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| ToR TTF T002 (TC ITS / WG1) |
| Version: 0.7 |
| Author: TC ITS – Date: 2020-02-04 |
| Last updated by: Saurav Arora – Date: 2020-07-22 |
| page 1 of 4 |

Terms of Reference –Testing Task Force Proposal

TTF T002 (following STF 581) (TC ITS / WG1)

**“Update of Infrastructure services test specifications”**

Summary information

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| --- | --- | --- | --- |
| Approval status | Approved by TC ITS by remote consensus (25 April 2019)  GA#74 approval TTF2020 budget | | **YES** |
| Reference Body | TC ITS | | |
| ETSI Funding | **Maximum budget : *122 000 EUR*** | | |
| Minimum of 4 ETSI Members Support | **YES** | | |
| Time scale | **From** | 2020-03-30 | |
| **To** | 2021-02-22 | |
| Work Items | See §6.2 (deliverables to be produced) | | |
| TTF Roadmap reference | TTF2020 | | |

Part I –TTF Technical Proposal

# Rationale & Objectives

The deployment of ITS systems is a real challenge as it involves collaborative efforts by many stakeholders from regulatory bodies and industry.

The ITS Infrastructures Services (MAPEN, SPATEN, IVIM, SREM, SSEM and RTCEM) protocols have

been specified and designed to operate correctly across a wide variety of infrastructures worldwide. The risk profile for ITS systems indicates a high impact of these protocols if their design includes a widespread error or fault. This issue provides evidence that successful testing and interoperability are key factors that enable the deployment of these technologies and their successful global introduction.

The provisioning of application-specific testing and compliance scenarios for ITS applications is essential and allows the EU to maintain its leadership in present and future ITS technology.

In order to address these new challenges, the proposed action intends to adapt solid and proven ITS testing methodology and tools that were developed over 10 years by ETSI. The project will use TTCN-3 formal notation to improve the quality and the repeatability of test cases and will provide a TTCN-3 test tool environment for test execution. The project will extend previous ITS STFs, which would improve quality and repeatability of tests, reduce the room for interpretation of the test specifications and provide a cost-efficient approach to test solution development.

The ITS Infrastructures Services specification (ETSI TS 103 301) is referenced by ITS Delegated Act and Test Specifications for these protocols shall be conformed to the recent versions of other ITS standards, referenced in the ITS Delegated Act, for example ITS TS 103 097 v1.3.1.

The existing test specification needs to be updated to cover all parts of the ITS Infrastructures Services specification which are not covered yet.

## Rationale

This present document proposes the creation of a new TTF in order to align conformance test specifications with the most recent version of ITS Infrastructures Services standards in order to keep the consistency of ETSI ITS packet of standards.

## Objectives of the work to be executed

The objective of this present TTF proposal is:

* to update the current conformance test specifications RTS/ITS-001943 (TS 103 191-1), RTS/ITS-001944 (TS 103 191-2), RTS/ITS-001945 (TS 103 191-3) according to the latest versions of ETSI TS 103 301 RTS/ITS-00181 and ETSI TS 103 097 v1.3.1;
* to make a general review of the test specifications (references, names, abbreviations);
* to update the Test Purposes;
* to update and implement Service Specific Permission TTCN-3 test scripts;
* to compile and validate the TTCN-3 test scripts on at least three TTCN-3 tools

## Previous funded activities in the same domain

ETSI has been developing ITS standards since 2008 and has produced a full list of standards for Day-1 services and applications under the European mandate M/453 which are listed in the Release-1 standardisation ETSI report TR 101 607 from 2013 and form the bases for the further development of ITS cooperative services and Automation.

In 2010, TC ITS started together with ETSI CTI a STF project funded by the EC/EFTA to produce conformance test specifications for the Release 1 of TC ITS CAM, DENM, BTP, GN and GN6 protocols. In 2011/2012 a prototype test system (so called Conformance Validation Framework) was designed, built and validated (see <http://portal.etsi.org/stfs/STF_HomePages/STF424/STF424.asp>). The STF 565 (see <https://portal.etsi.org/STF/STFs/STF-HomePages/STF565>) produced a consistent set of specifications related to Vulnerable Road Users (VRU) in alignment with non-European developments.

