

# Spirent **TTCN-3** Introduction

## The Only Standardized Testing Technology Enabling Test Automation

The Testing and Test Control Notation TTCN-3 is a powerful, standardized testing technology specifically designed for testing and certification by the European Telecommunications Standards Institute (ETSI). It can be applied to a variety of application domains and types of testing. TTCN-3 is being used in standardization as well as in industry, research, international projects and academia since 2000.

TTCN-3 provides all constructs and features necessary for black box testing with a rich typing system and powerful matching mechanisms. It supports both message-based and procedure-based communication, timer handling, dynamic test configuration including concurrent test behavior, the concept of verdicts & verdict resolution, and much more.

Due to its intrinsic extensibility, TTCN-3 is able to import external data and type specifications directly. Several mappings like ASN.1, IDL and XML are already standardized, further ones can be added easily.

### Typical Areas of Application

- Protocol and service testing
- Component, integration and system testing
- Testing of embedded, communication-based, and distributed systems

### Application Domains

- Mobile communications (LTE, WiMAX, 3G, TETRA, GSM)
- Broadband technologies (ATM, DSL)
- Middleware platforms (WebServices, CORBA, CCM, EJB)
- Internet protocols (SIP, IMS, SIGTRAN and IPv6)
- Smart Cards
- Automotive (AUTOSAR, MOST, CAN)

### Unique Feature Set

- Dynamic concurrent testing configurations
- Synchronous and asynchronous communication mechanisms
- Encoding information and other attributes (including user extensibility)
- Data and signature templates with powerful matching mechanisms
- Test verdict mechanisms
- Test suite parameterization and test case selection mechanisms
- Harmonized with ASN.1, IDL, XML, and other languages
- Well-defined syntax, interchange format and static semantics
- Optional presentation formats (textual, graphical, tabular)
- Precise execution algorithm (operational semantics)
- Test suite and test system control

As recent developments show, industry and research start focusing more and more on testing with TTCN-3. This universal and adaptable testing language provides all necessary concepts and tools to cover the ever increasing test service requirements.

Read more about TTCN-3 at the official home page at [www.ttcn-3.org](http://www.ttcn-3.org).

### Less Time and Costs

- Reduction of development time for new testing platforms by 20 to 30 percent
- 30 to 50 percent savings in implementation efforts (adaptation and maintenance of test suites)

### Quality

- Testing in early design stages
- Systematic, automated test methods

### Well Established on the Market

- Manufacturers—Motorola, Siemens, Nokia, etc.
- Carriers—Vodafone, France Telecom, O2, etc.
- Test Devices—Tektronix, Agilent, Aeroflex, Rohde & Schwarz, etc.

### Secure Investments

- Repeatability and continuous development
- Wide area of application test support and common methodology on a standardized level

### Multi-Purpose Testing Language

- All kinds of black-box testing (conformance, performance, interoperability etc.)
- Development of technology-independent test suites
- Suited for a wide range of application areas and domains

### User-Friendly Handling

- Easy graphical specification of test cases
- Full test execution control on test case and test suite level
- Clear visualization of complex test scenarios and clearly structured test documentation

### Highest Flexibility in Designing and Maintaining Test Software

- Specification in various presentation formats (textual, graphical, tabular)
- Support of automated and distributed testing
- Same set of test functionalities usable in different contexts

### Simple Test Adaptation

- Easy adaptation of existing test suites
- Easy implementation into existing systems via standardized interfaces (TRI/TCI)

### Global Standard

- The only internationally standardized test technology specifically designed for testing
- Maintenance and continuous enhancements guaranteed

### **1 – Secure investments through standardization**

TTCN-3 is an internationally recognized and standardized test technology introduced and maintained by the European Telecommunication Standards Institute (ETSI). It has also been adopted by the ITU-T. TTCN-3 is used to define standard test specifications for various application domains like telecommunications, automotive, health care, and more. Being an international, open and maintained standard with standardized interfaces, extensibility is built in. Permanent updates ensure its usability according to the latest testing requirements.

