

| STF 573 - Progress Report for ETSI | | | |
|---|--|----------------|----------------------|
| Presented to ETSI meeting | | Author: | Prof. Jens Grabowski |
| | | Date: | 17/12/2019 |
| Doc ref | | Version | |

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|-------------|------------|
| STF | 573 |
| TBWG | MTS |

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|-----------------------|----------------------|
| STF leader | Prof. Jens Grabowski |
| TB responsible | Mr. Dirk Tepelmann |
| Administrator | Ms. Elodie Rouveroux |

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| STF title: | TTCN-3 Evolution 2019 |
|-------------------|-----------------------|

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|------------------|---|--|------------------------|---|------------|
| Milestone | B | | Status Template | Covers the period until (cut-off date) | 31/01/2020 |
| Objective | Material to be available: · Input for updated TTCN-3 leaflet to be provided to the support Co-ordinator of TC MTS · Provide a list of technical changes useful for user and send it to TET group to be inserted in the News section of the TTCN-3 web site. · Final learning material for the Webinar (Task 2). Progress Report B; Final drafts of deliverables, Final learning material for the Webinar to be approved at MTS#79 | | | | |
| Achieved | Yes | | | | |
| Remarks | | | | | |

Achieved dates

| Template | Draft report | TB approval | ETSI approval | | |
|-----------------|---------------------|--------------------|----------------------|--|--|
| 17/12/2019 | 09/01/2020 | | | | |

1 Executive summary

The TTCN-3 testing language has intensively been developed by ETSI during the last decade and, by today, it consists of **17** ETSI standards, altogether more than **1650** pages. 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 (for further details see <http://www.ttcn-3.org/index.php/about/references/applicatio-domains>) and standards organizations (for further details see <http://www.ttcn-3.org/index.php/about/references>).

TTCN-3 has an important role in **standardization**; it is an enabler technology in many areas. Several conformance and end-to-end/interoperability test standards have been developed and being developed by **3GPP**, ETSI TBs **INT**, **ERM**, **ITS** and **oneM2M/smartM2M**. 3GPP is using TTCN-3 for UE conformance tests from Rel. 8 and onward to **LTE** and **VoLTE**, with NB-IoT on horizon. In the **C-ITS** area also several TTCN-3 test suites have been developed and they start playing important roles in ITS Plugtests™ events, with automated C-ITS interoperability testing being in progress. In 2016 **oneM2M** has started using TTCN-3 for IoT/M2M conformance test development that has been continued in ETSI smartM2M in 2017. oneM2M is also developing an open source test tool to execute the conformance tests.

The purpose of STF573 – “TTCN-3 evolution 2019” is to maintain the high quality of the language – that currently consists of 17 ETSI standards - 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 STF team consists of 6 experts. During its working sessions, STF573 progressed **53** CRs, updated the TTCN-3 leaflet and TTCN-3 web pages, developed educational material for a webinar describing the effective usage of the TTCN-3 OO features, identified and implemented additional OO features, and developed the first version of a standard library for OO features.

2 Introduction

The TTCN-3 language evolution work 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 3GPP, OMA, 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, and the versions for approval.
- Present the TTCN-3 standards' status and the work of the STF at the conference(s) associated with ETSI TB MTS and at ETSI TB MTS meetings.
- Updating TTCN-3 leaflet and web pages.
- Development of educational material for the effective usage of the TTCN-3 OO features. The educational material will be used for a webinar to be organized by the STF.
- Further development of TTCN-3 Language Extensions: Object Oriented features - Implementation of additional features needed for a more efficient use of the TTCN-3 OO features.
- Development of a standard library for OO features supporting the effective use of the TTCN-3 OO features.

The STF consists of seven experts:

- Jens Grabowski, University of Göttingen (STF Leader)
- Philip Makedonski, University of Göttingen
- Axel Rennoch, Fraunhofer FOKUS
- György Réthy, Testcom OÜ
- Kristóf Szabados, Testcom OÜ

- Tomáš Urban, Elvior
- Jacob Wieland, Spirent Communications

Philip Makedonski and György Rethy do not physically participate in the STF sessions, but contribute by following the ongoing work in Mantis and providing useful feedback via email and telephone.

