LXI – The LAN-Based Successor to GPIB

"*It's About Time*"

LAN eXtensions for Instrumentation

www.lxistandard.org

Looking for GPIB's Successor

- GPIB served T&M Industry well for 35 years
- Simple, consistent interface
- But getting old and needs to be replaced
  - Cables expensive and bulky
  - Requires expensive, nonstandard cards
  - Slow by today's norms
  - Limited number of nodes
  - Limited distances

Beyond GPIB

- Wanted something standard
- No expensive, special cards and cables
- Plug into any PC or laptop
- Stable and robust
- Fast and able grow with data transfer needs
- Beyond simple point-to-point, instrument-to-controller-to-instrument models

Ethernet – The Future of Testing

- LAN-based instrumentation will transform test system capabilities
- Test vendors and integrators already putting LAN ports on instruments
- Customers have LAN infrastructure in place
- Industry better served if Ethernet implemented in common, interoperable manner
- Leading T&M companies supporting LXI as successor to GPIB

It’s About Time for LXI

- LXI is LAN-based successor to GPIB
  - Goes beyond GPIB to provide additional capabilities that make it easier to create faster, more efficient test systems.
- Meets needs of R&D, test engineers and system integrators for:
  - Aerospace/defense
  - Automotive
  - Industrial
  - Medical
  - Consumers

LXI Advantages to Test Engineers

- Six key advantages:
  - Speed, simplicity, ubiquity, low cost, ongoing enhancement and backward compatibility of **LAN**
  - Quick, easy configuration through intuitive **Web interface** built into compliant instruments
  - Simplified programming and greater software reuse through **IVI drivers**
  - Ability to create hybrid systems that include LXI, GPIB, VXI, PXI, CANbus, etc.
  - Enhanced system performance and event handling via hardware- and LAN-based **triggering** modes
  - Synchronization of local and remote instruments through **IEEE 1588** precision time protocol

LXI Accomplishments To Date

- 2005 – Focus on creating standard
  - Specification developed in 12 months
- 2006 – Focus on adoption
  - Specification enhancements
  - Help vendors design and certify products
  - Help integrators get familiar with LXI capabilities
  - Interest in basic topics such as Ethernet, network configuration/management, security, IVI instrument drivers

LXI Accomplishments To Date

- Over 40 members
  - One of most rapid adoption curves among standards organizations
- “Who’s Who” of test industry
- Exceptional acceptance, cooperation and collaboration among test vendors
- PXI community acceptance
- 65 certified products in 10 categories
  - Representing basic building blocks of test systems
- Fifth PlugFest scheduled for April in Munich

Who Is Adopting LXI?

- **T&M Vendors** have embraced LXI
- **Integrators** – Interest from those with most difficult test needs
- **DoD**, driven by NavAir, selected LXI as basis for future synthetic instrument test platforms
- **Data Acquisition** community sees LXI as way to deal with large channel-count systems
  - Examples include airframe strain gage testing, jet engine testing, car body control module testers
  - Many events over large distances

Making Integrator's Life Easier

- Improvement for integrator is critical
- All meetings have "Voice of the Integrator" session
  - Integrators speak about their world and LXI
  - What they like, don't like, how LXI should evolve
  - Feedback used to stay aligned with user base
- Expanding to include "Voice of the IT Professional"
  - What will make IT department want LXI on network

Present and Future

- T&M vendors working on new products
- Leading customers trying products
- Initial systems will be hybrid (LAN + GPIB or LAN + VXI)
- Vendors still working out details on IEEE 1588 & LAN messaging
  - Aligning more closely with customer needs
- Release 2.0 coming
  - Noteworthy elements include enhanced discovery & security

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Technical Review/Background

Why Ethernet?

- Most widely used communications interface
- Speed increases not matched by GPIB & MXI
- Ethernet's advantages:
  - Automatic discovery, addressing, asset management & network management
  - Unlimited range & nodes
  - Multiple media choices
  - Lower cost cabling
  - No special cards
  - Speed scales with processor
  - Simple linkage to enterprise software and peripherals

The LXI Standard

- Defines small, modular instruments using Ethernet as system backbone
- Offers size and integration advantages of modular instruments without cost & constraints of card-cage architectures
- Modules use host PC and Ethernet connections to display setup and results
- Self-contained power supplies improve reliability, reduce costs and enable widely distributed system architectures

Why Customers Need LXI

- Faster set-up and integration
- No special cards or cables
- No expensive Slot 0 controllers
- Small footprint for deployed systems
- Fully featured instruments for development and troubleshooting
- Instrument capabilities packaged in small, easy to integrate format
- Provides “synthetic instruments” with microwave performance

LXI vs. Rack and Stack

- LXI modules controlled with PC and mounted into test system rather than stand alone
  - Signal connections on front
  - Power and communications connections on back
  - Optimized to run over high-speed LAN
- LXI allows peer-to-peer operation
- LXI boards and software identical to rack and stack versions
  - Greater product availability, improved compatibility with full-feature bench instruments, lower costs

Making the Switch to LXI

- Key advantage is easy transition
  - Simply replace GPIB/MXI cables with CAT-5 cables
- LAN/GPIB converter enables movement of all instruments to LAN backbone
- Advanced features such as peer-to-peer, scripting, time-based systems possible
- Several products certified with IEEE 1588 and trigger bus
- Test systems built with all 3 LXI classes for multivendor demo at Autotestcon