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| ToR STF 598 (ISG NFV) |
| Version: 0.6 |
| Author: Bruno Chatras/Vlademir Brusse – Date: 2020-07-08 |
| Last updated by: ETSI Secretariat – Date: 2021-03-08 |
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Terms of Reference –Specialist Task Force Proposal

STF 598 (ISG NFV)

OpenAPI Representations for NFV

Summary information

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| --- | --- | --- | --- |
| Approval status | Approved by remote consensus by Ref. Body ISG NFV (doc ref: NFV(20)000157r1) on 2020-09-11 and NFV(21)0000041r1 on 2021-01-25 | | **YES** |
| Approved by Board#129 (2020-09-22) | | **YES** |
| Reference Body | ISG NFV | | |
| ETSI Funding | **Maximum budget : 60 000 EUR** | | |
| Minimum of 4 ETSI Members Support | **YES** | | |
| Time scale | **From** | 2021-03-22 | |
| **To** | 2022-07-31 | |
| Work Items | RMI/NFV-SOL008ed2021 | | |
| Board priority | [ETSI STF funding criteria](https://portal.etsi.org/STF/STFs/Funding/ETSIbudget.aspx)   |  |  | | --- | --- | | **Priority Criteria** |  | | Maintenance of standards in mature domains |  | | Innovation in mature domains |  | | Emerging domains for ETSI |  | | Horizontal activities (quality, security, etc.) | X | | Societal good / environmental |  | | | |

Part I – STF Technical Proposal

# Rationale & Objectives

## Rationale

Within the ETSI Industry Specification Group (ISG) on Network Functions Virtualisation (NFV), the Solutions (SOL) working group develops the specifications of a set of APIs enabling access to NFV Management and Orchestration services in a multi-vendor environment. This currently represents over 30 APIs and is expected to increase with the advent of Release 4 and beyond. In the rest of this document, these APIs are designated as NFV-MANO APIs.

NFV-MANO API specifications are made available to the industry in two forms:

* A conventional Group Specification (GS) where APIs are specified using text and tables.
* A formal description using the [OpenAPI](https://swagger.io/specification/) specification language, formerly known as Swagger.

The OpenAPI representations of the APIs can be regarded as a representation of the contents of the corresponding GSs in a machine-processable language. The availability of the OpenAPI representations to the industry is intended to facilitate the development and validation of products exposing or consuming the specified APIs. The initial versions of the OpenAPI representations were created, with the help of ETSI CTI, by few WG delegates. The experience has shown that the amount of human resources required to develop, review, and maintain these specifications is beyond what can be provided on a voluntary basis by the delegates. Indeed, the translation of conventional API specifications into the OpenAPI language requires highly specialised knowledge and significant, concentrated effort. The involvement of STF resources is needed to continue ensuring effective development and maintenance of all OpenAPI representations of the NFV-MANO APIs specified by ETSI NFV.

It should be noted that the development of OpenAPI representations is not a specification development activity but consists in translating the contents of approved GSs developed by the ISG into representations in a formal language. This work is similar to the translation of test specifications into TTCN or other Domain Specific Language, and requires specialist resources for the same reasons.

Resorting to STF resources for supporting this work is all the more critical that maintenance versions of GSs are typically revised and approved every six (6) months. For each maintenance version of the GSs describing APIs, updates to the OpenAPI representations are required. Moreover, bugs reported on OpenAPI files need to be resolved and the solution implemented within the OpenAPI representation in less than one month, consistent with the Key Performance Indicators (KPIs) defined by ETSI NFV OpenAPI governance.

The ISG NFV SOL working group cannot perform this work in a reasonable timeframe on the sole basis of voluntary resources. STF 563 and STF 586 resources have been used during the past two years to perform this work.

## Objectives of the work to be executed

The work to be performed is to develop, enhance and maintain the OpenAPI representations of existing and new NFV-MANO API specifications. This work is the continuation of the work performed by STF 586 in 2020.

