AXIe: AdvancedTCA® Extensions for Instrumentation and Test

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Agilent Technologies, Inc.
Test Evolution Corporation

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AXIe Standard: What and Why

- **What is it?**
  - A next-generation, open standard that extends Advanced Telecom Computing Architecture (AdvancedTCA®) for general purpose and semiconductor test

- **Why another modular test standard?**
  - Higher performance per rack inch
  - Greater scalability
  - Integrates easily with PXI, LXI and IVI
  - More modularity, more flexibility, higher speeds => addresses a range of platforms
    - ATE Systems, rack-and-stack modular, bench top, module plug-ins
  - Significant reduction of development and unit costs

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Why AdvancedTCA as a foundation?

- **AdvancedTCA PICMG® 3.0 Standard:** *proven* open system architecture
- **Large board size**
  - Ideal for *high performance* instrumentation
  - Board size matches that of planar instrument design
- **Rack space efficiency**
  - Horizontal and vertical configurations
- **Scalability**
  - 1 slot to 14 slots, 1 Chassis to many, PXI/PCI adapters
- **Ideal for high power applications**
  - Single rail power management and robust cooling
- **Virtual LXI and PXI**
  - Base fabric support of LAN and PCIe data fabric support
- **Robust system management**
  - Intelligent Platform Management Interface (IPMI) enables both single chassis and multi-chassis system control functions
- **Extensions** for I/O, custom backplanes, liquid cooling

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**AXIe Standard Structure**

AXIe is a scalable standard allowing a portfolio of applications, all of which can leverage general purpose instrumentation.

- Extensions built for specific applications
- Accepts all AXIe 1.0 modules
- Can define specific Zone 3 and additional System Management and system resources.

- Frugal use of AdvancedTCA resources
- Zone 3 unused to allow compatibility with extended uses and existing AdvancedTCA modules
- Allows carrier boards
- Core system management

AXI 1.0 and AXI 1.1 refer to standards, not revision numbers
Revisions handled as Revision X.Y

### AXIe Structure

**AXIe 1.0**
- Zone 1 & 2
- Core Triggers, Timing and Local bus
- AdvancedTCA PICMG3.0, PICMG3.4
- LAN + PCIe
- System Management

**AXIe 1.1**
- Zone 3 signals
- DUT I/O on RTM
- Add’l Trigger/Sync
- Analog Busses
- FRU & RTM Management

**Other future Applications**
- Examples:
  - Network Test
  - Physics
  - Liquid Cooling
  - Custom

### AXIe 1.n

**General Purpose**
- Zone 1 & 2
- Core Triggers, Timing and Local bus
- AdvancedTCA PICMG3.0, PICMG3.4
- LAN + PCIe
- System Management
# AXIe 1.0 vs 1.1 Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>1.0</th>
<th>1.1</th>
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<tbody>
<tr>
<td>PCIe &amp; LAN Hub</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Local Bus</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Trigger Bus</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Frequency Reference (CLOCK) &amp; Sync (SYNC)</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Star Trigger (STRIG)</td>
<td>x</td>
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<tr>
<td>Bidirectional DSTAR (4)</td>
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<td>x</td>
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<tr>
<td>User Defined Synchronization Signals</td>
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<td>x</td>
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<tr>
<td>Load Board Support</td>
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<td>x</td>
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<tr>
<td>Field Calibration Support</td>
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</tbody>
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*** Only with 14-slot (or fewer) chassis
AXIe leverages ATCA

...draws from and works with existing instrument standards

**AXIe**
- Advanced TCA specific extensions
- IPMI and resource management
- Timing and Sync
- Zone 3 configurations

**Advanced TCA**

**PXI**
- Virtual PXIe instruments
- PCIe communication

**IVI**
- Standard drivers work in all Application Development Environments
- VISA standard

**LXI**
- Virtual LXI instruments
- LAN communication
High scalability of AXIe

1U Horizontal

14 slot Vertical

Specialty instrument with AXIe module

PXI carrier module
AXIe integration with Rack and Stack

LXI Box Instruments

AXIe
(LAN and PCIe on backplane)

PXI

GP-IB Instruments

LAN

Stand-alone PC

Cable PCIe

Common control via
• Rack mounted controller, or
• Embedded controller in chassis, or
• Desktop controller

Note: Graphic for example only, instruments do not need to be co-located in same rack unit.
AXIe integration in Semiconductor Test

- Scalable combinations of AXIe and PXI chassis
- Zone 3 Extensions for digital synchronization DUT I/O, and other ATE system resources
- Accepts standard PXI and AXIe 1.0 modules

Note: Graphic for example only.
Summary

• **Extending AdvancedTCA**
  - AXIe is based on AdvancedTCA with extensions for instrumentation and test.

• **General Purpose (1.0) & Semiconductor Test (1.1)**
  - AXIe will have a base standard of AXIe 1.0 for general instrumentation, and a layered standard of AXIe 1.1 for semiconductor test.

• **More Performance, Scalability, Flexibility**
  - AXIe delivers higher performance in a flexible, scalable platform.

• **PXI, LXI, IVI**
  - AXIe works well with other standards, such as PXI, LXI and IVI.

• **Lower costs**
  - Enables significant reduction of development and unit costs.

• **Longevity**
  - Promises longevity due to high performance coupled with layered standards.
Next Steps

• **Potential future AXIe standard efforts**
  - AXIe 1.N standards for additional markets
  - Alternative Zone 3 definitions within new 1.N standards
  - Hybrid systems of AdvancedTCA/AXIe 1.n combinations
  - Fully integrated PXImc
  - MicroTCA® derivatives for AXIe

• **AXIe Consortium**
  - Quick completion of the AXIe 1.0 and 1.1 standards
  - For more information, go to www.axiestandard.org or email Bob Helsel, Executive Director at execdir@axiestandard.org

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