

**ITC** ITC 2006 Tutorial #8

**Designing Testable Multi-Board  
Systems using 1149.1  
Architectures: SJTAG**

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and

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**Agenda**

- Moving from single-board test to multi-board system test.
  - Introduction
  - Architectures
- Planning for system-level test
- Case studies
- The SJTAG initiative**



## Disclaimer

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- ❑ This presentation is a personal view of what is happening within the SJTAG initiative. It is not an SJTAG-endorsed presentation. Other members of SJTAG may have a different view of the objectives and status of SJTAG. This is the nature of formative activities.

## Background to SJTAG

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- ❑ Kick-off meeting at the May 2005 European Board Test Workshop, Tallinn, Estonia: 14 attendees
- ❑ Representatives from ASSET InterTech, BAE Systems, Cisco, Ericsson, Firecron, Goepel, ITT, JTAG Technologies, National Semiconductor, Nokia, Saab Test + Independent Consultants
- ❑ Follow-on meetings at ITC 2005, EBTW 2006, BTW 2006 and ITC 2006 (later this week)
- ❑ Presentations available at [www.dft.co.uk/SJTAG](http://www.dft.co.uk/SJTAG)

## Purpose of the Tallinn Meeting (1)

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- ❑ Several systems companies are proposing or are already building quite sophisticated approaches to system level test based on the use of a suitable backplane test bus, such as 1149.1 or an alternative e.g. I<sup>2</sup>C.
- ❑ The assumption is made that the boards already contain boundary-scan chains and that some form of multi-drop architecture allows access to individual boards and even individual devices on a board for test application (re-use of single-board tests or board-to-board tests) or in-system configuration/reconfiguration of on-board PLDs.
- ❑ Such techniques support various field service requirements and can be managed remotely (over a wireless network) or locally (over a wired connection) or be fully embedded.

## Purpose of the Tallinn Meeting (2)

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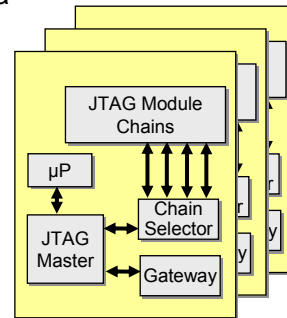
- ❑ The field-service Development and Diagnostic Test Manager can be a free-standing system based on an extension to existing PC-based single-board boundary-scan testers.
- ❑ The question has arisen - is there a suitable JTAG Test Command and Data Language (TCDL) capable of covering the following basic requirements:
  - ❑ **Represent** embedded test data (e.g. vectors) efficiently
  - ❑ **Write to, Read from and Manage** test data stored on the board
  - ❑ **Run** an embedded test
  - ❑ **Configure and Validate** an on-board PLD
  - ❑ **Capture** the result of the test and **Compare** with the expected result
  - ❑ **Log** test execution details (time, date, result, etc)
  - ❑ **Send** specific test reports and service logs to the Test Manager.

## The Goal of SJTAG - 1



Test Manager  
(External or Embedded)

- ❑ Vector and configuration data
- ❑ Response data
- ❑ Log and status data
- ❑ Commands
  - Vector management
  - Execution conditions set-up
  - Execution control
  - Response data retrieval
  - Log and status data retrieval
  - UUT recovery from a test



Multi-Board System

## The Goal of SJTAG - 2

The goal for SJTAG is:

for all variants of XBST and EBST, to define the data contents and formats communicated:

between external Test Manager platforms and internal Embedded Test Controllers,

and

between Embedded Test Controllers and the UUTs they serve

in an open-standard vendor-independent and non-proprietary way.



## Targets and Focus (10 Nov ITC Meeting)

- ❑ Four main industries
  - Telecoms
  - Server/mass storage
  - Mil/Aero
  - Automotive
- ❑ Need ways of describing:
  - The nature of the Test Manager function: all external, all embedded, distributed
  - The access and communication protocols
  - Test flow control and data requirements for test, debug, diagnosis, configuration, etc
- ❑ Issues:
  - Security
- ❑ Initial focus: telecoms, especially MicroTCA/ATCA but not exclusively.

