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| --- |
| ToR TTF T042 (Ref. Body ITS WG3) |
| Version: 1.4 |
| Author: Denis FILATOV (for WG3) – Date: 2023-08-17 |
| Last updated by: ETSI Secretariat – Date:2024-10-14  |
| page 1 of 11 |

Terms of Reference –Testing Task Force Proposal

TTF T042 (Ref. Body TC ITS WG3)

**Conformance test suite for ITS Network Communication; Release 2;**

Summary information

|  |  |  |
| --- | --- | --- |
| Approval status | Approved by TC ITS (ITS(23)052011) | **YES** |
| Reference Body | Ref. Body ITS WG3 |
| ETSI Funding | **Maximum budget :17 000 EUR** |
| Minimum of 4 ETSI Members Support |  |
| Time scale | **From** | 2025-02-01 |
| **To** | 2025-11-30 |
| Work Items  | *PICS, TSS&TP, Test Suite* |
| TTF Roadmap reference | TTF Roadmap 2025 |

Part I –TTF Technical Proposal

# Rationale & Objectives

## Rationale

On 13 March 2018 the European Parliament adopted its opinion on cooperative intelligent transport systems C-ITS to improve road safety, traffic flow and reduce CO2 emission through instant short-range communication between vehicles, vehicles and the infrastructure and public transport (the report was coordinated by Hungarian MEP, István Ujhelyi and received with broad cross-party support (633 in favour, 43 against, 11 abstention.

Various measures can significantly improve the reliability and interoperability of complex systems such as ITS. The development of test specifications for conformance and interoperability can be coupled with validation activities, such as building prototype test systems. Likewise, the prototype test systems can be used at interoperability events. Consequently, the project contributes to the effort of testing and validation ITS systems with the goal to bring the ITS systems to a stage where end users trust the services provided.

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>). In 2020 the testing framework was updated to use the LTE-V2X access scheme.

Conformance Validation Framework is a reference implementation and available to all ITS stakeholders. The Conformance Validation Framework enables vendors to assess the level of compliance of their equipment and the Conformance Validation Framework can be used in support of certification schemes. In addition, with its high degree of extensibility, it can be used for company internal testing.

In June 2023, the TC ITS decided to finalize the set of specifications combined in the Release 2 packet and make it available in the beginning of 2024. The ITS Release 2 packet shall contain specifications for newly developed services and updates of existing ones.

This present document proposes the creation of a new TTF to fulfil the ITS Release 2 packet with test specifications for updated standards of ITS network communications.

## Objectives of the work to be executed

The objective of this TTF proposal is to develop new and update existing test specifications for ITS network communication **in order to address ITS Release 2 specifications packet**.

##

## 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>).

In 2019 TC ITS started the STF 580 and STF 581 to update the CAM and DENM test specifications to align with new version of the protocols and to develop the test specification for ITS infrastructure services.

In 2021 TC ITS approved the TTF T011 to update the ITS testing framework to support the LTE C-V2X access scheme.

## Consequences if not agreed

C-ITS is a key element in pan-European, and wider international, critical transport infrastructure. The test suites defined by this activity are pre-requisites for maintenance of the market and failure to undertake this activity may inhibit the ability to deploy this technology.

# ETSI Members Support

|  |  |  |
| --- | --- | --- |
| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | Fraunhofer IVI | Andreas Festag |
| 2 | Volvo Technology Corporation | Katrin Sjöberg |
| 3 | Valeo | Subramanian BALARAMALINGESWARAN |
| 4 | FSCOM | Yann Garcia |
|  |  |  |

