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|  | ToR STF BD (TC MTS) |
| Version: 0.3 |
| Author: dr. György Réthy – Date:30 Sep 2016  |
| Last updated by: ETSI Secretariat – Date: 06 Jan 2017 |
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Terms of Reference - Specialist Task Force

STF BD (TC MTS)

TTCN-3 Evolution 2017

Summary information

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| --- | --- |
| Approval status | Approved by TC MTS (doc ref: MTS(16)000029r1) To be approved by Board#110 (1-Dec-2016) |
| Funding | **Maximum budget: 102 400 € ETSI FWP** |
| Time scale | Mar 2017 to Sep 2018 |
| Work Items  | TTCN-3 standard series at the time of writing this document consists of 14 published parts, 3 standards are under development and a further language extension to be developed by this requested STF. See list of WIs in clause 6.2 Deliverables |
| Board priority  | [ETSI STF funding criteria](http://portal.etsi.org/stfs/process/item2_PropApprFund/item2_A1_FundCriteria.asp) |

Part I – Reason for proposing the STF

# Rationale

The TTCN‑3 testing language has intensively been developed by ETSI during the last decade and, by today, it consists of 14 ETSI standards, altogether more than 1400 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 (<http://www.ttcn-3.org/index.php/about/references/applicatio-domains>) and standards organizations (<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**, and **ITS**. 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 **ITS** area also several TTCN-3 test suites have been developed and they start playing important roles in ITS Plugtest events as well. This year (2016) **oneM2M** has started using it for IoT/M2M conformance test development.

TTCN-3 fulfills an important role in the **industry**. Development of new products raises new TTCN‑3 language requirements and requests for new features. The customers of ETSI industrial members require low time to market of the new capabilities and features developed. Due to this, vendors have had introduced new, agile ways of working and continuous integration (CI) and continuous delivery (CD) machinery. Both agile and CI/CD are heavily relying on automated testing (AT), including AT solutions based on TTCN-3. Resolving these requests with short response time is important for user satisfaction and to keep low time-to-market for new capabilities and features being developed.

Performance and robustness, and security testing are also of increasing importance and TTCN-3 is used at some ETSI member companies in these areas as well.

During the last years several change requests from 3GPP, industrial users and TTCN-3 tool vendors could be resolved and closed in a shortest possible time period due to the fact that a TTCN-3 language evolution STF was available.

TC MTS is committed to keep the language powerful even so easy-to-use, up-to-date, well maintained and following the changing user needs. Also today 3 further parts of the TTCN-3 standards family are being developed and users request more extensions to ease test framework and test application (i.e. performance and security testing tools) development.

# Objective

TTCN-3 language evolution STFs in the last years enabled continuous maintenance and extension of the TTCN-3 standards in the ES 201 873 series and the 6 published language extensions for specific use cases and domains. This has essentially contributed to the success of TTCN-3.

The TTCN-3 language evolution work in general will comprise 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 TC MTS meetings.

On evolving the language for more than a decade, TC MTS has also recognized the need for:

* Harmonization of language concepts, clean up language from superfluous features and make a consistency check
* Add more sophisticated features for application and test framework development including consistent object oriented paradigm

# Relation with ETSI strategy and priorities

The proposed STF relates to the following aspects of the ETSI long term strategy and priorities:

* Keep ETSI effective, efficient and recognised as such
* Stay in tune with changing nature of the global ICT industry (innovation)
* Establish leadership in key areas impacting members' future activities
* Engage in other industry sectors besides telecoms, (cross-sector ICT)
* Emerging domains for ETSI
* Standards enablers/facilitators (conformance testing, interoperability, methodology)

