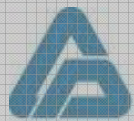


LXI Adoption Among Small To Medium Size T&M Equipment Integrators

Presented by:
Matt Rosato & Geoff Spielman



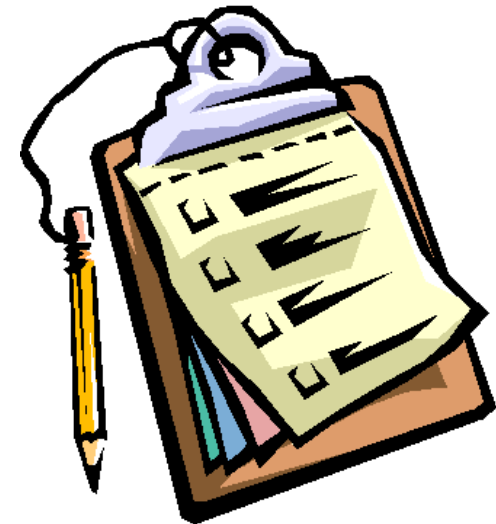
COM DEV
SPACE

Making It Possible
Yesterday, Today and Tomorrow



Agenda

- Introduction to COM DEV
- Introduction to Test Services Business Unit
- Description of need for LXI within COM DEV
- Discussion of LXI Topology
- LXI – Challenge for COM DEV
- COM DEV's Decision Regarding LXI Use



COM DEV at a glance

- **In operation since:** 1974
- **2007 Revenues:** \$164 M
- **Size:** 1250 + employees – 6 facilities
- **Patents:** 126 granted or pending
- **Public Ownership:** TSX-CDV
- **Satellite Contracts to date:** 664



Cambridge, ON



Ottawa, ON



El Segundo, CA



Portsmouth, UK



Aylesbury, UK

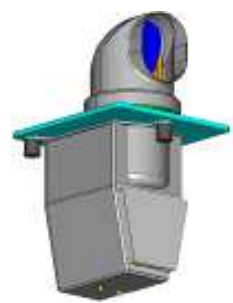


Xi'an, China

Most prolific supplier of payload equipment
for commercial communication satellites

COM DEV's Breadth of Technologies

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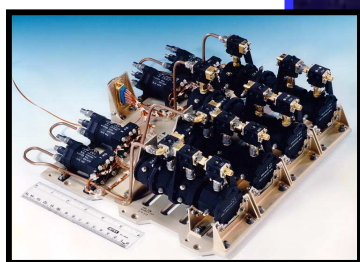


