

<b>TTF T023 - Progress Report for ETSI</b>			
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<b>TTF</b>	<b>T023</b>
<b>TBWG</b>	<b>MTS</b>

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<b>TB responsible</b>	Philip Makedonski
<b>Administrator</b>	Elodie Rouveroux

<b>TTF title:</b>	<b>TTCN-3 Maintenance</b>
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<b>Milestone</b>	<b>B</b>		<b>Status Template</b>	<b>Covers the period until (cut-off date)</b>	29/01/2023
<b>Objective</b>	Progress report#2 and, Final drafts for T1 approved by TC MTS, Stable drafts for T2 made available to TC MTS				
<b>Achieved</b>	No				
<b>Remarks</b>	Stable drafts for T2 are delayed and will be made available in March 2023				

**Achieved dates**

<b>Template</b>	<b>Draft report</b>	<b>TB approval</b>	<b>ETSI approval</b>		
13/01/2023					

## 1 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 utmost 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 T023 “Testing Task Force (TTF) T023 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. 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 three working session for Task 1 “TTCN-3 maintenance and further development” TTF T014 implemented 26 CRs in 3 final draft documents. 13 CRs have progressed, but their resolution requires further discussion. TTF T023 identified two technical risks or difficulties which require decisions or advice from ETSI TC MTS. A total of 21 CRs remain open and have to be resolved in the scope of the next TTCN-3 maintenance project. Most of these CRs are related to one of the identified technical risks or difficulties. TTF T014 updated the TTCN-3 leaflet and contributed to the TTCN-3 webpage <http://www.ttcn-3.org/>.

The work on Task 2 “Conformance test suites for TTCN-3 tools and sub-tasks” continues. The involved experts completed writing tests for the 2021 release of the TTCN-3 standards. The currently ongoing work is the validation of the newly written conformance tests, and conformance test writing for version 14 of the TTCN-3 core standard. These tests for v14 are under validation in this TTF, and will aid the work of software engineers implementing version 14 of the TTCN-3 core standard.

## 2 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.

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 T023 consists of the following five experts:

- Jens Grabowski, University of Göttingen (TTF management)
- Axel Rennoch, Fraunhofer FOKUS (TTF management)
- Ramon Barakat, Fraunhofer FOKUS
- Matthias Simon, Nokia
- Tomáš Urban, Elvior

### 3 Contractual milestone

The contractual milestone B is achieved by TB MTS approving

- (1) this report and
- (2) final drafts of deliverables, which have received CRs for TB approval, i.e., final drafts of the T1 deliverables.

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

The current TTF session plan for the work on Task 1 contains online working sessions where all experts work in parallel, as well as individual homework of the experts and one week of voluntary work spent for final CR cleaning and editorial work on the draft deliverables.

Online work sessions for work on Task 1 took place on the following dates:

- Week 33: 16. - 17. Aug. 2022
- Week 45: 07. - 11. Nov. 2022
- Week 51: 20. Dec. 2022 (telco for discussing the results of individual homework)

TTF T023 closed and implemented 26 CRs and progressed 13 CRs.

#### **Part 01: TTCN-3 Core Language (37 CRs in total, 24 CRs closed, 9 CRs progressed)**

##### **Closed CRs**

- 7994 Allow coordinated shared access to component variables.
- 8069 Range-based for loop
- 8070 If-else statements with initializers
- 8078 Incorrect example for present operation (Remove "causes error" comment)
- 8091 Add the not-implemented-function `???'`
- 8093 object not listed as a keyword in table A.5
- 8097 Optional return values
- 8098 Mandatory module prefix for imported module definitions
- 8099 Disallow circular imports
- 8101 Allow trailing comma
- 8103 Add increment and decrement statement
- 8104 Automatic type inference
- 8105 Extend allowed usage of nested types
- 8107 Support for variadic functions
- 8109 Examples for map templates needed
- 8114 Template support for the map type
- 8115 Explanation fuzzy/lazy is the opposite
- 8119 Wrong clause references to 16.1.5 -> 16.2.1
- 8120 activate/deactivate explanation shall be modified

- 8136 Outdated reference in chapter 5.2.2 "Uniqueness of identifiers"
- 8151 Update of TTCN-3 version references
- 8154 Embedded Fields
- 8183 Wrong BNF rules for enumerated types
- 8187 Check of Core Language BNF rules

#### **Progressed CRs**

- 8090 Deprecate `lengthof` in favor of `length`
- 8094 Provide a canonical style for source code layout
- 8100 Inline terminal productions
- 8106 Provide TTCN-3 definitions for predefined types
- 8111 Allow UTF-8 for charstrings?
- 8152 Harmonize string literals
- 8153 Extend usage of break and continue statements
- 8155 Issue with the number of elements of templates
- 8156 Introduce user defined methods

#### **Part 06: TTCN-3 Control Interface**

**(1 CR closed)**

##### **Closed CRs**

- 8110 When are global constants evaluated?

##### **Progressed CRs**

- 8095 Provide a TTCN-3 specification for TCI and TRI

#### **Part 11: Using JSON with TTCN-3**

**(1 CR closed)**

- 8181 object used as an identifier

#### **General**

**(3 CRs progressed)**

- 7981 Support for REST APIs (HTTP)
- 8113 Type traits and user defined methods
- 8180 Next major version of TTCN-3
- 8192 Simplify import statement

### ***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 involved experts completed writing tests for the 2021 release of the TTCN-3 standards. The currently ongoing work is the validation of the newly written conformance tests, and conformance test writing for version 14 of the TTCN-3 core standard, which have been published in 2022. These tests for v14 are under validation, and will aid the work of software engineers implementing version 14 of the TTCN-3 core standard.