# Context of the proposal

## ETSI Members support

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| --- | --- | --- |
| **ETSI Member** | **Supporting delegate** | **Motivation** |
| Telefon AB LM Ericsson | Dr. Gyorgy Rethy | TTCN-3 has a major role in our product development, both in functional and performance testing phases as well as in product deployment. It is essential for us that new language requirement, requests for clarification and user complaints arising during software development are handled in a short timeframe. |
| Telecom Italia | Giulio Carmelo Maggiore | TTCN-3 promotion and use for increasing the quality of standards and implementations in the network. |
| Institut fur Informatik, Universitaet Goettingen | Dieter Hogrefe | The University of Gottingen is interested in the further development of TTCN-3, because we are involved in several research and development projects where testing with TTCN-3 plays a central role. TTCN-3 can only keep such a central role, if TTCN-3 is continuously maintained and adapted to the new challenges of testing. |
| Fraunhofer FOKUS | Ina Schieferdecker | TTCN-3 plays a central role in our R&D projects and in our training programs. We run e.g. an automotive IOP test stand for Car2X communication based on TTCN-3 and a reference test system for IHE/HL7-based solutions likewise based on TTCN-3. In addition, our automated test generation methods and tools use TTCN-3 as target test specification so that in various respects a continuously maintained and evolving TTCN-3 is essential for our work |
| Spirent | Stephan Pietsch | For Spirent, being one of the main TTCN-3 tool provider the maintenance is crucial for its success and TTCN-3's success at its customers and users. Continuous development and enhancement of the language is one of its main USPs |
| OU Elvior | Dr. Andres Kull | Elvior is TTCN-3 tool provider and contributes actively into TTCN-3 evolution. Effective resolving CR-s raised by TTCN-3 users strengthens TTCN-3 position in test automation market and therefore has impact to our business. |

## Market impact

The user basis of the TTCN-3 language is estimated well above 10 000 users. However, it is a language for automated testing and thus it is widely used in unattended automatic build-and-test software development cycles (continuous integration, continuous delivery) and in security and performance testing. Therefore, its market impact is more substantial than just the number of users.

Delay in the language maintenance and development could cause user dissatisfaction, and would lead to tool vendor-specific solutions of unresolved issues that over time would lead to backward compatibility problems in the language, in tool implementations and in user test suites.

## Tasks for which the STF support is necessary

The STF support is needed for several reasons:

* Users need short response times to be confident in using the language and to avoid unnecessary delays in SW product development. The meeting schedule of the ETSI technical body does not makes it possible to respond in short time frames. See further information in clause 4.6.
* TTCN-3 is a test-specific programming language; program language development knowledge is not available at users in standardization bodies or industrial members; such knowledge is available at research institutes and universities that are not in the position of financing voluntary contribution to the language maintenance and development.
* TTCN-3 has been designed as a procedural language, which suits to its original purpose, automated functional types of testing in different domains. However, with time new areas and uses have appeared, like developing performance test frameworks, generic (customizable) functional test frameworks and new domains as ITS, IoT, etc. There is a strong requirement from the users to increase the efficiency of TTCN-3 code development in these areas by adding object orientation (or alike) extension to the language. This shall be developed in a way, consistent with the existing language concepts. This requires program language design knowledge, not present in the standardization body.

## Related voluntary activities in the TB

The ETSI Members supporting the creation of the STF are prepared to provide the following voluntary contribution:

* Telefon AB LM Ericsson: input in form of TTCN-3 CRs, providing voluntary resource in addition to MWP STF resources, consultation in cases when the STF requests that for CR resolution, participation in Steering Committee, review of documents.
* Telecom Italia: participation in Steering Committee.
* Institut fuer Informatik, Universitaet Goettingen: input in form of TTCN-3 CRs, providing voluntary resources in addition to MWP STF resources for reviewing the draft documents, participation in TTCN-3 Steering Committee
* Fraunhofer FOKUS: Input in form of TTCN-3 CRs, providing voluntary resources in addition to MWP STF resources for reviewing the draft documents, participation in TTCN-3 Steering Committee
* Spirent: Input in form of TTCN-3 CRs, providing expert for STF work, consultation in cases when the STF requests that for CR resolution, participation in TTCN-3 Steering Committee
* Elvior: Consultation in cases when the STF requests that for CR resolution and participation in TTCN-3 Steering Committee.

## Previous funded activities in the same domain

TTCN-3 language development and maintenance has been a continuous ETSI activity for the last 10 years due to new user requirements emerged by starting using the language in new domains and further types of testing and to increase the quality and unambiguity of the standard.

TTCN-3 language evolution STFs supporting TC MTS reached the numerical results below during the last 5 years. It is worth to note that CR numbers alone are not useful indicators as the type and overall complexity of CRs are changing year-by-year, and with time the number and complexity of TTCN‑3 standards have also grown, resulting resolution of CRs of the same complexity becoming a more complex task.

