



TELEDYNE LECROY
Everywhereyoulook™

How To Do Protocol Testing from SSDs to IOT

John Wiedemeier

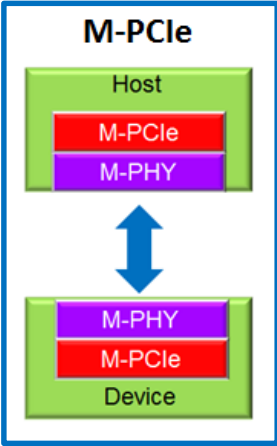
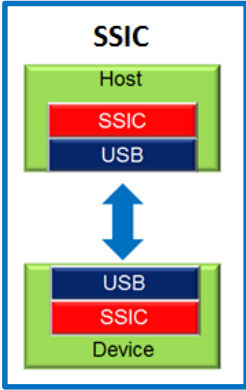
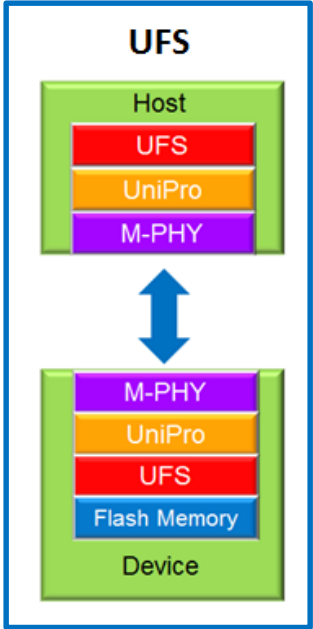
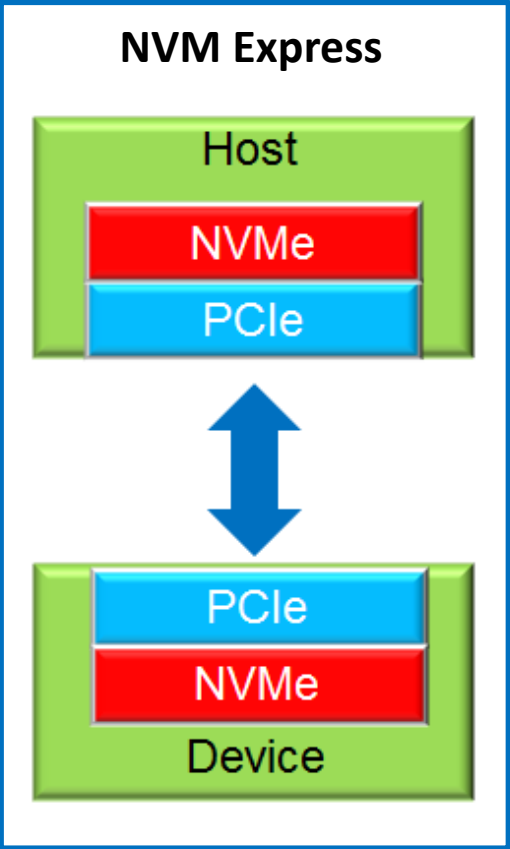
Product Marketing Manager

Teledyne LeCroy



Testing For Next Generation Protocols

- Devices are using more sophisticated protocols for system communications requiring:
 - Higher performance and data reliability
 - Layered architectures that are easily ported to new PHYs and flexible in order to address new applications.
 - Ease of use



SSDs The New High Speed Storage

- The storage industry is moving to PCIe-based storage protocols.
- NVMe Express is at the forefront of this evolution because of its optimized I/O design and high speed interface



How To Test PCIe® Storage

- There are two industry tests for PCIe-based SSDs.
 - PCIe Compliance- Does the interface meet the PCIe specification?
 - NVMe Conformance- Is the unit interoperable in a system configuration?



PCIe Compliance for SSDs

- The PCI-SIG® provides a comprehensive set of compliance tests for testing PCI Express® devices.
- SSDs can benefit by passing tests based on protocol link and transaction layers of the specification.



