Terms of Reference Template

Testing Task Force (TTF)

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| --- |
| ToR TTF XX (TC MTS / WG TDL) |
| Version: 0.5 |
| Authors: Kristoffersen, Makedonski – Date: 2023-07-28 |
| Last updated by: TTF T022 – Date: 2023-05-30 |
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Terms of Reference –Testing Task Force Proposal

TTF XXX (TC MTS / WG TDL)

TOP/TDL Runtime Interface and Enhancements

Summary information

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| --- | --- | --- |
| Approval status | Approved by **TC MTS** | **YES** |
| Reference Body | TC MTS / WG TDL |
| ETSI Funding | **Maximum budget : 107.200 EUR** |
| Minimum of 4 ETSI Members Support | **YES** |
| Time scale | **From** | 2023-10-02 |
| **To** | 2024-08-30 |
| Work Items  | See clause 3.2 below |
| TTF Roadmap reference | [https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020//MTS(20)080001\_TDL\_Roadmap.docx](https://docbox.etsi.org/MTS/MTS/05-CONTRIBUTIONS/2020//MTS%2820%29080001_TDL_Roadmap.docx) |

Part I –TTF Technical Proposal

# Rationale & Objectives

## Rationale

The ETSI TC MTS provides technologies, tools, and guidelines on conformance and interoperability testing and certification of protocols and other systems, including AI systems, that are under standardisation at various ETSI groups and committees. The Test Description Language (TDL) is such a testing technology. [Its standards](https://tdl.etsi.org/index.php/downloads) that define formal textual and graphical notations and transformations to deliver test objectives and executable test specifications have reached a mature state. In addition to the standardisation work on TDL, the [ETSI TDL Open-Source Project (TOP)](https://tdl.etsi.org/index.php/open-source) was created. Its initial purpose was to serve as a test bed for the validation of new TDL language features and to offer a kick-start to early technology adopters.

The recent TC MTS work on TDL has been focused on providing enhanced features of the TOP tools and provide better user-support in all phases of the testing process when using TDL. These enhancements include easier access to the TOP toolset, user-guides and examples illustrating the use of all TDL features. Also, an initial exploratory prototype for a web-based TDL editor has been implemented, that can further simplify access to the TOP tools.

The collaborative platform for drafting ETSI and 3GPP specifications, [New Working Methods (NWM)](https://nwmwiki.etsi.org/docs/), and the trend towards remote working also need TOP tool support for creating and maintaining test specifications, in order to make TDL the obvious choice to ETSI TCs when working on standardisation of test suite specifications.

The continued work on TDL enables the application of modern model-based development techniques within ETSI standardisation processes for the benefit of all ETSI members. It also puts ETSI in the leading position to address new testing challenges coming from distributed computing platforms in the cloud and AI domains.

## Objectives of the work to be executed

The work of this TTF will focus on specification and implementation of TOP tool features to enable easy integration with web-based platforms, such as the ETSI New Working Methods (NWM) platform. It will also enhance the initial web-based TOP tool for this purpose. In addition, support for Continuous Integration development will be defined.

* Description and provision of an adapted TDL TOP toolset that enables integrated use of TDL models in web-based platforms, such as the NWM platform. This may imply modification both to the desktop and standalone TOP toolsets and the initial prototype for a web-based TOP toolset.
* Support for using TOP tooling in Continuous Integration (CI) platforms.
* Refined TOP tool support for test specification and execution based on user feedback.
* Updated documentation and user guidelines to reflect the latest advances in TDL and TOP, including the web-based platform, the CI development.
* New ES 203 119-9 V1.1.1 on the TDL Runtime Interface.
* Maintenance and enhancements of the TDL standards (as needed).
* TOP feature demonstration that concludes all implementation efforts of this TTF.

The TOP tool development was performed according to the conceptual tool architecture, shown below, to provide the illustrated building blocks using state-of-the-art software development technologies.



## Previous funded activities in the same domain

The previous standardisation efforts on TDL and TOP can be briefly summarised as follows. They provide the foundation of work proposed in this ToR.