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| --- | --- | --- | --- | --- | --- |
| STF | year | total resources(k€) | No. of revised core stand’s (ES 201 873-x) | No. of new/revised language extensions | No. of CRs resolved |
| 514 | 2016 | 51,0 | 4 | - | 94 |
| 491 | 2015 | 53,4 | 4 | - | 94 |
| 478 | 2014 | 50,4 | 5 | 6 revised | 143 |
| 460 | 2013 | 50,4 | 8 | 5 revised | 85 |
| 446 | 2012 | 42,0 | 8 | 3 revised | 95 |
| 430 | 2011 | 48,0 | 6 | 2 (continouos, extTRI) | 106 |

## Consequences if not agreed

Clause 4.5 contains the results of past TTCN-3 language STFs. TC MTS thinks that the availability of the language team and the communication with users and tool vendors has – at least – equal importance than the numerical results.

Experience from last years shows that quick response to user requests improves efficiency and removes ambiguity both at standardization, in tool implementations and at the industrial users. Without support of the former STFs, TC MTS would not be able to respond in a timely fashion. A few examples from the last years are:

* Several new features, technical improvements and clarifications, requested by STF160 have been resolved in 2014, 2015 and earlier, and interim drafts versions have been produced; STF160 is baselining these interim versions for TTCN-3 tool vendors that allows using them about a year before the publication of the next versions of standards.
* CR 6088: resolving this CR by STF 433 in a few weeks enabled a user to test an XML-based protocol; before this only workaround with a very limited functionality was possible by complex TTCN-3 code constructs.
* Including IMS supplementary services into the scope of STF160, caused finding diversities in different TTCN-3 tool implementations that raised several CRs to Part-9 of the TTCN-3 standard. Existence of STF 430 allowed to resolve the problem until the summer and to provide the interim version v4.3.2 that has been used by STF160 as the baseline for tool vendors.
* Several issues for clarification as well as bug reports have been reported in the spring of 2010, in relation to the development of LTE UE conformance test suites by STF 160. All reported CRs has been resolved by STF 393 at its first sessions and in July 2010 the interim version v4.2.2 has been provided to STF 160 that has been used by STF160 in September as the baseline for tool vendors.

Part II - Execution of the work

# Technical Bodies and other stakeholders

## Reference TB

TC MTS, contact person: Dirk Tepelmann, TC MTS Chairman.

## Other interested ETSI Technical Bodies

All ETSI TBs developing or maintaining conformance and end-to-end test suites or interoperability test specifications also defined in TTCN-3 are receivers of the work done by the proposed STF.

In particular, the STF is in direct communication with 3GPP STF 160 leader regarding TTCN-3 language questions; ITS conformance and interoperability tests are also being developed in TTCN-3 and using the newest features of the language.

## Other interested Organizations outside ETSI

**ITU-T** Study Group 17: ITU-T has endorsed the TTCN‑3 standards produced by ETSI as ITU-T Recommendations in the Z.16x and Z17x series. TB MTS has an agreement with ITU-T SG17 on a "fast track" endorsement of the TTCN-3 standards to minimize the delay between the ETSI and ITU-T publications.

The **oneM2M** global IoT standardization alliance has started developing IoT conformance tests in TTCN-3 in 2016, which activity has also resulted requests for new language feature. This project will continue in 2017 and may result further requests for new features or clarifications.

Other fora like OMA, TCCA, Autosar and the MOST cooperation have also published test specifications in TTCN-3, therefore may use the outcome of the proposed STF.