Furthermore, beyond the actual code development effort, it is essential to provide easy access to up-to-date OpenAPI representations of all versions of the NFV API specifications. This requires maintaining a set of Wiki Pages.

## Previous funded activities in the same domain

The completion and maintenance/upgrade of Release 2 specifications and the development of the initial sets of Release 3 specifications have been performed with the support of STF 563 and 586.

So far, the specifications of conformance tests for the NFV-MANO APIs were developed by the ISG with the support of STF 557 and STF 583 on “NFV API conformance test specification”. This work is expected to continue during the 2021/2022 timeframe with the support of an ETSI-funded Testing Task Force (TTF).

## Market impact

The size of the NFV market is large and is expected to continue growing (e.g. ABI Research estimates that total NFV market revenues will reach $38 bn in 2022, Ovum estimates that the NFV market NFV is projected to hit $48bn in 2024) and the impact of ETSI NFV specifications on this market is undisputable.

The ETSI NFV specifications are referenced and/or used by operators, vendors and open source communities involved in NFV deployments. However, the availability of representations of the ETSI NFV API specifications in the OpenAPI specification language is essential to speed up the integration of these APIs in industry products. Moreover, this form of machine-processable specifications is essential to automate the development of API conformance test suites.

## Consequences if not agreed

The lack of resources will lead to significant delays in developing and maintaining high-quality OpenAPI representations, at the risk of making them irrelevant to the industry, thereby leading to much longer integration times for operators as they look to piece together an NFV system, and a general loss of confidence in the industry of the NFV system itself. Further, automated generation of conformance test specifications would not be possible if OpenAPI representations were not available. Indeed STF 557 and STF 583 have made a direct use of the OpenAPI representations delivered by STF 563 and STF 586 and the same working method is anticipated to continue to be used in the coming years.

# Relation with ETSI strategy and priorities

The activity to be performed by this STF directly relates to the ISG mission of enabling the creation of an open industry ecosystem for NFV.

This action supports the ETSI Long Term Strategy item(s) to:

* create high quality standards for global use and with low time-to-market, and
* establish leadership in key areas impacting members’ future activities.

This activity falls into the standards enablers category identified in BOARD(19)123\_014, as the availability of OpenAPI descriptions is a major enabler for interoperability in a multi-vendor NFV ecosystem.

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| --- | --- |
| **Priority Criteria** | **Rationale** |
| Maintenance of standards in mature domains |  |
| Innovation in mature domains |  |
| Emerging domains for ETSI |  |
| Horizontal activities (quality, security, etc.) | The availability of representations of the ETSI NFV API specifications in the OpenAPI specification language is essential to speed up the adoption and integration of these APIs in industry products.  Producing and maintaining high-quality API representations in the OpenAPI language requires highly specialised knowledge and significant, concentrated effort, beyond what can be provided on a voluntary basis by the delegates. |
| Societal good / environmental |  |

# ETSI Members Support

The list of ETSI Members supporting the request for this STF and the names of the supporting delegates are in the table below.