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Summit™ T3 Protocol Test System

NVM Express Conformance Testing



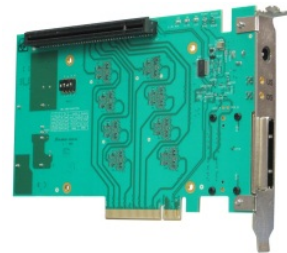
University of New Hampshire
InterOperability
Laboratory

- UNH-IOL conducts the NVM Express conformance testing
- Primary test tools: IOL Interactive Teledyne LeCroy Conformance Tests
- NVMe SSDs, add in cards and M.2 devices are tested
- Only devices that pass are admitted to the NVM Express integrators list



Debugging in Storage System Environment

- PCIe Storage Protocol Analyzer
 - Teledyne LeCroy Summit T34 Protocol Analyzer
 - Deep Buffer Memory (up to 64B)
 - NVMe, SATA Express and SCSI Express protocol decoding, measurement, and performance analysis
- PCIe Storage Optimized Interposers
 - 90 degree
 - Standard
 - M.2
 - SFF-8639
 - SFF long interposer



90° Rack Mount



Standard Interposer



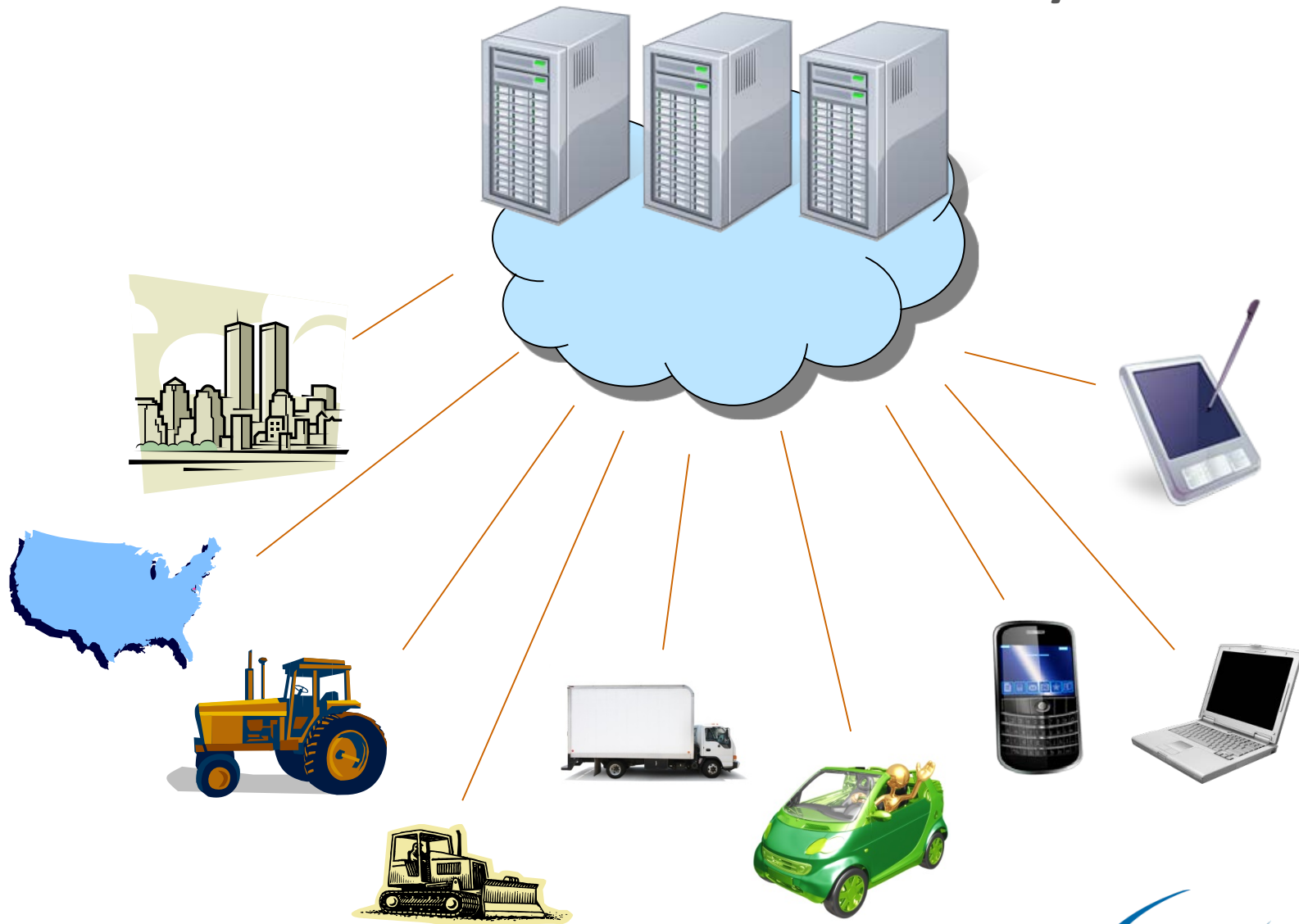
M.2 Interposer



SFF-8639

