

Getting to know LXI

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LAN eXtensions for Instruments



What is **LXI**?...it's about *your* time!

- LAN eXtensions for Instrumentation
- LAN instruments with predictable behavior
- Instruments that can utilize LAN capabilities
- Instruments that can incorporate a fast trigger bus
- Instruments that can be time aware



GPIB



GPIB + LAN + LXI Behavior

LXI Consortium objectives

- Leverage telecom industry infrastructure
- Lower test system costs
- Simplify system integration
- Ensure broad instrument availability
- Create local and distributed test systems
- Provide a successor to GPIB
- It's about *your* time...
 - LAN Triggering and Messaging
 - Time synchronization and characterization
 - Hardware Trigger Bus

LXI Conformant devices

- Since December 2005
- 1178 products June 2009
- 130 product families
- 23 vendors building products
- 53 Consortium members

Strategic

Agilent Technologies
Keithley Instruments, Inc.

Pickering Interfaces Ltd
Rohde & Schwarz GmbH & Co KG

VTI Instruments Corporation

Participating
Aeroflex, Inc.
C & H Technologies, Inc.
EADS North America
Defense
Intepro Systems
IPTE
Kepco, Inc.
National Instruments Corporation

The MathWorks, Inc.
AMETEK Programmable Power
Advisory

GOEPEL Electronic GmbH
TDK-Lambda Americas Inc.

Pacific MindWorks
ZTEC Instruments

Informational
Acery Technologies Co. Ltd.
AMREL
ARC Technology Solutions
Beijing Aerospace Measurement & Control Corp.
Beijing Control Industrial Computer Corporation
Bustec

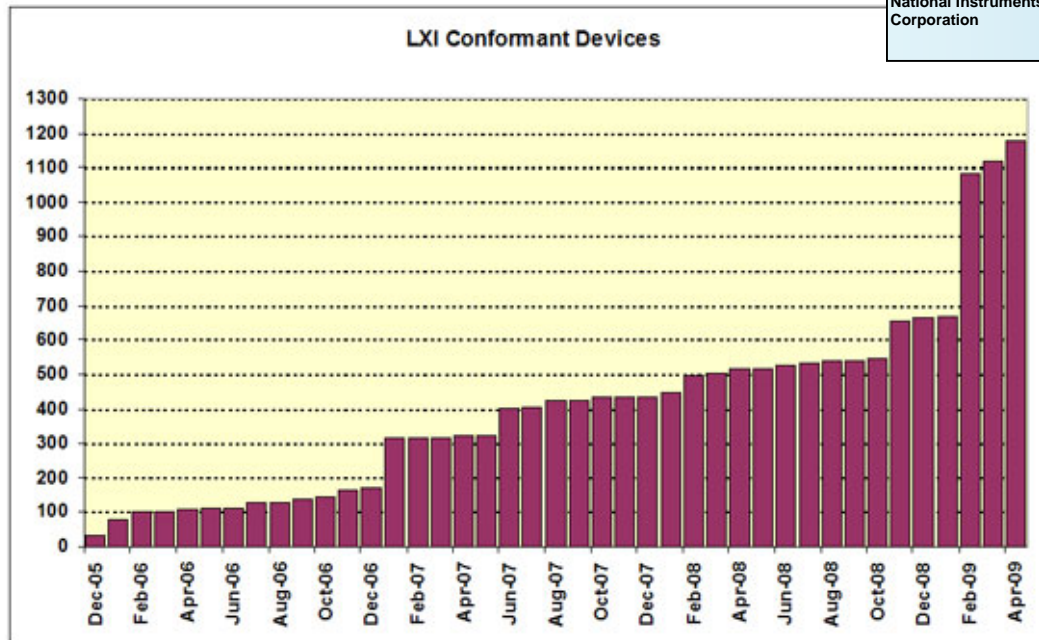
Circuit Assembly Corp.
COM DEV Ltd.
Data Patterns (India) PVT., LTD.