Gimbaled Optics and OISL

Gimbaled Antennas and Mechanisms



Spacecraft Electronics



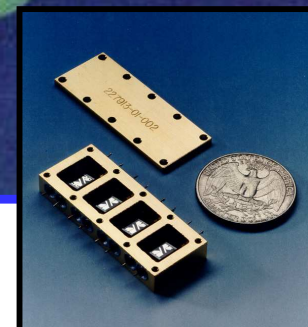
Muxes



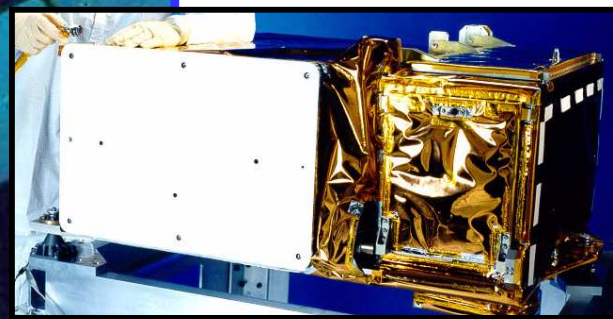
IF Processors



Switches



SAW Filters



Scientific Instruments



Lithium-Ion Batteries



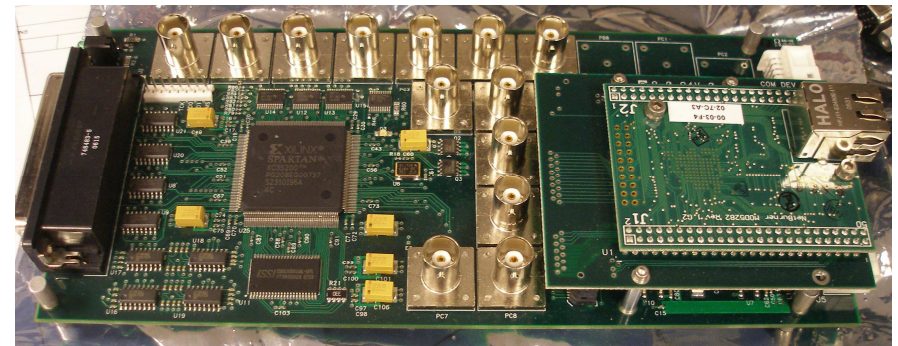
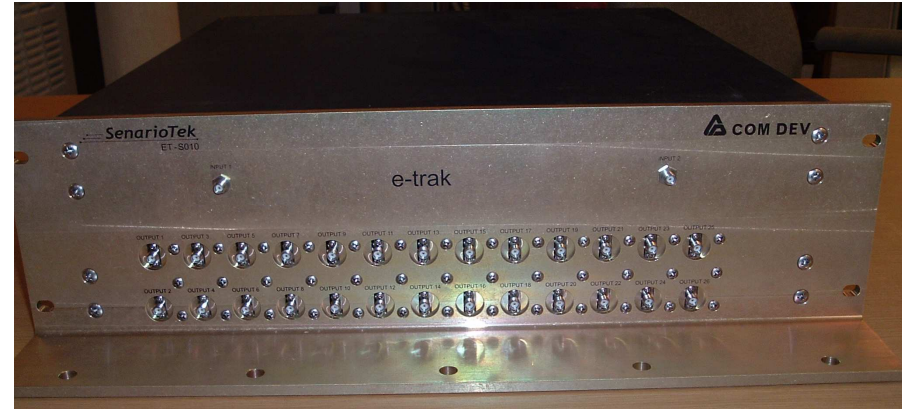
TES Business Unit

- **Unique experience in testing RF applications requiring**
 - High Reliability
 - High Traceability
 - RF Multiport Management (switching, calibration)
 - In high mix/ medium volume production environment (typically Aerospace and Defense Solutions)
- **Proven track record of delivering test solutions and providing local support**
- **Internal and external customers – 50 test systems/year**
- **Largest PNA installed based in the world (120+)**
- **World experts in calibration and PNA measurements**



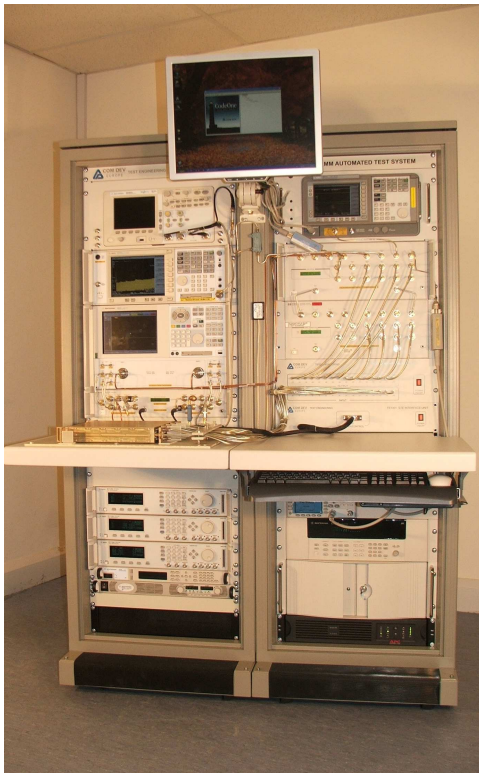
TES Products

- e-trak™
 - In-line tracking of calibration
 - Saves time and avoids need to re-calibrate
- TRM Test Set
 - Used to test all aspects of transmit and receive modules
 - Pulsed and non-pulsed measurements
- PTS
 - Solutions for testing space payloads
- System Integrators Tools
 - CodeOne™: Software testing suite to simplify and accelerate testing
 - PMC : Circuit board to control pulsed signals between test equipment and DUT