# Base documents and deliverables

## Base documents

|  |  |  |  |
| --- | --- | --- | --- |
| **Document** | **Title** | **Current Status** | **Expected date for stable document** |
| ETSI ES 201 873-1 V4.8.1 | Part 1: TTCN-3 Core Language | Published | 2016-07 |
| ETSI ES 201 873-4 V4.5.1 | Part 4: TTCN-3 Operational Semantics | Published | 2016-07 |
| ETSI ES 201 873-5 V4.7.1 | Part 5: TTCN-3 Runtime Interface (TRI) | Published | 2015-06 |
| ETSI ES 201 873-6 V4.8.1 | Part 6: TTCN-3 Control Interface (TCI) | Published | 2016-07 |
| ETSI ES 201 873-7 V4.5.1 | Part 7: Using ASN.1 with TTCN-3 | Published | 2013-04 |
| ETSI ES 201 873-8 V4.6.1 | Part 8: The IDL to TTCN-3 Mapping | Published | 2015-04 |
| ETSI ES 201 873-9 V4.7.1 | Part 9: Using XML schema with TTCN-3 | Published | 2016-07 |
| ETSI ES 201 873-10 V4.5.1 | Part 10: TTCN-3 Documentation Comment Specification | Published | 2013-04 |
| DES/MTS-00201873-11ed471JSON | Part 11: Using JSON with TTCN-3 | Ongoing | 2016-12 |
| DES/MTS-0020187312 | Part 12: Using WSDL with TTCN-3 | Ongoing | 2016-12 |
| ETSI ES 202 781 V1.4.1 | TTCN-3 Language Extensions: Configuration and Deployment Support | Published | 2015-06 |
| ETSI ES 202 782 V1.3.1 | TTCN-3 Language Extensions: TTCN‑3 Performance and Real Time Testing | Published | 2015-06 |
| ETSI ES 202 784 V1.5.1 | TTCN-3 Language Extensions: Advance Parameterization | Published | 2015-06 |
| ETSI ES 202 785 V1.4.1 | TTCN-3 Language Extensions: Behaviour Types | Published | 2015-06 |
| ETSI ES 202 786 V1.3.1 | TTCN-3 Language Extensions: Support of interfaces with continuous signals, v1.2.1 | Published | 2015-06 |
| ETSI ES 202 789 V1.4.1 | TTCN-3 Language Extensions: Extended TRI | Published | 2015-06 |
| DES/MTS-203022AdvMatch ed111 | TTCN-3 Language Extensions: Advanced Matching | Ongoing | 2016-12 |

NOTE: Ongoing work items DES/MTS-00201873-11ed471JSON and DES/MTS-0020187312 are being developed in TC MTS, outside of the funded STF and will only become base documents for this STF following their publication.

## Deliverables

|  |  |  |
| --- | --- | --- |
| **Deliv.** | **Work Item code****Standard number** | **Working title****Scope** |
| D1 | RES/MTS-201873-1 T3ed4A1 | TTCN-3 ed.V4.10.1: Core |
| D2 | RES/MTS-201873-4 T3ed471 | TTCN-3 ed.V4.7.1: OS |
| D3 | RES/MTS-201873-5 T3ed491 | TTCN-3 ed.V4.9.1: TRI |
| D4 | RES/MTS-201873-6 T3ed4A1 | TTCN-3 ed.V4.10.1: TCI |
| D5 | RES/MTS-201873-7 T3ed471 | TTCN-3 ed.V4.7.1: Use of ASN.1 |
| D6 | RES/MTS-201873-8 T3ed481 | TTCN-3 ed.V4.8.1: Use of IDL |
| D7 | RES/MTS-201873-9 T3ed491 | TTCN-3 ed. V4.9.1: Use of XSD |
| D8 | RES/MTS-201873-10T3ed471 | TTCN-3 ed. V4.7.1: T3doc |
| D9 | RES/MTS‑00201873‑11ed481JSON | TTCN-3 ed. V4.8.1: Using JSON with TTCN-3 |
| D10 | RES/MTS-202781ConfDepl ed161 | TTCN-3 extension: Configuration and Deployment Support ES 202 781 ed.V1.6.1 |
| D11 | RES/MTS-202782PerfRealTed151 | TTCN-3 extension: Performance and Real Time Testing ed.V1.5.1 |
| D12 | RES/MTS-202784-AdvParam ed171 | TTCN-3 extension: Advance Parameterization ed.V1.7.1 |
| D13 | RES/MTS-202785ed161 | TTCN-3 extension: Behaviour Types ed.V1.6.1 |
| D14 | RES/MTS-202786ed151 | TTCN-3 extension: Support of interfaces with continuous signals ed.V1.5.1 |
| D15 | RES/MTS-202789ed161 | TTCN-3 extension: Extended TRI ed.V1.6.1 |
| D16 | RES/MTS-203022AdvMatch ed121 | TTCN-3 extension: Advanced Matching ed.V1.2.1 |
| D17 | DES/MTS- 203790-OOF \_ed111 | TTCN-3 extension: Object Oriented features ed.V1.1.1 |

The scope of the work items above – with the exception of D17 - is to produce the new versions of the existing standards, containing the changes **coming from** **resolved change requests**. **No new revisions** are produced for documents with no resolved CR.

Upon request of STF160, an intermediate version may be produced around mid-2017. This does not require formal approval by TC MTS as will appear as a draft uploaded to the TC MTS drafts area.