|  |  |  |
| --- | --- | --- |
| **#** | **ETSI Member** | **Supporting delegate** |
| 1 | Ericsson | Vlademir Brusse |
| 2 | Orange | Bruno Chatras |
| 3 | Nokia Germany | Uwe Rauschenbach |
| 4 | DOCOMO Communication Labs. | Yuya Kuno |
| 5 | ZTE | Manchang Ju |
| 6 | Huawei | Xu Yang |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Status** |
| ETSI GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point | Published  (v2.8.1) |
| ETSI GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point | Published  (v3.3.1)  Early draft (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point | Work Items to be created |
| ETSI GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point | Published  (v2.8.1) |
| ETSI GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point | Published  (v3.3.1)  Stable draft (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point | Work Items to be created |
| ETSI GS NFV-SOL 005 | Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point | Published  (v2.8.1) |
| ETSI GS NFV-SOL 005 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point | Published  (v3.3.1)  Work Item created (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 005 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point | Work Items to be created |
| ETSI GS NFV-SOL 009 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO | Published  (v3.3.1)  Stable draft (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 009 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO | Work Items to be created |
| ETSI GS NFV-SOL 011 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Or Reference Point | Published  (v3.3.1)  Work Item created  (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 011 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Or-Or Reference Point | Work Items to be created |
| ETSI GS NFV-SOL 012 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface | Published  (v3.3.1)  Final draft (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 012 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface | Work Items to be created |
| ETSI GS NFV-SOL 013 | Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs | Published  (v2.8.1) |
| ETSI GS NFV-SOL 013 | Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs | Published  (v3.3.1)  Work item created  (v3.4.1)  Work Items to be created  (v3.5.1)  (v3.6.1) |
| ETSI GS NFV-SOL 013 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs | Work Items to be created |
| ETSI GS NFV-SOL 015 | Network Functions Virtualisation (NFV); Protocols and Data Models; Specification of Patterns and Conventions for RESTful NFV-MANO APIs | Published  (v1.1.1)  Final draft (v1.2.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 002 – Release 2  (<https://forge.etsi.org/rep/nfv/SOL002>) | Published  (v2.7.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 002 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL002>) | Final Draft  (v3.3.1)  To be developed by STF586  (v3.4.1)  (v3.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 003 – Release 2  (<https://forge.etsi.org/rep/nfv/SOL003>) | Published  (v2.7.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 003 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL003>) | Final Draft  (v3.3.1)  To be developed by STF586  (v3.4.1)  (v3.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 005 – Release 2  (<https://forge.etsi.org/rep/nfv/SOL005>) | Published  (v2.7.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 005 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL005>) | Final Draft  (v3.3.1)  To be developed by STF586  (v3.4.1)  (v3.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 009 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL009>) | Published  (v3.3.1)  To be developed by STF586  (v3.4.1)  (v3.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 011 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL011>) | Published  (v3.3.1)  To be developed by STF586  (v3.4.1)  (v3.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 012 – Release 3  (<https://forge.etsi.org/rep/nfv/SOL012>) | To be developed by STF 586  (v3.4.1)  (v3.5.1) |
| NFV SOL Wiki | Working title: ETSI NFV OpenAPI Governance – Release 3  ([[SOL OpenAPI Representations wiki](https://nfvprivatewiki.etsi.org/index.php?title=SOL_OpenAPI_Representations)](https://nfvprivatewiki.etsi.org/index.php?title=SOL_OpenAPI_Representations)) | Not Applicable |

## New deliverables

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| --- | --- | --- | --- |
| **Deliv.** | **Work Item code**  **Standard number** | **Working title**  **Scope** | **Expected date for publication** |
| D1 | RMI/NFV-SOL008ed2021 | Working title: OpenAPI Work Programme 2021  Scope: This work item aims at creating and managing the OpenAPI work programme. This will enable the ETSI NFV OpenAPI work to be tracked within the ETSI Work Programme to assess progress towards the completion of deliverables. | 31 March 2022 |

The scope of each API representation, for each specific version, will be visualized on the SOL Wiki page ([[SOL OpenAPI Representations wiki](https://nfvprivatewiki.etsi.org/index.php?title=SOL_OpenAPI_Representations)](https://nfvprivatewiki.etsi.org/index.php?title=SOL_OpenAPI_Representations)) and will be composed by:

* API yaml file
* Swagger editor file
* API PDF file

NOTE: The RMI/NFV-SOL008ed2021 work item frames the activities of the ETSI NFV SOL working group on the development and maintenance of OpenAPI representations. The actual deliverables from the STF will be a set of OpenAPI files, available on GitLab on the ETSI Forge platform (see <https://forge.etsi.org/>).

# Maximum budget

## Task summary/Manpower Budget

The budget per task allocated for this STF is specified below.

