|  |
| --- |
| ToR TTF T006 (Ref. Body INT) |
| Version: 0.6 |
| Author: Giulio Maggiore – Date: 2018-12-04 |
| Last updated by: ETSI/FA – CTI – Date: 2019-06-19 |
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Terms of Reference –Testing Task Force Proposal

TTF T006 (Ref. Body INT)

VoLTE/ViLTE interoperability test description over 4G/early 5G (3GPP Rel15) in physical/virtual environments  
(Continuation of STF 574)

Summary information

|  |  |  |  |
| --- | --- | --- | --- |
| Approval status | Approved by TC INT (Full STF ToR, Phases I & II: December 2018: INT(18)041018r3) | | **YES** |
| Reference Body | Ref. Body INT | | |
| ETSI Funding | **Maximum budget: ETSI FWP:**  Phase I 159 000 € manpower cost + 4 000€ travel cost funded in 2019  **Phase II 91 000 € manpower cost + 3000€ travel cost from 2020 budget** | | |
| Minimum of 4 ETSI Members Support | **YES** | | |
| Time scale | **From** | 2020-08-03 | |
| **To** | 2021-06-30 | |
| Work Items | Phase II of STF574: Validation  Update/maintenance of the documents due to validation findings   * TS 103 653-1 VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 1: Test Purposes & PICS * TS 103 653-2 VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 2: Test Descriptions * TS 103 653-3 VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 3: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification | | |
| TTF Roadmap reference | TTF Roadmap 2020, TTF Budget approved in GA#74, December 2019 | | |

Part I –TTF Technical Proposal

# Rationale & Objectives

## Rationale

NOTE: The present TTF ToR describes phase II of the already active STF574. STF574 has started its work in June 2019. The ToR of STF574 have originally been published as part of the call for expertise in ETSI CL19\_3527.

In 4G and 5G networks it is expected that, both Voice over LTE (VoLTE) and Video over LTE (ViLTE) will form the backbone of IP-based telecommunications just as voice was an integral part of 2G and 3G networks. VoLTE is already the technology that enables High Definition (HD) voice call quality, while ViLTE provides high quality video services by typically offering lower latency and higher capacity compared to competing Over-the-Top (OTT) services which utilize best-effort bearers that can adversely affect the quality. According to GSMA sources, VoLTE is commercially deployed in at least 13 countries and combined with trail roll-out in more than 100 countries. On the other hands, roll-outs of ViLTE have just begun.

The key drivers for wide deployment of VoLTE/ViLTE interconnection are mainly:

* Faster call setup and higher-quality of voice and video calling, and class of service (using IPX);
* Efficient use of spectrum, releasing extra capacity for data; by migrating traffic from the 3G network (GSM or even CDMA) to the 4G network helps to free up additional spectrum that can be realigned to support the growth of 4G data;
* Optimization of network and service management while simplifying service delivery;
* Security based on IPX;
* Support for GSMA IR.92/IR.94 drives the parameters and standards for allowing partner networks to communicate with each other;
* Signalling protocol shift from SS7 to Diameter and SIP;
* SIP normalization;
* Ability to work with the variations in standards IR.34;
* Bandwidth management;
* Efficient charging and accounting;
* Implementation of Emergency and priority calls;
* Multimedia interworking between operators;
* Voice transcoding, which includes delivering a call to a legacy voice network, which may not support the AMR codec.

In order to facilitate a global migration to the new standards, it is equally important, not only to assure the conformance and interoperability of the VoLTE and ViLTE interfaces within single operator’s network, but also the interoperability of network-to-network interfaces (NNI) and end-to-end integration and interoperability within multi-vendors and multi-operators networks. As shown in the Figure 1, the key components for delivering the VoLTE and ViLTE are the IP Multimedia Subsystem (IMS) and Evolved Packed Switch (EPS) architecture, which are the corner stone for the 3GPP NGN and 5G architecture.

