ITU Forum on Conformance and Interoperability Testing in CIS and Europe Regions
(Moscow, Russia, 9-11 November 2011)

TESTING EXPERIENCE OF A1 - TELEKOM AUSTRIA

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TESTING EXPERIENCE OF A1 TELEKOM AUSTRIA

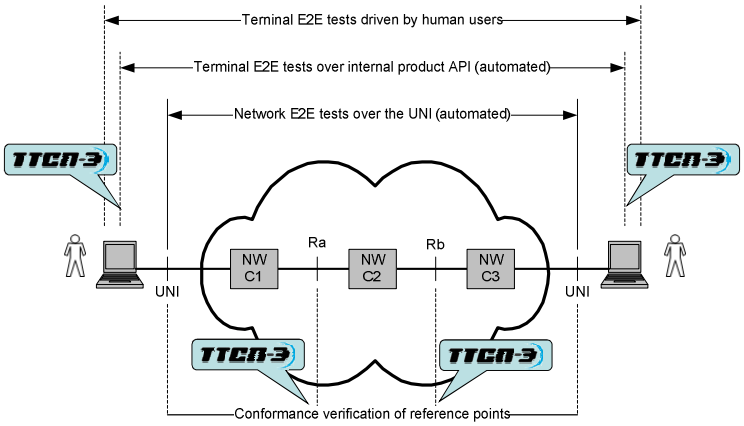
ETSI TC INT Vice Chairman

Presentation Outline

- Used NGN Testing methods
  - Tested Interfaces
  - Interfaces which can be tested with conformance tests
  - Limitations of the strategy
  - Testing experiences
  - Tested Interconnection Interfaces
  - TTCN-3 test systems, a system with limits ?
- QoS
- QoS Testing experiences
- Conclusions

Used NGN testing methods

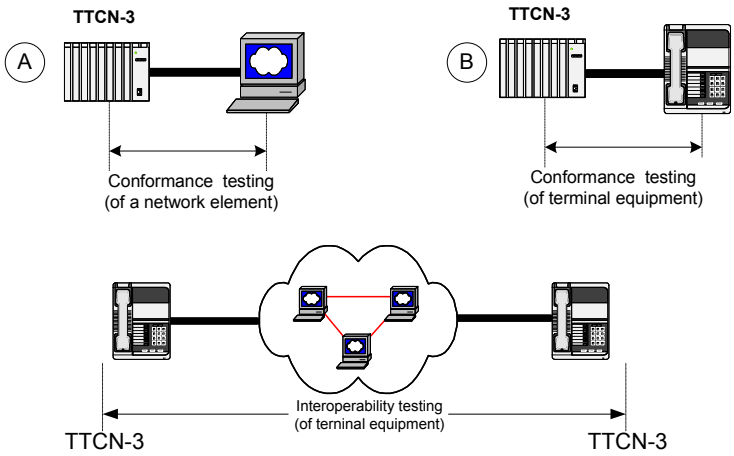
IOT with Conformance Checking



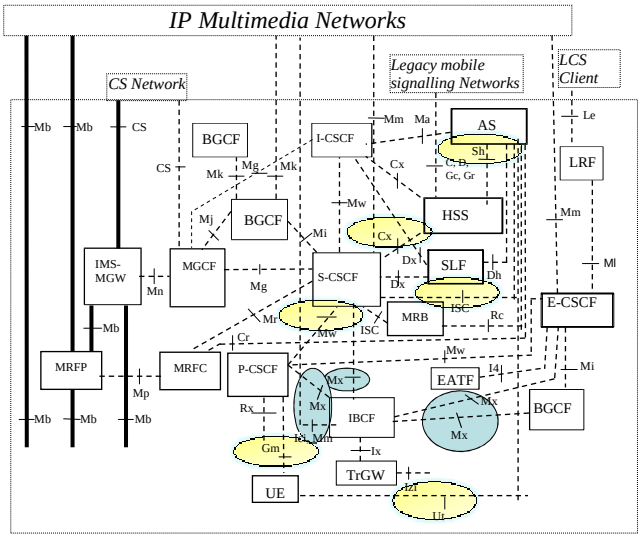
Characteristics and limitations of Conformance Testing

