

# LXI Day

Sponsored by

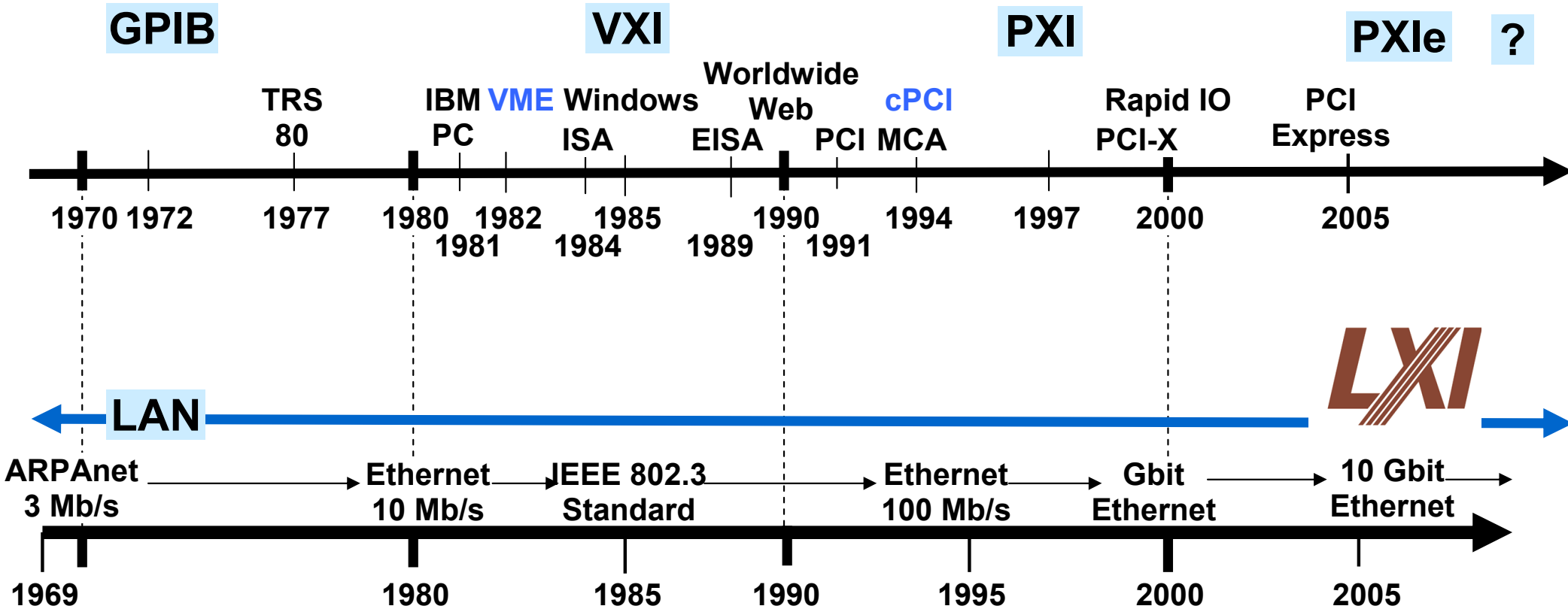
***testforce***  
MEASUREMENT EXPERTS

May 23, 2008

# Introduction to LXI



# Why LXI?



- **Stability.** LAN has demonstrated longevity
- **PC backplanes change too rapidly**
- **Test industry is moving to PC standard I/O (LAN, USB)**
- **Computer industry continues to improve LAN**

# LXI is widely endorsed



*The LXI Consortium is a not-for-profit corporation made up of 50 leading companies in the Test and Measurement Industry.* **LXI Consortium Members**