3 Contractual milestone

This contractual milestone consists of:

- 1) This progress report.
- 2) The updated TTCN-3 leaflet.
- 3) Updated TTCN-3 web site.
- 4) Final learning material for the TTCN-3 Webinar.
- 5) Final drafts of deliverables that include
 - a) the implementation of additional features needed for a more efficient use of the TTCN-3 OO features, and
 - b) a standard library for OO features supporting the effective use of the TTCN-3 OO features.

The items 2) and 3) are continuously ongoing activities. STF573 updated the TTCN-3 leaflet before UCAAT 2019 and continuously contributed to the TTCN-3 webpages (www.ttcn-3.org).

The result of the work on item 4) is documented in the MTS#79 contribution MTS(20)079006.

The result of the work on item 5) is documented in the sections 4 and 13 of this progress report. The standard library for OO features supporting the effective use of the TTCN-3 OO features is also available as MTS#79 contribution MTS(20)079008.

4 Progress of the work

The STF session plan comprises three working sessions with all experts present, individual homework of the experts and one week of voluntary work spent for final CR cleaning and editorial work on the draft deliverables. Working sessions of the STF are:

- W32, 04 – 09 August 2019, Tallinn
- W35, 26 – 28 August 2019 (3 days), Berlin
- W51, 16 – 18 December 2019 (3 days), Tallinn

During the working sessions in Tallinn and Berlin, the **53** CRs listed below have been resolved and closed:

Part 01: TTCN-3 Core Language

(22 CRs)

- | | |
|------|--|
| 7455 | The type of formal in parameters of external functions should be allowed to be 'any' |
| 7603 | Delete note on template restriction passing table |
| 7611 | Valid port lists for the procedure operations |
| 7618 | alternative event headers could allow a boolean combinators |
| 7682 | Table with index-operators using keys as indices should be supported |
| 7798 | Address problems with implicit default alt invocation |
| 7813 | Missing template restrictions in return clause declaration |
| 7826 | Non-backward compatibility issue with reserved words of extension packages |
| 7846 | Preprocessing macro <code>_SCOPE_</code> value "control" to be clarified |
| 7857 | Superfluos restriction 16.1.4.k |
| 7858 | Invalid restriction for non-deterministic lazy and fuzzy parameters |
| 7860 | CR 7611 wasn't properly added to the specification |
| 7861 | Indirect reference to a deprecated feature |
| 7865 | the text for union alternatives can be easily misunderstood to support omit being assigned to alternatives |

- 7867 the ispresent, ischosen, isvalue, isbound predefined functions should be moved to operations.
- 7869 unfortunate wording
- 7875 Typos in the section 21.3.10
- 7876 Restrictions in 21.3.10 are incorrectly numbered
- 7877 Invalid reference to alstep return value
- 7883 Fully initialized templates
- 7884 the current standard is not really specific on how records with port types as field work
- 7891 Missing syntax rules for functions and altsteps in BNF

Part 06: TTCN-3 Control Interface (2 CRs)

- 7847 Java mapping of tliPrCatchChecked_c
- 7849 C++ mapping of address parameter in TCI-TL check operation

Part 07: Using ASN.1 with TTCN-3 (1 CRs)

- 7805 Support of ASN.1 sequence with extension containing mandatory fields

Part 09: Using XML with TTCN-3 (2 CRs)

- 7835 incorrect example?
- 7848 Mapping XML Schemas: Name clashes in NoTargetNamespace

Ext Pack: Advanced Parametrization (ES 202 784) (2 CRs)

- 7852 Allow inline type expressions also as actual type parameters
- 7853 classes should allow type parameterization

Ext Pack: Behaviour Types (ES 202 785) (2 CRs)

- 7812 mtc and system clauses in behaviour types
- 7822 Invalid restriction on values of behaviour types

Ext Pack: Extended TRI (ES 202 789) (1 CR)

- 7816 There should be some way to determine what to log as 'TriMessage' for xtriSend

Ext Pack: Advanced Matching (ES 203 022) (7 CRs)

- 7785 Add Mutation annotations to the Value data type
- 7818 Dynamic Matching: wrong type used for template mw_closeTo
- 7819 semantic of (Restriction a):The dynamic matching syntax shall only be used in a typed context.
- 7820 Wrong definition of templates in EXAMPLE.
- 7821 Clarify semantic of examples (usage of value-lists and value retrieval assignment)
- 7827 Semantic of disjunction
- 7829 Syntax of repetition for arrays and of types