## Consequences if not agreed

ITS equipment is currently being deployed in experimental trials with the progression towards fully operational deployment. Thorough conformance testing will increase the level of confidence that equipment from various suppliers will interoperate. This in turn will reduce implementation and rollout times. Not providing timely validated and reliable test specifications, would ultimately delay the deployment of ITS.

# ETSI Members Support

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| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | FSCOM | Peter Schmitting |
| 2 | Anemone Technology | Niels Peter Skov Andersen |
| 3 | Siemens AG | Thomas Ritter |
| 4 | Filatov DV | Denis Filatov |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Status** |
| ETSI TS 103 301 v1.2.1 RTS/ITS-00180 | Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services | published |
| ETSI TS 103 301 v1.3.1 RTS/ITS-00181 | Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Facilities layer protocols and communication requirements for infrastructure services | draft |
| CEN ISO/TS 19321-2015 | “Intelligent transport systems – Cooperative ITS – Dictionary of in-vehicle information (IVI) data structures | published |
| CEN ISO/TS 19091:2017 | Intelligent transport systems – Cooperative ITS – Using V2I and I2V communications for applications related to signalized intersections | published |
| ISO 17427:2014 | Intelligent transport systems – Cooperative systems – Roles and responsibilities in the context of cooperative ITS based on architecture(s) for cooperative systems | outdated |
| ISO 17427-1:2018 | Intelligent transport systems – Cooperative ITS – Part 1: Roles and responsibilities in the context of co-operative ITS architecture(s) | published |
| ETSI TS 103 097 v1.3.1  RTS/ITS-00540 | Intelligent Transport Systems (ITS); Security; Security header and certificate formats | published |

## New deliverables

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| --- | --- | --- | --- |
| **Deliv.** | **Work Item code**  **Standard number** | **Working title** | **Expected date for publication** |
| D1 | RTS/ITS-001943  TS 103 191-1 | Title: Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Facilities layer protocols and communication requirements for infrastructure services; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma. | Feb 2021 |
| D2 | RTS/ITS-001944  TS 103 191-2 | Title: Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Facilities layer protocols and communication requirements for infrastructure services; Part 2: Test Suite Structure and Test Purposes (TSS&TP). | Feb 2021 |
| D3 | RTS/ITS-001945  TS 103 191-3 | Title: Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Facilities layer protocols and communication requirements for infrastructure services; Part 3: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT). | Feb 2021 |

# Maximum budget

## Task summary/Manpower Budget

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| **Task short description** | Budget (EUR) |
|
| Project Management | CTI |
| PICS, TSS&TP Update | 50 000 |
| ATS Update | 25 000 |
| Codecs and Test Adapter (TA) development | 23 000 |
| ATS Validation | 14 000 |
| TS updates | 10 000 |
| **TOTAL** | 122 000 |

## Travel budget

N/A

Part II – Details on TTF Technical Proposal

# Tasks, Technical Bodies and other stakeholders

## Organization of the work

ETSI CTI will plan the work of the TTF members, ensuring that the timescales of the TTF deliverables are met.

Organising TTF meetings to discuss the drafts, recording any major issues and resolutions of the TTF, identifying and progressing the actions of TTF members

Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF.

Represent, or arrange for other TTF members to represent the TTF at other external meetings as appropriate.

## Other interested ETSI Technical Bodies

ITS WG 1 - Reports produced by the TTF for ETSI TC ITS WG1 about the progress of the work.

Draft versions of the deliverables will be provided to TC ITS WG1 and TC ITS for circulation within the stakeholder community for commenting, namely: stable draft and final draft for approval.

## Other stakeholders

ERTICO – ITS Europe and ETSI have a MoU in place which defines amongst other activities the cooperation on ‘Testing support and certification initiative’.

The C2C CC has been an observer of the TC ITS test activities since 2010.

The C-Roads project is going to develop the validation platform using conformance test specifications.

The 5G Automotive Association (5GAA) observes TC ITS test activities.