## Deliverables schedule

The schedule for all deliverables listed in clause 6.2 is the same:

* TB adoption of WI November 2016
* Early draft mid-2017 (Only on request! intermediate version for STF160)
* Stable Draft 31-Dec-2017
* Draft for approval 28-Jan-2018
* TB approval First MTS meeting in spring 2018
* Publication 30-June 2018

NOTE: As the new versions contain changes based on CR resolution, and resolved CRs may have mutual influence to the final text, editing of deliverables is done at the end of the project.

# Work plan, time scale and resources

## Organization of the work

The CR resolution process (see MTS(10)0091) has been discussed and approved by TC MTS. Resolution of each CR comprises the following activities:

* review and technical discussion of the CR (all STF members);
* agree technical solution (all STF members);
* if no consensus is reached or the issue raises a backward incompatibility problem, consult with tool vendors and users (e.g. STF 160); if no technical agreement can be reached by the consultation, escalate the issue to the TTCN-3 Steering Group of TC MTS;
* develop initial proposed draft text for resolution (changes needed in the text of the relevant standard(s)) (dedicated STF member: the CR "responsible");
* iterative review and agree the resolution text (CR " responsible " and one or more reviewers);
* implement CR resolution in the draft(s) of the standard(s) (editor of the relevant ETSI standard(s)).

Joint STF sessions requiring all STF members to be present will be needed at least, to reach the technical agreement on resolving CRs, and to discuss the technical extensions like object orientation. The drafting and reviewing the resolution text doesn’t necessary need joint sessions, though this phase typically raises technical issues that need joint discussion and agreement of the STF members.

The implementation of the resolved CRs in the drafts, editorial preparation of drafts for TB approval and handling possible comments during the approval and ETSI publication doesn’t require joint working sessions.

For this reason, the work will be organized in joint working sessions and “home” sessions, located at premises of the STF members as agreed by the STF members at the beginning of the work.

## Task description

Task 0 – Project management

Objectives

* Planning, organisation, and preparation of STF meetings
* On-going reporting
* Participation at SG and TC meetings
* Delivery of the STF reports

Input

* This ToR
* Information from the preparatory meeting
* TTCN-3 CRs in the ETSI Mantis system
* Expertise availability information and other project management data

Output

* Session plan
* Reporting STF session plan and working progress after sessions to TC MTS
* Materials for SG and TC meetings
* Progress reports
* Final report

Interactions

* The STF leader will interact with the SG and TC MTC
* Communicating with other interested bodies and STFs, in particular STF160
* Additional support will be provided by the ETSI secretariat

Task 1 – Resolution of outstanding CRs

Objectives

* Resolving Mantis CRs in a tool-independent and consistent – with the existing language specification – way
* In case of real or potential backward incompatibility of the preferred solution, initiate consultation with other interested bodies and projects and TTCN-3 tool vendors
* If the STF doesn’t reach a technical consensus, or the solution – as confirmed by a tool vendor – would cause backward incompatibility with actively used existing code, the issue shall be escalated to the TTCN-3 SG for decision.

Input

* Base documents in clause 6.1 Base documents of this document
* TTCN-3 CRs in the ETSI Mantis change tracker system (<http://forge.etsi.org/mantis/main_page.php>)

Output

* New drafts of the documents, which are (a) listed in clause 6.2 Deliverables AND (b) has resolved CRs ready for implementation at the end of the last STF working session.

Interactions

* TTCN-3 SG of TC MTS, organizations and projects listed in clause 5.2 Other interested ETSI Technical Bodies, clause 5.3 Other interested Organizations outside ETSI and TTCN-3 tool vendors on a need basis
* ETSI CTI will provide additional feedback based STF request

Task 2 –TTCN-3 language extension: Object Orientation features

Objectives

* Extend the language with sophisticated features for application and test framework development including consistent object oriented paradigm. This includes harmonization of the existing object oriented (and alike) features of the language
* The concepts has to be discussed and agreed with TC MTS and – in between TC MTS meetings with the TTCN-3 SG - before texting them