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| **Task short description** | Budget (EUR) |
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| T0 | 3 000 |
| T1 | 5 000 |
| T2 | 8 000 |
| T3 | 7 000 |
| T4 | 11 000 |
| T5 | 14 000 |
| T6 | 3 000 |
| **TOTAL** | 51 000 |

## Travel budget

All tasks can be performed 100% remotely. There is a requirement on the STF resources to participate in the 2Q2021, 3Q2021 and 4Q2021 ETSI NFV Plenary meetings to review STF progress status on the tasks and milestones in this ToR.

9 000 EUR to travel to 3 NFV ISG meetings: 2 in Europe + 1 overseas (US, Europe or Asia).

## Other budget line

Part II – Details on STF Technical Proposal

# Tasks, Technical Bodies and other stakeholders

## Organization of the work

A Steering Committee will be created to assist the STF experts in understanding the GSs to make sure the OpenAPI files produced are an accurate translation of the contents of these GSs. The Steering Group will be composed as follows:

* The Rapporteur of the RMI/NFV-SOL008ed2021 work item
* A representative from ETSI CTI
* The Rapporteurs of the relevant ETSI NFV GSs
* Designated experts from the ETSI NFV SOL working group currently involved in the development of OpenAPI files
* A representative of the Steering Committee of STF 583 or any successor STF in charge of developing API conformance tests.

## Tasks for which the STF support is necessary

The STF support is necessary to develop OpenAPI representations for a set of versions of the APIs specified in GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as new GSs that might be created by the ISG during the 2020/2021 timeframe*.*

NOTE: In the tasks descriptions, the “first Release 4 version” and “second Release 4 version” are used as a placeholder to indicate the first and second versions part of the Release 4 for which OpenAPI representations are expected to be delivered by the STF. In the ETSI NFV, the stage 3 deliverable versions usually align with the version of the associated deliverables from stage 2. At present, it is not possible to determine the initial version from stage 2 that will be used for the specification of the stage 3 solutions.

Experience during the past four years has shown that the translation of conventional API specifications into the OpenAPI language requires highly specialised knowledge and significant, concentrated effort. The involvement of STF resources is needed to continue ensuring effective development and maintenance of all OpenAPI representations of the NFV-MANO APIs specified by ETSI.

Furthermore, it is essential to provide easy access to up-to-date OpenAPI representations of all versions of the ETSI NFV API specifications. This requires maintaining a set of Wiki Pages.

The ISG NFV SOL working group cannot perform this work in a reasonable timeframe on the sole basis of voluntary resources. STF 563 and STF 586 resources have been used during the past two years to perform this work.

## Other interested ETSI Technical Bodies

ETSI OSM, ETSI MEC, and ETSI ZSM will be made aware of the availability of new OpenAPI files and encouraged to provide feedback.

## Other stakeholders

Open source communities involved in the development of NFV management and orchestration solutions will be made aware of the availability of new OpenAPI files and encouraged to provide feedback.

Part III: Execution of Work

# Work plan, time scale and resources

## Task description

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| --- | --- |
| **Task #0** | **T0 – Project Management** |
| **Objectives** | * Technical lead of the STF * Manage the resources assigned to this project * Chair periodic meetings of the STF * Ensure that the project stays on track and meets all milestone delivery dates * Identify if/when there are impediments that may affect the delivery of the project at an early stage so that stakeholders can help mitigate potential risks |
| **Input** | * Periodic meetings of this STF, reflecting interactions (as shown below). * The tasks and schedule in this STF. |
| **Output** | * Progress reports, including report to the SOL WG after each Steering Committee meeting summarizing the current status of this STF * Intermediate reports to the STF Steering Committee * Final report |
| **Interactions** | The Steering Committee for this STF will be consulted for guidance throughout the STF. There will be regular interactions between the experts and the STF Steering Committee.  The SOL WG will review the progress of the ToR tasks. |
| **Resources required** | One of the resources required for this STF which is charged with the responsibility to manage the delivery of the tasks according to the milestone table (see clause 7.4), in addition to contributing to other tasks. |

