
Source:	ETSI PTCC
Title:	Development & deployment of TTCN tests for 3GPP terminals
Document for:	Information
Agenda Item:	8.3.1
Summary:	This document is provided as background information for TSG-SA in association with the request of TSG-T to endorse the funding for TTCN test case elaboration (the TSG-T status report in SP-010561)

Experience in GSM has clearly demonstrated that conformance testing of mobile terminals plays a key role in ensuring interoperability between GSM networks and terminal equipment. However, if they are to be useful it is essential that the test specifications are written in a rigorous, detailed and unambiguous manner, using dedicated languages such as TTCN (Tree and Tabular Combined Notation). Standardised by the ISO and ITU-T in 1992 TTCN is specifically designed for testing. It has a well-proven track record and has become the de-facto language for standardised conformance test suites. The current 3GPP protocol conformance test specification for UE and most ETSI conformance test specifications, for example, GSM, DECT, INAP, TETRA, ISDN, VB-5, Hiperlan and VoIP are written in TTCN.

Test specifications written in plain English are simply not adequate, and in the long run result in a more expensive development cycle. This was the experience of GSM phase 1 which did not use TTCN. This ultimately led to significant delays in the availability of executable test suites in the GSM system simulators, which in turn contributed to the late introduction of services. Similarly, GPRS did not receive funding for testing and no formal test suite was developed. This has resulted in poor interoperability between GPRS networks and GPRS terminals, and ambiguities in the standard have taken a long time to identify and resolve. Again, this has led to the late deployment of GPRS services. GSM phase 2 on the other hand *did* receive funding. The successful development and deployment of test suites resulted in the wide availability of interoperable terminals and a reasonable deployment and take-up of services. Note that, where relevant, TTCN code developed in GSM phase 2 can be re-used in 3G.

TTCN concentrates on specifying the detailed test requirements in a test-tool independent manner, something that is very difficult to do in a normal programming language such as C++ or Java. This enables the early development of test platforms and it allows several test equipment vendors to run the same test suite, with the same results. It also provides a competitive impetus to get conformance test platforms available early and allow early deployment of the standard. This and the stability of TTCN together with the fact that the language is fast becoming an integral part of many manufacturer's internal testing processes, means that there is real long-term commitment by test tool manufacturers to TTCN.

The next version of TTCN (called TTCN-3) has been developed and published by ETSI in 2001. TTCN-3 is currently being used by EP TIPHON to define conformance tests for Internet-related protocols such as SIP and OSP. It is expected that TTCN-3 will be used in a similar context in 3GPP.

A test suite is essentially a complex piece of software, which is almost impossible to produce by committee on a voluntary basis. The funding of teams of experts has proved to be the most efficient and cost-effective way to develop these specifications. Over the years there has built up a significant international pool of TTCN expertise with a deep knowledge of testing mobile communications. 3GPP should capitalise on that knowledge base. The ETSI PTCC (Protocol and Testing Competence Centre), a world-leader in the use of TTCN, provides all the necessary support to 3GPP including co-ordination, administration, MCC task leading, testing expertise, TTCN training etc.

TSG-T1 ***Conformance Test Specifications*** ***TTCN Comments***

**Phil Brown, 3GPP
T1 Chairman**

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TS34.123 – 3 v3.3.0 TTCN



- 82 **P1** test cases now verified by T1 to Mar 02 baseline
- 21 **P2** test cases now verified by T1 to Mar 02 baseline @ 19 Sep 03
- TTCN now moving to Mar 03 baseline
- Major effort by industry to re-verify all test cases on new baseline
- **TS 34.123-3 TTCN V3.3.0 will be based on March-03 core specifications**



A total of 37 new test cases were approved by email since T#21

T1 Verification Progress - 1

@ T#18	3
@ T#19	18
@ T#20	66
@ T#21	103

- **All test cases to the R99 Mar 02 baseline**
- **Future verification to the Mar 03 baseline or later**
- **Minimum certification criteria comprises ~ 400 tcs**

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T1 Verification Progress - 2

Challenges

- Immature core specs
- Changing baseline
- Lack of test UEs
- No quality benchmarks
- Increasing regression
- Wide spread of test

‘types’ attempted in early stages i.e. GCF Package One

Improvements

- Experience & continuity
- Reuse of test steps
- Availability of UEs
- More company assistance & cooperation
- Optimisation of processes
- Similar tests in later packages

T1 Verification Progress - 3

- **Implementation effort on R99**
 - Earlier commitment by 3GPP to R99
 - All ‘early’ launches based on R99 therefore direction is market driven in accordance with GCF priorities
 - All test cases in GCF certification criteria will be forward compatible for Rel 4, therefore effort is relevant and re-usable
- **T1 still updating specs to the latest core specs including TDD**

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ETSI MCC 160 Focus for 2004

- **FDD – completion of Packages 1 to 4**
- **TDD – anticipated demand**
- **Resource and budget dependent**
- **Current ETSI budget request from PCG:**
 - **FDD 58 man months (MM) see next slide**
 - **TDD 39 MM**

R99 TTCN Task Breakdown for 2004 (FDD only)



TTCN maintenance Tasks	Corresponding prose	Workload (mm)
SS ASP interface/ configurations	34.123-3	5
RRC (without interRAT HO)	34.123-1, clause 8	20
NAS + SMS	34.1231, clauses 9-13, 16	6
RLC, MAC	34.1231, clause 7	3
Idle mode	34.1231, clause 6	3
RAB	34.1231, clause 14	5
UTRAN->GERAN HO	34.1231, clause 8.3.7	3
GERAN->UTRAN HO	51.010, clause 60	4
Common library	34.108, 34.123-1, annexes	6
Error report & TTCN CR handling		3
Total		58

Support for TTCN



- **SP-010562 presented in SA#13 Sep 01 justified the use of TTCN**
- **GSMA provided 11 MM and a consortium of UE manufacturers provided ~ 7 MM funding in 2002 to supplement ETSI funding to keep programme on track**
- **GCF OP considers ETSI based TTCN as the reference in the first instance (agreed 2002)**
- **Unanimous support among active UE manufacturers in the GCF for ETSI based TTCN indicating a unified approach**
- **Early test implementations starting to be utilised by UE manufacturers in response to operators' requests**
- **UE certification by GCF as a condition of future procurement by operators anticipated**

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Future of Programme



- **Dependent on:**
 - Desire for single source of reference code as applicable to different regions/ access technologies
 - Good will of the industry to supplement the programme
 - Desire to complete certification programme now that it is in full swing
 - Desire to maintain existing suite of tests and expansion of current certification criteria in the future
- **Funding structure is always under pressure!**
- **T1 will have to be adaptable to changing market demands and imposed limitations of resources**

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