

VXI-11 Discovery and Identification Extended Function

Revision 1.1

May 10, 2022

[VXI-11 Discovery and Identification Extended Function 1](#_Toc94623215)

[*Notices* 3](#_Toc94623216)

[*Revision history* 5](#_Toc94623217)

[1 Overview 6](#_Toc94623218)

[1.1 Introduction 6](#_Toc94623219)

[1.2 Purpose and Scope of this Document 6](#_Toc94623220)

[1.2.1 Purpose 6](#_Toc94623221)

[1.2.2 Scope 6](#_Toc94623222)

[1.3 Definition of Terms 7](#_Toc94623223)

[1.4 Additional LXI Conformance Requirements 8](#_Toc94623224)

[1.4.4 Extended Functions 8](#_Toc94623225)

[10 LAN Discovery and Identification 9](#_Toc94623226)

[10.1 RULE – Support VXI-11 Discovery Protocol 9](#_Toc94623227)

[10.1.1 RULE – VXI-11 Servers Respond Within One Second 9](#_Toc94623228)

[10.1.2 RULE– SCPI \*IDN? 9](#_Toc94623229)

[10.1.3 LXI VXI-11 Web Interface Requirements 9](#_Toc94623230)

[10.1.4 LXI VXI-11 XML Identification Document Requirements 10](#_Toc94623231)

[10.1.5 LXI VXI-11 mDNS Service Discovery Requirements 10](#_Toc94623232)

**Notices**

**Notice of Rights.** All rights reserved. This document is the property of the LXI Consortium.  It may be reproduced, unaltered, in whole or in part, provided the LXI copyright notice is retained on every document page.

**Notice of Liability.** The information contained in this document is subject to change without notice. “Preliminary” releases are for specification development and proof-of-concept testing and may not reflect the final “Released” specification.

The LXI Consortium, Inc. makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The LXI Consortium, Inc. shall not be liable for errors or omissions contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

**LXI Standards Documents** are developed within the LXI Consortium and LXI Technical Working Groups sponsored by the LXI Consortium Board of Directors. The LXI Consortium develops its standards through a consensus development process modeled after the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Consortium and serve without compensation. While the LXI Consortium administers the process and establishes rules to promote fairness in the consensus development process, the LXI Consortium does not exhaustively evaluate, test, or verify the accuracy of any of the information contained in its standards.

Use of an LXI Consortium Standard is wholly voluntary. The LXI Consortium and its members disclaim liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon this, or any other LXI Consortium Standard document.

The LXI Consortium does not warrant or represent the accuracy that the use of the material contained herein is free from patent infringement. LXI Consortium Standards documents are supplied “as is”. The existence of an LXI Consortium Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the LXI Consortium Standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Users are cautioned to check to determine that they have the latest edition of any LXI Consortium Standard.

In publishing and making this document available, the LXI Consortium is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is the LXI Consortium undertaking to perform any duty owed by any other person or entity to another. Any person utilizing this, and any other LXI Consortium Standards document, should rely upon the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

This specification is the property of the LXI Consortium, a Delaware 501c3 corporation, for the use of its members.

**Interpretations** Occasionally questions may arise regarding the meaning of portions of standards as they relate to specific applications. When the need for interpretations is brought to the attention of LXI Consortium, the Consortium will initiate action to prepare appropriate responses. Since LXI Consortium Standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received the concurrence of a balance of interests. For this reason, LXI Consortium and the members of its working groups are not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. Requests for interpretations of this standard may be sent to [interpretations@lxistandard.org](mailto:interpretations@lxistandard.org) using the form “*Request for Interpretation of an LXI Standard Document*”. This document plus a list of interpretations to this standard are found on the LXI Consortium’s Web site: [http://www.lxistandard.org](http://www.lxistandard.org/)

**Legal Issues, Trademarks, Patents, and Licensing Policies.** These items are addressed specifically in the document “LXI *Consortium Trademark, Patent, and Licensing Policies*” found on the LXI Consortium’s Web site: <http://www.lxistandard.org> .

**Conformance** The LXI Consortium draws attention to the document “*LXI Consortium Policy for Certifying Conformance to LXI Consortium Standards*” found on the LXI Consortium’s Web site: <http://www.lxistandard.org> .That document specifies the procedures that must be followed to claim conformance with this standard.