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| **Task #1** | **T1 – OpenAPI Representations Quality Management**  The OpenAPI Representations Quality Management task is composed by three subtasks:   * Refine the methodology to define OpenAPI representations. * Make recommendations for ETSI CTI tool enhancements. * Review and update OpenAPI governance procedures. |
| **Objectives** | * Evaluate and update/refine the methodology used to define OpenAPI representations of NFV-MANO APIs. * Recommend ETSI CTI tool enhancements on a quarterly basis to help improve the bug tracking and reporting capabilities available and enable better management of the OpenAPI work programme. * Review and update OpenAPI governance procedures to determine if the OpenAPI governance procedures/criteria continue to meet the needs of ETSI NFV. |
| **Input** | * Available OpenAPI representations and contents of the NFV-SOL Wiki pages. * Available ETSI CTI tools and ETSI CTI tools enhancement recommendations made in ETSI NFV SOL WG. * Current OpenAPI governance procedures published on the public and private ETSI NFV Wikis. * Publicly available information from other SDOs (e.g., TM Forum) about their governance procedures that can be potentially leveraged within ETSI NFV. |
| **Output** | * A contribution to the ETSI NFV SOL WG to propose evolutions of the methodology, if any. * Input to ETSI CTI proposing recommendations for additional ETSI CTI tool enhancements. * A contribution to the ETSI NFV SOL WG to propose recommendations for enhancements to OpenAPI governance procedures. |
| **Interactions** | * The Steering Committee for this STF will be consulted to produce the design considerations. * The Steering Committee for this STF will be consulted to propose recommendations for ETSI CTI enhancements pertaining to OpenAPI representations. * The Steering Committee for this STF will be consulted to propose enhancements to the OpenAPI governance procedures. |
| **Resources required** | All STF resources are required to be a participant in this task, whereby at least one resource shall have significant OpenAPI expertise and be familiar with open source tools such as Swagger, BugZilla, GitLab and Jenkins. |

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| **Task #2** | **T2 – VNF LCM API producer emulation** |
| **Objectives** | Develop a server emulation facilitating a try-and-learn approach to SOL APIs using the “try-it out” feature of the Swagger UI.  The server emulation developed within the framework of this task is limited to version 3.3.1 of the VNF LCM API. However, it shall be designed in a way that facilitate extension to other versions of this API and to other NFV-MANO APIs. |
| **Input** | * OpenAPI representations of the VNF LCM API version 3.3.1. |
| **Output** | * A software module emulating the VNF LCM API producer, integrated with the Swagger UI. The emulation focuses on sending consistent replies and notifications to the API consumer during the lifetime of a VNF. Interactions with the NFVO and VIM are emulated by a “no-op” function. |
| **Interactions** | The Steering Committee for this STF will be consulted for guidance when developing this software module. |
| **Resources required** | At least two resources with significant OpenAPI expertise, including one resource with knowledge of ETSI NFV-SOL GSs on NFV-MANO APIs. |

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| **Task #3** | **T3 – Create Release 3 GS OpenAPI Representations, version 3.6.1** |
| **Objectives** | Completion of OpenAPI representations for versions 3.6.1. |
| **Input** | * Version 3.6.1 of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, GS NFV-SOL 013 and last approved version of GS NFV-SOL 015. * OpenAPIs for version 3.5.1 of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012. |
| **Output** | * Final versions 3.6.1 of OpenAPI representations for all APIs defined in the input GSs, published on the ETSI Forge platform and referenced from both the public and private SOL WG Wiki pages, reflecting the definition of OpenAPIs, including those resulting from bug reports. |
| **Interactions** | The Steering Committee for this STF will be consulted for guidance when processing bug reports and for completing the development of the OpenAPI representation of the APIs.  The SOL WG will approve the final versions of the OpenAPI files. |
| **Resources required** | At least two resources with significant OpenAPI expertise, including one resource with knowledge of ETSI NFV-SOL GSs on NFV-MANO APIs. |