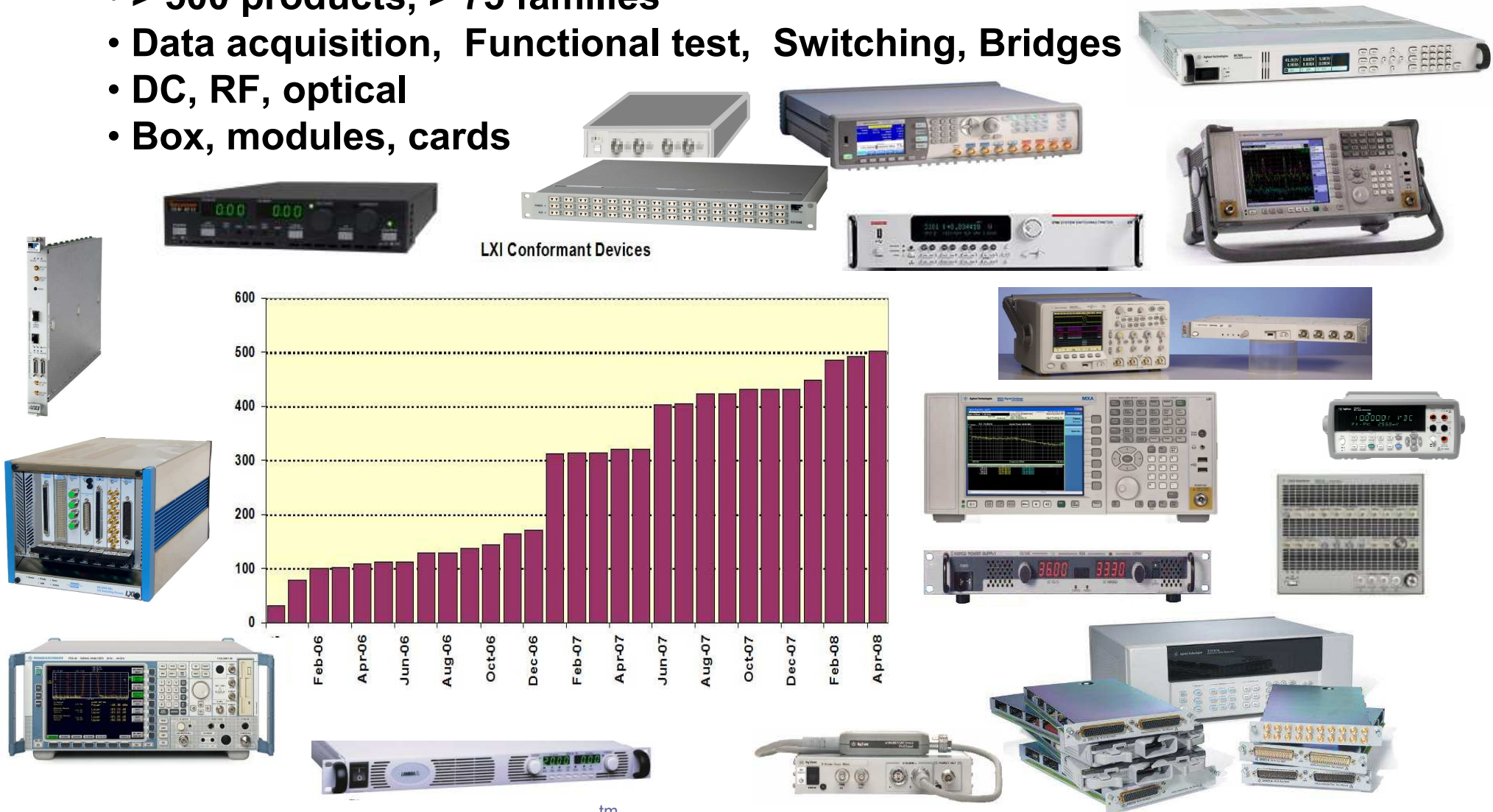
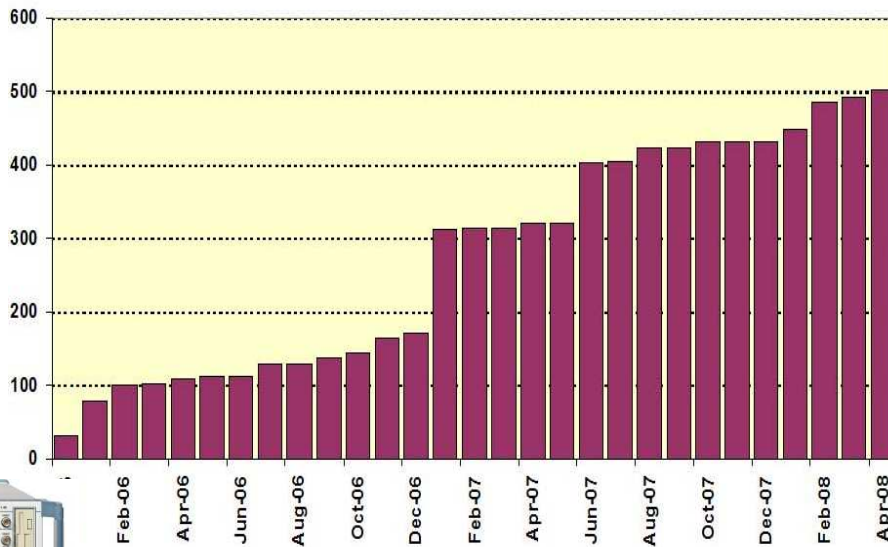
[www.lxistandard.org](http://www.lxistandard.org)

