



LAN eXtensions for Instrumentation

# LXI: IT'S ABOUT YOUR TIME

It took years for Ethernet and the Web to transform the way we work. Now it's time for both to transform test systems. That's why leading test and measurement (T&M) companies are supporting LXI (LAN eXtensions for Instrumentation). LXI is the power of Ethernet and the Web applied to test and measurement, offering you new possibilities in test systems – local, remote, distributed, and time aware.

LXI is the standard for Ethernet-based instrumentation that helps you reduce the time it takes to set up, configure, and debug test systems. Better still, LXI lets you leverage the time and effort you've already invested in system software and architecture. **LXI — it's about your time.**

## What It Is

LXI is an open, accessible standard based on Ethernet that identifies specifications and solutions related to the functional test, measurement and data acquisition industries. It was developed to leverage the telecommunication industry infrastructure, lower test system costs, simplify system integration, and ensure broad instrument availability. LXI opens new possibilities for test systems by enabling local and distributed test systems, adding network-based triggering and messaging, and providing extensions for time synchronization and characterization.



# PROMOTING EASE OF USE

## LXI Core: Promoting Ease of Use

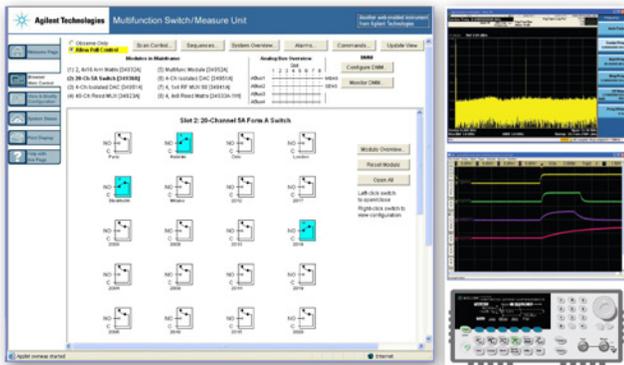
Based on the LAN Standard, the key features provided by the LXI Core include:

- Open industry standard
- High-speed Ethernet I/O
- Instrument discovery
- Web interface
- LAN-based triggering
- Interchangeable Virtual Instrument (IVI) drivers

LXI is based on Ethernet technology, which is up to 10 Gb/s today and will gain speed in the future. Ethernet I/O provides backward compatibility and standard connections, and is ubiquitous to virtually every PC. It works with any operating system and eliminates the cost of an additional interface card. The LXI Core gives you the flexibility to build systems that are local, remote, or distributed.

## Typical LXI Network Topologies

**Easy-to-Use Web Pages:** After you've entered your instrument IP address into a built-in Web browser, you will see an LXI Web page, which enables immediate verification of instrument connectivity and instrument operation.



Example of LXI Web pages



Examples of Discovery Tools From National Instruments and Agilent

**Fewer Resources Required:** Fewer resources are required when getting started with LXI than with GPIB or card cage systems, so you save integration time. When you connect your instrument to the LAN and turn it on, it just works. No plug-in adapter is necessary; all PCs have Ethernet ports.

## Easily Compatible with Other Bus Standards

LXI is easily compatible with the other main instrumentation standards, such as GPIB, VXI, PXI, and AXIe, which aids in the creation of hybrid systems. The fast acceptance of LXI has been due to its easy migration and interoperability.

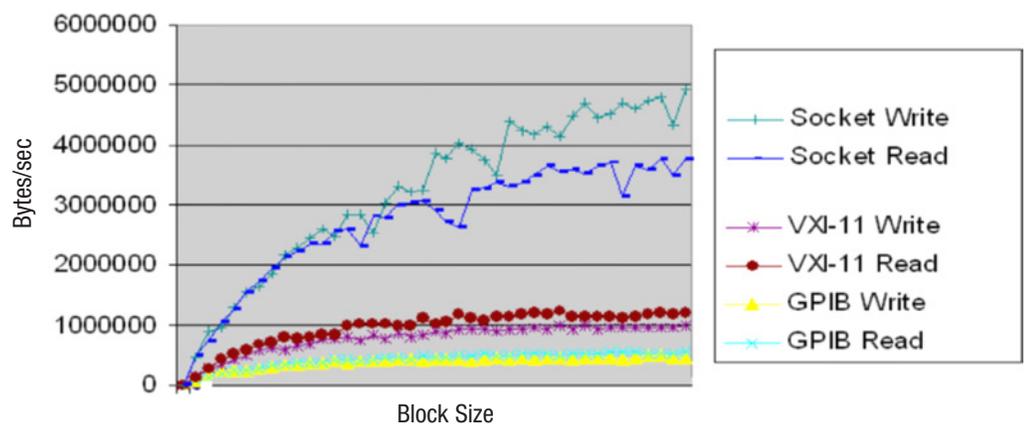
**Quickly Find LXI on the Network.** LXI System Discovery Tools enable you to find and configure instruments quickly. You minimize your development time through automatic discovery.