Data Physics Corporation
Data Translation
DowKey Microwave
Hitech Group International, Ltd

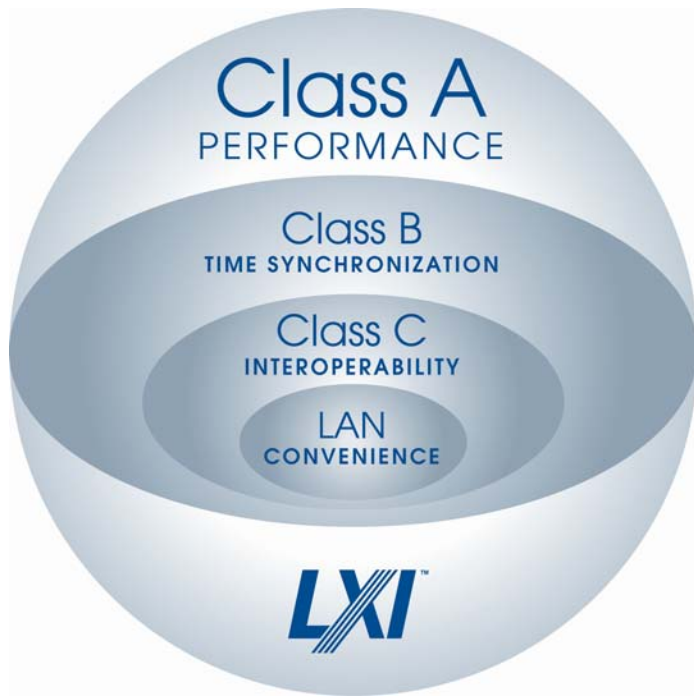
Holding Informtest
JDS Uniphase Corporation
Kikusui Electronics Corporation

LeCroy
LX Instruments GmbH
Magna-Power Electronics Inc.
NH Research
Pacific Power Source, Inc.
Picotest Corp.

Rigol Technologies, Inc.
TEGAM
Teradyne
TTI Ltd.
Universal Switching Corporation
Wheelwright Enterprises
Yokogawa Electric Corporation



LXI Classes



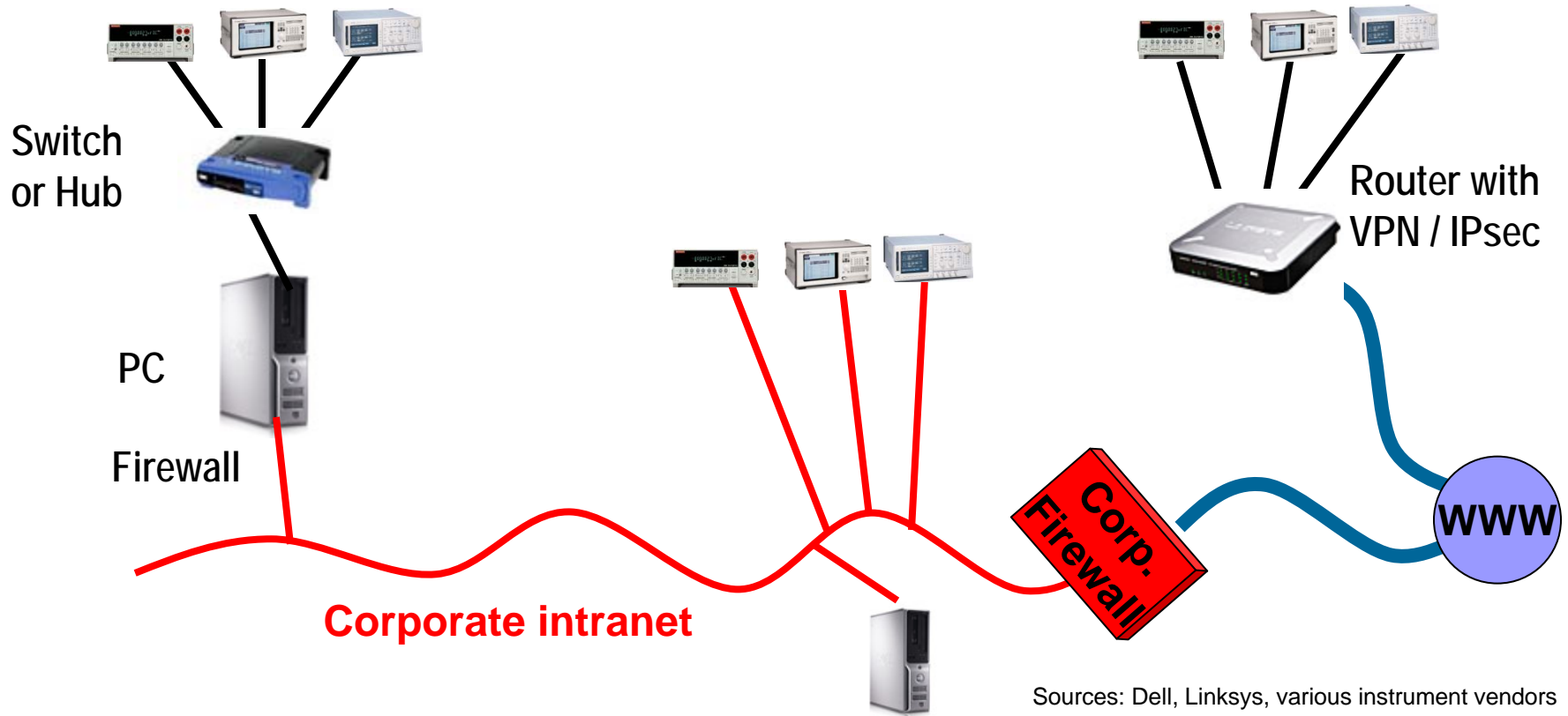
- **Class C: Base class**
 - Built upon LAN standard
 - Predictable LAN behavior
 - Built-in Web server
 - IVI driver API
- **Class B: Adds synchronization**
 - Class C plus
 - IEEE 1588 Precision Time Protocol (PTP)
 - Peer-to-peer messaging and multicast
 - Timestamp data and state changes
- **Class A: Adds a wired trigger bus**
 - Class B plus
 - A fast hardware trigger bus

