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| ***TTF T032 - Progress Report for ETSI*** |
| **Presented to ETSI meeting** |  |  | **Author:** | Jens Grabowski |
|   |   |   | **Date:** | 17/01/2024 |
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| **TTF** | **T032** |   | **TTF leader** | Jens Grabowski |
| **TB/WG** | **MTS** |   | **TB responsible** | MTS |
|  |  |   | **Administrator** | Marie-Laure Lasnier |
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| **TTF title:** | TTCN-3 maintenance and conformance testing |
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| **Milestone** | **B** |  | **Status** | **Covers the period until (cut-off date)** | MTS#91 |
| **Template** |
| **Objective** | Progress report#2 and,Final drafts for T1 approved by TC MTS |
| **Achieved** | Yes |  |
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| **Remarks** | --- |
|  |  |  |  |  |  |
| **Achieved dates** |  |  |  |  |  |
| **Template** | **Draft report** | **TB approval** | **ETSI approval** |  |  |
| 07/09/2023 |   |   |   |   |   |
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# Executive summary

The TTCN-3 testing language has intensively been developed by ETSI during the last 20 years. By today, TTCN-3 has become a significantly important testing technology in different domains (see more details at <http://www.ttcn-3.org/index.php/about/references/applicatio-domains>). It is used by standardization bodies (see more details at <http://www.ttcn-3.org/index.php/about/references>) as well as by EU research projects and open source initiatives. TTCN-3 reached very high deployment at various ETSI member companies. The language is also endorsed by ITU-T as the Z.16x and Z.17x Recommendation series.

Significant number of TTCN-3 test toolsets are available on the market. At least five commercial tools, five free or open source tools and one internal test tool of an industrial ETSI members are known to exist (<http://www.ttcn-3.org/index.php/tools>). This also indicates the high interest and use of the language. TTCN-3, as THE standard test language, serving several domains and application areas, is specified in very detail. For example, the TTCN-3 core language alone is estimated to contain about 5,000 requirements. It is of upmost importance for users of standard test suites as well as for industrial users that the TTCN-3 tools conform to the TTCN-3 language standards. This can be secured by TTCN-3 tool conformance test suites, in a similar way as implementations of other ETSI standards (e.g. protocol specifications) are checked by means of ETSI-developed conformance test suites. In the past, the TTCN-3 tool conformance test suite development process itself has led to several language standard clarifications.

TTF T032 “Testing Task Force (TTF) T032 on TTCN-3 Maintenance” has two objectives. The first objective is to maintain the high quality of the language and at the same time keep it harmonized with the new requirements of the users, new application areas and new ways of working like Agile SW development. In addition TTF T032 has the task to study the need and scope of a new major revision of the TTCN-3 standards. The second objective is to maintain and further develop the TTCN-3 tool conformance test suites in order to reach full test coverage of the TTCN-3 series of standards.

During two video conferences and one in-person work session for Task 1 “TTCN-3 Maintenance and Evolution,” TTF T032 implemented and completed 17 CRs in one final draft document. Progress has been made on 17 CRs, but their resolution requires further discussion. TTF T023 identified one technical risk or difficulty for Task 1. The technical risk or difficulty is associated with the development of a new major revision and was discussed at MTS#90. As a consequence of this discussion, TTF T032 prepared an initial ToR with a focus on developing a new major revision and organized a TTCN-3 open workshop to collect suggestions for modernizing and innovating TTCN-3. A total of 20 CRs are still open and need to be solved as part of the next TTCN-3 project. Most of these CRs relate to the identified technical risk or difficulty. TTF T032 attended the UCAAT conference at the ETSI booth. In addition, TTF T032 updated the TTCN-3 leaflet and contributed to the TTCN-3 website <http://www.ttcn-3.org/>.

The work on Task 2 “Conformance test suites for TTCN-3 tools and sub-tasks” continues. The currently ongoing work is the validation of conformance test for version 15 (2023) of the TTCN-3 core standard. These tests for v15 are under validation in this TTF, and will aid the work of software engineers implementing version 15 of the TTCN-3 core standard.