Input

* Input from TTCN-3 users and tool vendors and literature on object orientation

Output

* Draft for TC MTS approval of the deliverable D17 DES/MTS- 203790-OOF \_ed111

Interactions

* The TTCN-3 SG shall review and agree on the concepts. The requirements and concepts will be made visible by the STF (preferably by using ETSI Mantis) the first review of the concept is foreseen after the 2nd joint STF working session by the TTCN-3 SG, and report results at MTS#72 meeting (Sep 2017). Online TTCN-3 SG meetings will be called on a need basis, depending on the progress of the discussion or/and at request from the STF.
* Additional discussions with users and tool vendors

Task 3 –TTCN-3 language harmonization

Objectives

* Clean up language from superfluous features, consistency check, harmonization of language concepts and improvement of explanations and examples for easy understanding from the user’s perspective.
* All proposed backward incompatible changes has to be agreed by TC MTS and – in between TC MTS meetings with the TTCN-3 SG, except those not implemented by any active TTCN‑3 tool or are claimed by the TTCN-3 tool vendors to be unused.

Input

* Base documents in clause 6.1 Base documents of this document

Output

* New drafts of the documents, which are (a) listed in clause 6.2 Deliverables AND (b) effected by the changes resulted by this task

Interactions

* Beyond decisions related to non-backward compatible changes of actively used features, the TTCN-3 SG is involved to provide technical advice in case there are or conflicting opinions on technical matters
* Additional discussions with users and tool vendors

## Milestones

With the exception of D17DES/MTS-1029507 TTCN3ext\_OOed111, other deliverables are developed in a CR‑driven way of working (see clause 7.1 Organization of the work). This means that the output of the STF at each milestone - but milestone 3 – are the resolved and progressed CRs, publically available in the ETSI Mantis change tracker system. The progress is reported by the STF in terms of list of resolved CRs in each progress report and in the final report. Resolved CRs are implemented in the deliverables, submitted to TC MTS for approval, following the last working session of the STF. In addition to the resolved CRs, the final report shall contain the list of deliverables submitted for TC approval.

Milestone 1

MTS#71 (May 2017):

* First progress report
* Concepts for D17 DES/MTS-1029507 TTCN3ext\_OOed111
* (optional) Technical issues raised by the harmonization tasks and requiring TC decision

Milestone 2

MTS#72 (Sep-Oct 2017):

* Second progress report
* First draft of D17 DES/MTS-1029507 TTCN3ext\_OOed111
* (optional) Technical issues raised by the harmonization tasks and requiring TC decision

Milestone 3

MTS#73 (Jan-Feb 2018):

* Third progress report
* Stable draft of D17 DES/MTS-1029507 TTCN3ext\_OOed111
* Final drafts of deliverables for TB approval, with the exception of D17 DES/MTS-1029507 TTCN3ext\_OOed111

Milestone 4

MTS#74 (June 2018):

* Final report
* Final draft of D17 DES/MTS-1029507 TTCN3ext\_OOed111 TC approved and accepted by ETSI for Membership Vote

## Task summary

|  |  |  |
| --- | --- | --- |
| **N** | **Task / Milestone / Deliverable** | Target date |
|
| M0 | Start of work | 01/03/2017 |
| T0 | Project management | 01/03/2017-31/05/2018 |
| T1 | Resolution of outstanding CRs | 01/03/2017-31/12/2017 |
| T2 | Object Orientation features | 01/03/2017-31/05/2018 |
| T3 | TTCN-3 language harmonization | 01/03/2017-31/12/2017 |
| M1 | Milestone 1 | MTS#71 (May-June 2017) |
| M2 | Milestone 2 | MTS#72 (Sep-Oct 2017) |
| M3 | Milestone 3 | MTS#73 (Jan-Feb 2018) |
| M4 | Milestone 4 | MTS#74 (May 2018) |
| M5 | Publication of deliverables, except D17 | 30/06/2018 |
| M6 | Publication of D17 | 30/09/2018 |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Task Milest.** | **Description** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** | **J** | **F** | **M** | **A** | **M** | **J** |
| T0 | Project management |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 | Resolution of outstanding CRs |  |  |  |  |  |  |  |  |  | (1) |  |  |  |  |  |  |
| T2 | Object Orientation features |  |  |  |  |  |  |  |  |  |  |  |  |  | (2) | (2) |  |
| T3 | TTCN-3 language harmonization |  |  |  |  |  |  |  |  |  | (1) |  |  |  |  |  |  |
| M0 | Start of work |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M1 | Milestone 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M2 | Milestone 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M3 | Milestone 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M4 | Milestone 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M5 | Publication |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | (3) |