Typical LXI Network Topologies

Isolated subnet

Across campus

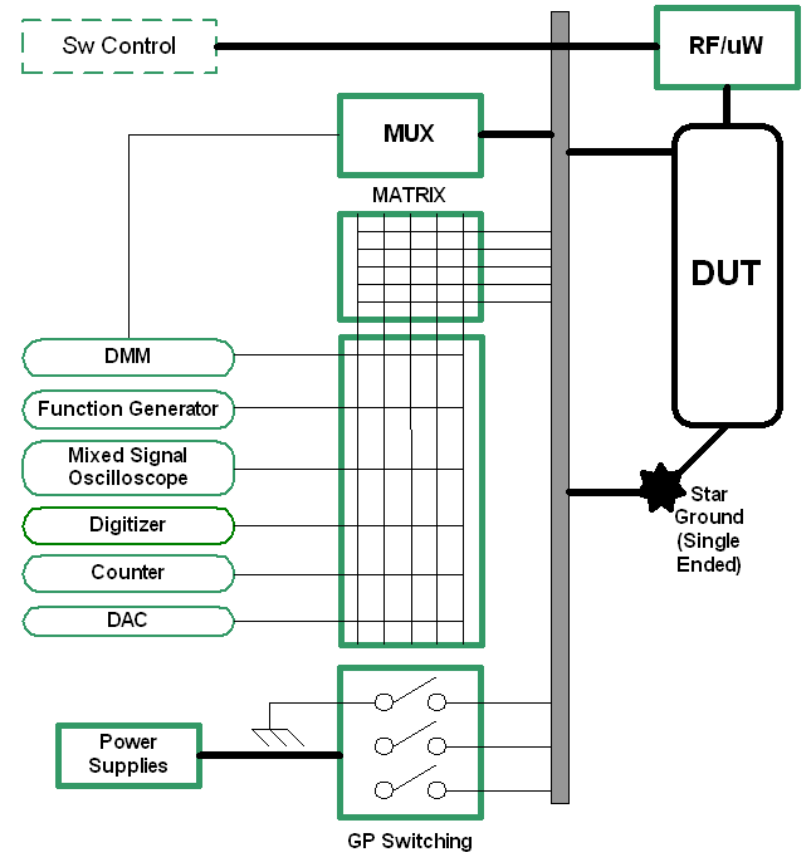
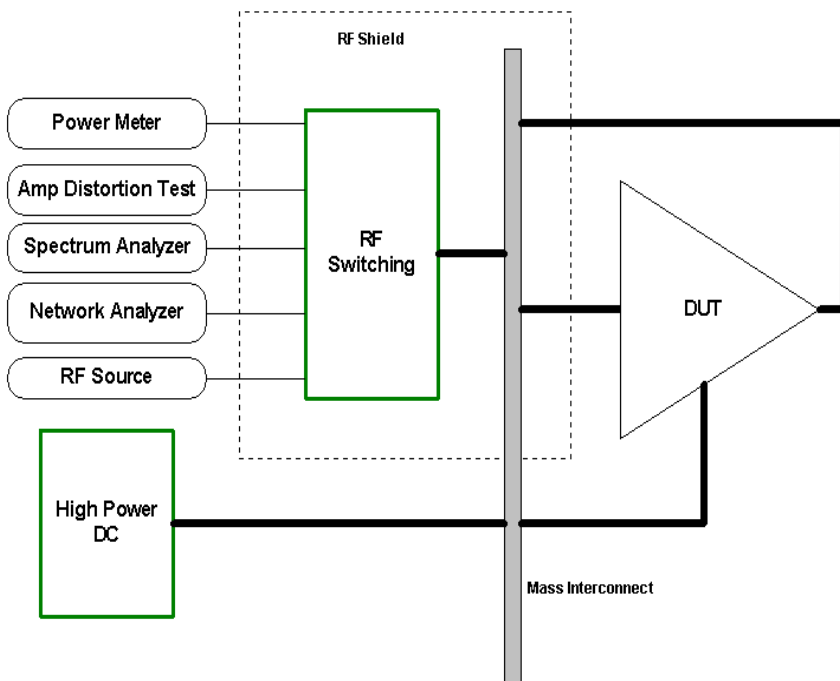
Anywhere in the world