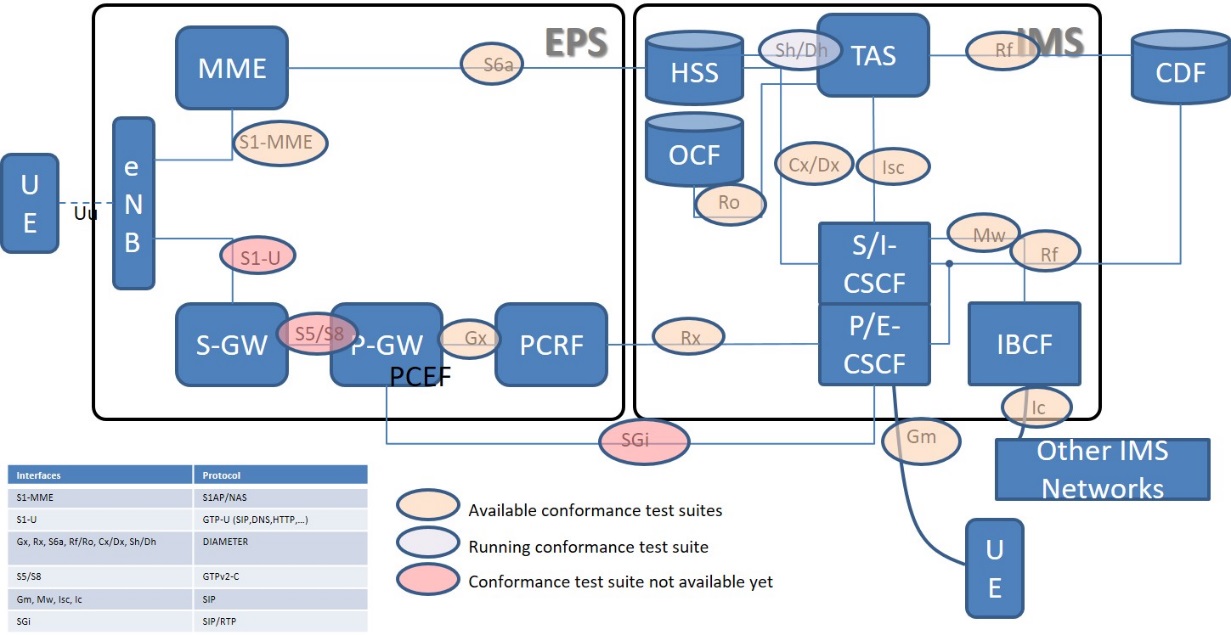


Figure 1: VoLTE/ViLTE IMS and EPS architecture.

ViLTE uses the same control plane protocol as VoLTE, namely the Session Initiation Protocol (SIP). From the protocol conformance testing perspective, ViLTE protocol conformance testing can be developed with the minor adaptations of VoLTE conformance testing specifications. Main extensions of the VoLTE control plane protocol for ViLTE are associated with the use of video codecs. ViLTE uses the H.264 codec to encode and decode the video stream and to deliver superior quality as compared to the low bit rate 3G-324M codec that is used in 3G conversational video calls. It is vital that ViLTE video calls are allocated appropriate quality of service (QoS) to differentiate and prioritize this delay and jitter sensitive conversational traffic from other streaming video traffic that is not as delay or jitter sensitive.

For the entities and interfaces depicted in Figure 1, ETSI has put substantial efforts in the past in developing conformance test suites all interfaces using SIP and DIAMETER protocols. While the conformance of each and every interface between functional entities within IMS and EPS cores is essential for assuring the standardized behaviour and functionality, the conformance itself does not assure the interoperability in multi-vendor and/or multi-operator environments. In order to test the interoperability, ETSI has proposed a systematic approach to automated interoperability testing in ETSI TR 102 788. Specifically, using the proposed methodology, an initial set of ETSI interoperability test specifications (TS 186 011- 2, TS 102 901, TS 103 029) for IMS architecture has been developed and used at the RCS VoLTE Plugtest in 2012, co-organized by ETSI, GSMA and the MSF for 3GPP R9. In addition, TB INT has developed test specification ETSI TS 103 397 which defines the VoLTE and ViLTE interconnect, interworking and roaming test specification with QoS/QoE for basic call and supplementary services.

VoLTE/ViLTE implementation in a Virtual environment will require deeper investigation tools to be applied at the relevant interfaces within the VNF in order to test properly and quickly the services.