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| **Task #4** | **T4 – Create Release 4 OpenAPI Representations of ETSI NFV-MANO APIs, “first version in Release 4”** |
| **Objectives** | Develop and maintain OpenAPI representations for version the first version of the APIs defined in ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as in new Release 4 GSs that may be created during this timeframe. |
| **Input** | * First Release 4 version of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, GS NFV-SOL 013, as well as new GSs that may be created during the timeframe, and last approved version of GS NFV-SOL 015. * OpenAPIs for version 3.5.1 and drafts of 3.6.1 of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012. |
| **Output** | * Final versions of OpenAPI representations for all APIs defined in the first Release 4 version of the input GSs, published on the ETSI Forge platform and referenced from both the public and private SOL WG Wiki pages, including those resulting from bug reports. |
| **Interactions** | See Task #2. |
| **Resources required** | See Task #3. |

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| **Task #5** | **T5 – Create Release 4 OpenAPI Representations of ETSI NFV-MANO APIs, “second version in Release 4”** |
| **Objectives** | Develop and maintain OpenAPI representations for the 2nd Release 4 version of the APIs defined in ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as in new Release 4 GSs that may be created during this timeframe. |
| **Input** | * Second Release 4 version of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, GS NFV-SOL 013 and last approved version of GS NFV-SOL 015, as well as new Release 4 GSs that may be created during this timeframe. * OpenAPIs for the first Release 4 version of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as of new Release 4 GSs that may be created during this timeframe. |
| **Output** | * Final versions of OpenAPI representations for all APIs defined in the second Release 4 version of the input GSs, published on the ETSI Forge platform and referenced from both the public and private SOL WG Wiki pages, including those resulting from bug reports. |
| **Interactions** | See Task #2. |
| **Resources required** | See Task #3. |

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| **Task #6** | **T6 – Maintenance of published OpenAPI Representations** |
| **Objectives** | Maintenance of all published OpenAPI representations for Release 2, 3 and 4 versions of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as of new Release 4 GSs that may be created during this timeframe. This task includes the maintenance of OpenAPI representations published in the past, in addition to those which are output from other tasks of the present STF, such as versions 2.8.1, 3.6.1, and the first Release 4 version. |
| **Input** | * All published versions of OpenAPI representations of ETSI GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as of new Release 4 GSs that may be created during this timeframe. |
| **Output** | * Maintenance of all published Release 2, 3 and 4 versions of OpenAPI representations. |
| **Interactions** | See Task #2. |
| **Resources required** | See Task #3. |

## Milestones

Milestone 0 – STF 598 Kick-off Meeting

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| **Milestone** | **Description** | **Cut-Off Date** |
| **0** | STF 598 Kick-off Meeting | 2021-03-22 |
|  |  |
|  | Start of work planned for March 22, 2021 |

Milestone B – Requirements and Design specification of the VNF LCM API producer emulation tool

* Requirements and Design specification of the “VNF LCM API producer emulation tool”.
* Available late May 2021.
* No approval is required.
* This milestone is associated with Task #2.

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| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | Requirements and Design specification of the “VNF LCM API producer emulation tool”. | 2021-05-31 |

Milestone C1 – Proof of Concept version of the VNF LCM API producer emulation tool

* Proof of Concept version of the “VNF LCM API producer emulation tool”.
* Available mid September 2021.
* No approval is required. The STF shall perform a demo of the tool.
* This milestone is associated with Task #2.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C1** | Proof-of-concept version of the software. | 2021-09-15 |
|  | Demonstration. |

Milestone C2 – Final version of the VNF LCM API producer emulation tool

* Final version of the “software design documentation”, manual of use of the emulation tool and final version of the software of the “VNF LCM API producer emulation tool”.
* Available late November 2021.
* No approval is required. The STF shall perform a demo of the tool.
* This milestone is associated with Task #2.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C2** | Final documentation of the software design of the “VNF LCM API producer emulation tool”. | 2021-11-30 |
|  | User manual of the tool. |
|  | Final version of the software. |
|  | Demonstration. |

Milestone D – First drafts available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (v3.6.1)

First draft of all OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (all v3.6.1) available on the ETSI Forge platform.