Sources: Dell, Linksys, various instrument vendors

Test systems built with LXI

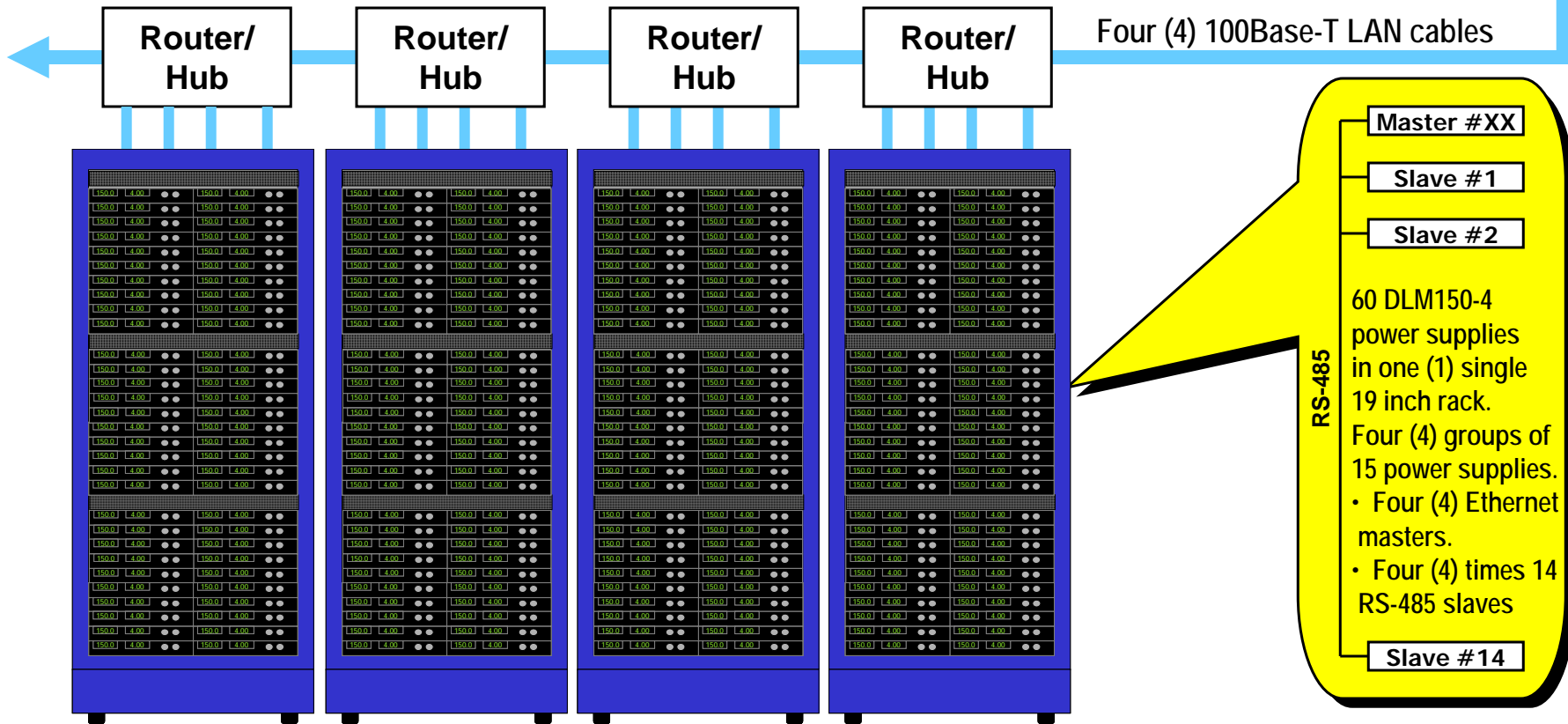
RF Test Systems



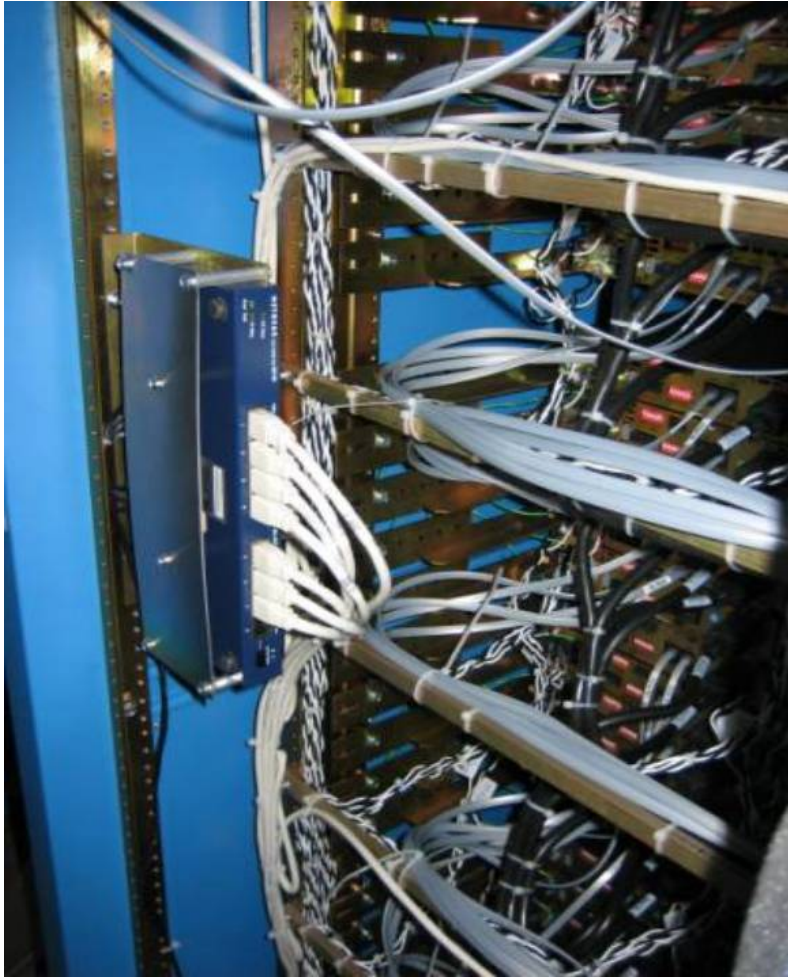
Electronic Functional Test

High Density Instrumentation

Spacecraft Environmental Testing



