Title: **Development & Deployment of TTCN Tests for 3GPP Terminals**
Source: ETSI PTCC

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.