

GETTING THE MOST OUT OF LXI INSTRUMENTS WITH EMBEDDED WEB APPLICATIONS

Introduction

How LXI Instruments Increase Your Efficiency and Effectiveness.

LAN is everywhere. More and more, so are your test systems. LXI puts the power of Ethernet and the Web inside those systems and, by standardizing and extending LAN (Local Area Network), LXI offers new possibilities in test-system design — local, remote, distributed, and time-aware.

How To Use The Web With An LXI Instrument is one white paper in a series that highlights the benefits of LXI technology, and best practices for accomplishing the integration of LXI instruments into the system you need today and the migration to the one you need next.

Overview

LXI-compliant instruments provide a host of benefits over other instruments but none are more visible than the ability to provide complex information and control in an intuitive graphical user interface via a web server that displays information in any standard browser. The Internet and the web browser have significantly shifted the conversation regarding the configuration and operation of a host of sophisticated devices, including test and measurement instruments.

Many test and measurement instruments provide Ethernet/LAN connectivity but the LXI Standard is unique in that it defines the base functionality an instrument must provide, which includes the ability to serve browser-based information, in order to be compliant with the LXI standard.

There are three immediate benefits attributed to an LXI instrument’s web interface. They are the ability to:

- Easily configure and operate the system from a customizable graphical user interface (GUI).
- Collect and analyze data without user software programming.
- Operate instruments remotely, either across the lab or across the globe.

Configure and Operate from a Graphical User Interface

Instrument control choices have typically been associated with front panel interfaces or the GPIB interface. GPIB, which was standardized in 1975, connects and controls programmable instruments, and provides a standard interface for communication between instruments from different sources. SCPI and other standards were used to make instrument control easier, but most instruments lacked a command structure that intuitively worked the way users thought about their measurements, which meant these standards needed to be learned. Today’s instruments now offer a host of interfaces such as PXI, cPCI, USB, and Ethernet. However with Ethernet the unique ability to embed web server applications within the instrument provides a “no software installation” approach that the other interfaces cannot provide.



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For example, the LXI Specification requires instruments to implement an industry-standard Ethernet LAN and serve html-compliant data as a basic web page. Each device incorporates a standard set of web pages that provide useful information about the instrument and configuration settings for the LAN interface. This builds in flexibility and efficiency by enabling users to review and modify settings, examine acquired data, and operate the instrument in an intuitive and information-rich graphic user interface (GUI) that significantly improves user experience and simplifies the basic tasks of instrument control and interactive operation.

Data Collection and Analysis

In many applications, interactive operation isn't enough. These applications require advanced data collection and analysis because users are looking for answers, not just a data set. For example, the LXI architecture is built around flexible web applications that allow instrument manufacturers to embed specialized web tools into the instrument that can bridge the gap from instrument control to the user's ultimate need. Data can be quickly presented in easy to understand ways and exported to the analysis tool of choice for the user. The data can be downloaded to the users computer or to USB-flash media. By eliminating the need for custom programming and making the interface usable rather than learnable, collecting valuable test data has never been easier.

The LAN interface is used to upgrade applications directly over the network. Alternatively, a USB drive can be used to upgrade applications.

Furthermore, savvy instrument manufacturers have provided additional web page capabilities, over and above the basic web page, that leverage the potential of a full-featured web browser to provide a rich, responsive, and easy-to-use interface that brings the applications to the users in a way that was never before possible.

Remote Instrument Operation

Test and measurement systems are generally situated in an environment that requires the user to be nearby to monitor and control the system. Many typical communication interfaces have distance limitations between instruments and controllers. For example, the legacy GPIB interface allows a maximum separation of 4m between any two adjacent devices and an average separation of only 2m over the entire bus. Ethernet and by definition LXI Instrumentation, do not require instruments and associated controller to be in close proximity to each other. Typical Ethernet cabling is recommended for distances less than 100 meters, but going beyond is easily attainable by utilizing repeaters, segmentation, or even wireless networking.

For example, in large satellite or payload testing chambers, which may span over 50-foot high, it is common for instruments to be placed through-out the chamber, making LAN the ideal communication interface. Using LAN for communications enables LXI instruments to work effectively, in spite of these distance challenges.

Using LAN enables an instrument to be easily configured and set-up remotely. You can sit at your desk and have access to instruments that are located miles or continents away.



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By using instruments that conform to the LXI specification, users can expect configuration access via a web browser, whereby the LXI specification defines essential information and key settings that must be depicted on web pages. The user simply logs into the instrument from any remote site using a standard web browser (Internet Explorer, FireFox, Safari, and so on) and the IP address, and the user can control, monitor, and troubleshoot the system, as well as gather data. This remote capability increases efficiency by reducing travel and enables instruments to be placed in limited access locations.

Additionally, some LXI instruments are now equipped with IEEE 1588 timing features (Class A and Class B). This protocol allows Ethernet connected instruments to maintain a close timing relationship (as low as nanoseconds of offset) among a group of instruments. This type of time correlation is beneficial when data from multiple instruments and locations must be correlated in time for cause-effect analysis. This feature also makes remote operation a reality in applications where it would otherwise not be possible.

Conclusion

Taking advantage of the benefits of LXI will reduce test system development time while significantly improving a user's time to measurements. Whether the web tools can supply all the required data or just make learning and understanding a test easier using the LXI interface on a new instrument will be time well spent. Using the LXI Instrument's web functionality expands the efficiency and effectiveness of the test-system designer and user by:

- Providing an intuitive user interface far more flexible than the front panel display
- Configuring and controlling the instrument
- Graphically displaying tabular or other complex data
- Utilizing wizard-type guidance for common tasks and extensive user help
- Viewing web pages via any browser-equipped, remote computer.
- Operating the instrument from across a room or the world.
- Eliminating the need to install software on a remote computer, as well as computer software and hardware obsolescence issues

The LXI Standard creates new capabilities that optimize test throughput, overall system performance, and cost efficiency in a way that allows engineers to build powerful, web-enabled test systems in less time. LXI's flexible packaging, high-speed I/O, and standardized use of LAN connectivity address a broad range of commercial, industrial, aerospace, and military applications. Additional information about LXI-compliant products is available at www.lxistandard.org.



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