# Deliverables

## Base documents

|  |  |  |  |
| --- | --- | --- | --- |
| **Document** | **Title** | **Current Status** | **Expected date for stable document** |
| ETSI TS 103 836-4-1V2.2.1 | Intelligent Transportation Systems (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 1: Media-Independent Functionality; Release 2 | Under revision | Nov 2024 |
| ETSI TS 103 836-4-2V2.1.1 | Transport and Network (ITS); Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 2: Media-dependent functionalities for ITS-G5 | Under revision | Nov 2024 |
| ETSI TS 103 836-4-3V2.1.1 | Intelligent Transport Systems (ITS) Vehicular Communications; GeoNetworking; Part 4: Geographical addressing and forwarding for point-to-point and point-to-multipoint communications; Sub-part 3: Media-dependent functionalities for NR-V2X PC5 and LTE-V2X PC5; Release 2 | Published | Oct 2023 |
| ETSI TS 103 836-3V2.1.1 | Intelligent Transport Systems (ITS); Vehicular Communications; GeoNetworking; Part 3: Network Architecture; Release 2 | Under revision | Nov 2024 |

## New deliverables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Delivery** | **Work Item code****Standard number** | **Working title** | **Current version** | **New version** | **Expected date for publication** |
| D1 | RTS/ITS-003102ETSI TS 102 871-1GeoNet | Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) proforma; Release 2 | 1.5.1(2022-03) | 2.1.1 | 2025-11 |
| D2 | RTS/ITS-003103ETSI TS 102 871-2GeoNet | Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking; Part 2: Test Suite Structure and Test Purposes (TSS & TP); Release 2 | 1.5.1(2022-03) | 2.1.1 | 2025-11 |
| D3 | RTS/ITS-003104ETSI TS 102 871-3GeoNet | Intelligent Transport Systems (ITS);Testing; Conformance test specifications for GeoNetworking;Part 3: Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT) ; Release 2 | 1.5.1(2022-03) | 2.1.1 | 2025-11 |

# Maximum budget

## Task summary/Manpower Budget

|  |  |  |  |
| --- | --- | --- | --- |
| **Task short description** | CTI effort | Expertise effort | Expertise Budget (EUR) |
| Project Management | 100% |  |  |
| Testing technical specifications development |  |  |  |
| GeoNetworking conformance test specification (D1-D3) | 50% | 50% | 5 000 |
| Conformance validation framework update (D1) | 25% | 75% | 3 000 |
| TTCN-3 code development |  | 100% | 5 000 |
| Validation of the framework |  | 100% | 2 000 |
| Final deliveries update and prepare for publication | 75% | 25% | 2 000 |
| **TOTAL** |  |  | **17 000** |

## Travel budget

Zero (not applicable – all reporting activity will be carried out by ETSI staff).

## Other budget line

N/A

Part II –Details on TTF Technical Proposal

# Tasks, Technical Bodies and other stakeholders

## Organization of the work

ETSI will perform this work by the creation of an ETSI TTF, reporting the milestones and providing the draft deliverables to ETSI TC ITS WG3 (on behalf of TC ITS), according to the planned meeting agenda agreed by the TC ITS Chairman. TC ITS WG3 will perform an active role in steering and contributing to this work.

Coordination with various other stakeholders will be necessary, under TC ITS WG5 supervision, to achieve the best outcome of this work and the widest possible collection of views amongst all parties concerned.

## Other interested ETSI Technical Bodies

None

## Other stakeholders

None

Part III: Execution of Work

# Work plan, time scale and resources

## Task description

The TTF work will be performed by a group of Companies/Organizations (Service Providers) that will collectively ensure the following mix of skills are represented:

* Deep knowledge of C-ITS specific Functional requirements;
* Deep understanding of GeoNetworking requirements;
* C-ITS System architecture;
* Expert knowledge of ITS networking technologies and implementations;
* Expert knowledge of TTCN-3 (ES 201 873);
* Expert knowledge in conformance testing;
* Project management skills are required for the TTF leader who will be responsible for Task-1.

In addition, there must be experience in drafting standards and the expert team should include members familiar with the policy frameworks for C-ITS deployments.

Based on the interest and variety of skills the expert team may vary in size. For project execution efficiency a maximum of 2-3 experts is expected.

The TTF Leader will be responsible for coordinating the execution of the tasks according to the requirements in the Terms of Reference and following the technical direction given by TC ITS. The TTF Leader also possesses project management experience, report-writing skills, standardisation process, experience of consensus building, presentation skills, experience of working in an international environment especially with the EU Commission, different SDOs, authorities and industry.