This document and its test purposes will serve as a base document for a newly produced VoLTE/ViLTE interoperability test description document which will complement the existing set of IMS NNI, IMS NNI for RCS and EPC/IMS interoperability test description specifications. The main objective will be the development of an automated test suite for VoLTE/ViLTE interoperability for use cases with conformance checks of each and every interface between physical entities for 3GPP R14 and interoperability for ENUM services. Improvement of the test suite quality is achieved with test suite validation against real SUT equipment.

Experience with the validation of other testing specifications has shown that involvement of experts on interoperability testing requires highly specialized knowledge in testing methodology, TTCN‑3 language and dedicated tools. In addition, the validation of this kind of specifications requires significant effort and it cannot be expected that this effort can be provided on a voluntary basis. Hence the involvement of testing experts is needed in order to assure timely completion and high quality of the test adaptors. These testing experts are not available on TC INT level and need to be recruited on a funded basis. The experts will use TTCN-3 platforms.

Past ETSI experience has shown that an STF, supported by the ETSI CTI, is the most effective and cost-efficient way to develop and validate test specifications.

## Objectives of the work to be executed

Once phase I of STF 574 is completed, a first version of the three-part ETSI TS 103 653 test specification will be published. Phase II will be the logical next step to validate the functionality of the TTCN-3 code in TS 103 653-3. Shortcomings identified during the validation of the abstract test suite against real and simulated equipment will be corrected which will lead to an improved quality of all test specifications developed during Phase I as changes required in the TTCN-3 code will also feedback into the test descriptions and test purpose documents, TS 103 653-1 and -2.

TC INT will follow and manage/monitor all the TTF activities and will inform all identified interested bodies via liaison statements at regular intervals.

An administration task will be maintained handling the progress reports of the TTF and the representation at the TC INT meetings during the lifetime of the TTF.

## 

## Previous funded activities in the same domain

STF394

Revision of TS 186 011-1/-2 to 3GPP Rel.8 and production of TS 102 901 for RCS Rel.2

Resource: 75 remunerated and 30 voluntary effort days, 45 000€

STF414

Revision of TS 186 011-1/-2 to 3GPP Rel.9 and of TS 102 901 to RCS-e and production TS 103 029 (IMS-EPC interworking)

Resource: 80 remunerated and 15 voluntary effort days, 48 000€

STF453 - update of IMS NNI Test Specifications for 3GPP R9 RCS 5.1 and IMS&EPC

STF574 Phase I – Test specifications for VoLTE/ViLTE interoperability test description over 4G/early 5G (3GPP Rel15) in physical/virtual environments

Resource: 159 000€

## Consequences if not agreed

VoLTE/ViLTE networks are currently being deployed in telecoms networks during the progression towards fully VoLTE/ViLTE compliant network architectures. Thorough interoperability testing will fill the gap between various suppliers to be able to interwork. This in turn will reduce implementation and rollout times. Not providing timely test specifications, would ultimately delay the deployment of 4G/early 5G solutions. Without the availability of suitable test specifications and test suite, any VoLTE/ViLTE interoperability testing activities will be of no technical value, and of little commercial or promotion value.

# ETSI Members Support

|  |  |  |
| --- | --- | --- |
| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | Telecom Italia | Giulio Maggiore |
| 2 | Orange France | Tayeb Benmeriem |
| 3 | Iskratel | Primoz Kocar |
| 4 | Fraunhofer Fokus | Axel Rennoch/Marius Corici |
| 5 | University of Gottingen | Dieter Hogrefe |
| 6 | ITALTEL SpA | Diego Saiu |
| 7 | Spirent Communications | Dirk Tepelmann |
| 8 | Huawei | Fabio Faoro |
| 9 | Sigos | Shicheng Hu |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Current Status** |
| ETSI TS 124 229 (V15.4.0) | IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 | Published |
| ETSI TS 129 165 (V15.5.0) | Inter-IMS Network to Network Interface (NNI) | Published |
| ETSI TS 129 228 (V15.1.0) | Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents | Published |
| ETSI TS 129 229 (V15.0.0) | Cx and Dx interfaces based on the Diameter protocol; Protocol details | Published |
| ETSI TS 132 260 (V15.0.0) | Telecommunication management;Charging management;IP Multimedia Subsystem (IMS) charging | Published |
| ETSI TS 132 299 (V15.4.0) | Telecommunication management; Charging management; Diameter charging applications | Published |
| ETSI TS 129 214 (V15.4.0) | Policy and charging control over Rx reference point | Published |
| ETSI TS 129 212 (V15.4.0) | Policy and Charging Control (PCC); Reference points | Published |
| ETSI TS 129 272 (V15.5.0) | Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol | Published |
| ETSI TS 129 215 (V15.1.0) | Policy and Charging Control (PCC) over S9 reference point; Stage 3 | Published |
| ETSI TS 129 328 (V15.4.0) | IP Multimedia (IM) Subsystem Sh interface; Signalling flows and message contents | Published |
| ETSI TS 129 329 (V15.1.0) | Sh interface based on the Diameter protocol; Protocol details | Published |