### **2 – Technology independent**

Besides typical programming constructs, TTCN-3 contains all the important features to specify test procedures and campaigns for all kinds of testing such as functional, conformance, interoperability, or load tests. These test-specific features are unique compared to traditional scripting or programming languages, and above all technology-independent. TTCN-3 supports all kinds of black-box testing and is suited for a large variety of application domains.

### **3 – Easy test definition**

The graphical representation format (GFT) enables test specification on a pure and easy graphical level with Message Sequence Charts. They are perfectly suited for visualizing complex test behavior and clearly structured test documentation. The textual representation format (TTCN-3 Core Language) enables test engineers to specify test types, data and behavior more effectively, compared to other modern programming languages.

### **4 – Abstract test implementation**

TTCN-3 defines test cases on an abstract level. Thus, test developers can focus on developing tests instead of worrying about the implementation on a platform or operating system. A TTCN-3 compiler translates the abstract tests into executable code. Errors can already be spotted and fixed at compilation level, avoiding them at runtime. The generated code can be reused by adapting it to any platform or technology, also enabling testing in any design stages.

### **5 – Full test execution control**

TTCN-3 supports full test execution control built in the core language itself. On test suite level, within the control part, TTCN-3 enables the definition of test case execution via selection expressions. Together with a powerful import mechanism the same set of test cases can be used in different contexts, for several test scenarios.

### **6 – Distributed test execution**

TTCN-3 allows a dynamic creation of test components at runtime, providing maximum flexibility for defining distributed test configurations. With a distributed test solution based on TTCN-3, you can run scalability and load tests on various distributed environments. Therefore, this solution is perfectly suited for an application to different test behavior and to simultaneous execution.

### **7 – Less costs but more efficiency through test automation**

TTCN-3 enables test automation which reduces manual interaction related to all test phases, like monitoring and collecting traces from interfaces, configuration of network elements, test execution, traces and log analysis, or reporting. It ensures efficient and systematic testing saving time and costs. Test automation increases reliability and reduces the risk of human errors. Tests can be run faster within a regression test, and they can be run over and over again with less overhead. As more automated tests are added to the test suite more tests can be run each time thereafter.

## **We are already using proprietary test technology. Why should we switch to TTCN-3?**

Typical proprietary test technology is platform-dependent and designed for a dedicated language or technology. Using the concept of an Abstract Test Suite, test developers can focus on the development of the test logic without worrying about implementation on a platform. TTCN-3 provides a graphical presentation format to easily create test cases and get fast graphical output results. Its powerful features—in particular control, configuration and communication—enable efficient testing of modern communication systems and domains.

## **What is the difference between an abstract test suite and an executable test suite?**

An abstract test suite is a collection of test data and test cases that gives an abstract view on issues like communication, time and data. Abstract means that the properties of these concepts are defined without the need for concrete (i.e., implementation-dependent) representation. In an executable test suite, the abstract concepts are already implemented making it possible to execute the test suite in real life environment. To create an executable test suite out of an abstract one, an additional implementation of test execution control, logging and codecs plus SUT adaptor is required. This can be realized by using standardized TRI and TCI implementation together with a test execution tool like TTworkbench.

## **Is TTCN-3 extensible?**

Yes. TTCN-3 enables data import from different data languages. Specifically for ASN.1, IDL, and XML the data import is standardized in TTCN-3. Users can also integrate any data language of their choice. In addition, TTCN-3 enables connectivity to external functions, so users can add their own extensions and implement them on the target platform. As a maintained and user-driven test specification TTCN-3 is continuously being enhanced bringing further benefits such as realtime support.

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#### About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information, visit:  
[www.spirent.com](http://www.spirent.com)

#### What is the benefit of having different representation formats, and which one should I use?

At the moment, 3 representation formats are defined: the core language, i.e., the textual representation, the graphical format based on sequence diagrams, and the tabular format based on tables like in TTCN-2. With the core language, types and values can be effectively specified, while the graphical format can be selected by the user for the definition of dynamic behavior and for documentation issues. The tabular format might be better suited for developers used to TTCN-2 test case specification.

#### Which types of testing does TTCN-3 cover?

TTCN-3 can be used for many types of testing like:

- Valid, invalid and inopportune testing
- Software module, unit, layer, protocol, integration and laboratory testing
- Functional, load, and distributed testing
- Regression, certification and approval testing

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