## Core Group (September 2006)

### Change of Leadership

#### **SJTAG Core Group**

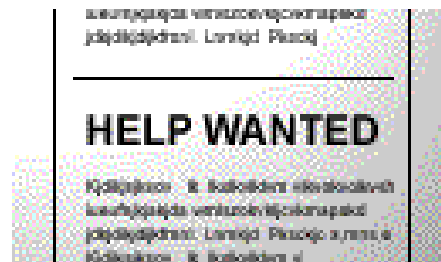
Brad Van Treuren, Lucent Technologies – Chair  
 Gunnar Carlsson, Ericsson – Vice Chair  
 Ben Bennetts, Bennetts Associates – Chair Emeritus  
 Anthony Sparks, JTAG Technologies  
 Bill Eklow, Cisco Systems  
 Ken Filliter, National Semiconductor  
 Steve Harrison, Motorola Networks  
 Peter Horwood, Firecron  
 Jim Webster, BAE Systems  
 Adam Ley, ASSET InterTech

Scan Support Device Vendors  
 Test Manager Vendors  
 System Company End Users

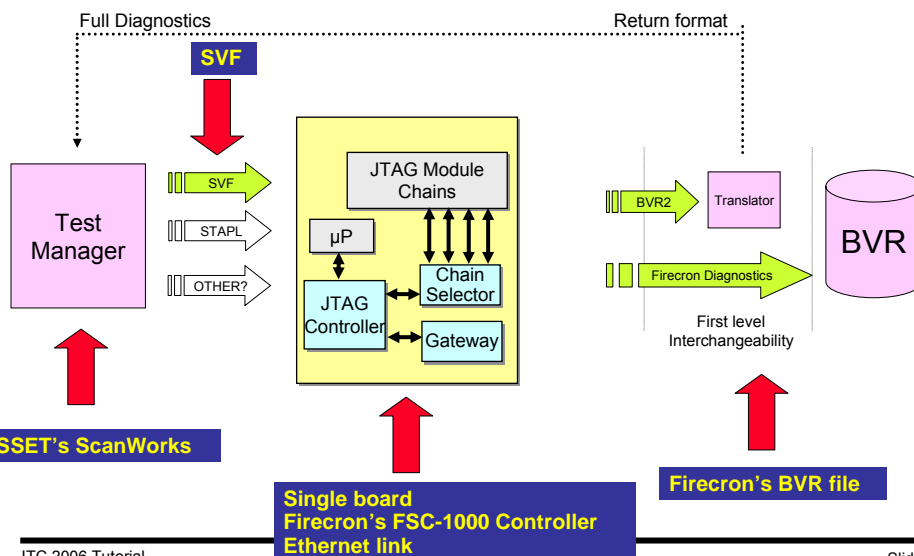


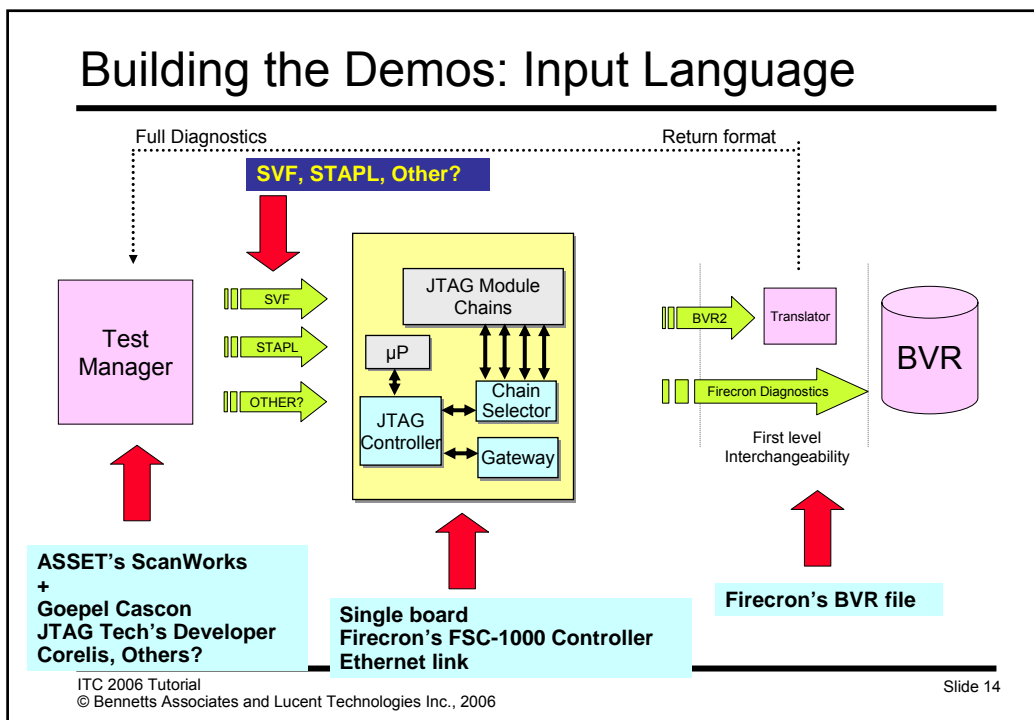
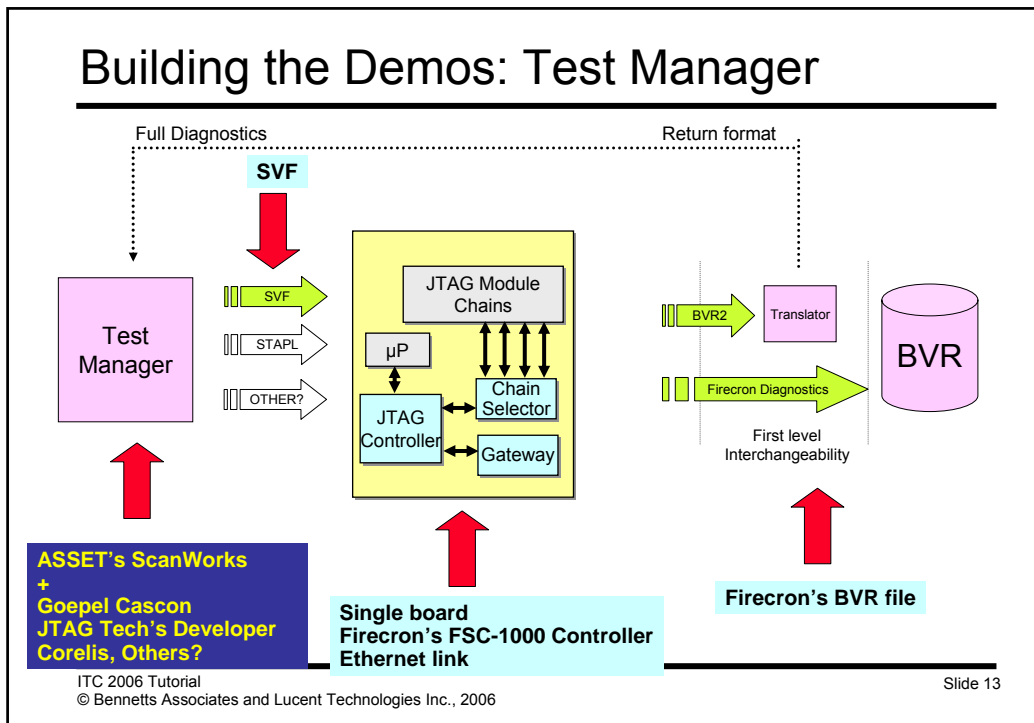
## Where Are We Now?