- |                                   |   |                        |                         |
|-----------------------------------|---|------------------------|-------------------------|
| • <b>Agilent</b>                  | • Anritsu                               | • Teradyne             | • C&H Technologies      |
| • <b>VXI Technology</b>           | • Bruel & Kjaer                         | • Tektronix            | • Circuit Assembly Corp |
| • <b>Keithley</b>                 | • Adlink                                | • The MathWorks        | • Data Patterns         |
| • <b>Rohde &amp; Schwarz</b>      | • California Instruments                | • Universal Switching  | • Data Translation      |
| • <b>Pickering</b>                | • Complete Networks                     | • Ztec Instruments     | • Dept of Defense       |
| • <b>National Instruments</b>     | • Beijing Aerospace                     | • Acqiris              | • Geotest/Marvin        |
| • <b>Aeroflex</b>                 | • Beijing Institute of Metrology & Meas | • AMREL                | • Kepco                 |
| • <b>Xantrex</b>                  | • Goepel                                | • JDS Uniphase Corp    | • Pacific MindWorks     |
| • <b>ARC Technology Solutions</b> | • Lambda                                | • Intepro Systems      | • Hitech Group Intl.    |
| • <b>Data Physics Corp</b>        | • EADS N. Am. Defense                   | • Pacific Power Source | • Symtx                 |
| • <b>DowKey Microwave</b>         | • LXInstruments                         | • Com DEV, Ltd.        | • Yokogawa Electric     |
|                                   | • BAE                                   | • Symmetricom          | • Digalog Systems       |
|                                   | • Wheelwright Enterprises               | • Altera Corp.         | • Rigol Technologies    |
|                                   |   | • Holding Informtest   | • IPTE                  |
|                                   |   | • SofTec Microsystems  | • TTI                   |
|                                   |   | • NH Research          |                         |
|                                   |   | • TEGAM                |                         |