European Commission funded pre-deployment pilots such as AutoNet2030, iGAME, SCOOP@F and Cooperative ITS Corridor Rotterdam – Frankfurt/M. – Vienna, will benefit from the available tests.

Part III: Execution of Work

# Work plan, time scale and resources

## Task description

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| **Task 1** | **Project Management** |
| **Objectives** | Plan the work of the TTF members, ensuring that the timescales of the TTF deliverables are met |
| **Input** | Take TC ITS and TC ITS Working Groups inputs for the work of the TTF |
| **Output** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Interactions** | Attending Technical Body, WG and TTF meetings, presentation of the TTF activity |
| **Resources required** | * Ability to lead and manage a team * Project management and communication skills |

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| **Task 2** | **PICS, TSS&TP Update** |
| **Objectives** | Development of the PICS, TSS&TP according to the investigation report |
| **Input** | Phase I STF 581 investigation report |
| **Output** | Early drafts and Progress Report approved by TC ITS #39 |
| **Interactions** | Attending Technical Body, WG and TTF meetings, presentation of the TTF activity |
| **Resources required** | * knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; |

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| **Task 3** | **ATS Update** |
| **Objectives** | Development of the ATS document |
| **Input** | Phase I STF 581 investigation report |
| **Output** | Stable drafts and Progress Report approved by TC ITS #40 |
| **Interactions** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Resources required** | * knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; |

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| **Task 4** | **Codecs and Test Adapter (TA) development** |
| **Objectives** | Update of codec and test adapter features according to base standard revision |
| **Input** | Updated PICS, TSS&TP, ATS |
| **Output** | Update of codec and test adapter features according to base standard revisions:   * Common Data Dictionary (ETSI TS 102 894-2 v1.3.1 and upcoming v1.4.1) * Infrastructure (ETSI TS 103 301 v1.2.1 and upcoming v1.3.1) * Security (ETSI TS 103 097 v1.3.1)   Furthermore, tests will be updated according to issues found during the validation phase.  The Codec and TA software shall be delivered as source code including all source code modules needed for the compilation into an executable version of the software. All software shall be accessible from <https://forge.etsi.org> |
| **Interactions** | Attending Technical Body, WG and TTF meetings, presentation of the TTF activity |
| **Resources required** | * knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; * expert knowledge in codec and adaptation layer development in Java and C++; |

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| **Task 5** | **ATS Validation** |
| **Objectives** | The ITS Conformance Validation Framework shall be validated against a minimum of at least two DUTs per base protocol. In addition and beyond the TTF effort, it is expected to get documentation and support from the company providing the DUTs on any issues that may arise. This support shall be limited to reasonable effort. |
| **Input** | Updated PICS, TSS&TP, ATS |
| **Output** | * Extension and maintenance of the ITS Conformance Validation Framework * Provision and installation of SUT(s) * Execution of the tests * Reporting of errors in the ITS Conformance Validation Framework * Validation of test verdicts |
| **Interactions** | Attending Technical Body, WG and TTF meetings, presentation of the TTF activity |
| **Resources required** | * knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; * expert knowledge in codec and adaptation layer development in Java and C++; |

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| **Task 6** | **TS updates** |
| **Objectives** | Update of the test specifications according to the validation results |
| **Input** | ATS Validation |
| **Output** | Final drafts and TTF Final Report approved by TC ITS #41 |
| **Interactions** | Attending Technical Body, WG and TTF meetings, presentation of the TTF activity |
| **Resources required** | * knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; * expert knowledge in codec and adaptation layer development in Java and C++; |

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| **Task 7** | **TC ITS approval and publication** |
| **Objectives** | TC ITS approval and publication of deliverable |
| **Input** | Updated TSs |
| **Output** | Deliverable publication |
| **Interactions** | Attending Technical Body, WG and working with ETSI editHelp |
| **Resources required** | * knowledge of ETSI drafting rules; * expert knowledge of ITS Security technologies and implementations; * expert knowledge of TTCN-3 (ES 201 873); * expert knowledge in conformance testing; * expert knowledge in codec and adaptation layer development in Java and C++; |