# Introduction

The work on Task 1 “TTCN-3 maintenance and further development” comprises the following tasks:

* Review and resolve change requests reporting technical defects or requesting clarifications and new language features for all existing TTCN-3 language standards.
* Develop proposals for language extensions requested by ETSI TBs, 3GPP, oneM2M, ETSI members and the TTCN-3 community and consent the solution with the contributor(s).
* Implement agreed solutions.
* Manage the change request (CR) process.
* Manage the interim versions of the standard according to 3GPP needs (when requested), and the versions for approval.
* Present the TTCN-3 standards’ status and the work of the TTF (previously STF) at the conference(s) associated with ETSI TB MTS and at ETSI TC MTS meetings.
* Providing input for the updates of the TTCN-3 leaflet and the TTCN-3 web pages.
* Study the need and scope of a new major revision of the TTCN-3 standards.

The work on Task 2 “Conformance test suites for TTCN-3 tools and sub-tasks” comprises the following tasks:

* Analysis of the latest published versions of the relevant TTCN-3 standards and identifying new and changed requirements.
* Identifying affected existing test cases and define new test cases for the new requirements.
* Implement changes and additions in the textual part of the deliverables (PICS, TSS&TP, textual part of the ATS).
* Implement changes and additions in the code of the ATS.
* Verification of the test cases with test tools.
* Discussion of validation outcomes with TTCN-3 experts, and raising CRs for clarification in case of discovered ambiguity.
* Analysis of the latest draft versions of the relevant TTCN-3 standards and development of not validated new test cases for the new requirements.

TTF T032 consists of the following seven experts:

* Jens Grabowski, University of Göttingen (TTF management)
* Axel Rennoch, Fraunhofer FOKUS (TTF management)
* Ramon Barakat, Fraunhofer FOKUS
* Gusztáv Adamis, Ericsson Hungary
* Lénárd Nagy, Ericsson Hungary
* Matthias Simon, Nokia
* Tomáš Urban, Elvior

# Contractual milestone

The contractual milestone B is achieved by TB MTS approving

this report and

final drafts of deliverables, which have received CRs, i.e., final drafts of the T1 deliverables.

# Progress of the work

***Progress of the work on Task 1 – TTCN-3 maintenance and further development***

The TTF work on Task 1 included two video conferences, an in-person work session in Göttingen, as well as individual homework from the experts and a week of voluntary work for final CR cleaning and editorial work on the draft deliverables. In addition, TTF T032 organized a TTCN-3 open workshop to collect proposals regarding the modernization and innovations of TTCN-3.

Video conferences, the in-person work session and the workshop took place on the following dates:

* 27. July 2023: video conference
* 5. Sept. 2023: video conference
* 7. – 10. Nov. 2023: in-person work session in Göttingen
* 23. Jan. 2023: open TTCN-3 workshop in Berlin (before MTS#91)

The first video conference (July 27, 2023) was dedicated to the preparation of a TTF ToR for the development of a new major revision of the TTCN-3 standards. In the second video conference (September 5, 2023) all open CRs were discussed and assigned to team members for further processing. Detailed discussion on CR resolutions took place during the in-person work session in Göttingen. The results of the open TTCN-3 workshop will be presented and discussed at MTS#91.

TTF T032 closed and implemented **17** CRs and progressed **17** CRs.