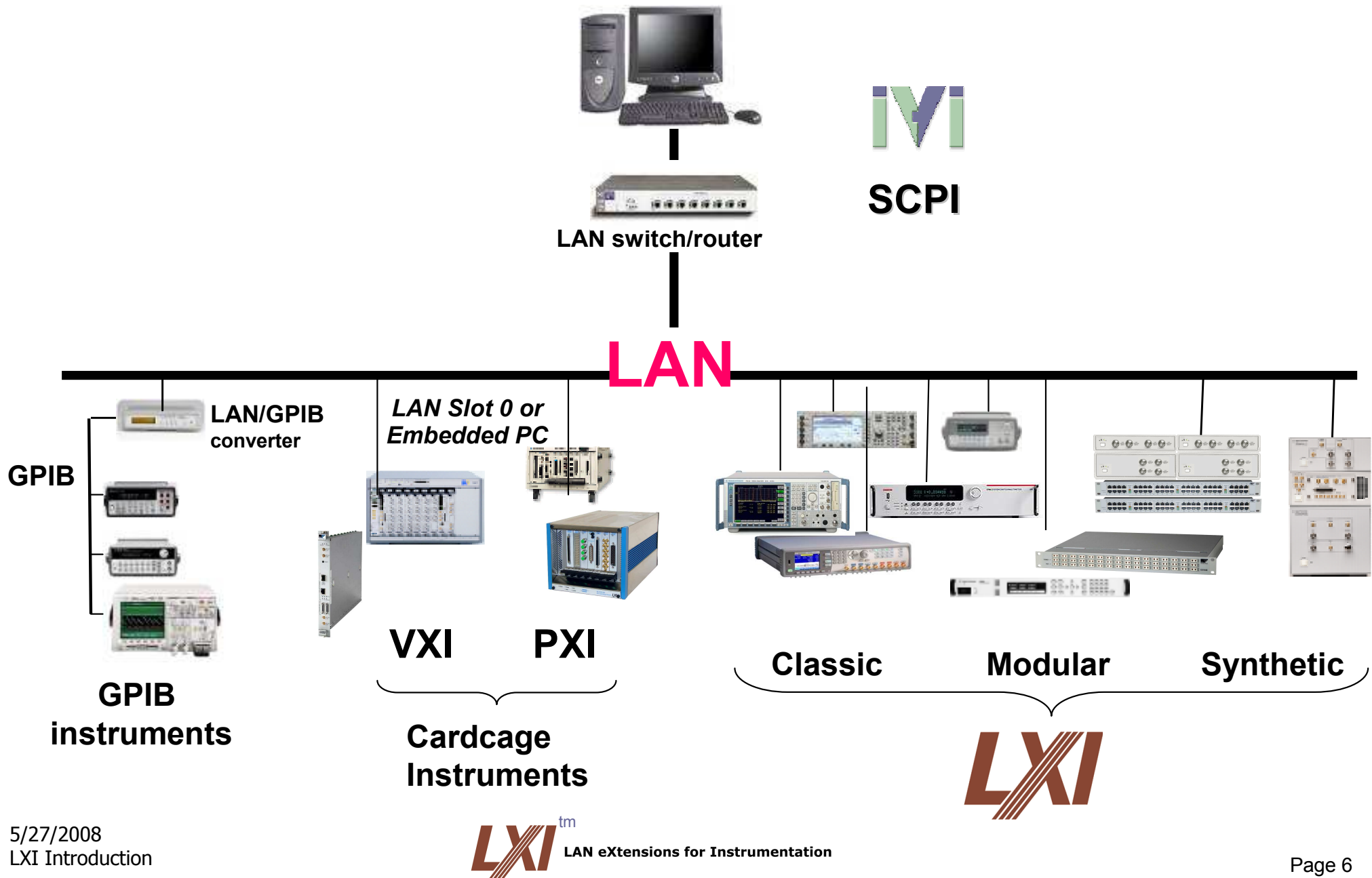
# Adoption: over 500 LXI certified products

- > 500 products, > 75 families
- Data acquisition, Functional test, Switching, Bridges
- DC, RF, optical
- Box, modules, cards