Table 1: Base documents

The following table contains test specifications which were used as input for the preparation of the new documents produced in phase I.

NOTE: Release of below test specifications have been considered, all content has been aligned with 3GPP Rel. 15.

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Current Status** |
| ETSI TS 103 397 V1.1.2  (based on 3GPPTM Rel 12) | VoLTE and ViLTE interconnect, interworking and roaming test specification with QoS/QoE | Published |
| ETSI TS 101 585 V2.1.1  (based on 3GPPTM Rel 13) | IMS interconnection tests at the Ic Interface; | Published |
| ETSI TS 186 011-1 V5.1.1  (based on 3GPPTM Rel 10) | Test Purposes for IMS NNI Interoperability | Published |
| ETSI TS 186 011-2 V5.1.1  (based on 3GPPTM Rel 10) | Test Descriptions for IMS NNI Interoperability | Published |
| ETSI TS 102 901 V5.1.1  (based on 3GPPTM Rel 10) | IMS NNI interoperability Test descriptions for RCS | Published |
| ETSI TS 103 029 V5.1.1  (based on 3GPPTM Rel 10) | IMS & EPC Interoperability Test Descriptions | Published |
| ETSI TR 102 788 V1.1.1  (based on 3GPPTM Rel 7) | Automated Interoperability Testing | Published |
| ETSI TS 102 790-2 V3.1.1  (based on 3GPPTM Rel 10) | SIP-SIP IMS Conformance Basic Call | Published |
| ETSI TS 103 289-2 V2.1.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for Cx/Dx interfaces | Published |
| ETSI TS 103 374-2 V1.2.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for Rf/Ro interfaces | Published |
| ETSI TS 101 580-2 V2.1.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for Rx interface | Published |
| ETSI TS 101 606-2 V2.1.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for Gx interface | Published |
| ETSI TS 103 261-2 V1.2.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for S6a interface | Published |
| ETSI TS 103 262-2 V1.2.1  (based on 3GPPTM Rel 10) | Diameter Conformance testing for S9 interface | Published |
| ETSI TS 103 497-2 V1.1.1  (based on 3GPPTM Rel 13) | S1AP Conformance Testing for the S1-MME interface | Published |
| ETSI TS 103 530-2 V1.1.1  (based on 3GPPTM Rel 13) | NAS Conformance Testing for the S1-MME interface | Published |
| ETSI TS 103 571-2 V1.1.1  (based on 3GPPTM Rel 13) | Diameter Conformance testing for Sh/Dh interfaces | Published |

Table 2: Test specifications

## New deliverables

|  |  |  |
| --- | --- | --- |
| **Deliv.** | **Work Item code**  **Standard number** | **Working title**  **Scope** |
| D1 | RTS/INT-00168-1 | VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 1: Test Purposes |
| D2 | RTS/INT-00168-2 | VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 2: Test Descriptions |
| D3 | RTS/INT-00168-3 | VoLTE/ViLTE interoperability test description over 4G/early 5G in physical/virtual environments; Part 3: ATS&PIXIT |

