29:00 AM

The LAN eXtensions for Instrumentation (LXI) consortium was formed in 2005, and the LXI standard has experienced widespread adoption in just a short time. In June, the the LXI Consortium held its general meeting in Beijing, China, where 187 product developers and system integrators gathered to hear the latest developments and attend a mini trade show.

To learn more about the promise LXI holds for automotive and aerospace applications, I recently interviewed, Bob Rennard, president of the LXI Consortium.

Keep up to date on the LXI standard by reading our blog:
LXI: Instruments and Applications

Q: Briefly review LXI's role within the context of test and measurement technologies.

A: At its core, LXI is simply a common application of standard, commercial Ethernet for test applications. It is a group of leading test and measurement vendors agreeing upon a common implementation to simplify product development and system integration.

LXI is a better interconnect technology for test and measurement than that offered by legacy GPIB-based systems. The LXI Consortium selected Ethernet because it is stable. Test systems, particularly those used in military and industrial automation applications, often must last many years and Ethernet has proven remarkably stable for almost four decades. Of course speeds and capabilities keep improving, but the core connectivity and backward compatibility has proven to be very reliable.

Q: How would you assess the state of LXI technology adoption today?

A: The adoption of LXI is the fastest of any new standard in the test industry's history. To date there are more than 50 manufacturers that have joined the LXI Consortium and there are more than 325 LXI-compliant products with more on the way. Some members report LXI products represent more than half their instrument shipments, and others report LXI versions of their products overtaking non-LXI versions of the same instrument.

Migrating to LXI is as easy as attaching new cables and readdressing a global address variable. The new system can also integrate GPIB components where needed. The transition is seamless and Ethernet discovery and network management tools make the system setup easy with a low cost. As integrators become more familiar with LXI, we are seeing very impressive results and innovative applications.

Q: How does LXI uniquely support mil/aerospace and automotive applications?

A: LXI offers integrators many new tools and capabilities previously unavailable to the test and measurement industry. In fact, the benefits of LXI prompted the US DoD to select LXI as the preferred platform for the upcoming ECASS upgrade. Some advantages of the technology include:

- *Unlimited nodes and distance.* Unlike other test I/O technologies, Ethernet and LXI are not limited by distance or system size, and they support copper, fiber, and wireless links. Integrators have used these features in test ranges, where the device under test (DUT) is not co-located with the test suite. A military example may be a missile test range or an antenna test range, where long distances are involved. Automotive applications include test track applications where wireless links or distributed nodes are required. Other high channel count applications include aircraft and automotive strain-gage tests, jet engine testing, and automotive engine or body control module test.

- *Mulitcast and peer-to-peer communication.* In many test systems, the DUT or monitoring instruments may need to trigger multiple events. A common example might be monitoring current or voltage, where an alarm condition triggers a shut down sequence to prevent damage to sensitive downstream equipment. With traditional instrument I/O, the controller monitors the alarm condition then sends an SRQ to initiate a shut-down sequence. Unfortunately, the timing depends upon controller loading and is not deterministic. With LXI, a digital multimeter (DMM) or power supply may detect an overvoltage condition and immediately send out a multicast

message to other instruments in the system, bypassing the controller. Further, with a common notion of time provided by IEEE 1588 in LXI Class B and Class A, the alarm trigger can execute a well-coordinated shutdown sequence without ever involving the controller.

- ✍ *Low-cost, readily available infrastructure.* Unlike some T&M interfaces that require specialized, expensive cards and cables, LXI uses standard Ethernet cables and routers. Integrators can purchase cables from their local electronics retailer, and Ethernet adapters are standard on most every computer produced today.

Q: Can LXI leverage GPIB, VXI, and PXI architectures?

A: Absolutely. LXI was developed with the knowledge that test systems often last many years, customers have large inventories of perfectly good legacy test equipment, and not all products are available simultaneously on all formats. The result is hybrid systems, and the LXI Consortium worked hard to ensure LXI works well with other formats.

For example, the transition from GPIB to LXI can be as simple as replacing GPIB cables with LAN cables and changing a global address variable. LXI offers integrators many new tools and capabilities, but integrators can adopt them when they are ready. The LXI specification also defines bridges and adaptors to ensure legacy equipment can be added to LXI systems. We already have GPIB-LAN adaptors, PXI-LXI card cages, VXI-LXI Slot-0 controllers, and M-Module bridges offered by several members.

Q: What are some challenges or roadblocks to LXI technology adoption?

A: Like any other standard, the biggest challenge is balancing supply with demand. This means simply getting a critical mass of products and vendors to cover a wide variety of applications. With over 325 products to date, including scopes, power meters, DMMs, and RF gear, we are quickly approaching critical mass. The next hurdle is getting software tools, application examples, and integrator experience. LXI Class C offers a very easy transition to LXI, requiring little in the way of new infrastructure or software. While it replicates the point-to-point connectivity familiar to existing I/O formats, it does not take advantage of the real eye-opening benefits Ethernet can offer. As integrators become familiar with application examples and software tools evolve to take advantage of Ethernet's networking capabilities, LXI adoption will accelerate well ahead of where we are today.

Q: The meeting in Beijing generated a record turnout; are there special opportunities in China?

A: China represents a tremendous opportunity for LXI and the test industry. First, much of the world's manufacturing is shifting to China, creating new opportunities for both western and Chinese companies. Second, there is a significant aerospace industry and rapid growth in telecommunications, both historically large consumers of test gear. Third, there are many engineers familiar with commercial Ethernet and Chinese companies, and the Chinese government supports the low-cost, open nature of Ethernet. We see a lot of support from the Chinese government, in the form of the China LXI User's Group, aerospace-defense contracts, and academic research.

We believe China will quickly become a leading user and developer of LXI products and systems. LXI is ideal for western companies outsourcing to China. With the Web interface and Ethernet connectivity, engineers in Europe or the US can monitor manufacturing processes or collaborate with Chinese colleagues from their home offices. They can see results and waveform displays, instrument setups, and program steps in real time. They can also control instruments remotely, if they have the proper security clearance, as if they were sitting beside their colleagues in China.

Q: Looking to the future, how will LXI technology evolve?

A: LXI will continue to follow the Ethernet community, adding capabilities as they become available. In the short term, the LXI Technical Committee has improved instrument discovery to make it easier for integrators to plug instruments onto a test subnet and have the system identify and self-configure addresses. Other improvements include event logging to record event sequences, simplifying system troubleshooting, and a common ID schema, making system asset management easier.

The ID schema, added to the standard LXI Web page, makes it easy for military, medical, and other documentation-centric industries to automatically track instrument model, serial number, firmware rev, last cal, next cal, and other relevant factors over the network. The Technical Committee is also working on resource management protocols to ensure instruments in multiple application environments don't encounter problems when multiple applications try to use the same instrument simultaneously.

www.lxistandard.org

« Back | **Print**

5 Tips for Managing a Seasonal Workforce

Expert Business Source

Real Tips. Right Now.