NOTE 1: CR resolution is to be finished by end of November in order to allow their implementation in December

NOTE 2: Period for editing and approval of the final draft

NOTE 3: With the exception of D17, which is expected to be published around Sep-2018

## Working methods and travel cost

The nature of the work involved requires a mixture of independent investigation and editorial work by the individual providers assigned to each task, as well as regular coordinated working sessions where all providers discuss the possible technical solution(s) and makes technical agreements. Prior experience with work on TTCN-3 change requests has shown that 1-2 joint working sessions between milestones is required to reach technical consensus. These should be accompanied by individual and coordinated homework in between, allowing efficient analysis of the assigned CRs and preparation of proposed solutions containing possible technical alternatives. Decisions on the chosen solution can be made by correspondence, if the choice is technically trivial or at joint working sessions otherwise.

The progress of the STF shall be presented at TC MTS meetings with the STF leader or at least one representative appointed by the provider attending in person at the TC meetings. Other providers’ representatives may join the TC meetings online as necessary. Regular SG meetings will be organised online between coordinated working sessions or in conjunction with TC meetings for technical discussions between the STF and the SG

Travel cost for working sessions will be included in the contract compensation. Travel costs for attending the TC meetings and possible associated F2F SG meetings, as well as other mission travel will be reimbursed to the provider directly from the travel budget upon agreement and approval of the mission travel.

# Expertise required

## Team structure

To elaborate the tasks above require the following expertise at the team level:

* Professional skills in the TTCN-3 language and knowing the existing TTCN-3 standards;
* ASN.1, IDL, XSD and XML;
* Compiler theory and technology.
* TTCN-3 tool implementation skills (knowledge of tool APIs);
* Testing methods (conformance, interoperability, performance and load etc.) is preferred;
* Knowlegde of communication technologies including mobile, ICT and IoT is appreciated

Part III: Financial conditions

# Maximum budget

## Manpower cost

The base estimation for the manpower costs to be expected is 98 400 EUR.

Please note that requested resource is higher than it was in previous years for TTCN-3 language evolution, caused by the new language extension requested by users for application and advanced test framework development (Task2), which is not a “mechanical” extension, but also requires collection of requirements, a conceptual work and discussing and agreeing the concepts with the TTCN-3 SG.

## Travel cost

|  |  |
| --- | --- |
| **Expected travels** | **Cost estimate** |
| Participation at MTS#71 | 1000 | Euros |
| Participation at MTS#72 | 1000 | Euros |
| Participation at MTS#73 | 1000 | Euros |
| Participation at MTS#74 | 1000 | Euros |
| **Total cost** | **4000** | **Euros** |

It was stressed that it was considered important that the STF be represented at the UCAAT event – only travel for one is covered. (MTS#72 travel cost should be close to zero since it will be held on STF Leader’s premises in Gottingen)

## Other Costs

No other costs are foreseen.

Part IV: STF performance evaluation criteria

# Key Performance Indicators

Contribution from ETSI Members to STF work

* Steering Group meetings (number of participants/duration)
* Direct contribution of delegates (e.g. number of documents/comments/e-mail)
* Contribution from other ETSI TBs, projects and CTI

Liaison with other stakeholders

* TTCN-3 Change Requests are received in the CR handling tool (Mantis)
* The STF may liaise with 3GPP STF 160 and any other users within or outside ETSI

Quality of deliverables

* Approval of deliverables according to schedule
* Respect of time scale, with reference to start/end dates in the approved ToR
* Quality review by TB
* Quality review by ETSI Secretariat

In the course of the activity, the STF Leader will collect the relevant information, as necessary to measure the performance indicators. The result will be presented in the Final Report.

Time recording

The STF experts shall report in the time sheet provided by ETSI, the days spent for the performance of the services.

# Document history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 0.1 | 03-10-2016 | György Réthy | Initial | Creation of document, first draft for MTS review |
| 0.2 | 28-Oct-2016 | Alberto Berrini | OCG/Board consult. | Cost table previous years completed. |
| 0.3 | 04-Nov-2016 | György Réthy | For TB approval | WI number, additional information for the OO language extension are added |
| 0.4 | 06-Jan-2017 | ETSI Secretariat | Board#110 Approved | Editorials |
| 0.5 | 11-Jan-2017 | ETSI Secretariat |  | Editorials |