Ext Pack: Object-Oriented Features (Draft ES 203 790) (14 CRs)

- 7830 Clarification request for OO features (order or member initializer and constructor)
- 7831 Clarification request for OO features (reaching super super class)
- 7832 incorrect syntax used in example
- 7833 typo in comment
- 7834 case else in the select case is not described
- 7854 Better BNF derivations for 'this' and this-related entities are necessary
- 7855 BNF for ClassMember should not allow more than one ConstructorDef
- 7856 Implicit constructor shall only provide parameters for non-var fields without initializer
- 7859 Modified BNF/restrictions for functions, external functions and altsteps
- 7863 libraries that could be added to OO
- 7866 Allow nested classes
- 7868 External classes should be allowed internal members (direct and inherited)

As part of **progress of the work on Task 1** “Resolution of outstanding CRs, preparing drafts of new versions, updating TTCN-3 leaflet and web pages, STF573 updated the TTCN-3 leaflet before UCAAT 2019 and continuously contributed to the TTCN-3 webpages (www.ttcn-3.org).

The **progress of the work on Task 2** “Development of educational material for the effective usage of the TTCN-3 OO features” will be presented to MTS#79 in contribution MTS(20)079006. The educational material has been finalized. A date for a Webinar should be discussed and scheduled during MTS#79.

The **progress of the work on Task 3** “Further development of TTCN-3 Language Extensions: Object Oriented features - Implementation of additional features needed for a more efficient use of the TTCN-3 OO features” is related to the progress of the work on the CRs:

- 7862 Allow trait classes and multiple inheritance,
- 7864 Allow overloading for object methods,
- 7866 Allow nested classes, and
- 7868 External classes should be allowed internal members (direct and inherited).

Each CR defines an additional feature needed for a more efficient use of the TTCN-3 OO features. As indicated in the CR list for “Ext Pack: Object-Oriented Features (Draft ES 203 790)” the CRs 7866 and 7868 have been resolved and closed. For the CRs 7862 and 7864 the STF developed and discussed complete resolutions. Due to general open discussion items regarding implementability and usage, the STF decided to continue the discussion on these features in the scope of the next TTCN-3 maintenance STF and, thus, to shift the resolution of both CRs to 2020.

The **progress of the work on Task 4** “Development of a standard library for OO features supporting the effective use of the TTCN-3 OO features” is related to the work on CR:

- 7863 libraries that could be added to OO.

The library is finalized (i.e., CR 7863 is resolved and closed) and will be implemented as Annex B of ES 203 790 “TTCN-3 Ext Pack: Object-Oriented Features”. This Annex will also be presented to MTS#79 in contribution MTS(20)079008.

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

The resolution of the following 6 CRs has been left open for the next TTCN-3 maintenance STF:

- Part 01: TTCN-3 Core Language (2 CRs)
 - 7874 Reintroduce restriction on restricted modified templates
 - 7890 module parameters should behave like variables during control part execution
- Ext Pack: Object-Oriented Features (Draft ES 203 790) (4 CRs)
 - 7862 Allow trait classes and multiple inheritance
 - 7864 Allow overloading for object methods.
 - 7870 Allow definition of class properties
 - 7871 Class templates to be added to the language?

The number is reasonable and none of the open CRs looks critical.

At this point in time no action is seen to be required from TC MTS.

6 Proposed changes in the STF work plan

No proposed change.

7 Resources requirements

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

8 Changes in the STF Team

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

9 Meetings/events attended on behalf of the STF

| Date | Place | TB/Orga | Event description | Reason to attend | Expert(s) |
|----------------------|---------------------|---------|---|--|-------------------|
| 10.09 – 11.09.19 | Munich, Germany | TC MTS | MTS#78 regular meeting | Presentation of progress report (milestone A) | Jens Grabowski |
| 22.10. – 24.10.19 | Bordeaux, France | TC MTS | User Conference on Advanced Automated Testing (UCAAT) | Participation at ETSI booth | Jens Grabowski |