High Density Instrumentation



- Only one Ethernet LAN-cable per 19-inch rack
- High-speed Ethernet hub added to system design.
 - Seven-channel switch included in each cabinet

Everywhere and getting better...

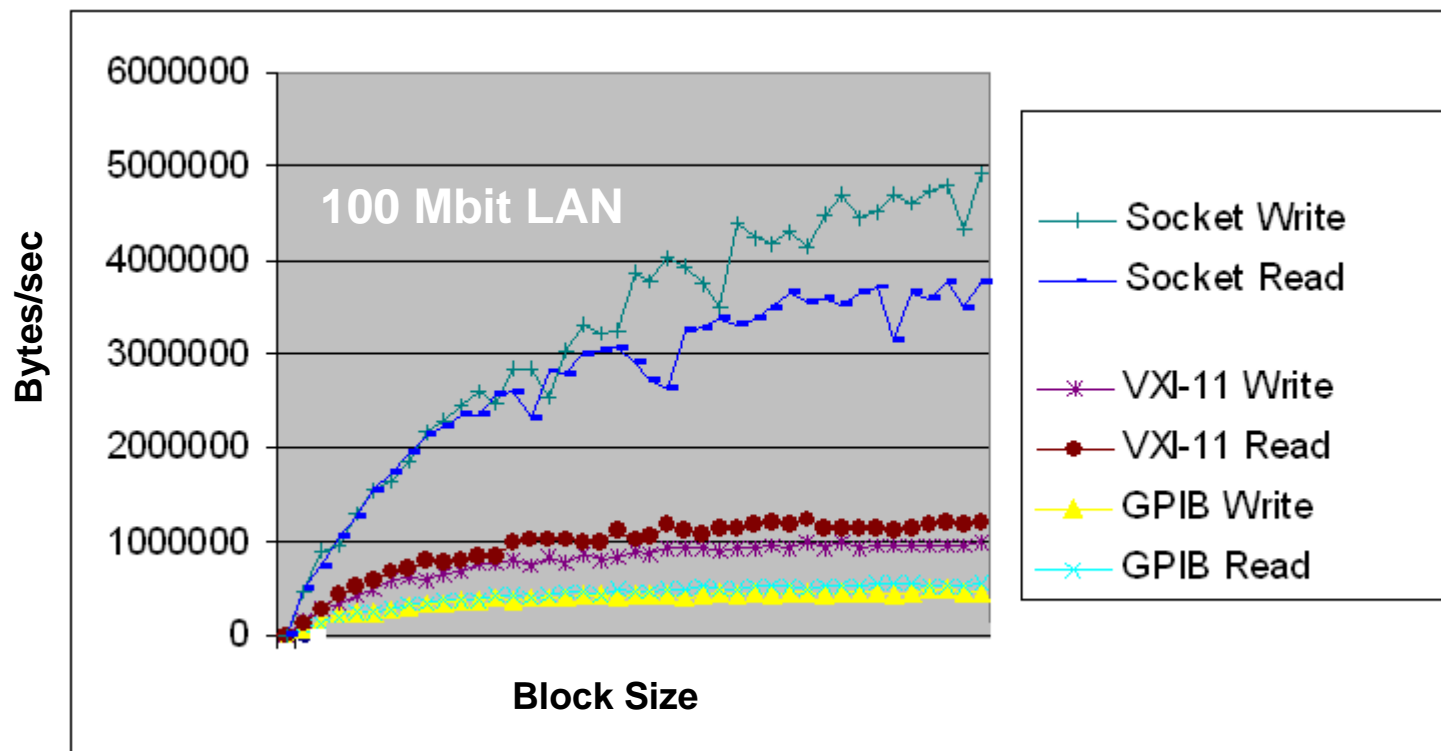


- LAN is a common PC component and has longevity
- LAN is cheap, can bridge long distances, has higher performance
- LAN's biggest asset is its flexibility:
 - Simultaneous communication
 - Peer-to-peer communication without arbitration by the controller
- GPIB is emulated over LAN (VXI-11) to ease migration path