Available late September 2021.

No approval required as this is a first draft, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #3.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | First drafts available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (v3.6.1) | 2021-09-30 |
|  | First Drafts v3.6.1 available on the ETSI Forge platform for verification. |

Milestone E – Final versions available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (v3.6.1)

Final versions of all OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (all v3.6.1) available on the ETSI Forge platform.

Available late October 2021.

SOL WG approval of these OpenAPI representations is planned for October 2021.

This milestone is associated with Task #3.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **E** | Final versions available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012 (v3.6.1) | 2021-10-31 |
|  | Final versions 3.6.1 available on the ETSI Forge platform for verification. |
|  | Final versions 3.6.1 approved by SOL WG. |

Milestone F – First drafts available for OpenAPI representations of the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 GS NFV-SOL 012 and new GSs created during the timeframe

First draft of all OpenAPI representations covering the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012 and new GSs created during the timeframe available on the ETSI Forge platform.

Available mid December 2021.

No approval required as this is a first draft, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #4.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **F** | First drafts available for OpenAPI representations of the first release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as for new GSs that may be created during this timeframe | 2021-12-15 |
|  | First Drafts available on the ETSI Forge platform for verification. |

Milestone G – Final versions available for OpenAPI representations of the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 GS NFV-SOL 012 and new GSs created during the timeframe

Final versions of all OpenAPI representations covering the first Release 4 version GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012 and new GSs created during the timeframe available on the ETSI Forge platform.

Available late January 2022.

SOL WG approval of these OpenAPI representations is planned for January 2022.

This milestone is associated with Task #4.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **G** | Final versions available for OpenAPI representations of the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012, as well as for new GSs that may be created during the timeframe. | 2022-01-31 |
|  | Final versions available on the ETSI Forge platform for verification. |
|  | Final versions approved by SOL WG. |

Milestone H – First drafts available for OpenAPI representations of the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, and new GSs created during the timeframe.

First draft of all OpenAPI representations covering the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012 and new GSs created during the timeframe available on the ETSI Forge platform.

Available late June 2022.

No approval required as this is a first draft, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #5.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **H** | First drafts available of the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012 OpenAPI representations, as well as for new GSs that may be created during this timeframe. | 2022-06-30 |
|  | First Drafts available on the ETSI Forge platform for verification. |

Milestone I – Final versions available for OpenAPI representations of the second release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 GS NFV-SOL 012, and new GSs created during the timeframe

Final versions of all OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 and new GSs created during the timeframe (all v4.5.1) available on the ETSI Forge platform.

Available late July 2022.

SOL WG approval of these OpenAPI representations is planned for July 2022.

This milestone is associated with Task #5.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **I** | Final versions available for OpenAPI representations of the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012, as well as for new GSs that may be created during this timeframe. | 2022-07-31 |
|  | Final versions available on the ETSI Forge platform for verification. |
|  | Final versions approved by SOL WG. |

Milestone J – First round of maintenance of published OpenAPI representations

Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 available on the ETSI Forge platform.

Available late October 2021.

No approval required as this is regular maintenance, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #6.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **J** | Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012. | 2021-10-31 |
|  | Final versions available on the ETSI Forge platform for verification. |

Milestone K – Second round of maintenance of published OpenAPI representations

Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 available on the ETSI Forge platform. This includes also the maintenance of published OpenAPI representations output from Task #2.

Available late January 2022.

No approval required as this is regular maintenance, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #6.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **K** | Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012. | 2022-01-31 |
|  | Final versions available on the ETSI Forge platform for verification. |

Milestone L – Third round of maintenance of published OpenAPI representations

Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 and new GSs created during the timeframe available on the ETSI Forge platform. This includes also the maintenance of published OpenAPI representations output from Tasks #2, #3 and #4.