10 Meetings/events planned to be attended

| Date | Place | TB/Orga | Event description | Reason to attend | Expert(s) |
|---------------------|----------------------|---------|------------------------|--|-------------------|
| 28.01 – 29.01.20 | ETSI HQ | TC MTS | MTS#79 regular meeting | Presentation of progress report (milestone B) | Axel Rennoch |
| 12.05 – 13.05.20 | Budapest, Hungary | TC MTS | MTS#80 regular meeting | Presentation of final report, discussion of webinar | Jens Grabowski |

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

- The STF573 webpage can be found on: <https://portal.etsi.org/STF/STFs/STFHomePages/STF573>.
- The work of STF573 has been presented and discussed on the ETSI UCAAT conference (<https://ucaat.etsi.org/>) in October 2019. An expert of STF573, i.e., Jens Grabowski, was available at the ETSI booth.
- STF573 updated the TTCN-3 leaflet and contributes continuously to the TTCN-3 webpage <http://www.ttcn-3.org/>.
- Further external communication is done via Mantis and emails.

12 Technical advice required from the reference Technical Body

There is no issue requiring TB decision.

13 Status of the deliverables

Part 01: TTCN-3 Core Language

| | |
|------------------------|---|
| Name: | RES/MTS-201873-1 v 4.12.1 (ES 201 873-1) TTCN-3 Core V4121 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079013 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079013_Draft_-_RES_MTS-201873-1_v4_12_1_TTCN-3_Core_v4_11_4_.zip |

Part 06: TTCN-3 Control Interface

| | |
|---------------------|---|
| Name: | RES/MTS-201873-6 v4.12.1 (ES 201 873-6) TTCN-3 TCI V4121 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079004 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079004_Draft - RES MTS-201873-6 v4 12 1 v4 11 2 ES 201 873-6 T.zip |

Part 07: Using ASN.1 with TTCN-3

| | |
|---------------------|---|
| Name: | RES/MTS-201873-7v481ASN-1 (ES 201 873-7) TTCN-3: the use of ASN.1 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079012 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079012_Draft - RES MTS-201873-7v481ASN-1 v4 7 2.zip |

Part 09: Using XML schema with TTCN-3

| | |
|---------------------|---|
| Name: | RES/MTS-201873-9 v 4.11.1 (ES 201 873-9) TTCN-3 XSD V4111 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079010 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079010_Draft - RES MTS-201873-9 v 4 11 1.zip |

Ext Pack: Advanced Parametrization (ES 202 784)

| | |
|---------------------|---|
| Name: | RES/MTS-202784ed171 (ES 202 784) TTCN-3 extension: Advanced Parameterization |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(19)000047 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(19)000047_Draft - RES MTS-202784ed171 v0 0 1 ES 202 784 TTCN-3 ex.zip |

Ext Pack: Behaviour Types (ES 202 785)

| | |
|---------------------|---|
| Name: | RES/MTS-202785BehTypesv171 (ES 202 785) TTCN-3 BehTypes V171 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(19)000048 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(19)000048_Draft - RES MTS-202785BehTypesv171 v0 0 1 ES 202 785 TT.zip |

Ext Pack: Extended TRI (ES 202 789)

| | |
|---------------------|---|
| Name: | RES/MTS-202789 ed151xTRI (ES 202 789) |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079004 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079005_Draft - RES MTS-202789 ed151xTRI v1 4 2 ES 202 789 .zip |

Ext Pack: Advanced Matching (ES 203 022)

| | |
|---------------------|--|
| Name: | RES/MTS-203022-AdvMatch v141 (ES 203 022) |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(19)000049 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(19)000049_Draft - _RES MTS-203022-AdvMatch v141_v0_0_4_ES 203_022_.zip |

Ext Pack: Object Oriented features

| | |
|---------------------|--|
| Name: | RES/MTS-203790-OOF v1.2.1 (ES 203 790) TTCN3ext_OOed111 |
| Status: | Final draft for approval |
| MTS#79 contribution | MTS(20)079007 |
| Link | https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020/MTS(20)079007_Draft - _RES MTS-203790-OOF v1_2_1_v0_0_1_ES 203_790_TTC.zip |

14 Next report

The next report is the final project report. It is scheduled for TB MTS#80 (planned: 12.-13.05.2020 in Budapest, Hungary)

15 Any other business

None