TTF T014 - Progress Report for ETSI

Presented to ETSI meeting		Author:	Prof. Jens Grabowski
		Date:	22/12/2021
Doc ref		Version	

TTF	T014		TTF leader	Prof. Jens Grabowski
TB/WG	MTS		TB responsible	
			Administrator	Ms. Elodie Rouveroux

TTF title:	TTCN-3 maintenance & evolution of language and conformance test suites 2021

Milestone	B		Status Template	Covers the period until (cut-off date)	31/01/2022
Objective	Second progress report to be approved by TC MTS, at MTS#85 Final drafts of deliverables which have received CRs for TB approval				
Achieved	Yes	*Indicate whether the objective has been achieved* *If the objective is not achieved, give a short explanation in the "remarks"*			
Remarks					

Achieved dates

Template	Draft report	TB approval	ETSI approval		
22/12/2021					

1   Executive summary

The TTCN-3 testing language has intensively been developed by ETSI during the last 15 years, by today, it consists of 24 ETSI standards, altogether comprising almost 1800 pages and more than 3300 test cases in TTCN-3 code. The language is also endorsed by ITU-T as the Z.16x and Z.17x Recommendation series. By now TTCN-3 is used exceptionally as the formal specification language of standardized test suites and has also become an important testing technology at various ETSI member companies and in several industrial domains (http://www.ttcn-3.org/index.php/about/references/applicatio-domains) and standards organizations (http://www.ttcn-3.org/index.php/about/references).

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 member 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 is one of the most important standardized test languages. TTCN-3 can be used in many domains and areas of application and is specified in great 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 T014 "TTCN-3 maintenance & evolution of language and conformance test suites 2021" 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 closed and implemented 50 CRs in 12 final draft documents. 4 CRs will remain open. They have to be resolved in the scope of the next TTCN-3 maintenance project. 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, which currently has stable draft status. These tests for v14 will remain unvalidated 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.

TTF T014 consists of the following nine experts:

- Jens Grabowski, University of Göttingen (TTF management)
- Andras Kovacs, Broadbit (TTF management)
- Gusztáv Adamis, Ericsson
- Ramon Barakat, Fraunhofer FOKUS
- Zoltán Jakó, Broadbit
- Lénárd Nagy, Ericsson
- Axel Rennoch, Fraunhofer FOKUS
- Tomáš Urban, Elvior
- Jacob Wieland, Spirent Communications

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.

4   Progress of the work

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

The TTF session plan for the work on Task 1 contained two online working sessions where all experts worked 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.

The following online working sessions for the work on Task 1 have been carried out:

- Week 36:   06. - 10. Sept. 2021
- Week 45:   08. - 12. Nov. 2021

Further working sessions may be organized on demand.

During the working sessions, the 50 CRs listed below have been closed and implemented in final draft documents:

Part 01: TTCN-3 Core Language   **(37 CRs closed)**

7910	Allow parallel control parts/components
7998	lengthof for maps
7999	Evaluation of function calls in templates
8000	ES 201 873-1, clause 5.4.1.1, EXAMPLE 5 - v_int
8003	Typo in Section 6.2.16
8004	Unassigned variables in return statements
8005	It should be possible to reactivate a default
8006	Unnecessary Restriction 15.6.1 should be removed.
8007	Nested maps should be allowed
8009	Missing rule for no optional attribute (or default value of the optional attribute)
8017	Useless restriction for "*"
8031	TTCN-3 syntax BNF productions – corrections
8032	BNF links and formatting
8035	Wrong clause reference
8036	Definition of "existing TTCN-3 types" missing
8037	Wrong assignment in an example
8038	Explanation in an example

8039   Declarations too far
8040   => operator is missing from List of TTCN-3 operators and Precedence of Operators tables
8041   Typos in 15.12
8042   Wrong reference in 16.1.3
8043   typo in 20.2
8044   Component creation
8045   Start component operation can also be applied on control components
8046   master control component
8047   Clarification in Kill component operation
8048   Keywords shall be bold
8049   Value part in receiving operators
8050   Typo in 23.1
8051   Typo in 26.2
8052   Typo in 27.1.2.0
8053   Start a previously expired timer
8054   What happens if same verdict but with different text is set by setverdict
8055   Arguments of External actions shall be same as log
8066   Invalid example on modified templates
8067   Postfix value notation for templates
8068   Wrong table reference in log

Part 05: TTCN-3 Runtime Interface   **(1 CR)**
8064   add triSUTAction function that gets a parameter list

Part 06: TTCN-3 Control Interface   **(1 CR)**
8010   When does tliModulePar trigger?