Potential Use Cases for LXI

- Transmit Receive Module Test

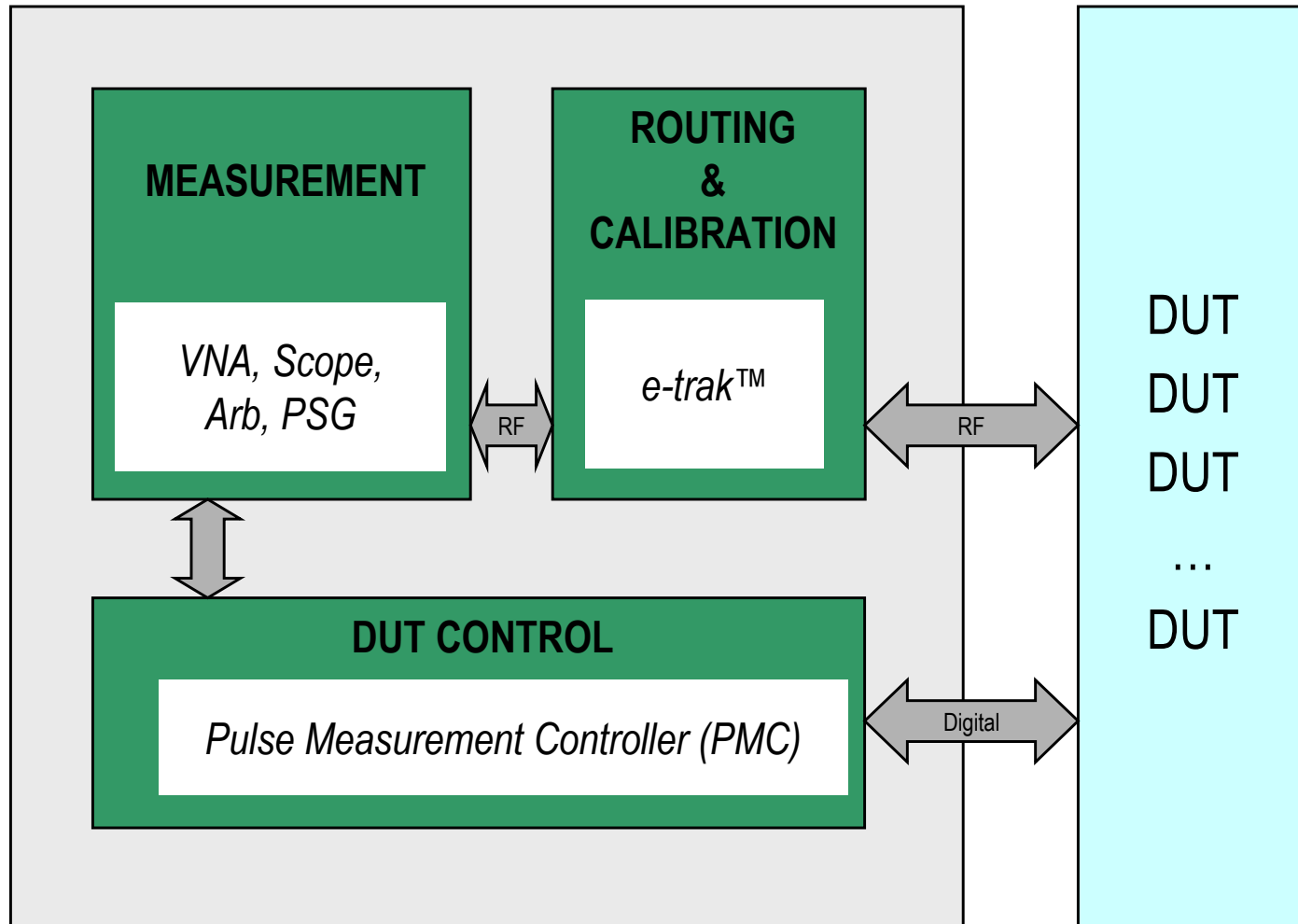


- Payload Test System



- Highly Integrated Tests
- Require precise timing and switching

General Test System Setup



System synchronization is critical

Transmit Receive Modules

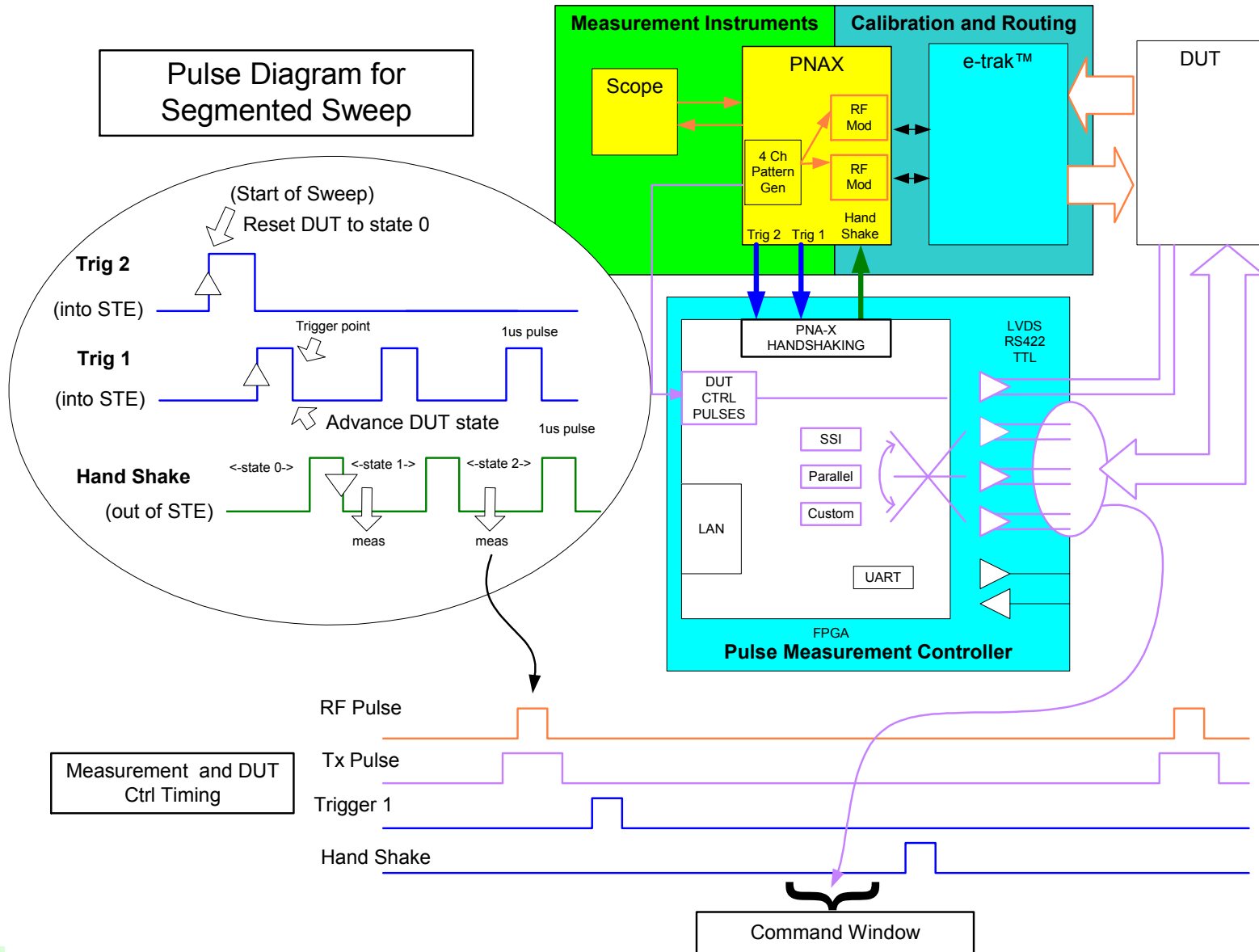
- Basic Principle
 - Device emits a pulsed RF signal
 - Device then waits for any reflected signals to return
- Used in the Aerospace and Military fields for applications such as Radar, Phased Array Antennas,...
- Used commercially for various purposes
 - E.g. anti-collision systems in automobiles

Transmit Receive Modules with LXI

- Testing Sequence
 - External Pulse Generators create pulsed RF signal
 - Test equipment is configured to capture RF signal
 - Device under test is configured to appropriate state
 - Measurement is captured

The most critical aspect of testing a TRM is synchronizing the timing between the generated pulses, the test equipment and the device being tested