The following Tasks are identified:

|  |  |
| --- | --- |
| **Task 0** | **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 TTFProgress report and final report as required |
| **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 1** | **Testing technical specifications update** |
| **Objectives** | Develop the GeoNetworking conformance testing specification |
| **Input** | Base specification documents, Testing technical specification |
| **Output** | Stable drafts of D1 and D2 presented to TC ITS |
| **Interactions** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Resources required** | * Deep knowledge of C-ITS specific Functional requirements.
* Deep understanding of GeoNetworking architecture and requirements.
* Expert knowledge of ITS Security technologies and implementations.
* Expert knowledge in conformance testing.
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| **Task 2** | **Conformance validation framework update** |
| **Objectives** | Update the codec and test adapter framework to support the GeoNetworking release 2 changes. |
| **Input** | Base specification documents |
| **Output** | Source code of the codec and test adapter |
| **Interactions** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Resources required** | * Knowledge of ETSI TS 303 613, ETSI TR 103 099 and other TC ITS test specifications
* Expert knowledge of TTCN-3 (ES 201 873).
* Expert knowledge in conformance testing.
* Expert knowledge in C/C++ programming.
* Expert knowledge in Titan TTCN-3 execution framework and architecture.
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| **Task 3** | **Develop the TTCN-3 code** |
| **Objectives** | Develop the TTCN-3 code |
| **Input** | Base specification documentsTest specification documents |
| **Output** | Source code of the ATS |
| **Interactions** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Resources required** | * Knowledge of ETSI TS 303 613 and ETSI TC ITS testing technical specifications.
* Expert knowledge of ITS technologies and implementations.
* Expert knowledge of TTCN-3 (ES 201 873).
* Expert knowledge in conformance testing.
* Expert knowledge in Titan TTCN-3 execution framework and architecture.
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| **Task 4** | **Validation of the Framework** |
| **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 Conformance Validation Framework and its specification |
| **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** | * Expert knowledge of ITS test specifications.
* Expert knowledge of ITS 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 C++.
* Expert knowledge in Titan TTCN-3 execution framework and architecture.
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| **Task 5** | **Final deliveries update and prepare for publication** |
| **Objectives** | Update ITS test specifications to resolve all issues found during the validation phase. |
| **Input** | Base specification documentsDeliveries D1-D3Validation results |
| **Output** | Final drafts presented to TC ITS |
| **Interactions** | Report to TC ITS and TC ITS Working Groups as appropriate on the work of the TTF |
| **Resources required** | * Knowledge of ETSI TS 303 613.
* Expert knowledge of ITS test specifications.
* Expert knowledge of ITS technologies and implementations.
* Expert knowledge of TTCN-3 (ES 201 873).
* Expert knowledge in conformance testing.
 |

## Milestones

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | **Progress Report approved by TC ITS and early draft of the D1-D2 made available** | 2025-07 |
| TC ITS | Early drafts of D1-D2 made available to TC ITS |
| ETSI Deliverable | Progress Report approved by TC ITS |

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| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | **Final Report and final drafts of the D1-D3 approved by TC ITS** | 2025-10 |
| TC ITS | Final drafts made available and approved by TC ITS |
| ETSI Deliverable | Final Report approved by TC ITS |

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | **Deliverables published, TTF closed** | 2025-11 |
| TC ITS | Deliverables published, TTF closed |
| ETSI Deliverable | Deliverables published, TTF closed |

## Task summary

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Code** | **Task / Milestone**  | Target Date | CTI effort | Expertise effort | Estimated Cost (EUR) |
| From | To |
|  | Start of work |  |  |  |  |  |
| T0 | Project Management | 2025-02-01 | 2025-11-30 | 100% |  |  |
| T1 | Testing technical specifications development | 2025-02-01 | 2025-06-30 | 50% | 50% | 5 000 |
| Milestone A | Progress Report approved by TC ITS and stable drafts of D1-D2 made available |  | 2025-07 |  |  |  |
| T2 | Conformance validation framework update | 2025-05-01 | 2025-08-31 | 25% | 75% | 3 000 |
| T3 | TTCN-3 code development | 2025-05-01 | 2025-08-31 |  | 100% | 5 000 |
| T4 | Validation of the Framework | 2025-08-01 | 2025-09-30 |  | 100% | 2 000 |
| T5 | Final deliveries update and prepare for publication | 2025-09-01 | 2025-10-31 | 75% | 25% | 2 000 |
| Milestone B | Final Report and final drafts approved by TC ITS  |  | 2025-10-31 |  |  |  |
| MilestoneC | Deliverables published, TTF closed |  | 2025-11-30 |  |  |  |
|  |  | **17 000** |