LXI Conformant Devices



# LAN as the system backbone



# What is LXI?

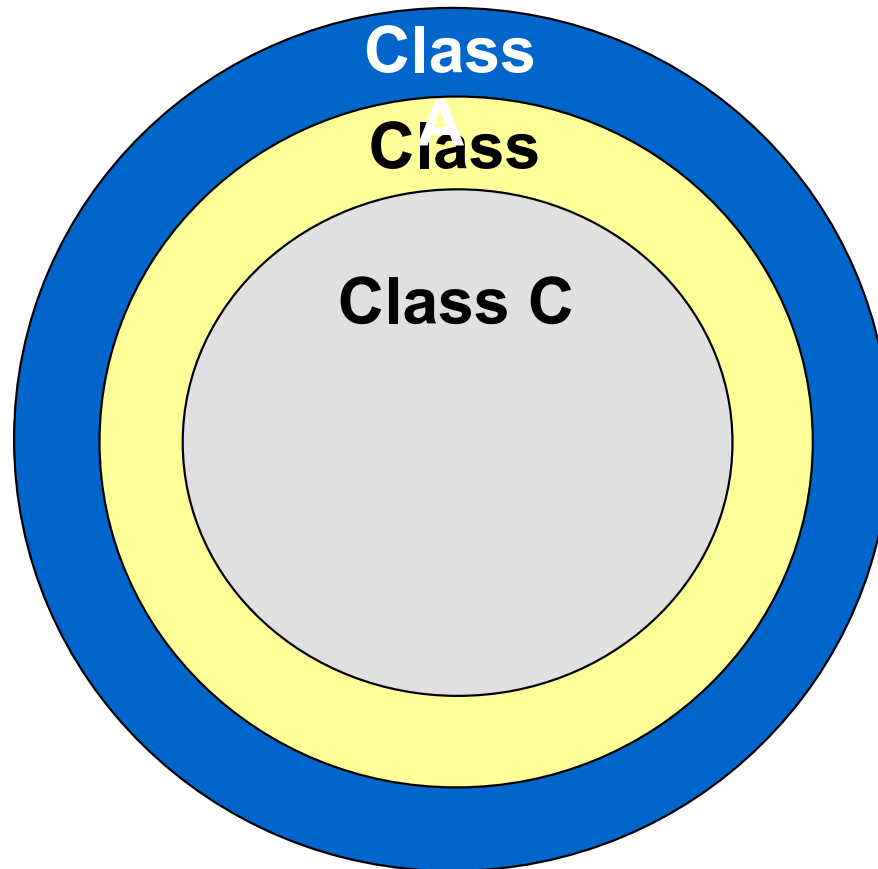


Based on  
existing  
standards

## Applying proven standards to test & measurement

- **Ethernet standards**  
(TCP/IP, DHCP, URL / IP addresses, Dynamic DNS, Auto-MDIX)
- **Interface standards**  
(IVI driver, VXI-11 discovery, Device locking, Security)
- **Instrument web pages**  
(Information, Set-up, control, and data access from a web browser)
- **Physical standards**  
(IEC sizes, Power, Cooling, Front panel Indicators, Reset button)
- **Trigger standards (optional)**  
(LAN triggers, IEEE 1588 time synchronization, Trigger bus)

# 3 Classes of LXI



## Class C (base class)

- Ethernet standards
- IVI driver
- Instrument web page
- Physical
  - Size / Shielding
  - Power / Cooling
  - Indicators / reset button

## Class B

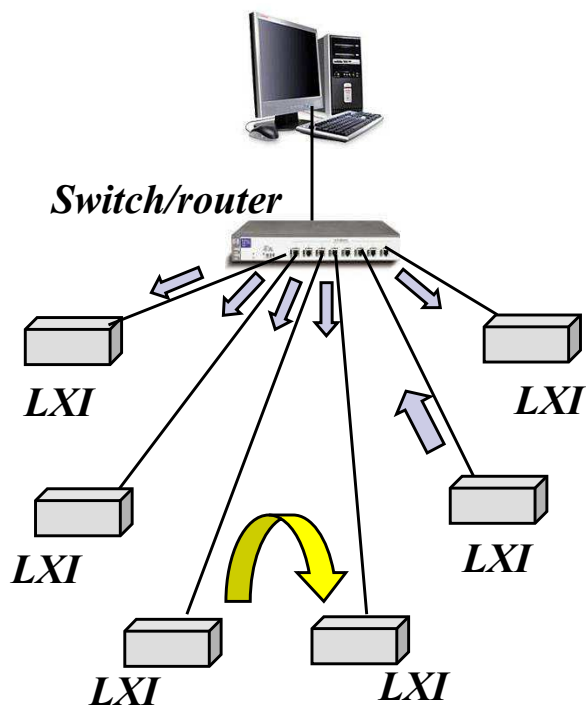
- Class C plus
  - IEEE 1588 time sync
  - LAN messaging
  - Timestamp data
  - Peer-to-peer messaging

## Class A

- Class B & C plus
  - Hardware trigger bus

# LXI Offers more choices...

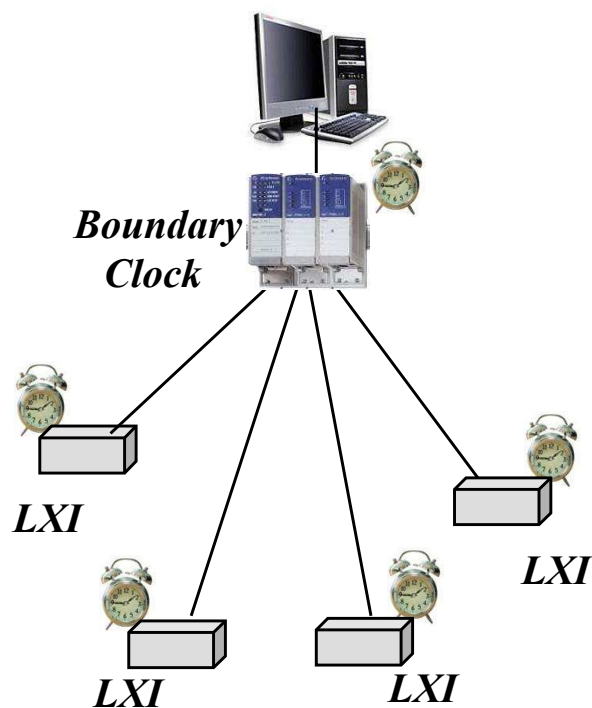
## LAN triggers (Class B, A)