* The previous TDL/TOP TTF 022 provided an updated TOP toolset with enhanced user features for test description development, validation, execution, and analysis as well as updated user guidelines and an initial prototype for a web-based TDL editor.
* [TTF 013](https://portal.etsi.org/STF/STFs/STF-HomePages/T013) added methodology support for RESTful API testing using OpenAPI, extended the TDL data type system and worked towards a test execution engine. It also provided a new standardized textual syntax for TDL. Moreover, the TDL methodology guidelines for test description derivation from test objectives were updated to support semi-automatic workflows.
* Earlier STFs, the first one started in 2013, laid the foundation of TDL and defined its principal building blocks of abstract syntax (meta-model), concrete syntax (textual, graphical and transfer syntax), and the principal tool architecture and its integration into ETSI’s test specification process. These STFs also standardised the separation of totally ordered and locally ordered test descriptions and established the connection between TDL and TTCN-3 to enable the generation of executable tests from TDL.

## Consequences if not agreed

The focus of this TTF on the TOP implementation provide application of the web-based TOP toolset for broader use cases and further integrations, not least potential integration with the ETSI NWM platform. If not performed this could cause a delay in the uptake of TDL for ETSI TCs using NWM and other web-based platforms as their standardisation platform. It could also lead to more overhead in the handling and maintenance of ETSI test standards.

This TTF is a continuation of the work done in TTF 022 as well as earlier TTFs and STFs with the aim to speed up progress in the adoption of TDL by making the tooling in TOP easier to use by end-users in general and especially for ETSI TCs. A web-based platform will provide an easier alternative for end-users to get started with using TDL and collaborating on TDL test specifications. Without this TTF, the application of the TDL standard by end-users such as other ETSI technical bodies and industrial partners will likely be delayed.

In addition, more and more practices on system and software design are influenced from open-source technologies that implement commonly agreed approaches in system and software engineering and make them freely available. This development could lead to a fragmented landscape of system and test specification languages that might not be in ETSI’s interest as it needs a common, strong, and sound formal approach to certification and other ways of testing of the complex systems it designs. Moreover, ETSI might lose influence in the area of modern system and software engineering practices if there is a standstill on this proposed work.

# ETSI Members Support

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| --- | --- | --- |
| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | Cinderella ApS | Finn Kristoffersen |
| 2 | Elvior LLC | Martti Käärik |
| 3 | Ericsson Hungary Ltd | Dr. György Réthy |
| 4 | Fraunhofer FOKUS | Dr. Axel Rennoch |
| 5 | Institut für Informatik, Universität Göttingen | Prof. Dr. Dieter Hogrefe |
| 6 | Siemens AG | Dr. Andreas Ulrich |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Status** |
| ES 203 119-1 V1.7.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 1: Abstract Syntax and Associated Semantics | Final draft |
| ES 203 119-2 V1.5.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 2: Graphical Syntax | Final draft |
| ES 203 119-3 V1.5.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 3: Exchange Format | Final draft |
| ES 203 119-4 V1.5.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 4: Structured Test Objective Specification (Extension) | Final draft |
| ES 203 119-6 V1.3.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 6: Mapping to TTCN-3 | Final draft |
| ES 203 119-7 V1.3.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 7: Extended Test Configurations | Final draft |
| ES 203 119-8 V1.2.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 8: Textual Syntax | Final draft |
| TR 103 119 V1.4.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Reference Implementation and User Guidelines | Final draft |
| EG 203 647 V1.1.1 | Methods for Testing and Specifications (MTS); Methodology for RESTful APIs specifications and testing | Published |

## New deliverables

The main deliverable of this TTF is the TDL TOP tools available for download as a configured package to install. The deliverable will potentially include a means to access and use the TOP tools in an online platform, also in combination with the NWM platform. Updated versions of the base TDL standards parts may also be part of the deliverable of the TTF.

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| **Deliv.** | **Work Item code****Standard number** | **Working title** | **Expected date for publication** |
| D1 | RTS/TR 103 119 V1.5.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Reference Implementation and User Guidelines | 2024-08 |
| D2\* | RES/ES 203 119-1 V1.8.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 1: Abstract Syntax and Associated Semantics | 2024-08 |
| D3\* | RES/ES 203 119-8 V1.3.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 8: Textual Syntax | 2024-08 |
| D4 | RES/ES 203 119-9 V1.1.1 | Methods for Testing and Specification (MTS); The Test Description Language (TDL); Part 9: Test Runtime Interface | 2024-08 |

\*) Work items of the TDL standard series which are not affected by CRs will not be updated. If other parts of the TDL standard series are affected by CRs, they will be opened as work items during the work of the TTF as well.