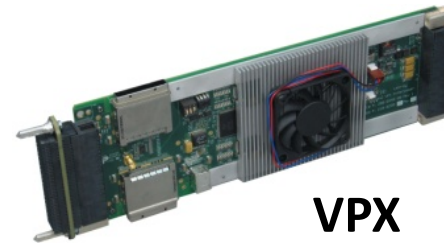
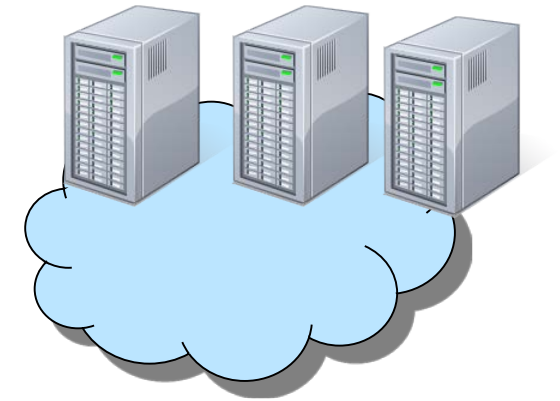
Internet of Things(IOT)- Building a Better and Kinder “Skynet”

- Internet of Things
 - Interconnection of embedded computing devices within the existing Internet infrastructure
- Devices
 - Personal Appliances
 - Medical
 - Local Servers and Cloud services.
- Protocols
 - Most devices will use advanced protocols like PCIe and MIPI® M-PHY® protocols to manage their applications

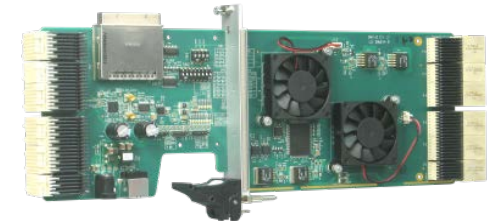


PCI Express is becoming an Important Internet Backbone Technology

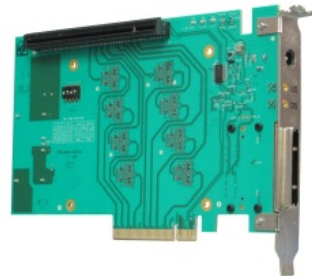
- PCIe backplane servers and switches are replacing proprietary systems yielding faster throughput and faster time to market.
- Some of these systems are using new AMC, VPX, XMC and CPCI Serial form factors for embedded, industrial, military, and medical uses.
- PCIe backplane optimized Interposers
 - Rack mount
 - AMC
 - VPX
 - Compact PCI Serial
 - XMC



