The role of TTCN-3 within the TETRA Certification process

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Agenda

- TETRA Association
- Why TTCN-3
- How has TTCN-3 been applied
- Outlook
What is TETRA?

• **TE**rrestrial **T**runked **RA**dio

• Open ETSI Standard for Trunked Radio
  – Mobile Radio for Voice and Data
  – Group Communication, Encryption, Priorities
  – High Reliability and Availability
  – Multi-Vendor Market

• Nationwide Public Safety Networks

• Airports, Metros, On-site systems
• Goals:
  – support and promote the TETRA standard world-wide
  – provide a forum to share and exchange information and ideas

• 150 member organisations from 35 Countries
  – Manufacturers, Operators, Users, Applications Developers, etc.

• TETRA World Congress and TETRA Seminars

• TETRA Interoperability Tests

• www.tetra-association.com
Interoperability (IOP) Tests

- Ensure that equipment from one manufacturer is working with equipment from another manufacturer.
- IOP ensures Open Standard and enables Multi-Vendor market.
How is IOP Done Today?

• Today: Manual Tests between Manufacturer A and Manufacturer B (1000+ Test Cases)
• IOP Test Automation to decrease testing time and costs
• TETRA Association facilitates its members to use test automation

Time spent in IOP Testing

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<tr>
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<th>Setup</th>
<th>Execution</th>
<th>Log File Analysis</th>
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<td>Percentage</td>
<td>40%</td>
<td>40%</td>
<td>20%</td>
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MW spend for IOP testing

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The Selection Process

- Idea for a TETRA owned scripting engine more than 2 year old. Started in 2007

- Open tender for the technology and a solution
  - 104 requirements in the area: hardware (16), language (14), licensing (17), functionality (30), upgradeability (11), maintenance and support (8), training (8)
  - 10 qualified responses, five on the short list
  - TTCN-3/TTworkbench

- Implementation phases (so far)
  - September 2009 – December 2009
  - January 2010 – May 2010
TTCN-3 Usage within TETRA

At IOP testing terminals are communicating end-to-end while observing the message exchange at the air interface

Scripting Engine
- Driving end-to-end tests at the terminals
- Standardized serial communication interface

Trace Analysis
- Observation of message exchange at the air-interface
- Standardized message format
Scripting Engine Framework

PEI TTCN-3 Framework

Communication

Encoding

TTCN-3 Runtime Environment
TTCN-3 Usage within TETRA

- Demo Test Cases
- Initial Test Cases
- PEI Conformance

Scripting Engine
Basic License – TTworkbench Runner

• The light-weight command line execution environment for TTCN-3 test suites
• Execute released, pre compiled test suites
• Free of charge for TETRA members
Full License – TTworkbench Professional

- Graphical test development and execution environment based on TTCN-3
- Includes full range of features needed for
  - Text-based and graphical TTCN-3 specification
  - Compilation
  - Test case execution
  - Test result analysis and reporting
  - Debugging
TTCN-3 Usage within TETRA (II)

- Demo Test Cases
- Initial Test Cases
- IOP Test Cases
- Scripting Engine
- Air Traffic Trace Analysis
Trace Analysis in the TETRA Network

![Diagram of TETRA Network components and connections]

- **PEI** to **Base Station** via **AI**
- **DMO Gateway** to **Base Station**
- **TETRA Switch** connected to **PSTN**, **ISDN**, **PDN**, and **Other TETRA Network**
- **3rd Party Systems**
- **Covered by IOP**
- **not covered by IOP**

Diagram showing the integration of different telecommunications networks through the TETRA Network.
Trace-File Analysis

- Step 1: Execute PEI Scripts
  - Verdict based on observations at the PEI
- Step 2: Analyse “Air Log File”
  - Verdict based on observations at the air interface
- Overall verdict
  - Combination of both
- Future: Combine 1 and 2 in one test case
TTCN-3 Usage within TETRA

IOP Test Cases

Trace Analysis

Scripting Engine
Status

• Scripting Engine
  – Released to the TETRA Members

• Initial Test Cases
  – Validated and Released to the TETRA Members

• IOP Test Cases
  – Work in Progress

• Trace Analysis
  – Validated and released to TETRA Association

Demonstrated at the TETRA World Congress in Singapore
Outlook

• Test & certify the radio terminals PEI implementations

• Extending the test case basis for IOP testing

• Merging PEI tests with online “trace-analysis”
  → 100% test automation for IOP test

• Embed test automation into the certification process
  – To be renewed in 2012
Summary

• TTCN-3 has been selected as test automation platform among other proprietary solution
  – Unmatched cost benefits taking requirements into consideration

• Implementation was efficient and highly flexible

• Benefits for members
  – Time and cost saving at the IOP testing
  – Introducing test automation
  – Extending the scripting engine platform to accommodate their company internal test requirements
Questions?

Thank you!