# GREATER PERFORMANCE



## LAN vs. GPIB Performance

LXI-based instruments are built upon the power of the Ethernet, so test systems are able to deliver higher-speed performance than a typical GPIB test system.

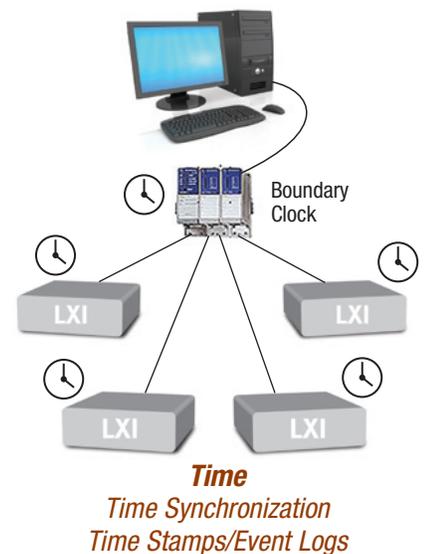
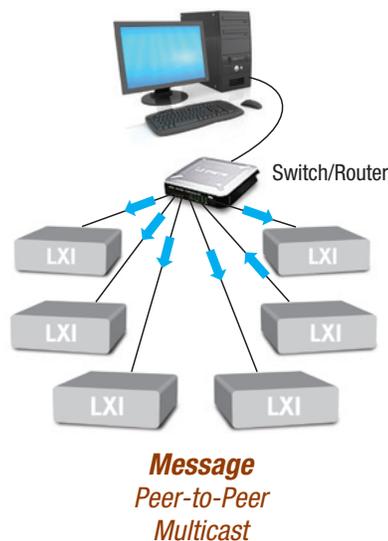


**LAN vs. GPIB Performance:** The chart shows the performance for socket, VXI-11, and GPIB writes and reads using an Agilent 34411A DMM configured for 270k rdgs/s from memory and 50k rdgs/s continuous.



The LXI Specification includes a wide variety of performance features that provide greater performance than other instrument communication protocols:

- **Conformance Testing** provides confidence that instruments from different manufacturers will deliver compatible functionality.
- **The LXI Event Log** utility contains records of LAN events that have occurred, permitting observation of an instrument – or of an entire system – in action. The event log helps you understand what is happening in your instrument or system.
- **LXI Event Messaging** allows devices to signal each other based on events or time without the intervention of a computer, which improves speed.
- **LXI Clock Synchronization** via 1588-2008 gives you the correlation between instruments in order to aid monitoring and debugging.
- **LXI Timestamping** allows the capability of marking a LAN event at a point in time – events such as triggering, measuring, or connecting channels. You can understand what happened first, last, and in between in your test programs.
- **LXI Wired Trigger Bus (WTB)** is a hard-wired interface to specify input or output configurability, wired-OR, and shielding and cabling for the most demanding triggering applications. This method of triggering increases your accuracy to the nanosecond range compared to software triggering via the LAN, which is typically in the millisecond range.