# Maximum budget

## Task Summary and Manpower Budget

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| --- | --- |
| **Task short description** | **Budget (EUR)** |
|
| **T0** Project Management | 5.800 |
| **T1** TOP Requirements and Validation | 8.800 |
| **T2** TOP Architecture Design | 19.200 |
| **T3** TOP Features Implementation | 56.800 |
| **T4** TDL Methodology, Enhancements, and Maintenance | 12.700 |
| **TOTAL** | **103.300** |

## Travel budget

Travel is required for the TTF lead or deputy to attend the three MTS Plenary Meetings and TDL Work Group Meetings to discuss the achieved progress. Additional budget is required for promotion activities at conferences and workshops inside and outside ETSI..

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| **Expected travels** | **Cost estimate (EUR)** |
| Participation at MTS#90 (Oct 2023) | 800 |
| Participation at MTS#91 (Jan 2024) | 800 |
| Participation at MTS#92 (May 2024) | 800 |
| Participation at UCAAT 2023 to promote TDL and TOP (to be determined) | 1.500 |
| **TOTAL** | **3.900** |

## Other budget line

None.

**Part II – Details on TTF Technical Proposal**

1. **Tasks, Technical Bodies and other stakeholders**
	1. **Organization of the work**

The working group MTS TDL will, acting as a steering group, oversee and advise the work of the proposed TTF. It will plan regular meetings between the TTF working sessions to monitor the progress of the work and provide technical advice.

The major goal of this TTF is to extend the TDL TOP tools to support the TDL users and in addition handle existing and incoming user requests for updates to the TDL standards. It is essential for the continued growth of the TDL user community that TDL is maintained and the TDL open-source project is aligned with these changes. It targets stakeholders both within ETSI and within the industry. The work is organized around the activities to develop the TOP tools and to maintain the TDL standards as well as providing further information and guidelines to streamline the adoption of TDL.

Intermediate stable drafts and final drafts will be delivered at milestones set in regular intervals which coincide with the plenary sessions of TC MTS. Once draft versions of the TDL updated standards become available, they will be sent out to ETSI MTS and parties outside of ETSI for review and feedback. There are multiple milestones intended for soliciting feedback such that there is enough room for delivering enhanced and improved TDL standards and updates of the tools that fit the needs of different organizations and users.

* 1. **Other interested ETSI Technical Bodies**

In principle, MTS expect interest in TDL and TOP from ETSI Technical Bodies that already investigated into TTCN-3. But other TBs that are interested in test specifications are in focus, too. The following ETSI TBs are expected to contribute to the TTF by providing feedback on the developed TDL methodology: NFV, MEC, INT, ITS, ERM, oneM2M, 3GPP.

* 1. **Other stakeholders**

Additionally, the following organizations are expected to be interested in the outcome from this TTF: OMA, TCCA (former TETRA Association), Ipv6Forum. Standardisation bodies from other domains such as automotive run similar initiatives in providing solutions for their specific needs in testing. These initiatives should be also interested in the results of the proposed TTF.

**Part III: Execution of Work**

1. **Work plan, time scale and resources**
	1. **Task description**

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| **Task 0** | ***Project Management*** |
| **Objectives** | Planning, organisation, and preparation of TTF meetingsOn-going reportingParticipation at TC/WG meetingsDelivery of the TTF final report |
| **Input** | This ToRInformation from the preparatory meetingExpertise availability information and other project management dataTDL CRs in the ETSI Mantis system and reports from the TOP ETSI Labs project |
| **Output** | Session planningMaterials for WG and TC meetingsProgress reportsFinal report |
| **Interactions** | The TTF leader will interact with the MTS TDL Working Group and the MTSCommunicating with other stakeholders and TTFsAdditional support will be provided by the ETSI secretariat |
| **Resources required** | Resource planning, reporting, and coordination5.800 € |