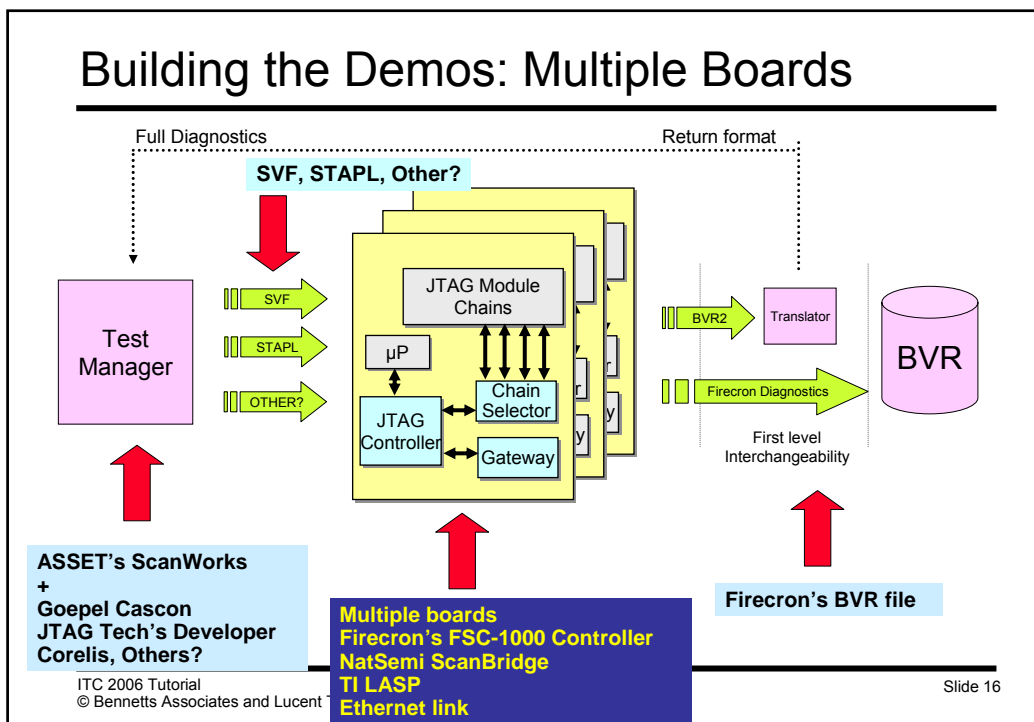
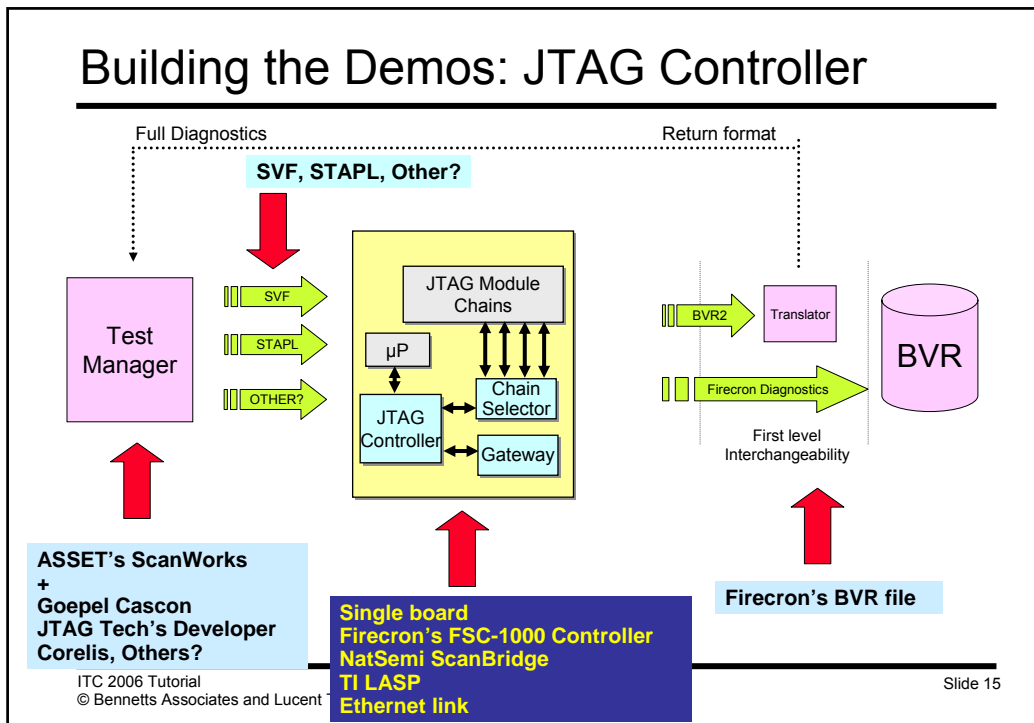
- We are defining:
  - Demos.
  - Use scenarios.
  - University projects
- We are also looking for more volunteers to become active in the future (more later)