Function	GPIB	LAN
	VISA/SICL GPIB	VISA/SICL VXI-11
Write ASCII command	Yes	Yes
Read ASCII/binary data	Yes	Yes
Write ASCII/binary data	Yes	Yes
Device Clear	DCAS	DCAS
Serial Poll	SPOLL	SPOLL
Trigger	GET	GET
SRQ	SRQ	SRQ



LAN vs. GPIB Performance



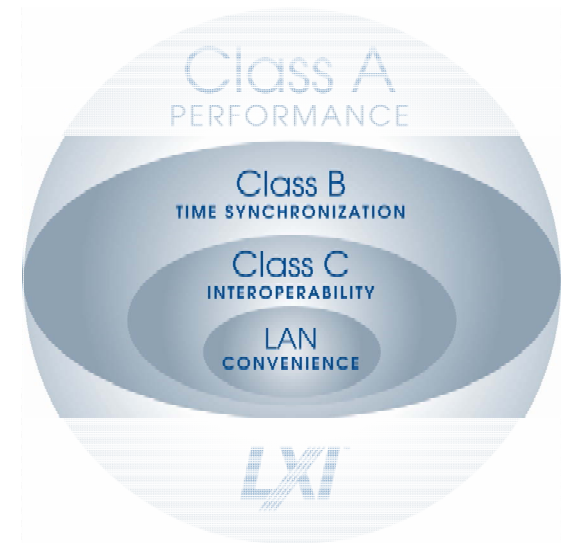
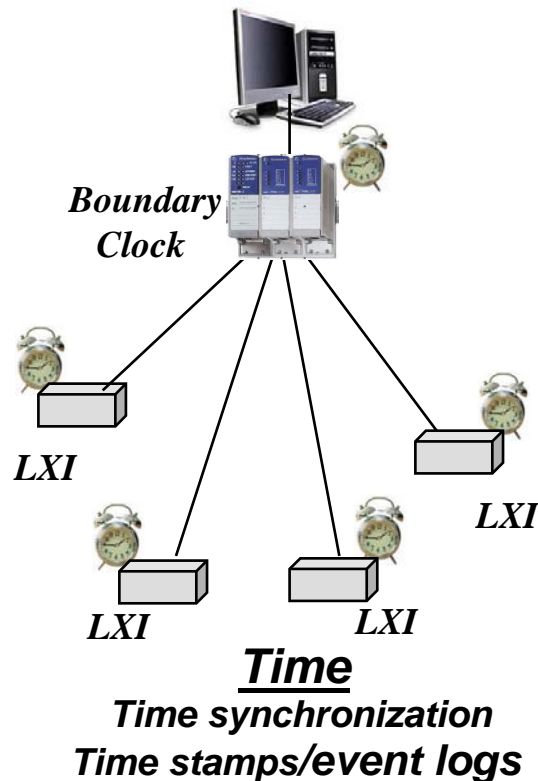
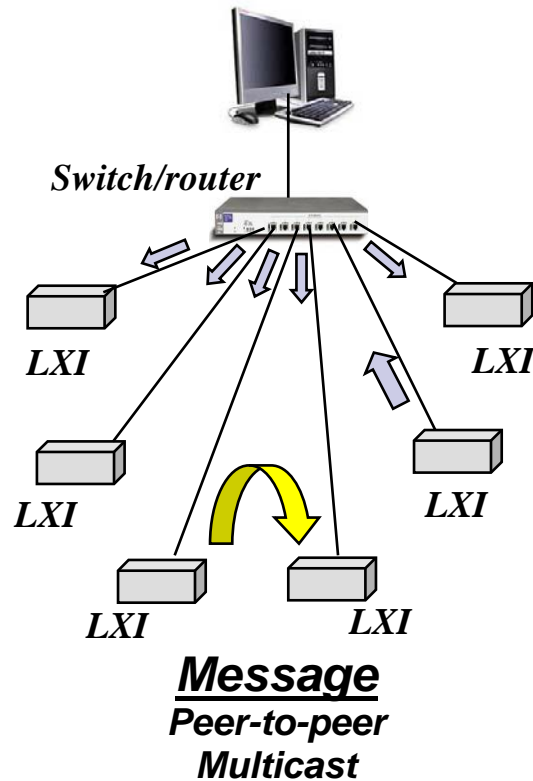
**Agilent
34411A DMM**