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| **Task 1** | ***TOP Requirements and Validation*** |
| **Objectives** | Functional specification of use-case scenarios and workflows to be supported by the TOP implementation to address the needs of frequent ETSI applicationsAnalysis and prioritisation of supported subset of TDL features for execution frameworkDemonstration of implemented use-case scenarios and workflows |
| **Input** | TDL TOP implementation as available end of TTF022Identification of the TDL feature limitations in the current TDL TOP implementationOpenAPI examples and ASN.1 examplesCRs raised on missing TOP features Collection of issues raised on user-friendliness of the TOP tool implementation accessibility and installation guidance |
| **Output** | The agreed set of use-case scenarios and workflows and definition of check list for the TOP tool access and user-guidanceSuccessful demonstration of these use-cases and their validation |
| **Interactions** | The TDL Working Group shall be involved in this initial task to ensure that the agreed set of requirements for the TOP tool implementation can be verified |
| **Resources required** | Selection and description of requirements in terms of use-cases and workflow examples, validation and demonstration of the implementation8.800 € |

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| **Task 2** | ***TOP Architecture Design*** |
| **Objectives** | Improvement of the TDL Runtime Interfaces* + Improvement of existing TRI specifications
	+ Specification of the interface for test data validation
	+ Specification of the interface for test execution reporting (test logging interface)
	+ Specification of the codec interface

Design of the web-based platform Design of the TDL Continuous Integration features |
| **Input** | Latest version of TR 103 119 from TTF 022 |
| **Output** | Input for the TOP tool implementationInput for the revised version of TR 103 119, material for a NWI on the specificationsDocumentation of the design in the TDL/TOP Methodology TRNew ES 203 119-9 V1.1.1 on the TDL Runtime Interface |
| **Interactions** | The TDL Working Group is involved to provide technical advice in case there are conflicting opinions on technical mattersAdditional discussions with users and tool vendors (via Mantis) according to the submitted CRs |
| **Resources required** | Review of current design, evaluation of available technologies, architecture evolution19.200 € |

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| **Task 3** | ***TOP Features Implementation*** |
| **Objectives** | Sub-task: Web-based platform* + Implementation of the web-platform as specified in Task 1 and 2 with integration options in other platforms such as the NWM platform.

Sub-task: Continuous Integration (CI)* + Implementation of the CI development using TDL as specified in Task 1 and 2

Sub-task: Refined test development and execution using TDL as specified in Task 1 and 2* + Bug fixes to editors and importers/converters
	+ Additional templates and wizards according to user needs
	+ Updates to TRI implementation according to design changes
	+ Implementation of adapters for interfaces designed in task 2
	+ Support for missing features in execution framework
 |
| **Input** | The TOP tools of TTF022The output from the specification Task 2Description of use-cases and workflows from Task 1 |
| **Output** | The updated TOP project and TOP libraries (plug-ins) |
| **Interactions** | The TDL Working Group is involved to provide technical advice in case there are conflicting opinions on technical mattersAdditional discussions with users and tool vendors (via Mantis/ETSI Labs) according to the submitted CRs |
| **Resources required** | CR resolution, software maintenance, new feature development56.800 € |

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| **Task 4** | ***TDL Methodology, Enhancements, and Maintenance*** |
| **Objectives** | Update and extend the TDL standards according to identified requirementsDocument the implementation and usage aspects of TOP tooling |
| **Input** | CRs raisedOutput of Task 1 |
| **Output** | Updated standard deliverables. |
| **Interactions** | The TDL Working Group is involved to provide technical advice in case there are conflicting opinions on technical mattersAdditional discussions with users and tool vendors (via Mantis/ETSI Labs) according to the submitted CRs |
| **Resources required** | Technology review, assessment, and recommendations, PoC preparation12.700 € |

* 1. **Milestones**

**Milestone A – Title**

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| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | First progress report to TC MTS | *2024-02-05* |
| *Reference Body Deliverable* | First progress report to be approved by TC MTS |
| *ETSI Deliverable* | Early drafts submitted to TC MTS |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | Second progress report to TC MTS | *2024-04-08* |
| *Reference Body Deliverable* | Second progress report to be approved by TC MTSStable drafts to be accepted by TC MTS |
| *ETSI Deliverable* | Stable drafts submitted to TC MTS |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | Final drafts and final progress report to TC MTS | *2024-06-10* |
| *Reference Body Deliverable* | Final drafts and final report to be approved by TC MTSTOP tool demo |
| *ETSI Deliverable* | Final drafts and final report submitted to TC MTS |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | Deliverables published, new TOP tool version published, TTF closed | *2024-08-30* |

