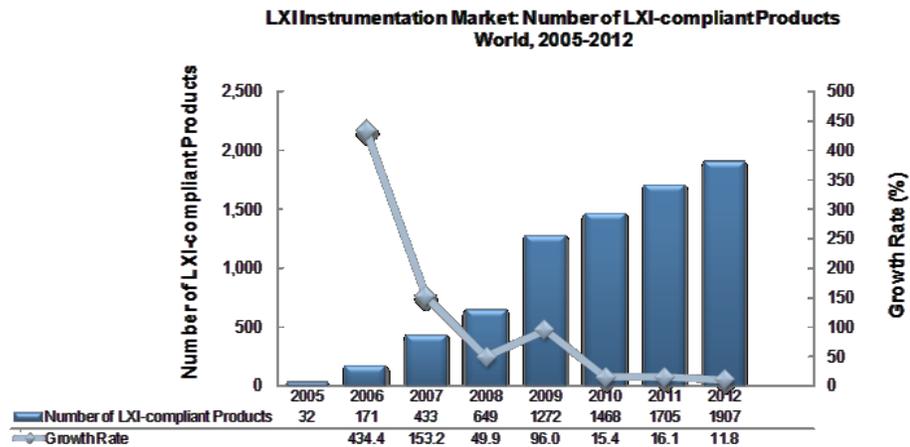


Ethernet Benefits Combined with Mandatory Conformance Testing

Drive Demand for LXI in Automated Test Systems

By [Jessy Cavazos](#), Industry Director, Test & Measurement

As the next-generation control interface for box instrumentation, the LAN eXtension for Instrumentation (LXI) standard has witnessed significant adoption among instrument vendors since its introduction in 2005. Research performed by Frost & Sullivan estimates that the market reached \$644.0 million in 2012, representing a significant percentage of the total market revenues in the automated test market. Over the next few years, several factors are expected to fuel demand for LXI instrumentation; among them, the benefits from Ethernet and specific aspects of the LXI standard such as the conformance testing required.



Ethernet Benefits

The usage benefits users get from LAN-based instrumentation are the most important factor driving demand for LXI instrumentation now and in the future. Test engineers are increasingly asking for the same user experience/capabilities they get from their consumer electronic devices, and that is driving the adoption of LAN-based instrument control, and therefore LXI. Users are asking for remote or mobile access, distributed solutions using cloud computing, and ubiquitous and easy access and control.

Building distributed applications is certainly a compelling benefit of Ethernet that provides the ability to run Category 5 (CAT5) cables over long distances. This particularly attracts the interest of customers in the data acquisition arena as they want to place instrumentation closer to the test article while having the host computer located in a control room.

The demand for Ethernet control of instrumentation however is not only due to distributed applications but also other benefits from Ethernet including that it just makes the job of the test engineer simpler. For example, it is a lot easier to navigate an instrument that is complicated with Ethernet. The starter time is also quicker. With the LXI capability, the user can have access to all the instruments in one box over the browser without having to install any software. Web access is really appreciated by a lot of users because it provides them the equivalent of a front panel.

Remote diagnostic and remote applications are driving demand for LXI instrumentation. Customers in a factory environment may have a control room or operator room that is physically separated from the instrumentation. While not critical in most automation applications, the distance advantage of LXI is garnering increased interest.

The backward compatibility and speed of Ethernet is another attractive factor. The Ethernet bus on which LXI is based is getting faster but remains backward compatible, which is important for customers looking to protect their investments. However, latency associated with Ethernet transactions can be an issue in production test applications due to single-point operations that result from the assembly of packets and the different layers of the communication protocol.

Last but not least, cost is also a factor conducive to the growth of the LXI instrumentation market. GPIB is viewed as an expensive solution due to the costs of controllers and cables. With customers trying to drive costs down, Ethernet is viewed as a low-cost solution due to the Ethernet cable and the availability of Ethernet ports on computers. Through the establishment of a core set of standards, LXI also makes it easy to identify and discover the instruments and quickly access and start using the instrumentation standardizing the means of communication.

Conformance Testing

The benefits of Ethernet are not the sole factors driving demand for LXI instrumentation. There is a key difference between LAN-based instrumentation and LXI-compliant instruments: rigorous conformance testing. The compliance technique of the LXI consortium ensures that the products are compliant and interoperable. Customers may encounter issues with LAN-based instrumentation that is not LXI-compliant. Requests for comment (RFC), instrument vendors picking and choosing what to implement in their products, personnel in charge of implementation not always understanding the standard, misreading it, or ignoring it, etc., also makes the conformance testing aspect of the LXI standard critical to ensure that customers will be able to configure and use their LXI instrument, and that it will be a good citizen on their LAN.

Future Outlook

Today, the LXI standard is fairly robust only requiring maintenance work as new capabilities arise. Recent developments include the addition of the HiSLIP and IPv6 extended functions. Formerly organized into three classes of instruments, the LXI consortium moved away from the class structure in 2011, enabling vendors to select the aspects/extended functions that the market demands for the applications they are targeting. In the past, it was too expensive for them to move their products to a more demanding class just to add a certain functionality. With the class structure out of the way, the market is expected to witness the emergence of core instruments that have additional functionality.

Extended functions currently include:

- Wired trigger bus (WTB)
- Event messaging
- Clock synchronization (IEEE 1588)
- Timestamped data
- Event logs
- HiSLIP

- IPv6

WTB is the most definitive implementation for reducing latency as it provides a hardware mechanism for passing synchronization and trigger signals between instruments. Only a small percentage of applications require this level of synchronization between devices, limiting its adoption. Many instruments do not support this functionality and there has been less and less of WTB in the industry.

In contrast, instrument vendors expect to see more of the event messaging capability of LXI over time. However, it is expected to have a slow uptake as it addresses the needs of relatively advanced users. Event messaging and event logs functionalities relate to the distributed nature of an LXI test system.

IEEE 1588 is an interesting feature that provides customers the ability to synchronize over great distances. Functional test applications however do not generally require synchronization to absolute time but it is appropriate for specific data acquisition applications.

HiSLIP, a new network protocol to talk to instruments, holds a lot of promise for the LXI instrumentation market. Users get twice the efficiency and packets with HiSLIP than with the previous protocol, and it supports IPv6. An increasing number of vendors are expected to move to HiSLIP in the coming years.

Finally, IPv6 is the latest extended function introduced by the LXI consortium. It addresses the required shift from IPv4 to IPv6 due to the world running out of IPv4 addresses. While not a huge issue at the moment, demand for this extended function is expected to gradually increase over time.

Jessy Cavazos is industry director for the Test & Measurement group at Frost & Sullivan. She has authored numerous studies on various segments of the test and measurement industry over the past decade. Most recently, she completed research on the LXI instrumentation market. A research service detailing challenges, drivers and restraints, sizing the market and forecasting it over the next five years is available for purchase. It also discusses trends by product category, extended functions, end-user industry, and geography as well as details the market participants. For more information on this research service, please contact her at jcavazos@frost.com.