|  |  |
| --- | --- |
|  | **2025** |
| **Task/ Mil.** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** |
| T0 |  |  |  |  |  |  |  |  |  |  |
| T1 |  |  |  |  |  |  |  |  |  |  |
| MA |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |
| T5 |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |
| MC |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

# Expertise required

## Team structure

(Up to) 3 participants to ensure the following mix of competences:

|  |  |
| --- | --- |
| **Priority** | **Qualifications and competences** |
| High | Deep knowledge of C-ITS specific Functional requirements  |
| High | Deep understanding of ITS GeoNetworking architecture and requirements |
| High | C-ITS System architecture and facilities layer functions |
| High | Expert knowledge of TTCN-3 (ES 201 873) |
| High | Expert knowledge in conformance testing |
| High | Expert knowledge in Titan TTCN-3 execution framework and architecture. |
| High | Project management skills are required for the TTF leader who will be responsible for Task-1 |

Part IV: TTF performance evaluation criteria

# Performance Indicators

|  |
| --- |
| **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** |
| **Contribution from the TTF to ETSI work** |  |
| Contributions to Reference Body meetings (number of documents / meetings / participants) | 2-3 meetings |

# Document history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 1.1 | 2023-08-17 | CTI |  |  |
| 1.2 | 2023-09-13 | DF |  | Supporting companies added |
| 1.3 | 2024-07-03 | CTI | Approved | Change schedule according to decision in ITS WG3#67 meeting. |
| 1.4 | 2024-10-14 | ETSI Secretariat | Final | Update before CL publication |

Annex I Response to the Request for Proposals
CfE – TTF T042 (REFERENCE BODY ITS WG3) Deadline:  30 October 2024

|  |
| --- |
| **Contractor information \*** |
|  |
| **Contractor name \*:***Indicate the Company/Organization Name* |  |
|  |
| **Contact person for the technical aspects** | **Contact person for Decision on ETSI financial offer to this project (if any)** |
| Title |  | Title |  |
| First name |  | First name |  |
| Last name  |  | Last name  |  |
| Role |  | Role |  |
| e-mail |  | e-mail |  |
| Phone |  | Phone |  |
|  |
|  | **Yes** | **No** |
| Do you or any employee of your Company/Organization hold an elected or appointed position in the Reference Body requesting the TTF T042 creation? | Indicate in which position:----------------------------------- |  |
| **If you are self-employed candidate:**Do you currently have other contracts in progress with ETSI? |  |   |

All fields marked with an asterix (\*) are mandatory

**1.1 Introduction**

A short presentation of the technical structure responsible for this activity, e.g.:

* Business area, number of employees, link to WEB site,
* Department(s)/team(s)/experts in charge of the technical activities related to this Project,
* Reference to products/services of your Company/Organization or supporting Member to which the standards developed by this Project will apply,
* Motivation for your Company/Organization or supporting Member to participate in this Project.

**1.2 Proposed approach**

**Proposed contribution to tasks & related cost**

Identify the tasks to which your Company/Organization is proposing to contribute by filling-in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tasks No** | **Tasks Description** | **Max Budget Allocated in Euro** | **Amount in Euro (mandatory)** | **% of whole Task (mandatory)** |
| 00 | Project management | 0 | . | . |
| 01 | Testing technical specifications development | 5000 | . | . |
| 02 | Conformance validation framework update | 3000 | . | . |
| 03 | TTCN-3 code development | 5000 | . | . |
| 04 | Validation of the framework | 2000 | . | . |
| 05 | Final deliveries update and prepare for publication | 2000 | . | . |
|  |  | **17000** |  |  |

**Amount in Euro (mandatory)**: Indicate the price offered for your contribution to the task(s)

**% of whole task (mandatory)**: Indicate to which percentage of the execution of the whole task your offer corresponds

Provide a description of the proposed approach, competences, reference to related activities:

* Explain which part of the task is corresponding to the requested percentage that your Company/Organization will handle,
* Explain the scope that your Company/Organization will cover,
* Explain your approach to the management of the quality and,
* Explain your approach to the management of the risks and their mitigation,
* Describe and justify the proposed costs to achieve this project objectives.