**Part 01: TTCN-3 Core Language (25 CRs)**

8090 Deprecate `lengthof` in favor of `length` (closed)

8094 Provide a canonical style for source code layout (progressed)

8100 Inline terminal productions (progressed)

8106 Provide TTCN-3 defintions for predefined types (progressed)

8111 Allow UTF-8 for charstrings? (progressed)

8152 Harmonize string literals (closed)

8153 Extend usage of break and continue statements (progressed)

8155 Issue with the number of elements of templates (closed)

8156 Introduce user defined methods (progressed)

8182 Old module template parameter rules in 5.4.1.2 (closed)

8184 Implicit template restriction should mention the map type (closed)

8185 Implicit template restrictions for compound expressions (closed)

8191 Strict Rules (progressed)

8192 Simplify import statement (closed)

8193 Redefine keywords and reserved words (progressed)

8194 Optional Names for Formal Parameters (progressed)

8196 Redefining Macros as Predefined Constants (progressed)

8197 Automatic Alternative Selection for Unions (closed)

8198 Type requirement of value variable assignment is too restrictive. (closed)

8210 Clarify list subtyping of record of types (closed)

8211 Obsolete restriction for subtyping list-types? (closed)

8212 Dot missing in Example 4 of chapter 8.2.3.1 (closed)

8213 Is map a data or a reference type? (closed)

8215 Typo in 15.6.3 Example1 (closed)

8216 Typos in 15.6.3. Example 8 (closed)

**Part 06: TTCN-3 Control Interface (1 CR)**

8095 Provide a TTCN-3 specification for TCI and TRI (progressed)

**Part 09: Using XML with TTCN-3 (1 CR)**

8201 Handling empty element-values (closed)

**Ext Pack: Ext Pack: Behaviour Types (ES 202 785) (3 CRs)**

8188 Support for function literals (progressed)

8189 Implicit apply (closed)

8190 Expression Bodies (progressed)

**General: CRs not related/assigned to a TTCN-3 language specification document (4 CRs)**

8108 Uniqueness of identifiers for fields and enumerations (progressed)

8180 Next major version of TTCN-3 (progressed)

8195 Make specification updates easier to find (progressed)

8113 Type traits and user defined methods (progressed)

***Progress of the work on Task 2 – Conformance test suites for TTCN-3 tools and sub-tasks***

The work on Task 2 “Conformance test suites for TTCN-3 tools and sub-tasks” continues. The currently ongoing work is the validation of conformance tests defined for version 15 of the TTCN-3 core standard, which have been published in 2023. In addition, tests for v16 will be specified based on the results of task 1 to aid the work of software engineers implementing version 16 of the TTCN-3 core standard.

Each expert uses their own TTCN tool for the validation of conformance test cases. One exception is for Fraunhofer FOKUS who applies TTCN-3 tools from other companies not represented by members of the TTF. Despite significant efforts have been undertaken to get licenses and/or the latest version of other tools until today the tools with licenses are not available to Fraunhofer FOKUS. The reason is for one tool that we do not have the latest version of the tool that is available inside the company only and for another tool we still have to solve legal issues regarding the provision of the tool license.

# Assessment of technical risk, difficulties encountered/expected, unresolved issues

* **Task 1 – TTCN-3 maintenance and further development**

The previous TTCN-3 maintenance TTF, i.e., TTF T023, pointed out that the maintenance of the TTCN-3 language has become complex, since even small corrections and extensions require changes in many different places in the documents. Based on these findings TB MTS decides to prepare TTF ToR for developing a major revision of the TTCN-3 standards suite in 2024 and 2025. This decision influenced the work of TTF T032 in such a way that the resolution of several CRs has been deferred to 2024 and 2025. Thus, the following CRs should not be resolved in the normal CR resolution process, but should be addressed as part of work on a new major revision of the TTCN-3 standards:

8094 Provide a canonical style for source code layout

8100 Inline terminal productions

8106 Provide TTCN-3 defintions for predefined types

8111 Allow UTF-8 for charstrings?

8153 Extend usage of break and continue statements

8156 Introduce user defined methods

8191 Strict Rules

8193 Redefine keywords and reserved words

8194 Optional Names for Formal Parameters

8196 Redefining Macros as Predefined Constants

8095 Provide a TTCN-3 specification for TCI and TRI

8188 Support for function literals

8190 Expression Bodies

8108 Uniqueness of identifiers for fields and enumerations

8180 Next major version of TTCN-3

8195 Make specification updates easier to find

8113 Type traits and user defined methods

The TTF will continue to submit further CRs on the different modernization and refactoring issues.

Further 3 CRs remain open because they have been submitted too or their resolution requires additional discussions.