VPX



CPCI Serial



Rackmount



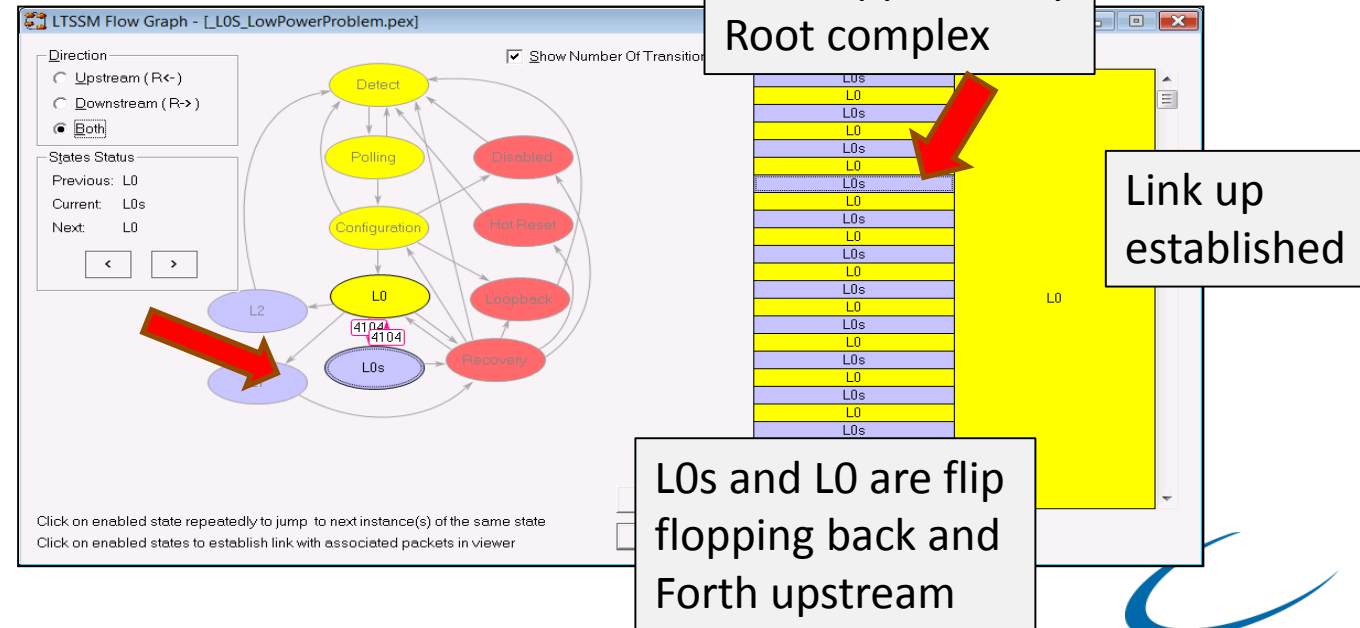
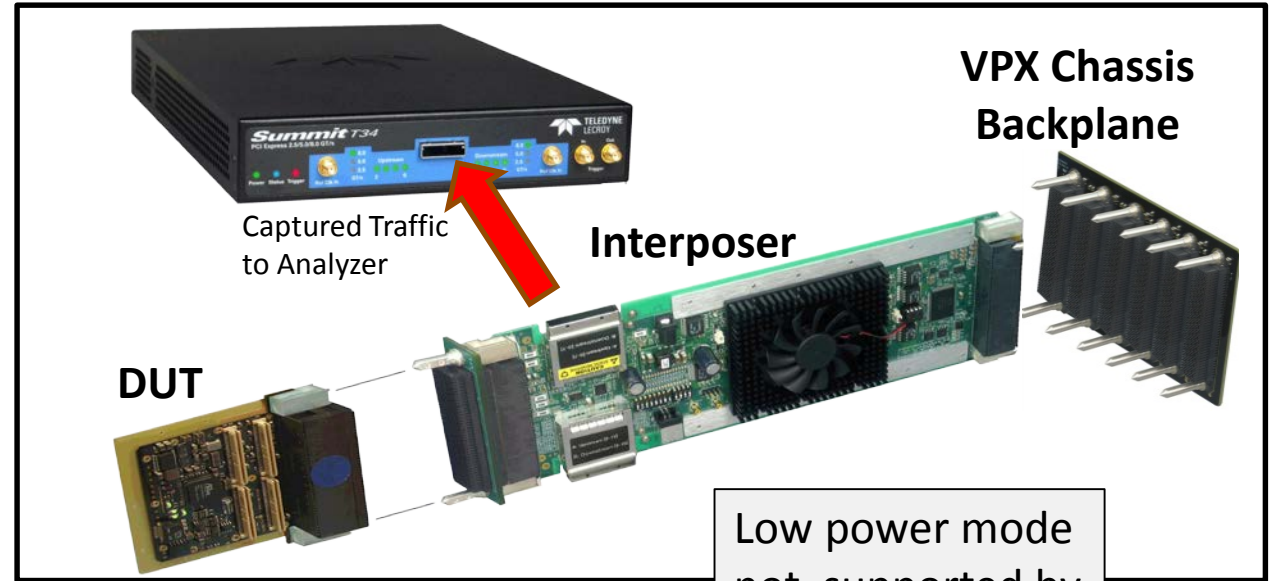
XMC