## Milestones

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| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | PICS, TSS and TP Update | 2020-04-30 |
|  | Early drafts made available and approved to ETSI CTI |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | PICS, TSS and TP Update | 2020-07-03 |
| TC ITS | Early drafts made available to TC ITS#39 |
| ETSI Deliverable | Progress Report approved by TC ITS #39 |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | ATS Updates | 2020-10-23 |
| TC ITS | Stable drafts made available to TC ITS #40 |
| ETSI Deliverable | Progress Report approved by TC ITS #40 |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | Final drafts and TTF Final Report approved by TC ITS #41 | 2021-01-22 |
| TC ITS | Final drafts approved by TC ITS #41 |
| ETSI Deliverable | Final Report approved by TC ITS #41 |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **E** | Deliverables published, TTF closed | 2021-02-22 |
| ETSI Deliverable | Final deliverables published |

## Task summary

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| --- | --- | --- | --- | --- |
| **Code** | **Task / Milestone** | Target Date | | Estimated Cost (EUR) |
| From | To |
|  | Start of work | Mar 20 |  |  |
| T1 | *Project management, reporting, meeting attendance* | Mar 20 | Feb 21 | CTI |
| T2 | *PICS, TSS and TP Update* | Mar 20 | June 20 | 50 000 |
| Milestone A | Early draft made available and approved by ETSI CTI |  | April 30 |  |
| Milestone B | Progress Report approved by TC ITS #39 and early drafts made available |  | 03 July 20 |  |
| T3 | *ATS Updates* | April 20 | Oct 20 | 25 000 |
| Milestone  *C* | Progress Report approved by TC ITS #*40* and stable drafts made available |  | 23 Oct 20 |  |
| T4 | Codecs and Test Adapter (TA) development |  | Oct 20 | 23 000 |
| T5 | ATS Validation | Oct 20 | Jan 21 | 14 000 |
| T6 | TS updates | Dec 20 | Jan 21 | 10 000 |
| Milestone  D | Final drafts and TTF Final Report approved by TC ITS #41 |  | 22 Jan 21 |  |
| T7 | TC ITS approval and publication |  | Feb 21 |  |
| Milestone E | Deliverables published, TTF closed |  | 22 Feb 21 |  |
|  | | | | **122 000** |

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| **Task/ Mil.** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** | **J** | **F** |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |
| MA |  |  |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |
| MC |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |
| T5 |  |  |  |  |  |  |  |  |  |  |  |  |
| T6 |  |  |  |  |  |  |  |  |  |  |  |  |
| MD |  |  |  |  |  |  |  |  |  |  |  |  |
| T7 |  |  |  |  |  |  |  |  |  |  |  |  |
| ME |  |  |  |  |  |  |  |  |  |  |  |  |

# Expertise required

## Team structure

Up to 2 persons with the following skills:

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| **Priority** | **Qualifications and competences** |
| High | knowledge of ETSI TS 103 301, CEN ISO/TS 19321-2015, CEN ISO/TS 19091:2017, ISO 17427:2014 and ISO 17427-1:2018, ETSI TS 103 097 and IEEE 1609.2 |
| High | expert knowledge of ITS Security technologies and implementations |
| High | expert knowledge of TTCN-3 (ES 201 873) |
| High | expert knowledge in conformance testing |
| Medium | expert knowledge in codec and adaptation layer development in Java and C++ |

Part IV: TTF performance evaluation criteria

# Performance Indicators

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| --- | --- |
| **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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 0.1 | 2020-02-03 | Saurav Arora | Stable Draft | STF 581 converted into TTF for phase-II |
| 0.2 | 2020-02-04 | Youssouf Sakho | Stable Draft | Update before CL publication |
| 0.3 | 2020-02-05 | Saurav Arora | Stable Draft | Minor updates before CL publication |
| 0.4 | 2020-02-05 | Saurav Arora | Stable draft | Phase-I and Phase-II are combined |
| 0.5 | 2020-02-04 | Youssouf Sakho | Stable Draft | Update before CL publication |
| 0.6 | 2020-02-18 | Youssouf Sakho | Final version | Update before CL publication |
| 0.7 | 2020-07-22 | Saurav Arora | Final version | Milestone update after TTF preparatory meeting |