A total of 20 CRs (including CRs dealing with the production of a new major revision of the TTCN-3 language standards) remain open. The processing of these CRs will be deferred to the next TTCN-3 TTF.

* **Task 2 – Conformance test suites for TTCN-3 tools and sub-tasks**

The preceding TTCN-3 conformance testing TTFs have provided a sound methodological basis for the work of this TTF. The work of this TTF has started in September 2023. During the validation work on release 15 some warnings and errors have been discovered due to the application of only one of the TTCN-3 compilers and are now under review. Until today the other TTCN-3 compilers have been identified as not updated to TTCN-3 standards release v15 or are still not available due to license legal issues. Due to this the ongoing work for T2 currently is delayed.

# Proposed changes in the TTF work plan

No proposed change.

# Resources requirements

There is no change foreseen in the TTF resource requirements related to the TTF’s ToR.

# Changes in the TTF Team

There was no change in the TTF's composition and no change is foreseen or required.

# Meetings/events attended on behalf of the TTF

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| --- | --- | --- | --- | --- | --- |
| **Date** | **Place** | **TB/Orga** | **Event description** | **Reason to attend** | **Expert(s)** |
| 26.09. – 27.09.23 | Mainz | TC MTS | MTS#90 regular meeting | Presentation of progress report (milestone A) | Jens Grabowski |
| 14.11. – 16 11.23 | Timisoara, Romania | TC MTS | User Conference on Advanced Automated Testing (UCAAT) | Participation at ETSI booth | Jens Grabowski |
| 23.01.24 | Berlin | TC MTS | Open TTCN-3 workshop (at MTS#91) | Workshop is organized by TTF T032 to prepare next major revision. | All experts (at least online) |
| 24.01. – 25.01.24 | Berlin | TC MTS | MTS#91 regular meeting | Presentation of progress report (milestone B) | Jens Grabowski, Axel Rennoch |

# Meetings/events planned to be attended

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| --- | --- | --- | --- | --- | --- |
| **Date** | **Place** | **TB/Orga** | **Event description** | **Reason to attend** | **Expert(s)** |
| 30.05. – 31.05.24 | Sophia-Antipolis | TC MTS | MTS#92 regular meeting | Presentation of TTF finalization (milestone C and D) | Jens Grabowski, Axel Rennoch |

# TTF communications, presentations, promotion, inside and outside ETSI, WEB pages etc

* TTF T032 Website (<https://portal.etsi.org/xtfs/#/xTF/T032/>).
* Participation of TTF T032 during UCAAT 2023 at ETSI booth
* Organized a TTCN-3 open workshop prior to MTS#91 to discuss and prepare a new major revision of the TTCN-3 standards suite.
* TTF T032 continuously updates the TTCN-3 leaflet and contributes to the TTCN-3 website <http://www.ttcn-3.org/>.
* Further external communication is done via Mantis (<http://forge.etsi.org/mantis/main_page.php>) and emails.

# Technical advice required from the reference Technical Body

There is no issue requiring TB decision.

# Status of the deliverables

* **Task 1 – TTCN-3 maintenance and further development**

TTCN-3 standards are stable documents. The way of working of TTCN-3 evolution TTFs is approved by ETSI TC MTS, is based on change requests submitted to ETSI’s Mantis CR handling system. Technical resolution and proposed changes in the texts of deliverables are publicly available in Mantis during the year. Agreed text of resolved CRs is implemented in drafts of deliverables at, and after the last working session of the TTF. Therefore, the output drafts of the deliverables are available at the end of the project. The actual status of the CRs can be found at <http://forge.etsi.org/mantis/main_page.php>.

For the achievement of milestone B, TTF T032 produced the following final draft

* + ES 201 873-1: Part 1: TTCN 3 Core Language:

Available at: <https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873-1v4.16.1/MTS-201873-1v4.16.1v001.docx>

* **Task 2 – Conformance test suites for TTCN-3 tools and sub-tasks**

The drafts of the T2 deliverables will be provided as part of Milestone C in June 2024.

# Next report

The next report (i.e., the final report of the TTF) is scheduled for MTS#92 in May 2024.

# Any other business

None