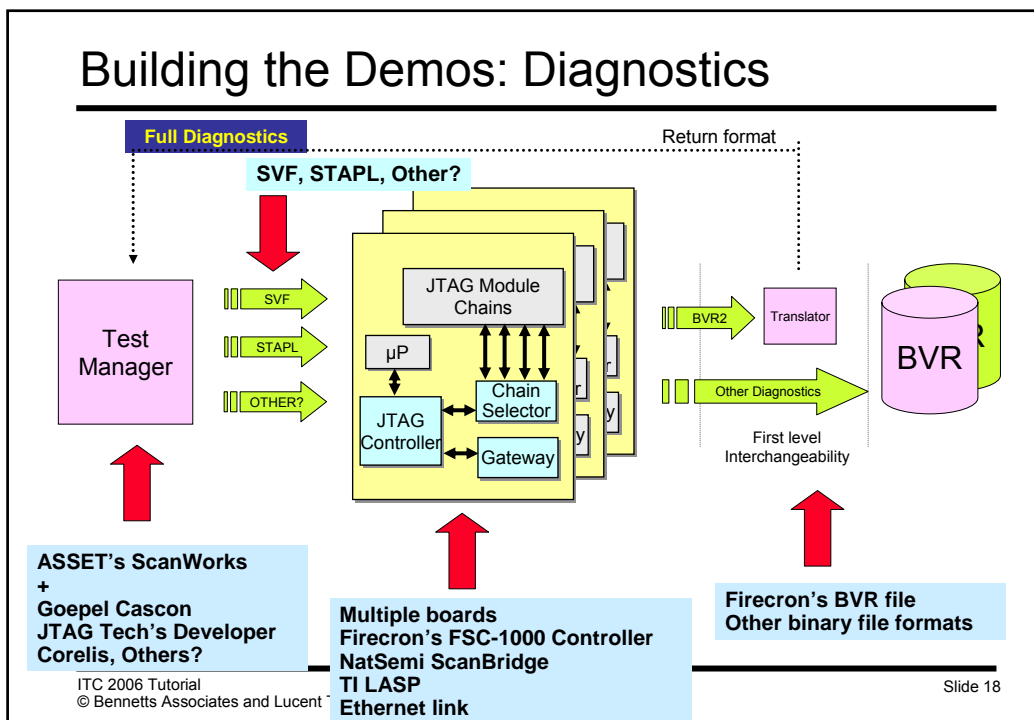
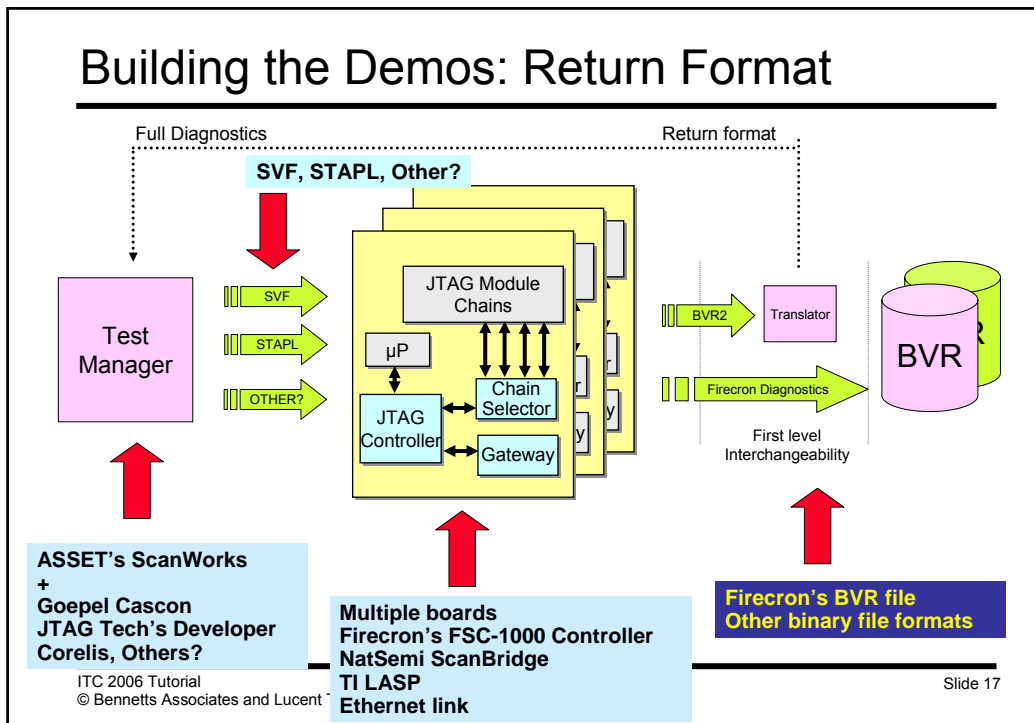
## Demo 1: Shown at EBTW May 2006