**270k rdgs/sec
from memory**

**50k Rdgs/sec
continuous**

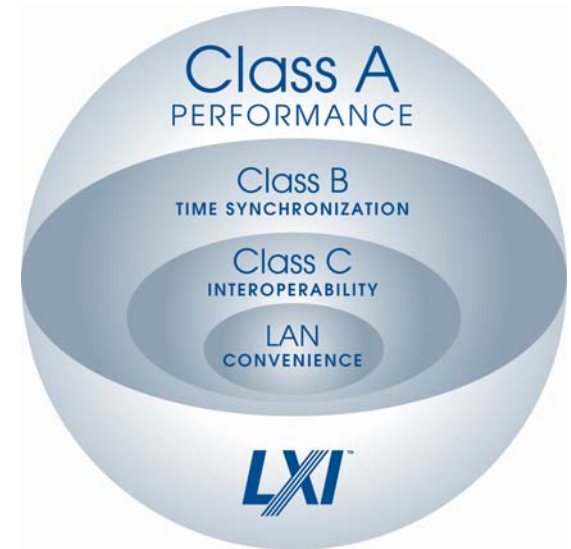
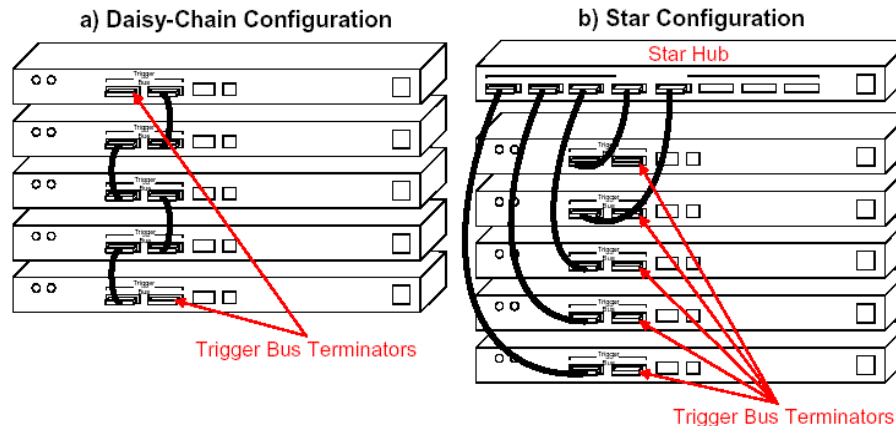
New possibilities for test systems...

- Flexible triggering using **time, P2P, or multicast**
- Time-aware instruments with **synchronization**
- Time logs give view into **timing of system**



LXI Class A Technology

- Analogous to VXI and PXI trigger bus
 - Hardware-based triggering and handshaking between discrete modules
 - Eight LVDS lines with wired-or operation
 - Supports segmented trigger bus lanes



Where to go for more information...

- www.lxistandard.org
 - Specifications
 - Papers and presentations
 - ... "Introducing LXI to your IT Department"
 - ... "Getting to know LXI", "Getting started with LXI"
 - ... "Migrating from GPIB to LXI", "What LXI Class B can do"
 - Products and vendors
- www.lxiconnection.com
 - Articles on all aspects of LXI
 - Includes multi-vendor cooperation
- Vendor Web sites – find links on the LXI Web site