**Message**  
Peer-to-peer  
Multi-cast

< 1msec

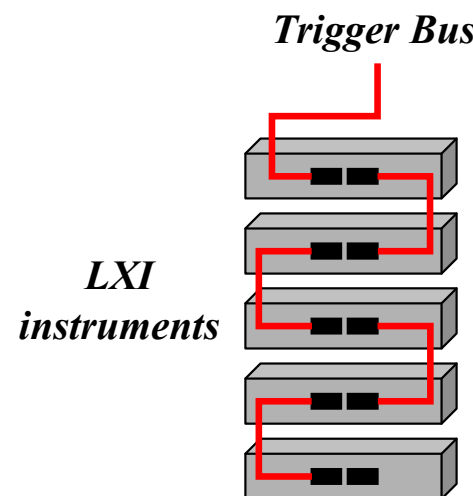
## IEEE-1588 (Class B, A)



**Time**  
Time synchronization  
Time stamps /event logs

<1 us

## Trigger Bus (Class A)

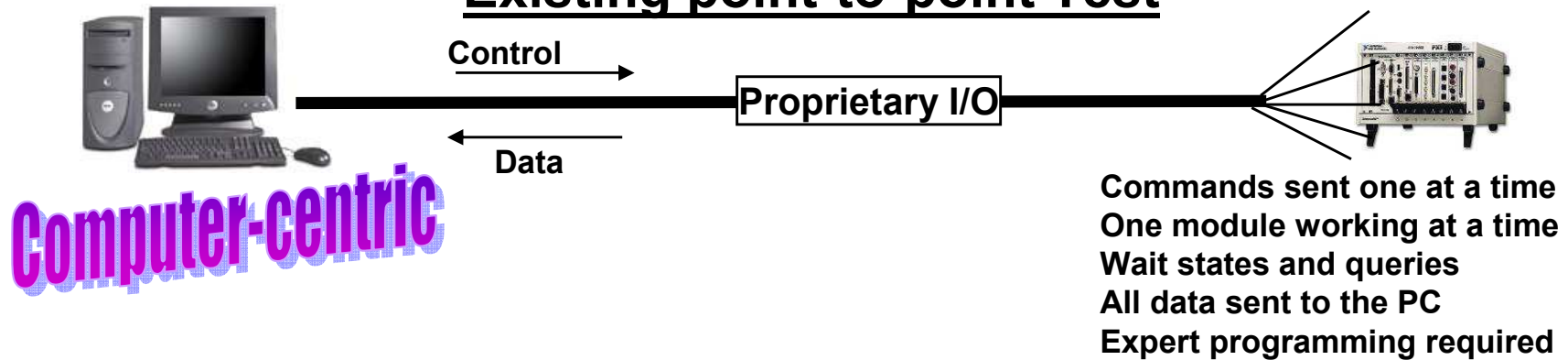


**Hardware**  
Instruments close  
together

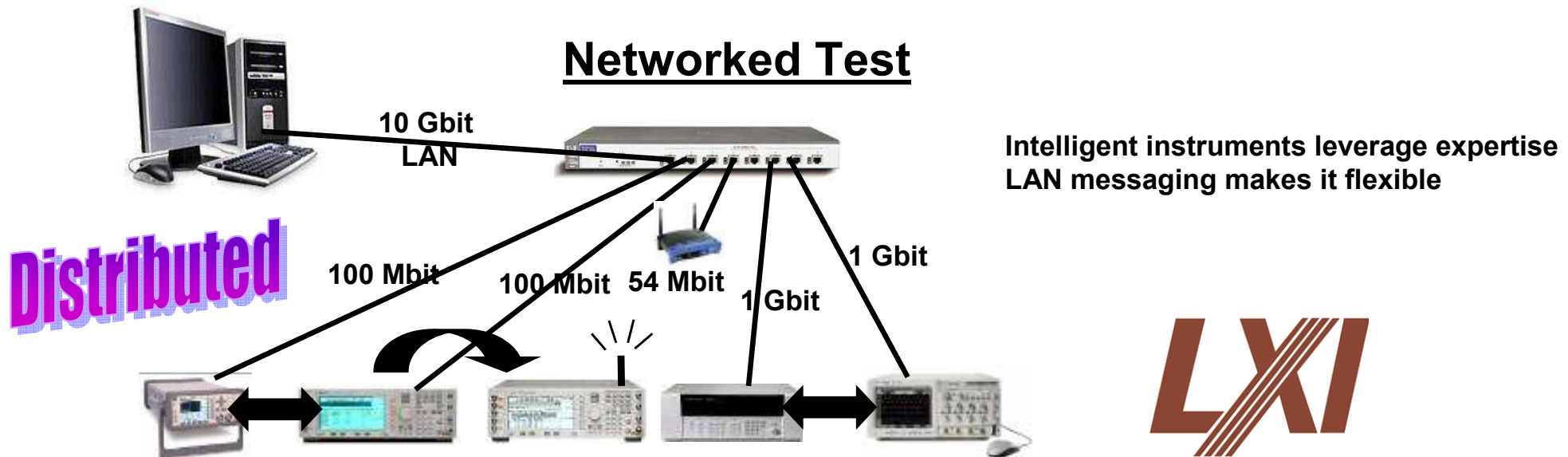
5 ns/ meter  
(20 meters)