AMC

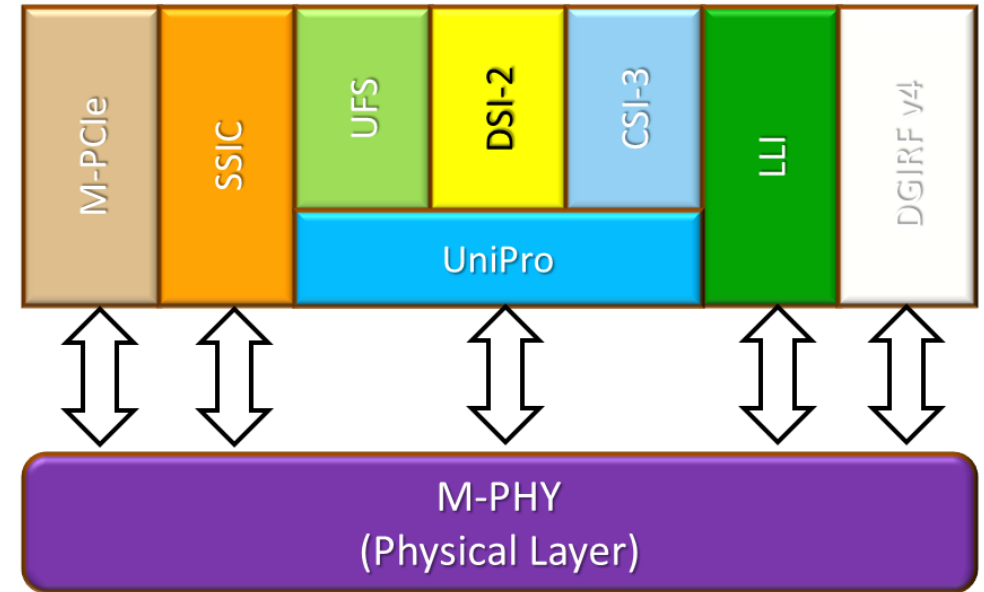
PCIe VPX Test Debug Set Up

- Analysis tools to help debug systems like VPX
 - Monitor PCIe traffic at x1/x4/x8/x16 lanes at 2.5/5GT/s
 - 21 voltage test points
 - Supports insertion into air cooled and conduction cooled systems

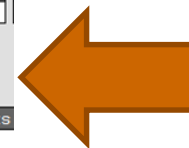


The Internet of Things will require MPHY Technologies

- The MIPI M-PHY is a serial communication protocol for use in mobile systems where performance, power, and efficiency are important.
- Protocol analyzers can help developers understand bus traffic for technologies such as M-PCIe, SSIC, Unipro and others.