Transmit Receive Modules Timing Diagram

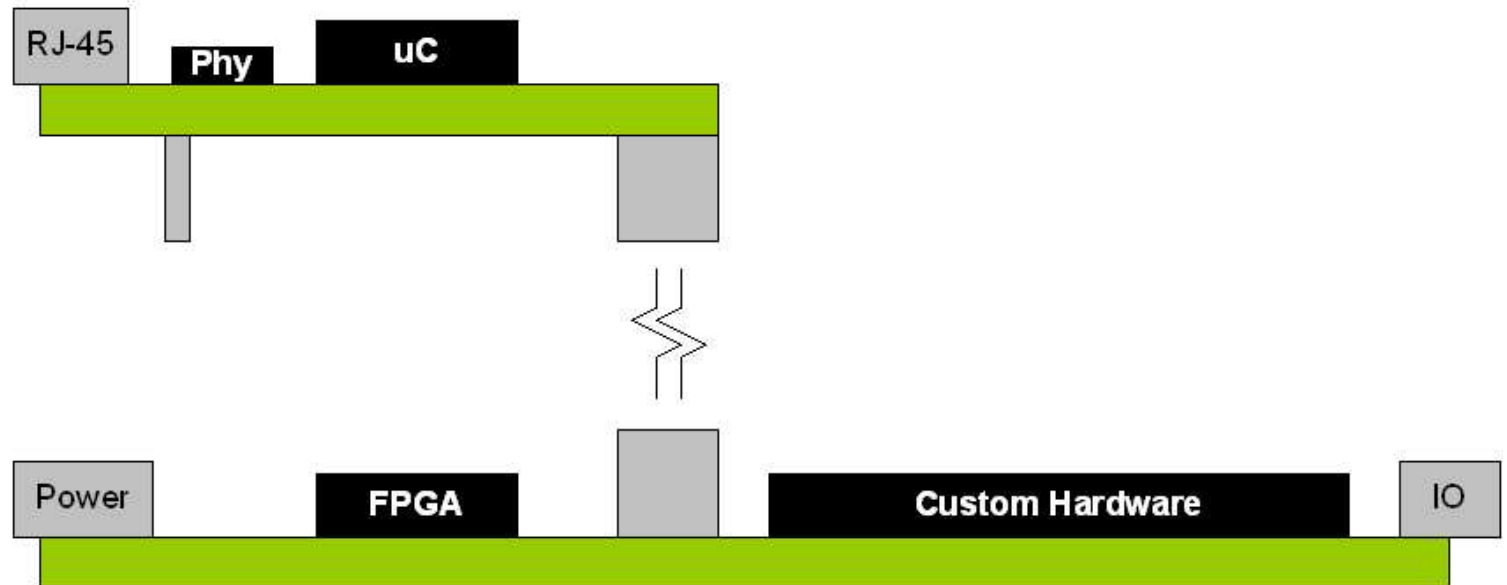


Payload Test Systems with LXI

- We feel that there is a good opportunity to use LXI when testing Payload Test Systems
- The systems are often complex, involving a large amount of test equipment and a large number of devices to control
- Synchronization is important
- Switching control and industry standards provided by LXI would be beneficial

DUT Controller

- Our Hardware Interfaces between DUT and T&M Equipment



LXI Rival Technologies

Item	GPIB	PXI	LXI
Interface	Parallel, Non-isolated	Parallel, Non-Isolated	Full-duplex Peer-Peer, Isolated
Max Number of Devices	32	256 with bridges	Unlimited
Max Cable Length	15m > 500 KBps or 20m <500 KBps		100m 10/100 BT Unlimited with router
Max Data Transfer rate (Mbps)	8 Mbps	132 MBps 264 MBps	10 MBps 100 MBps 1000 MBps
Backplane	Not required	Required	Not Required

Distinct Advantages of LXI for COM DEV

- The speed, simplicity, worldwide reach, ongoing enhancement and backward compatibility of LAN.
- Easy configuration through a web interface
- Simplified programming and greater software reuse through IVI drivers.
- The ability to create hybrid systems including GPIB, VXI, PXI, etc.
- Synchronization of local and remote instruments through the IEEE 1588 precision time protocol.
- Low hardware costs when compared to having to purchasing card cages and specialty PC cards for other topologies

Market Trends

- The LXI Consortium announced that a survey of its member manufacturers shows that annual sales of LXI-equipped test and measurement equipment now exceeds \$200 million (US).
- The widespread adoption of LXI by large test equipment manufacturers suggests that it will continue to be a dominant force in the industry.
- With over 500 products certified as LXI-compliant, and a growing list of Class B and Class A products on the market there is a clear trend towards this technology.
- When will we implement LXI technology into our systems?

LXI adoption challenges

- COM DEV currently uses a LAN topology
- Return on investment difficult to establish
- Turn distinct advantages of LXI into real benefits for our customer base
- Technology (VXI-11 stack not commercially available)
- Not all equipment currently available (yet)

Summary

- There seems to be a definite trend towards using LXI equipment from test equipment manufacturers
- We feel that it will be beneficial to start working to be LXI compliant – but hard to prove without an LXI compatible DUT control interface
- We are looking at ways to overcome these challenges!

CONTACTS

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