# LXI opens new possibilities

## Existing point-to-point Test



## Networked Test

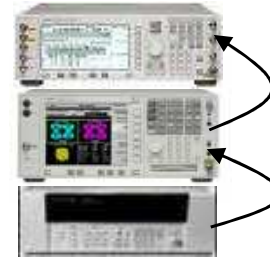


# Using LXI

Long distance operations



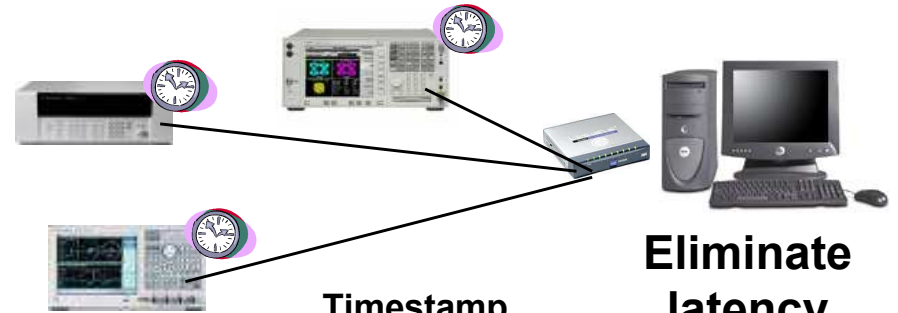
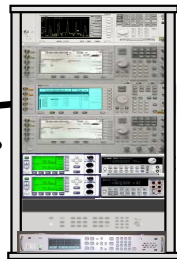
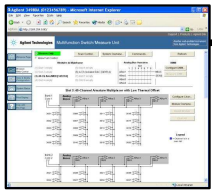
No trigger wires



