

LXI Reference Design and Implementation: A Technical Overview

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The [LXI Consortium](#) is about to launch a reference design and implementation of the LXI Standard as described in the [LXI Device Specification 2011, rev. 1.4](#). The reference design and implementation will be done by a contractor, the German company TSEP (Technische Software Entwicklung Plazotta).

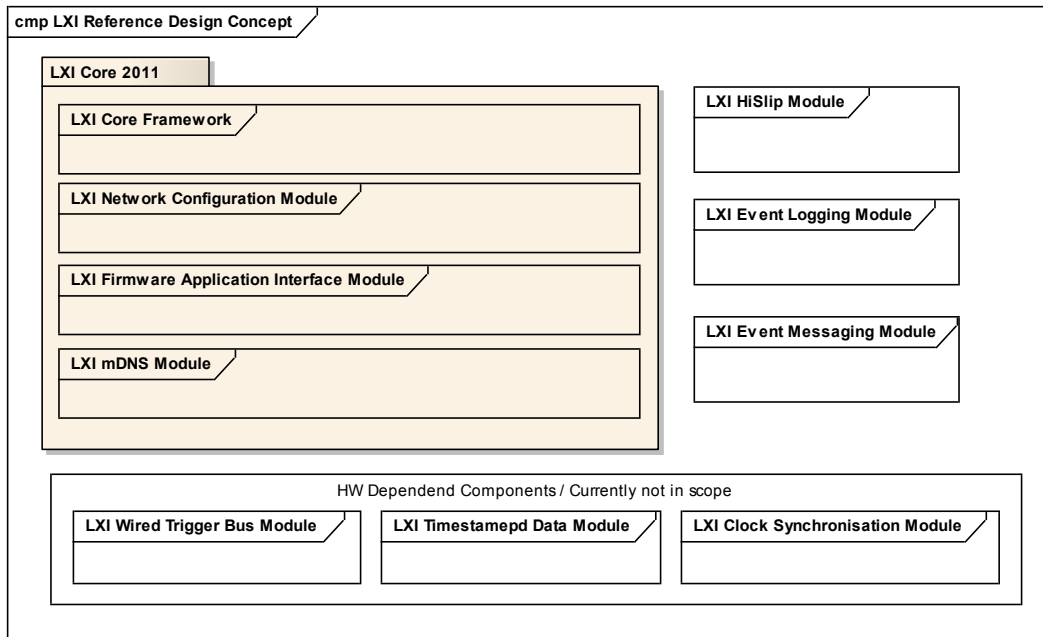
The main goals of this project are:

- To make it easier for vendors to **make** their devices LXI-compliant
- To make it easier for vendors to **keep** their devices LXI-compliant (after a revision in the LXI specifications)
- To provide a basic design and implementation that vendors can use as a foundation for their own designs
- To clarify the LXI Device Specification Standard

The LXI Reference Design and Implementation is based on a broad set of requirements, because it will be used for a wide variety of product families. To summarize, the main requirements are:

- Minimal usage of third party software
 - If third party software is used, it must be licensed free of charge
- Implemented in "light-weight" C++ to empower vendors of low-end devices
- Platform independent:
 - Will be implemented for Microsoft Windows 7 64-bit, Linux i386 and Linux ARM
 - Encapsulation of operating system functions, such as
 - Threads and thread synchronisation
 - File I/O
 - Inter-process communication
 - Memory allocation
 - LAN adapters and their configuration

The LXI reference design is based on a modular concept, which means vendors have the ability to select and combine the available modules they want to use for their LXI instrument.



For the “LXI Core 2011,” the following *mandatory* modules will be available:

- LXI Core Framework
- LXI Network Configuration Module
- LXI Firmware Application Interface Module
- LXI mDNS Module

The following *optional* modules will also be available:

- LXI HiSlip Module
- LXI Event Logging Module
- LXI Event Messaging Module

Some modules described in the LXI Device Specification depend on dedicated hardware. Therefore, these modules are currently out of scope and will not be available:

- LXI Wired Trigger Bus,
- LXI Timestamped Data,
- LXI Clock Synchronization using IEEE 1588

The LXI Reference Design will support IPv6; all software and web pages will support IPv6. However, the vendor has the capability to remove IPv6 support easily, if their device does not require it.

The LXI Reference Design acknowledges that some of the LXI vendors do not have modern operating systems and compilers. Therefore, the design and implementation avoids using advanced C++ constructs, such as templates; complex inheritance; and modern C++ keywords. Furthermore, the usage of dynamic memory access will be reduced to a minimum. All calls to system-related functions will be encapsulated allowing vendors of devices with unsupported operating systems to adopt the design.

The LXI Reference Design will support two web servers, a common one called “Nginx,” which is available on all main platforms, and a small embedded one, called “Civitweb,” which can be directly integrated into the main sources of the LXI Reference Design.

The design will be done completely with the tool Enterprise Architect from Sparx[®], a UML design and business analysis tool for modeling, documenting, reverse engineering, building and maintaining object-oriented software systems.

The code documentation will be generated with the Doxygen tool. The documentation is written within the code, and is thus relatively easy to be kept up-to-date. Doxygen can cross-reference documentation and code, so that the reader of a document can easily refer to the actual code.

The LXI reference implementation will be tested against the LXI Conformance Test Suite, so that it will be guaranteed that the LXI reference implementation fulfils the LXI Device Specification Standard.

The complete design and implementation phase will be supervised by an LXI working group, which monitors and supervises the progress. The working group has regular meetings, in which the current progress is presented and problems can be discussed.

TSEP offers LXI members VPN access to an internal server, which will contain the released versions of the LXI Reference Design, including documents and source code. Additionally, a bug tracking system will be established, so that every LXI member will have access to the bug tracking tool.

In summary, this article gives a brief overview of the basic goals, requirements, and architecture of the LXI Reference Design and Implementation. We intend to complete this work by Spring 2015. For further information on this exciting new LXI Consortium project, consult quarterly issues of the [LXI Newsletter](#) and the [Resources page](#) of the LXI Consortium website.