- Characteristics
  - **Gives a high-level of confidence that the standardised parts of a product are working as specified**
  - It is component (Black Box) testing
  - Requires a test system (i.e., executable test cases)
  - High degree of control and observation
  - Tests are thorough and accurate but limited in scope
- Limitations
  - **Does not necessarily prove interoperability with other products**
  - Tests are focussed on part of a product
  - Test systems may be expensive

Used Conformance and Interoperability Testing configurations



Interfaces which can be tested with conformance tests



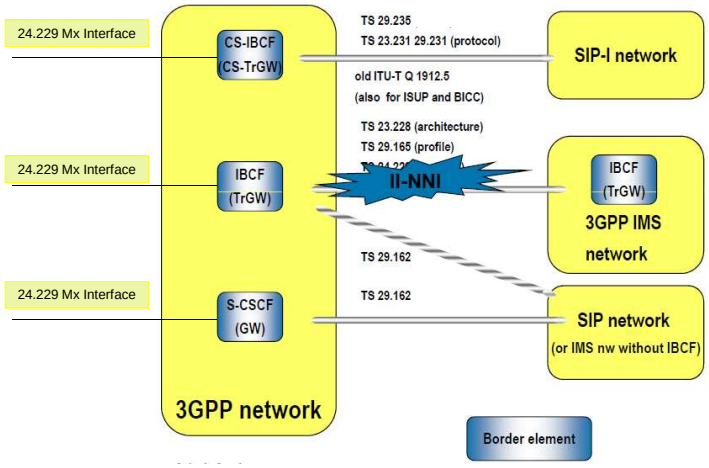
Limitations of the strategy

- Due to the limited number of tested interfaces (e.g. no vertical interfaces), the full system conformity of all elements can not be ensured
- As a consequence the system components which interfaces can not be tested (e.g. H.248, RACS Interfaces)should be used from one vendor to ensure the IOP between the different network components
- To ensure the end-to-end functionality, internal E2E tests with different interfaces must be executed
- As an option, tests performed with tools supplied from the vendors can be executed

Testing experiences

- The conformity of the products from some vendors could be not supported.
- These products are mostly cheaper, because they are not tested according to the standards
- The time for "go in service" will be for such products much longer

Tested Interconnection Interfaces

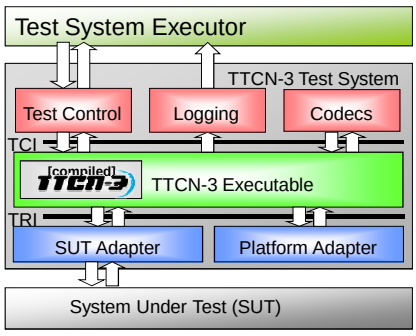


TTCN-3 test systems, a systems with limits ?

- Characteristics
  - TTCN-3 specifies the test structure but a specific system is needed for the execution
  - The **test system architecture** is defined with the **TRI** (TTCN-3 Runtime Interface) and **TCI** (TTCN-3 Control Interface) standards
  - TTCN-3 allows reuse of test platforms with different tools but also for different SUTs
  - A test system requires
    - A TTCN-3 tool = **TTCN-3 compiler** and execution environment
    - A **test platform** for a specific device under test

- Limitations
  - The SUT and platform adapter (TRI interface) is proprietary
  - The production of the TRI adapter is expensive (20 k€ - 30 k€) per ATS
  - With each release change of the TTCN-3 Compiler the platform adapters must be adapted
  - If the test equipment is not supported any more from the company which is developed the adapters the ATS can not be used with new releases
  - limited number of tests platforms
  - for the ATS validation are three SUT needed which causes a delay from 1-3 Year until a validated ATS is on the market