Higher throughput

Flexible triggering

Expert Troubleshooting



Timestamp all data

Eliminate latency

Parallel operations

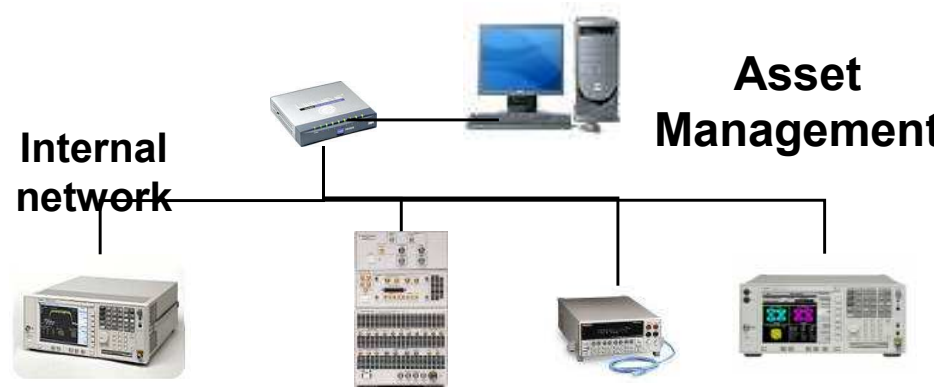
Smart instruments



Internal network

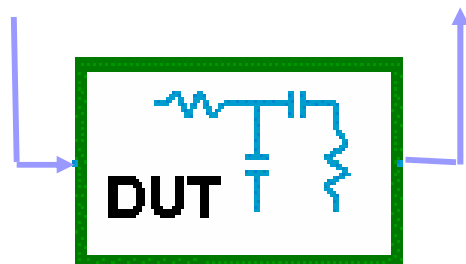
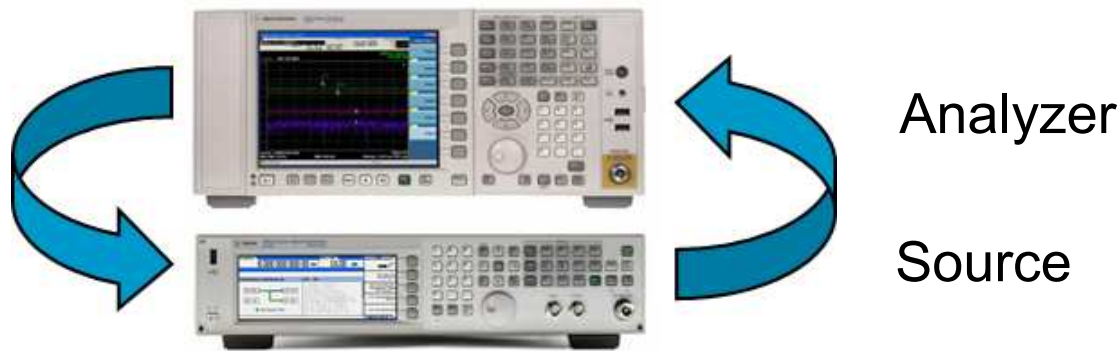
Asset Management

Reduce programming

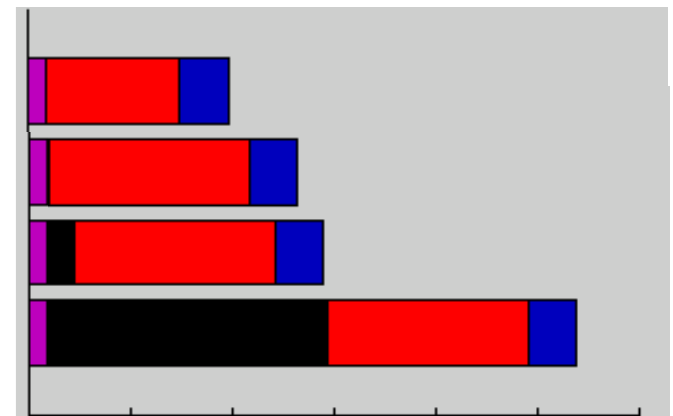


# Eliminate communication latency to improve test system throughput

## Filter/Amplifier Testing – Using Class B Instruments



- Time Triggers
- HDWR Triggers
- Peer-to-Peer
- PC Controlled



- Many frequencies/amplitudes
- Many measurements
- .... Many commands



# LXI advantages

*Harness the power of Ethernet for test*

- Replicates familiar use models
- Unlimited nodes and distance
- Low cost cables and infrastructure; Ethernet standard on all computers
- Fast discovery and setup
- Fast IO
- Flexible media: cable, fiber, wireless
- Time aware for synchronization and diagnostics
- ...

# LXI summary

- **LXI is “LAN done well” with an open industry standard** that can coexist with GPIB, PXI and VXI.
- **LXI is easy to adopt and an increasing percentage of rack & stack instruments conform to LXI Class C.** Class B will become increasing common and will likely be the new baseline over time.
- **LXI can simplify ATE integration** and provides time synchronization, triggering, and peer-to-peer communication capabilities that can reduce or eliminate the need for high-speed backplanes / card cages.
- **Long-term support and backward compatibility of LAN** makes LXI an excellent choice for the defense industry.
- **LXI can improve important ATE / DUT interaction** such as speeding up emergency shutdowns to help prevent damage to expensive hardware.
- **LXI instrument can help facilitate other important test equipment related functions** (calibration due dates, asset utilization rates, etc.)

# LXI Day Agenda

9:00	9:30	Welcome and Introduction
9:30	10:00	LXI Applications (ComDev)
10:00	10:30	Integrating LXI-based systems (Testforce)
10:30	10:45	Break
10:45	11:15	Challenges developing high-speed multichannel data acquisition system (Messier Dowty)
11:15	11:45	LXI in VXI hybrid test systems (VXI Technology)
11:45	12:30	Lunch
12:30	1:00	Antenna testing using LXI Class B (Agilent)
1:00	1:30	LXI Class B Time-Aware Systems (Keithley)
1:30	2:00	Review and wrap-up