**Comments for Revision Comments** for revision of LXI Consortium Standards are welcome from any interested party, regardless of membership affiliation with LXI Consortium. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Comments on standards should be addressed to:

Executive Director  
LXI Consortium  
www.lxistandard.org

[ExecDir@lxistandard.org](mailto:ExecDir@lxistandard.org)

**Revision history**

|  |  |
| --- | --- |
| ***Revision*** | ***Description*** |
| 1.1  May 10, 2022 | Added Rules 10.1.3, 10.1.4 & 10.1.5 to specify LXI Discovery and Identification be disclosed on the Welcome page and in the xml identification document. |
| 1.0  Nov 8, 2016 | Initial Release |

# Overview

## Introduction

Many LXI instruments communicate via the LAN through one of three protocols, VXI-11, raw sockets, and HiSLIP. The VXIbus Consortium published the [VXI-11Specification](http://www.vxibus.org/specifications.html) in 1995. The IVI Foundation published the [HiSLIP Specification](http://www.ivifoundation.org/specifications/default.aspx) in 2011 as a faster replacement for VXI-11. All these protocols provide mechanisms to send ASCII commands, such as Standard Commands for Programmable Instrumentation (SCPI), along with other familiar GPIB operations.

The LXI Consortium supports all of these protocols in the LXI Standard. All are available to instrument manufacturers whose instruments are LXI conformant. This document will focus on the VXI-11 Extended Function discovery function (\*IDN?).

VXI-11 was designed to emulate the capabilities of GPIB, including those based upon hardware

signals, such as service request (SRQ), serial poll, device trigger and device clear. It was first used in LAN to-GPIB gateways, before native LAN-based instruments became available. LAN-based instruments were standardized by implementing the LXI Specification, published in 2005.

VXI-11 was the only mandated discovery tool used in early versions of the LXI Standard. Later versions of the standard mandate mDNS and made VX-11 an optional Extended Functions, because it is less accepted in Ethernet and will not support IPv6.

The remaining portions of this document call out the rules, recommendations, observations, etc. for implementing the LXI VXI-11 Extended Function for LXI Device discovery and identification.

## Purpose and Scope of this Document

### Purpose

Each LXI Extended Function has its own document with unique section numbering that, if merged with the LXI Specification Core document, would produce a contiguous representation of the entire LXI Specification.

This document supplies the requirements for LXI conformance to the LXI VXI-11 Discovery and Identification Extended Function.

### Scope

This document defines a common set of RULES and RECOMMENDATIONS for constructing a conformant LXI Device with one or more Extended Functions. Whenever possible these specifications use existing industry standards.

The original LXI Device Specification included both requirements for all LXI Devices and a number of Extended Functions in a single document. Common information remains in the LXI Device Specification and specific information related to the Extended Function moves to separate documents.

## Definition of Terms

This document contains both normative and informative material. Unless otherwise stated the material in this document shall be considered normative.

NORMATIVE: Normative material shall be considered in determining whether an LXI Device is conformant to this standard. Any section or subsection designated as a RULE or PERMISSION is normative.

INFORMATIVE: Informative material is explanatory and is not considered in determining the conformance of an LXI Device. Any section or subsection designated as RECOMMENDATION, SUGGESTION, or OBSERVATION is informative. Unless otherwise noted examples are informative.

RULE: Rules SHALL be followed to ensure compatibility for LAN-based devices. A rule is characterized by the use of the words SHALL and SHALL NOT. These words are not used for any other purpose other than stating rules.

RECOMMENDATION: Recommendations consist of advice to implementers that will affect the usability of the final device. Discussions of particular hardware to enhance throughput would fall under a recommendation. These should be followed to avoid problems and to obtain optimum performance.

PERMISSION: Permissions are included to clarify the areas of the specification that are not specifically prohibited. Permissions reassure the reader that a certain approach is acceptable and will cause no problems. The word MAY is reserved for indicating permissions.

OBSERVATION: Observations spell out implications of rules and bring attention to things that might otherwise be overlooked. They also give the rationale behind certain rules, so that the reader understands why the rule must be followed. Any text that appears without heading should be considered as description of the specification.

## Additional LXI Conformance Requirements

### Extended Functions

#### General Description

The LXI Standard consists of the LXI Device Specification, required for all LXI Devices. In addition, it includes all optional Extended Functions.

LXI Extended Functions

Extended Functions come in the form of external documents. Each Extended Function document will have sections numbered as though they were part of the LXI Device Specification, but the documents are separate to simplify maintenance of the standard and to add new Extended Functions without altering the LXI Device Specification. The [*Guide to LXI Documentation*](http://www.lxistandard.org/Specifications/Specifications.aspx) identifies the Extended Function documents.