Annex II Terms and Conditions
CfE – TTF T042 (REFERENCE BODY ITS WG3) Deadline:  30 October 2024

**2.1 Submission of Proposals**

All proposals in response to this CfE shall be submitted before the deadline indicated in thisCollective Letter, using exclusively the WEB application on the ETSI Portal at the following address: <https://portal.etsi.org/cfe>.

Proposals shall be composed of Curriculum Vitae of the proposed service providers’ personnel and the Annex I of this CfE duly filled-out.

Proposals that will be partial or incomplete at the deadline will not be accepted.

The Terms and Conditions in this Annex will apply.

**2.2 Modification and Withdrawal of Proposals**

Applicants may, without prejudice to themselves, modify or withdraw their proposal by written request, provided that the request is received by ETSI prior to the due date and time, at the address to which their proposal was submitted. The applicant may submit a new proposal provided that such new proposal is received prior to the deadline for responding which is specified in this Collective Letter.

**2.3 Assessment of Proposals**

The ETSI Director-General, in consultation with the Reference Body Chairman, is responsible for the selection of the service providers that will be contracted to perform this Project work. The ETSI Director-General and the Reference Body Chairman may be assisted by a Selection Panel to assess the applications received and make the final decision.

As per article 1.10.4 of the ETSI Directives, the Director-General may discard proposals that could be identified as creating potential conflict of interest.

The ETSI Secretariat will only communicate to the applicants the result of the selection (accepted or not accepted). Should applicants need more information on the rationale for the selection, they must address a formal request to the ETSI Director-General.

The following evaluation criteria will be applied to all proposals, in order of priority:

* Evidence that the applicant has the necessary structure and expertise to ensure delivery
* Reference to current or previous activities in the specific technical domain of this project
* Critical review of the most efficient way to achieve the objectives in this Project ToR
* Effective proposed approach/methodology for the execution of the tasks
* Implementation schedule
* Clear pricing policy

Compliance with the first two (2) criteria is mandatory.

Proposals that are not considered compliant with these criteria will be discarded.

Priority will be given to technical quality of the proposals. Pricing considerations will be taken into account to ensure that the best value for money is achieved. Compatibility with the maximum budget allocated to this Project will be verified before placing a Service Contract.

Following the assessment process, ETSI reserves the right to grant contracts to other than the cheapest proposals, to accept or reject any offer completely or in part, or to reject all proposals, without providing the reasons. If no offer is accepted, ETSI may decide to abandon the work or proceed in any other manner ETSI may select.

**2.4 IPR and confidentiality Agreements**

The information provided in this CfE, as well as the fact that the applicant has received the CfE, is considered confidential and protected under copyright laws. The applicant may not discuss, share, or use the information in this CfE for any purpose other than the response to this CfE.

ETSI will not disclose the content of any proposals to other applicants or any other party, with the exception of the persons involved in the assessment process described in §2.3 above.

However, ETSI reserves the right to make use of the information provided in this proposal to improve this project definition for the purpose of this CfE or any other manner in which ETSI may decide to proceed to select the service providers.

If successful, the applicant will be required to sign a Service Contract, which includes IPR and Confidentiality clauses aligned with the relevant policies in the ETSI Directives.

**2.5 Preparation cost**

ETSI will not be responsible for any costs or expenses that the applicant may incur in preparing and/or submitting the proposal.

**2.6 Service Contract**

A Service Contract will be proposed to the applicants that will be selected to perform the work.

Details on the Terms and Conditions of this contract can be found on the ETSI Portal, at the following address: <https://portal.etsi.org/STF/STFs/Contracts.aspx>