Part 07: Using ASN.1 with TTCN-3   **(1 CR)**
8056   BNF updates and formatting

Ext Pack: Config & Deployment Support (ES 202 781)   **(1 CR)**
8057   BNF updates and formatting

Ext Pack: Perf & Real Time Testing (ES 202 782)   **(1 CR)**
8058   BNF updates and formatting

Ext Pack: Advanced Parametrization (ES 202 784)   **(1 CR)**
8059   BNF updates and formatting

Ext Pack: Ext Pack: Behaviour Types (ES 202 785)   **(1 CR)**
8060   BNF updates and formatting

Ext Pack: Continuous signal support (ES 202 786)   **(1 CR)**
8061   BNF updates and formatting

Ext Pack: Extended TRI (ES 202 789)   **(1 CR)**
8065 add xtriSUTAction function that gets a parameter list

Ext Pack: Advanced Matching (ES 203 022)   **(1 CR)**
8062   BNF updates and formatting - V1.4.1 (2020-05)

Ext Pack: Object-Oriented Features (ES 203 790)   **(3 CRs)**
8001   Syntax Error in Constructor invocation
8002   Operatiobn "Select class" is missing in Overview of program statements and operations
8063   BNF updates and formatting - clause A.2

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 corrently has stable draft status. These tests for v14 will remain unvalidated in this TTF, 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).

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

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

  During the work on Task 1, no technical risks or difficulties have been encountered.

  As expected and similar to previous work on TTCN-3 maintenance, the resolution of **4** CRs (11.01.2022), has been left open for a future TTF working on TTCN-3 maintenance. The open CRs are:
  - General: TTCN-3 Change Requests   (3 CRs)
    - 7981   Support for REST APIs (HTTP)
    - 8069   Range-based for loop
    - 8070   If-else statements with initializers
  - Part 01: TTCN-3 Core Language   (1 CRs)
    - 7994   Allow coordinated shared access to component variables.

- **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 on time in September 2021, the test case writing has progressed according to the project plan. During the work on Task 2, no technical risks or difficulties have been encountered.

6 Proposed changes in the TTF work plan

No proposed change.

7 Resources requirements

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

8 Changes in the TTF Team

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

9   Meetings/events attended on behalf of the TTF

Date	Place	TB/Orga	Event description	Reason to attend	Expert(s)
08.09. – 09.09.20	Online	TC MTS	MTS#84 regular meeting	Presentation of progress report (milestone A)	Jens Grabowski, Andras Kovacs

10   Meetings/events planned to be attended

Date	Place	TB/Orga	Event description	Reason to attend	Expert(s)
18./19. Jan. 22	Online	TC MTS	MTS#85 regular meeting	Presentation of progress report (milestone B)	Jens Grabowski, Andras Kovacs
May/ June 2022	tba	TC MTS	MTS#86 regular meeting	Presentation of TTF finalization (milestone C and D)	Jens Grabowski, Andras Kovacs
tba	tba	TC MTS	User Conference on Advanced Automated Testing (UCAAT)	Participation at ETSI booth	tba

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

- The TTF T014 webpage can be found on: https://portal.etsi.org/STF/STFs/STF-HomePages/T014.

- TTF T014 continuously updates the TTCN-3 leaflet and contributes to the TTCN-3 webpage http://www.ttcn-3.org/.

- Further external communication is done via Mantis (http://forge.etsi.org/mantis/main_page.php) and emails.

12   Technical advice required from the reference Technical Body

There is no issue requiring TB decision.

13   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 STFs 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 STF. Therefore, the output drafts of the deliverables are available at the end of the project. The actual status of all TTCN-3 related CRs can be found at http://forge.etsi.org/mantis/main_page.php.

For the achievement of milestone B, TTF T014 produced the following final drafts

- o ES 201 873-1: Part 1: TTCN 3 Core Language:
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873-1v1.14.1/MTS-201873-1v1.14.1v003.docx

- o ES 201 873-5: Part 05: TTCN-3 Runtime Interface:
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873-5_T3ed491/MTS-201873-5%20T3ed491v482.docx

- o ES 201 873-6: Part 06: TTCN-3 Control Interface:
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00201873-6v4.13.1/MTS-201873-6v4.13.1v4122.docx

- o ES 201 873-7 Part 7: Using ASN.1 with TTCN-3
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/002018737v4101/MTS-2018737v4101v492.docx

- o ES 202 781 TTCN-3 Language Extensions: Configuration and Deployment Support
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00202781v191/MTS-202781v191v001.docx

- o ES 202 782 TTCN-3 Language Extensions: Performance and Real-time Testing
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00202782_ed141RealtPer/MTS-202782%20ed141RealtPerv001.docx

- o ES 202 784 TTCN-3 Language Extensions: Advanced Parameterization
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00202784V191/MTS-202784V191v001.docx

- o ES 202 785 TTCN-3 Language Extensions: Behaviour Types
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/0020187314v191/MTS-20187314v191v001.docx

- o ES 202 786 TTCN-3 Language Extensions: Support of interfaces with continuous signals
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00202786ed151/MTS-202786ed151v001.docx

- o ES 202 789 TTCN-3 Language Extensions: Extended TRI
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00202789v161/MTS-202789v161v152.docx

- o ES 203 022 TTCN-3 Language Extensions: Advanced Matching
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00203022v151/MTS-203022v151v001.docx

- o ES 203 790 TTCN-3 Language Extensions: Object-Oriented Features
  Available at: https://docbox.etsi.org/MTS/MTS/07-Drafts/00203790v141/MTS-203790v141v001.docx

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

Stable drafts of the T2 deliverables have been made available for the approval of Milestone A in November 2021. The final drafts of the T2 deliverables will be provided as part of Milestone C in March 2022.

14 Next report

The next report (i.e., the final report of the TTF) is scheduled for MTS#86 in May/June 2022.

15 Any other business

None