# Maximum budget

## Task summary/Manpower Budget

|  |  |
| --- | --- |
| **Task short description** | Budget (EUR) |
|
| Project Management phase II | 7 000 |
| Codec and TA development | 24 000 |
| Interoperability ATS Validation | 42 000 |
| Update/Maintenance of the test specifications from phase I | 18 000 |
| **TOTAL** | 91 000 |

## Travel budget

|  |  |
| --- | --- |
| **Expected travels** | **Cost estimate** |
| Phase II: Travel to three INT meetings | 3 000€ |
| **Total cost** | **3 000**€ |

## Other budget line

None

Part II – Details on TTF Technical Proposal

# Tasks, Technical Bodies and other stakeholders

## Organization of the work

Once phase I of STF 574 is completed, a first version of the three-part ETSI TS 103 653 test specification will be published. Phase II will be the logical next step to validate the functionality of the TTCN-3 code in TS 103 653-3. Shortcomings identified during the validation of the abstract test suite against real and simulated equipment will be corrected which will lead to an improved quality of all test specifications developed during Phase I as changes required in the TTCN-3 code will also feedback into the test descriptions and test purpose documents, TS 103 653-1 and -2.

TC INT will follow and manage/monitor all the TTF activities and will inform all identified interested bodies via liaison statements at regular intervals.

An administration task will be maintained handling the progress reports of the TTF and the representation at the TC INT meetings during the lifetime of the TTF.

## Other interested ETSI Technical Bodies

* 3GPP CT1
* 3GPP CT3
* 3GPP SA3
* ETSI TC MTS

## Other stakeholders

* GSMA NG

Part III: Execution of Work

# Work plan, time scale and resources

## Task description

|  |  |
| --- | --- |
| **Task #1** | **Project Management** |
| **Objectives** | Provision of progress reports for the TC INT meetings #47 through to #49. Presentation of reports and TTF outputs during said meetings. Scheduling of common sessions, administration of TTF resources.  Processing of feedback comments received from the stakeholders.  The TTF leader will perform all actions required by this task. |
| **Input** | None |
| **Output** | Two TTF progress reports and one final report. |
| **Interactions** | Presence at all TC INT meetings during the TTF’s lifetime |
| **Resources required** | Costs: 7 000 EUR |

|  |  |
| --- | --- |
| **Task #2** | **Codec and TA development** |
| **Objectives** | 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/> . |
| **Input** | TTCN3 code from STF574 |
| **Output** | Source code of TA and Codec/Decodec |
| **Interactions** | Findings during the validation will be synchronized with developers and validators to support successful validation process. |
| **Resources required** | Costs: 24 000 EUR |

|  |  |
| --- | --- |
| **Task #3** | Interoperability ATS validation |
| **Objectives** | Real equipment from the industry is needed for the validation phase. Concerned companies need to be contacted to identify potential partners for the validation phase. Test suite have to be validated against available configurations where E2E scenarios are able to be run manually. |
| **Input** | ETSI TS 103 653-3 (ATS&PIXIT)  Codec and TA |
| **Output** | Internal test report |
| **Interactions** | Presentation of validation test report at INT#49 (Jun 2021) |
| **Resources required** | Costs: 42 000 EUR |

|  |  |
| --- | --- |
| **Task #4** | **Update/maintenance of test specifications** |
| **Objectives** | Due to findings during validation under Task #3 maintenance of existing standards will be required. |
| **Input** | Issues found during validation under Task #3.  TS 103 653-1 (developed in Phase I)  TS 103 653-2 (developed in Phase I)  TS 103 653-3 (developed in Phase I) |
| **Output** | Update of ETSI TS 103 653-1 (Update of Test purpose&PICS)  Update of ETSI TS 103 653-2 (Update of Test description)  Update of ETSI TS 103 653-3 (Update of ATS&PIXIT) |
| **Interactions** | Presentation of final drafts for approval at INT#49 (Jun 2021). |
| **Resources required** | Costs: 18 000 EUR |

## Milestones

Milestone A – Approval of progress report A

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | Approval of progress report A | 2020-12-03 |
| Reference Body Deliverable | Progress report making reference to location of source code for codec and test adapter on ETSI Forge. |
| ETSI Deliverable | Presentation of progress report A for approval at INT#47(Nov/Dec 2020). |