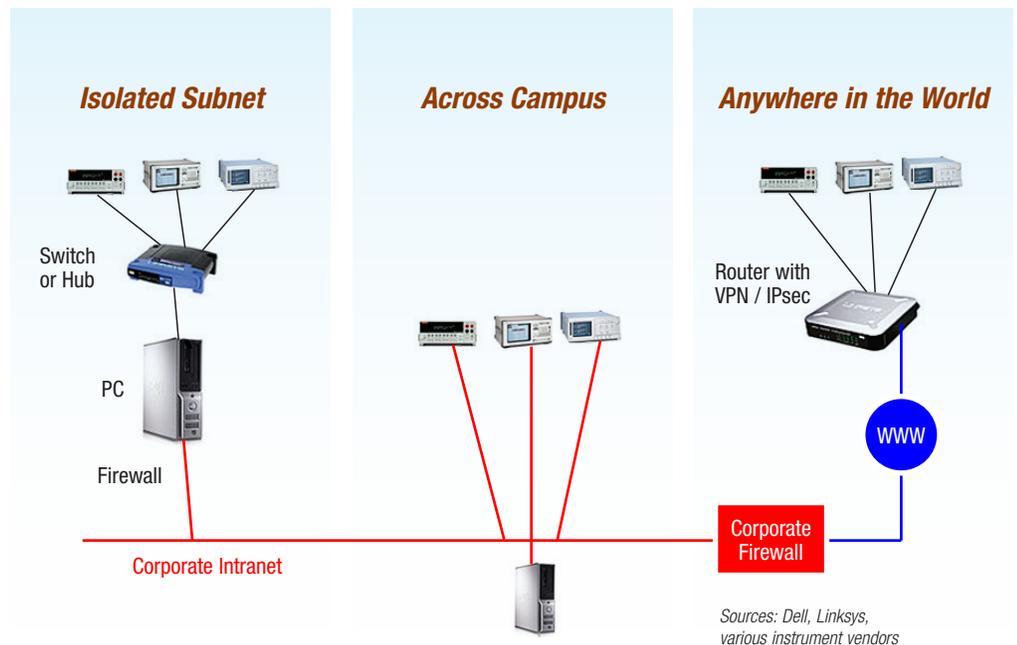
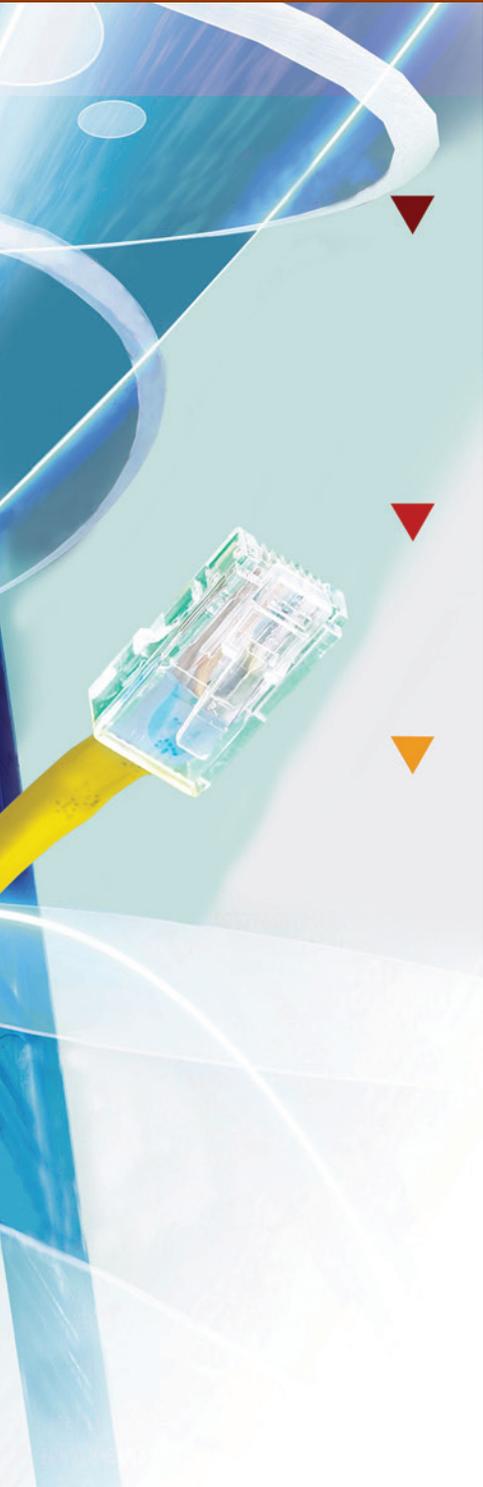
### LXI Extended Function Options

The LXI Device Specification 2011 provides optional extended functions that differentiate LXI from LAN-based instrumentation.

New capabilities allow devices to be “time aware” and talk directly to each other. These capabilities give three key benefits for the test engineer.

- Discover when operations occurred in the test program with built-in clocks that timestamp operations.
- Optimize system performance by eliminating wasteful WAIT statements normally used to synchronize instruments.
- Identify system shutdown conditions of each device independent of one another without the interference and intervention of a computer.

# ENABLING NEW DISTRIBUTED APPLICATIONS



LXI's seamless connectivity – local and global – enables new distributed applications. LXI overcomes the challenges of distributed test systems in ways that provide a number of advantages:

- **Remote Systems:** You can control your system as well as provide support from a distance, which allows more efficient use of expert resources.
- **Better Quality:** An LXI distributed system allows the instruments to be closer to the measurements, reducing cable lengths resulting in less excitation voltage loss or variation.
- **Lower Costs:** Less wiring in the system cuts your costs and simplifies maintenance.

# REDUCING COSTS

LXI lowers costs and improves ROI in three areas: equipment, setup and development, and maintenance.

- **Lower Costs for Equipment:** LXI uses standard I/O for simplified connections. There is no need for special I/O hardware, such as interface cards, cables, or card cages.
- **Reduced Setup and Development Costs:** With LXI, you have faster setup, operation that is easy to verify, and standard drivers available for easier test programming.
- **Easier LAN Setup.** You can use off-the-shelf LAN cables and routers or switches, which are inexpensive and ubiquitous.
- **Lower Operational and Maintenance Costs.** You can easily connect to test and corporate databases to save operational expense. And with LXI, it's possible to perform remote execution, monitoring, and debugging, which saves on maintenance costs.



## The LXI Consortium

The LXI (LAN eXtensions for Instrumentation) Consortium, a not-for-profit corporation comprised of leading test and measurement companies, manages the LXI Standard and promotes the development and adoption of the Standard. The LXI Standard is an open, accessible Standard that identifies specifications and solutions relating to the functional test, measurement, and data acquisition industries. LXI is the preferred Standard for your next test and measurement system.



LAN eXtensions for Instrumentation

[www.lxistandard.org](http://www.lxistandard.org)  
303-652-2571

*Note: C, C#, C++, VB are registered trademarks of the Microsoft Corporation. LabVIEW and LabWindows/CVI are registered trademarks of National Instruments. Agilent VEE is a registered trademark of Agilent Technologies. MATLAB is a registered trademark of MathWorks.*