* 1. **Task summary**

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| --- | --- | --- | --- |
| **Code** | **Task / Milestone**  | **Target Date** | **Estimated Cost (EUR)** |
| **From** | **To** |
|  | Start of work | 2023-10-02 |  |  |
| T0 | Project Management | 2023-10-02 | 2024-08-30 | 5.800 |
| T1 | TOP Requirements and Validation | 2023-10-02 | 2024-06-30 | 8.800 |
| T2 | TOP Architecture Design | 2023-10-02 | 2024-06-30 | 19.200 |
| T3 | TOP Features Implementation | 2024-01-05 | 2024-08-30 | 56.800 |
| T4 | TDL Methodology, Enhancements, and Maintenance | 2023-12-01 | 2024-08-30 | 12.700 |
|  |  |  |  |  |
| MA | First progress report to be approved by TC MTSFirst TOP tool feasibility demo | MTS#90 | 2024-02-05 | 33.000 |
| MB | Second progress report to TC MTSStable drafts to be accepted by TC MTSSecond TOP tool feasibility demo |  | 2024-04-08 | 33.000 |
| MC | Final drafts and final report approved by TC MTSThird TOP tool feasibility demo | MTS#91 | 2024-06-10 | 33.000 |
| MD | Deliverables published, TTF closed |  | 2024-08-30 | 4.600 |
|  | **103.600** |

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| **Task/ Mil.** | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |  | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |
| T0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MC |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |
| MD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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1. **Expertise required**
	1. **Team structure**

(Up to) 4 participants to ensure the following mix of competences:

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| **Priority** | **Qualifications and competences** |
| High | Deep understanding of the existing TDL and its application. |
| Medium | Understanding of black-box testing and testing of communicating real-time systems. |
| High | Experiences in the model-based implementation of software languages, including graphical and textual syntax implementation, syntactic and semantic model validation. |
| Low | Experiences in modelling and description techniques such as TTCN-3, UML, MSC. |
| High | Experiences in Eclipse ecore meta-modelling and tooling. |
| Medium | Experiences in the design of software languages and compiler/transformation techniques. |

**Part IV: TTF performance evaluation criteria**

1. **Performance Indicators**

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| ***Select relevant Performance indicators applicable for these ToR (X)*** |
| **Contribution from ETSI Members to TTF work** |
| *Direct financial contribution (co-funding)* |  |
| *Support to the TTF work (e.g., provision of testbeds, organization of workshops, events)* |  |
| *Steering Group meetings (number of meetings / participants / duration)* | *X* |
| *Number of delegates directly involved in the review of the deliverables* | *X* |
| *Contributions/comments received from the Reference Bodies* | *X* |
| *Contributions/comments received from other Reference Bodies* | *X* |
|  |  |
| **Contribution from the TTF to ETSI work** |
| *Contributions to Reference Body meetings (number of documents / meetings / participants)* | *X* |
| *Contributions to other Reference Bodies* |  |
| *Presentations in workshops, conferences, stakeholder meetings* | *X* |
|  |  |
| **Liaison with other stakeholders** |
| *Stakeholder participation in the project (category, business area)* |  |
| *Cooperation with other standardization bodies* |  |
| *Potential interest of new members to join ETSI* |  |
| *Liaison to identify requirements and raise awareness on ETSI deliverables*  | *X* |
| *Comments received on drafts (e.g. on WEB site, mailing lists, etc.)* |  |
|  |  |
| **Quality of deliverables** |
| *Approval of deliverables according to schedule* | *X* |
| *Respect of time scale, with reference to start/end dates in the approved ToR* | *X* |
| *Comments from Quality review by Reference Body* | *X* |
| *Comments from Quality review by ETSI Secretariat* | *X* |
|  |  |

# Document history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ver.** | **Date** | **Author** | **Status** | **Comments** |
| 0.1 | 2022-07-26 | Kristoffersen | Initial |  |
| 0.2 | 2022-07-27 | Makedonski | Revised | Minor refinements to Part I |
| 0.3 | 2022-07-28 | Makedonski, Kristoffersen | Revised, Cleaned | Additional refinements to Part I, budget adjustments |
| 0.4 | 2023-05-25 | Kristoffersen | Revised | Updates to Part 1 and adding Part 2 specification with initial refinement |
| 0.5 | 2023-05-30 | TTF 022 | Revised | Finalised Part 2 and minor updates to Part 1 |
|  |  |  |  |  |
|  |  |  |  |  |