Each expert uses their own TTCN tool for the validation of conformance test cases. One exception is the validation of Object Oriented test cases, as the Object Oriented extensions are presently supported only by Spirent’s compiler. We are grateful for Jacob Wieland’s help, who is validating these test cases (even though not directly involved in the development of the conformance tests).

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

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

During the work on Task 1, two technical risks or difficulties have been encountered.

- **Technical risk/difficulty 1:**  
TTF T023 implemented the not backwards compatible CR 8181 in ES 201 873-11 TTCN-3 Part 11: Using JSON with TTCN-3. A resolution is needed because without this resolution it is impossible to use JSON (Part 11) together with object oriented features (Ext Pack: Object-oriented features (ES 203 790)). CR 8181 was the only CR submitted for ES 201 873-11. Unfortunately, the urgency of the CR was detected too late for discussion with the tool vendors. TTF T023 decided to implement a reasonable resolution for the CR and submit the draft document for approval. If the draft is not approved, the resolution will be shifted to the next TTCN-3 maintenance TTF.
- **Technical risk/difficulty 2:**  
Currently, 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. Therefore, the members of TTF T023 believe that 13 years after the last major revision a new major revision should be prepared that cleans up, modernizes and refactors the TTCN-3 language specification. With this in mind, the TTF has identified a number of CRs that should not be implemented in the normal CR resolution process, but should be addressed as part of work on a new major revision of the TTCN-3 standards:
  - 7981: Support for REST APIs (HTTP)
  - 8090: Deprecate “lengthof” in favor of “length”
  - 8094: Provide a canonical style for source code layout
  - 8095: Provide a TTCN-3 specification for TCI and TRI
  - 8100: Inline terminal productions
  - 8111: Allow UTF-8 for charstrings
  - 8113: Type traits and user defined methods
  - 8152: Harmonize string literals
  - 8153: Extend usage of break and continue statements
  - 8180: Next major version of TTCN-3
  - 8191: Strict Rules
  - 8192: Simplify import statement

The TTF proposes to submit CRs on the different modernization and refactoring issues.

Further 9 CRs remain open because they have been submitted too or their resolution requires additional discussions.

A total of 21 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 maintenance TTF.

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

The preceding TTCN-3 conformance testing STFs have provided a sound methodological basis for the work of this TTF. The TTF work has started late in August 2022. During the validation work several warnings and errors have been discovered and are now under review. Due to this ongoing work the results for T2 will be delayed.

## 5 Proposed changes in the TTF work plan

No proposed change.

## 6 Resources requirements

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

## 7 Changes in the TTF Team

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

## 8 Meetings/events attended on behalf of the TTF

Date	Place	TB/Orga	Event description	Reason to attend	Expert(s)
13.- 15.10.22	Munich	UCAAT	Test Conference	TTCN-3 promotion	Matthias Simon
04.10. – 05.10.22	Tallin	TC MTS	MTS#87 regular meeting	Report on TTF progress	Axel Rennoch
Jan/Feb 2023	Thessaloniki	TC MTS	MTS#88 regular meeting	Presentation of progress report (milestone B)	Axel Rennoch

## 9 Meetings/events planned to be attended

Date	Place	TB/Orga	Event description	Reason to attend	Expert(s)
May/June 2022	tba	TC MTS	MTS#89 regular meeting	Presentation of TTF finalization (milestone C and D)	Jens Grabowski, Axel Rennoch
tba	tba	TC MTS	User Conference on Advanced Automated Testing (UCAAT)	Participation at ETSI booth	tba

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

- The TTF T023 webpage can be found on: <https://portal.etsi.org/STF/STFs/STF-HomePages/T023>.
- TTF T023 continuously updates the TTCN-3 leaflet and contributes to the TTCN-3 webpage <http://www.tcn-3.org/>.
- Further external communication is done via Mantis ([http://forge.etsi.org/mantis/main\\_page.php](http://forge.etsi.org/mantis/main_page.php)) and emails.

## 11 Technical advice required from the reference Technical Body

Two technical risks or difficulties have been identified and described in Section 4 “Assessment of technical risk, difficulties encountered/expected, unresolved issues”. *ETSI TC MTS should agree on the handling of the technical risks and difficulties:*

- Technical risk/difficulty 1 (approval of ES 201 873-11) requires a decision of ETSI TC MTS.
- Technical risk/difficulty 2 requires decision on the work direction before the work of the next TTCN-3 maintenance TTF starts.

## 12 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 publically 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](http://forge.etsi.org/mantis/main_page.php).

For the achievement of milestone B, TTF T023 produced the following final drafts

- ES 201 873-1: Part 1: TTCN 3 Core Language:  
Available at: <https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873-1v1.15.1/MTS-201873-1v1.15.1v001.docx>
- ES 201 873-6: Part 06: TTCN-3 Control Interface:  
Available at: <https://docbox.etsi.org/MTS/MTS/07-Drafts/0020187315/MTS-20187315v002.docx>
- ES 201 873-11 Part 11: Using JSON with TTCN-3  
Available at: <https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873114101/MTS-201873114101v003.docx>

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

Stable drafts of the T2 deliverables have NOT been made available for the approval of Milestone A in December 2022. The final drafts of the T2 deliverables will be provided as part of Milestone C in March 2023.

## 13 Next report

The next report (i.e., the final report of the TTF) is scheduled for MTS#89 in May/June 2023.

## 14 Any other business

None