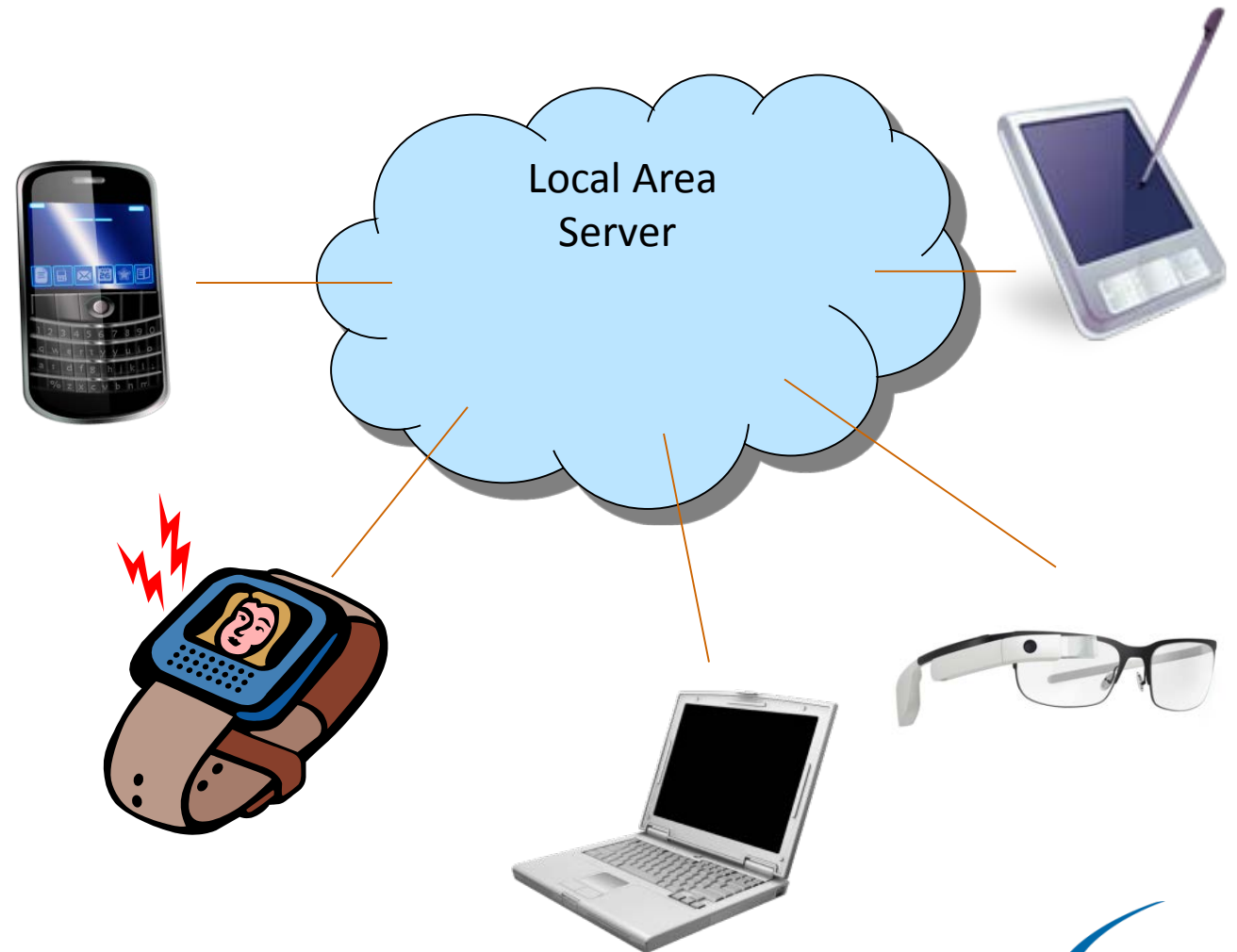


RRAP Tra	LS	RRAP	Address	Data	Status	Metrics	# Packets
4	R→	x1 CmdWr	0x0	0x07	SC		2
Packet	LS	RRAP	Time Delta	Time Stamp			
9	R←	x1 RespWr	1.000 ms	0000.005 000 400 s			
RRAP Tra	LS	RRAP	Address	Data	Status	Metrics	# Packets
1	R→	x1 CmdRd	0x4	0x06	SC		2
Packet	LS	RRAP	Data	Time Delta	Time Stamp		
1	R←	x1 RespRd	0x03	10.000 ms	0000.010 000 000 s		



Where Will We Find M-PHY Devices

- M-PHY technology is targeted at personal interactive applications
- Testing is challenging due to small form factors



Debugging in M-PHY System Environment

- M-PHY Protocol Analyzer
 - Teledyne LeCroy Eclipse™ X34 Protocol Analyzer
 - Up to 64 GB at GEAR3 and x4 link width
 - M-PCIe, SSIC, Unipro protocol decoding, measurement, and performance analysis
- M-PHY Optimized Interposers
 - SMA Interposer
 - Multi-lead Probe
 - Mid-bus Probe
 - M.2



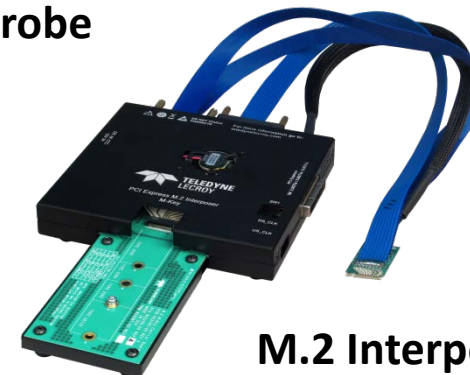
SMA Probe



Multi-lead Probe



Mid-bus Probe



M.2 Interposer

- New Serial Protocols are enabling SSD and IOT technologies
- PCI Express and MIPI MPHY are moving to the forefront
- The industry is utilizing and standardizing on new test methods to support these new protocols
- Test equipment and services are available to insure quality and company time to market goals



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Contact Teledyne LeCroy PSG



Summit T3-16
Analyzer

Summit T3-8
Analyzer

Summit T28
Analyzer

Summit Z3-16
Exerciser with
Test Platform

Eclipse X34

Summit T34

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