Milestone B – Approval of progress report B

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | Approval of progress report B | 2021-03 |
| Reference Body Deliverable | Stable Drafts of D1, D2 and D3 |
| ETSI Deliverable | Presentation of progress report B for approval at INT#48 (Mar 2021). |

Milestone C – Approval of Deliverables D1, D2 and D3, and Final Report

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | Approval of deliverables D1, D2 and D3 and Final Report. | 2021-06 |
| Reference Body Deliverable | Final Draft for approval of D1, D2 and D3. Final Drafts have to be made available at least two weeks before the start of INT#49. |
| ETSI Deliverable | Presentation of final report for approval at INT#49 (Jun 2021). |

Milestone D – Deliverables published, TTF closed

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | Deliverables D1, D2 and D3 published, TTF closed. | 2021-07 |
| Reference Body Deliverable | None |
| ETSI Deliverable | None |

## Task summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Code** | **Task / Milestone** | Target Date | | Estimated Cost (EUR) |
| From | To |
|  | Start of work | Aug 2020 |  |  |
| T1 | Project Management | Aug 2020 | Jun 2021 | 7 000 |
| T2 | Codec and TA development | Aug 2020 | Mar 2021 | 24 000 |
| Milestone A | Progress Report A approved at TC INT#47 | 3 Dec 2020 | 3 Dec 2020 |  |
| T3 | Interoperability ATS Validation | Oct 2020 | Jun 2021 | 42 000 |
| T4 | Update/Maintenance of the test specifications from phase I | Oct 2020 | Jun 2021 | 18 000 |
| Milestone  B | Progress Report B approved at TC INT #48 | Mar 2021 | Mar 2021 |  |
| Milestone  C | Final Report & Deliverables D1, D2 and D3 approved at TC INT #49 |  | Jun 2021 |  |
| Milestone  D | Deliverables Published, TTF Closed |  | Jul 2021 |  |
|  | | | | **91 000** |

Progress per task vs Milestones (Milestones per Tasks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Milestone A | Milestone B | Milestone C | Milestone D |
|  | 2020-12-03 | 2021-03-31 | 2021-06-30 | 2021-07-31 |
| T1 | 25% | 25% | 25% | 25% |
| T2 | 60% | 30% | 0% | 10% |
| T3 | 20% | 50% | 20% | 10% |
| T4 | 20% | 50% | 20% | 10% |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Task/ Mil.** | **2020** | | | | | | | | | | | | **2021** | | | | | | | | | | | | |
| **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** |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MA |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |  |
| MC |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| MD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |

# Expertise required

## Team structure

The following experts are required to perform the work. The actual number of experts and mix of skills may depend on the actual applications received and will be decided when setting up the TTF.

Number of experts required: 2 - 4

|  |  |
| --- | --- |
| **Priority** | **Qualifications and competences** |
| High | Knowledge of LTE, EPC and IMS architecture |
| High | Expertise of SIP, Diameter protocols |
| High | Experience in analysing of protocols and writing of test descriptions |
| High | Expertise in interoperability and conformance testing |
| High | Knowledge in implementing Abstract Test Suites in TTCN-3 |
| High | Expertise is required in the QoS area and on wireless technologies |
| High | Expert knowledge in validating interoperability test specification |
| High | Expert knowledge in codec and adaptation layer development in C++/Java |
| High | Awareness of outputs from earlier INT STFs on VoLTE |

Part IV: TTF performance evaluation criteria

# Performance Indicators

|  |  |
| --- | --- |
| **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 test–beds, 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 |  |
|  |  |
| **Contribution from the TTF to ETSI work** | |
| Contributions to Reference Body meetings (number of documents / meetings / participants) |  |
| Contributions to other Reference Bodies |  |
| Presentations in workshops, conferences, stakeholder meetings |  |
|  |  |
| **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 |  |
| 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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 0.4 | 2020-06-05 | Ultan Mulligan | CTI Approved | Update before CL Publication |
| 0.5 | 2020-06-08 | Youssouf Sakho | CTI Approved | Update before CL Publication |
| 0.6 | 2020-06-19 | ETSI/FA – CTI | Final | Update after IKOM and before CL Publication |