PXI Platform Overview

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PXI History

Organized in 1997
Founded in 1998

PXISA goals:
- Maintain the PXI specification
- Ensure interoperability
- Promote the PXI standard

65+ members comprise the PXISA

PXISA website (www.pxisa.org)
- Specifications
- Tutorials, application notes, and white papers
- Locate member companies and products
- News and announcements
PXI Specification

**Mechanical**
- High-performance connectors
- Eurocard mechanical packaging
- Forced-air cooling by chassis
- Optional module shielding
- Environmental testing
- Electromagnetic testing

**Electrical**
- Industry-standard PC buses
- System reference clocks
- Star trigger buses
- PXI trigger bus

**Software**
- Microsoft Windows software frameworks
- Software components that define HW configuration and capabilities
- Virtual Instrument Software Architecture (VISA) implementation

PXI = **PCI eXtensions for Instrumentation**
PXI Balances Standardization and Innovation

Interactive/Debugging Interface
- Application Programming Interface (API)

Usage of Synchronization
- Calibration

Module-Specific Shielding
- Signal Connectivity

Virtual Instrument Software Architecture
- PXI Trigger Bus
- Star Trigger Buses
- System Reference Clocks
- Industry Standard PC Buses

Electromagnetic Testing
- Environmental Testing
- Forced-Air Cooling by Chassis
- Eurocard Mechanical Packaging
- High-Performance Connectors

Vendor-Defined Functionality
PXI Interoperability - a standards approach

PXIe specification – a living specification
PXI - The Industry-leading Platform for Automated Test

**PXI Modules**
>1,500 options from over 65 PXI vendors

**PXI Chassis**
Up to 64x more throughput and 5000x lower latency than LAN-based systems

**Software**
Flexible driver APIs, soft front panels and module configuration

**PXI Controllers**
High-performance embedded or remote control via desktop or laptop
PXI Timing and Synchronization
Latency vs. Bandwidth

- Gigabit Ethernet
- USB 2.0
- PCI/PXI
- PCI Express/ PXI Express (x8)

Approximate Latency (μs) (Decreasing (improving) Latency)
PXI, PXI Hybrid and PXI Express Slots

**Standard PXI Slot**
- Power
- Trigger Bus
- Star Trigger
- Clk. 10
- Reserved Pins
- 64/66 PCI
- Local Bus (typically unused)

32/33 PCI (132 MB/s per system)

**PXI Express Slot**
- Gen3 x8 PCIe (up to 8 GB/s)
- Differential Clk. 100 & Star Triggers

**PXI Hybrid Slot**
- Power
- Trigger Bus
- Star Trigger
- Clk. 10
- Reserved Pins
- 64/66 PCI
- Local Bus (typically unused)
PXI and Hybrid Slots Ensure Compatibility
Ride Moore’s Law with Controller Performance

GFLOPs


Intel Inside

Pentium Dual Core Inside

Intel Inside XEON

PXI Controllers

Traditional Instruments
Peer to Peer Extends System Bandwidth: Example

Bandwidth not limited to System Controller
PXI Integrates All Instrumentation Protocols
PXI Express Software Specification

• Adds system-level management software extensions:
  – System-level geographical addressing
  – Slot type / capability identification
  – Chassis monitoring (temperature, fan speed, etc)

• Retains software compatibility with PXI, CompactPCI, and other PCI-based devices
What is PXImc?

- Uses Non-Transparent Bridges (NTBs) to transfer data between PCs by using PCI Express
- PXI Systems Alliance (PXISA) standardized the use of NTBs in PXI in 2009 to define a vendor interoperable solution (PXImc => PXIMultiComputing)
  - **Technology Differentiation**: Multiple GB/s data transfer rate with micro-second latency
PXImc Topologies

Master PXI System

Master Controller
MXIe
MXIe
MXIe
I/O

Cabled PCI Express Links

Secondary PXI System
Subsystem Controller
I/O
I/O
I/O

Secondary PXI System
Subsystem Controller
I/O
I/O
I/O

High Performance Box Instrument

ni.com/pxi
PXImc Topologies

Master Controller

Master PXI System

Cabled PCI Express Links

x86 Based
Compute Node

x86 Based
Compute Node

x86 Based
Compute Node

x86 Based
Compute Node
Product Announcements (Last Few Months)

NI Thunderbolt™ 3 Remote Control of PXI Test Systems

Pickering Interfaces’ BRIC™ Ultra-High-Density PXI Matrix Modules (model 40-559)

SignalCore Broadband and High Performance 6 GHz RF Upconverter

Keysight M9383A PXIe Microwave Analog/Vector Signal Generator, 1 MHz to 44 GHz

NI Baseband PXI Vector Signal Transceiver

VX Instruments High configurable PXIe Trigger Module PXIe1741

Keysight M9421A PXI VXT

Keysight M9260A PXI Audio Analyzer

NI 28-Bit, 32-Channel, 2 MS/s, ±15 V Flexible Resolution PXI Analog Input Module

GaGe 16-bit RazorMax Express Digitizer series

NI PXIe-54x3 Arbitrary Waveform Generator Family

OpenATE PA32S, 3U PXI Module, designed for MEMS Sensor device Testing

Keysight M9336A PXIe I/Q Arbitrary Waveform Generator

AMETEK VTI Instruments’ EMX-70XX Series of Precision Programmable Resistor Ladders

FlashRunner FRPXIA3 integrates In-System Programming function in the PXI system

Pickering Interfaces Expands Range of High-Density 2 Amp PXI Multiplexers
PXI Revenue Forecast for Test Applications

Source: Frost and Sullivan

Revenue [Million]


17.6% CAGR
Characteristics of the Stable PXI Platform

- Founded in 1997
- 60+ Vendors
- 2000+ Modules
- Latest Technology
- Growing Market Share