TTCN3 Tests System and Interfaces



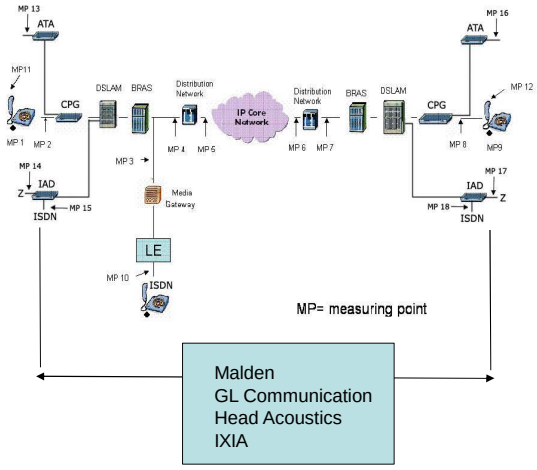
TCI = TTCN-3 Control Interface
TRI = TTCN-3 Runtime Interface

Protocol Test Equipment

Tester used by A1 Telekom Austria

- CATAPULT & Testingtech TTCN-3 compiler
- NAVTEL
- Tektronic K1297
- Tektronic Spectra 2
- ARCATECH Harmony
- Empirix Hammer

Telekom Austria
Voice QoS Test Configuration



Head acoustic

- ACQUA is a dual channel analysis system for diagnosis of acoustic and/or electric transmission paths up to 24 kHz.
- Applications
  - Quality control Conformance tests
  - Speech quality measurement and optimization (algorithms and systems)
  - Speech quality evaluations of - standard terminals (analog, digital) - mobile phones (UMTS, GSM, CDMA, TDMA ...)
  - cordless phones (DECT, CAT-iq™ ...)
  - hands-free and conference terminals (office, vehicle ...)
  - multimedia terminals (VoIP-Systems ...)
  - network components (echo canceller, DCME, speech codecs ...)

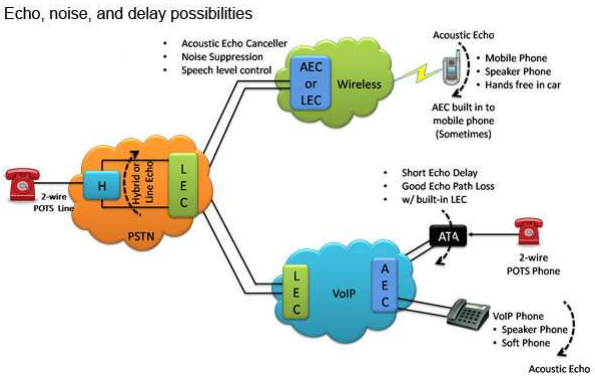
Malden

- Terminal development
- SIP phone test bed
- UMA performance and handover analysis
- Enterprise SLA validation
- Echo canceller analysis
- Jitter Buffer Tests
- Train communications
- DTMF Analysis
- Regression testing
- Conference bridge testing
- Speech quality optimisation in all networks
- Speech quality / load evaluation
- Drive Test
- Codec evaluation
- Electro-Acoustic conformance
- Network element development
- Wireless handset comparison
- Vendor selection
- Echo simulation
- Competitive analysis of cellular networks
- DSP performance measurement

IXIA

- **Key Features**
  - ITU-T T.38 support
  - Predefined test scenarios for automating functionality, interoperability, and conformance testing
  - Protocol flow functions shaped as visual blocks, no programming or other script language is needed.
  - Simulate multiple IAFDs and fax gateways
  - T.30/T.38 Fax Protocol Analysis
  - T.30 signal trace extracted from T.38 packet trace

GL Communication



QoS Testing experiences

The user applications (fax & modem) are mostly distorted due to:

- end-to-end delay bigger than 100 ms
- problems with not correct implemented Echo Cancellers and Jitter Buffers in the GW
- not interoperable H.248 and SDP procedures within the network
- T.38 is not sensible on the delay, but during the TDM- IP Transit Scenario with more TDM – IP segments T.38 does not work.
- Not time synchronized network elements

Conclusion

- The conformity of the products from some vendors could be not supported. The time for "go in service" will be for such products much longer.
- The fax & modem transmissions are mostly distorted due to end-to-end delay bigger than 100 ms and problems with not correct implemented Echo Cancellers and Jitter Buffers
- Not interoperable H.248 and SDP procedures within the network
- The testing of the NGN is mostly complicated caused due to different interfaces
- To ensure the end-to-end functionality, a combination of conformance tests and internal E2E tests with different interfaces must be executed

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THANK YOU!

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