#### Conformance Requirements

The rules in this document define the conformance requirements for this Extended Function. In addition to the requirements for all LXI Devices found in the ***LXI Device Specification***, an Extended Function may require conformance to another Extended Function. All these requirements are detailed in the following Rule:

**LXI Device Specification Document:**

* All LXI Devices shall conform to the rules found in Section 1.4 and all subsections

**LXI VXI-11 Document (this document):**

* Include all rules

# LAN Discovery and Identification

This section extends the discovery and identification of the LXI Device Specification. LXI devices must support mDNS discovery. VXI-11 is an early form of discovery supported by many LAN-based devices.

## RULE – Support VXI-11 Discovery Protocol

The VXI-11 protocol should be supported by all LXI Devices for discovery purposes. If an LXI Device supports the VXI-11 Discovery Protocol, it shall be accomplished by issuing a broadcast RPC call on the host’s subnet. The broadcast RPC shall be to either the port-mapper itself on port 111 (querying for VXI-11 support) or the NULL procedure (procedure 0) on the Program Number assigned to the VXI-11 Core Service (0x0607AF).

### RULE – VXI-11 Servers Respond Within One Second

If the VXI-11 discovery protocol is supported, it shall respond to a broadcast RPC to the NULL procedure within 1 second.

Observation – SCPI \*IDN? Usage

A host may establish a VXI-11 connection to each discovered LXI Device and perform a SCPI \*IDN? command to determine the LXI Device's manufacturer and model.

Since SCPI commands typically set the device into a Remote state due to the emulation of the GPIB interface, some manufacturers choose to single out this query and not allow the device to transition into the Remote state. This helps front panel users avoid having to press the Local key to resume front panel operations when some computer is querying devices on a shared LAN using the \*IDN?.

### RULE– SCPI \*IDN?

If the LXI Device support the VXI-11 Discovery Protocol at a minimum an LXI Device that supports VXI-11 shall be able to respond to the IEEE 488.2 “\*IDN?” command. This is a simple query that returns four comma-separated fields, which indicate manufacturer, model, serial number, and firmware version[[1]](#footnote-2).

#### Permission – Additional VXI-11 and SCPI Support Is Optional

LXI Devices may support additional VXI-11 functionality and SCPI commands beyond that required for discovery.

### LXI VXI-11 Web Interface Requirements

#### RULE – Include ‘LXI VXI-11’ in Welcome Web Page “LXI Extended Functions”

Devices implementing the LXI VXI-11Discovery and Identification extended function shall include ‘LXI VXI-11 Discovery and Identification’ in the ‘LXI Extended Functions’ display item of the welcome web page.

### LXI VXI-11 XML Identification Document Requirements

#### RULE – Include the LXI VXI-11 Function in the <LxiExtendedFunctions> element

LXI devices implementing VXI-11 Discovery and Identification extended function shall include a <Function> element in the <LxiExtendedFunctions> XML element with the FunctionName attribute of “LXI VXI-11 Discovery and Identification” and a Version attribute containing the version number of this document.

Examples:

<Function FunctionName=”LXI VXI-11 Discovery and Identification” Version=”1.1”/>

### LXI VXI-11 mDNS Service Discovery Requirements

#### RULE – Advertise the LXI VXI-11 Service Type

The following service needs to be advertised by mDNS. See section 10.4.3.10 in the LXI Device Specification for further information.

Observation

Devices should advertise the VXI-11 service ***only*** if they support a complete and useful VXI-11 implementation (e.g., full command interpreter for the device). Devices with only minimal VXI-11 services, as documented in ***LXI VXI-11 Discovery and Identification Extended Function*** are discouraged from advertising their VXI-11 service.

VISA Address can be derived from the generated xml file associated with this device. Use the IP address or hostname and do not include the domain name. For Example:

TCPIP::A-52230A-04585.local::inst0::INSTR

|  |  |  |
| --- | --- | --- |
| **Service Type** | **TXT Record Keys** | **Description** |
| vxi-11  (\_vxi-11.\_tcp) | txtvers=<version of TXT record">; default "txtvers=1"; current version is 1  Manufacturer=<first element of response to IEEE 488.2 \*IDN?>  Model=<second element of response to IEEE 488.2 \*IDN?>  SerialNumber=<third element of response to IEEE 488.2 \*IDN?>  FirmwareVersion=<fourth element of response to IEEE 488.2 \*IDN?>  Address=<VISA Address>  Address=<VISA Address>  Example:  TCPIP::myHostName.local::inst0::INSTR | VXI-11 Server |

1. For more information, see IEEE 488.2 Section 10.14. [↑](#footnote-ref-2)