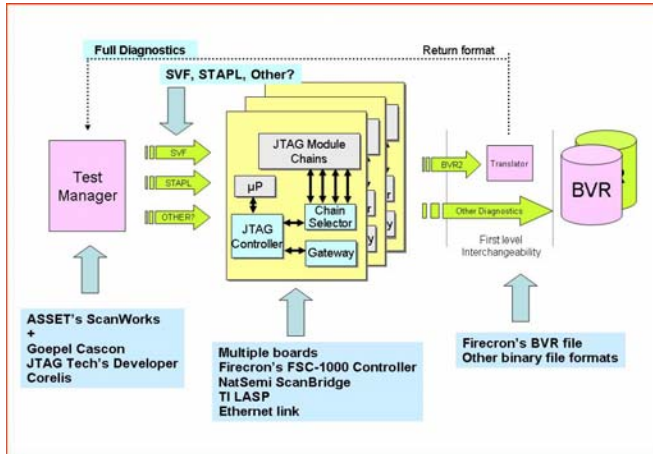








## Adding Use Scenario Considerations



- Prototype system debug.
- Manufacturing test,
- On-site customer installation.
- In-service field-service calls.
- Repair depots

## What's Next?

- SJTAG open meeting this week
  - Thursday, October 26, 10:30 – 12:30, Room 202
- To join SJTAG's extended group: e-mail awareness of future events, access to archived and new documents:
  - Send e-mail to Brad Van Treuren, [vantreuren@lucent.com](mailto:vantreuren@lucent.com)



## Other System JTAG Events this Week ...

### □ Wednesday, October 25, AM sessions

- **10.3 Reusable, Low-Cost, and Flexible Multidrop System JTAG Architecture**, *H. Lihn*, Brocade Communications Systems
- **14.1 Design for Board- and System-level Structural Test and Diagnosis**, *T. Vo, Z. Wang, T. Eaton, P. Ghosh, H. Li, Y. Lee, W. Wang, R. Fang, D. Singletary, X. Gu*, Cisco Systems

### □ Wednesday, October 25, 2:00 p.m. – 5:00 p.m.

#### Open BTTAC meeting.

- Open Board Test Technical Activity Committee (BTTAC) forum with one of the topics being "The Status of Board Test".

### □ Thursday, October 26, 2:00 p.m. – 3:30 p.m.

- **L 4.1 P1687-Toward a Standard Protocol for Embedded Instrumentation**, *K. Posse*, Independent Consultant; *A. Crouch*, Inovys; *B. Eklow*, Cisco Systems; *M. Laisne*, Qualcomm; *B. Bennetts*, Bennetts Associates; *J. Doege*, DA-Test; *M. Ricchetti*, ATI; *J. Rearick*, Agilent Technologies
- **L 4.2 On-line Boundary-Scan Testing in Service of Extended Products**, *I. Reis*, Patria Advanced Solutions; *P. Collins*, Consultant, *M. van Houcke*, JTAG Technologies

## Enjoy ITC