Available late July 2022.

No approval required as this is regular maintenance, though the content must be reviewed as part of this STF to help ensure that the level of detail exceeds expectations and the work is technically sound.

This milestone is associated with Task #6.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **L** | Maintenance of all published OpenAPI representations covering GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, and GS NFV-SOL 012 and new GSs created during the timeframe. | 2022-07-31 |
|  | Final versions available on the ETSI Forge platform for verification. |

**Milestone M – STF Closed**

Planned at the end of July 2022.

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| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **M** | STF Closed | 2022-07-31 |
|  | Planned STF concluded. |

## Task summary

**Milestones Schedule**

| Code | Task / Milestone | Target Date |  | Estimated Cost (EUR) |
| --- | --- | --- | --- | --- |
|  |  | From | To |  |
| Milestone A | Start of work | 22-Mar-21 |  |  |
| T0 | Project management | 22-Mar-21 | 31-Jul -22 | 3 000 |
| T1 | OpenAPI Representations Quality Management | 22-Mar-21 | 31-Jul -22 | 5 000 |
| T2 | VNF LCM API producer emulation | 22-Mar-21 | 30-Nov-21 | 8 000 |
| Milestone B | Requirements and Design specification of the VNF LCM API producer emulation tool |  | 31-May-21 |  |
| Milestone C1 | Proof-of-concept version of the VNF LCM API producer emulation tool |  | 15-Sep-21 |  |
| Milestone C2 | Final version of the VNF LCM API producer emulation tool |  | 30-Nov-21 |  |
| T3 | Create Release 3 GS OpenAPI Representations, versions 3.6.1 | 01-Jun-21 | 31-Oct-21 | 7 000 |
| Milestone D | First drafts available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (v3.6.1) |  | 30-Sep-21 |  |
| Milestone E | Final versions available for OpenAPI representations of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 (v3.6.1) Progress Report#2 approved by the Steering Committee (reporting on milestones E, and K) |  | 31-Oct-21 |  |
| T4 | Create OpenAPI Representations for the first of version in Release 4 of ETSI NFV-MANO APIs for propagated GSs | 01-Sep-21 | 31-Jan-22 | 11 000 |
| Milestone F | First drafts available for OpenAPI representations of the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012 |  | 15-Dec-21 |  |
| Milestone G | Final versions available for OpenAPI representations of the first Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011 and GS NFV-SOL 012  Progress Report#3 approved by the Steering Committee |  | 31-Jan-22 |  |
| T5 | Create OpenAPI Representations for the second version of Release 4 ETSI NFV-MANO APIs, including new APIs in new GSs that may be created during this timeframe. | 01-Mar-22 | 31-Jul-22 | 14 000 |
| Milestone H | First drafts available for OpenAPI representations of the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012, as well as new GSs that may be created during this timeframe |  | 30-Jun-22 |  |
| Milestone I | Final versions available for OpenAPI representations of the second Release 4 version of GS NFV-SOL 002, GS NFV-SOL 003, GS NFV-SOL 005, GS NFV-SOL 009, GS NFV-SOL 011, GS NFV-SOL 012 OpenAPI, as well as new GSs that may be created during this timeframe  Final Report approved by ISG NFV (including reporting on milestones I and L) |  | 31-Jul-22 |  |
| T6 | Maintenance of published OpenAPI Representations. | 22-Mar-21 | 31-Jul-22 | 3 000 |
| Milestone J | First round of maintenance of published OpenAPI representations  Progress Report#1 approved by the Steering Committee (reporting on milestones E and J) |  | 31-Oct-21 |  |
| Milestone K | Second round of maintenance of published OpenAPI representations Progress Report#2 approved by the Steering Committee (reporting on milestones G and K) |  | 31-Jan -22 |  |
| Milestone L | Third round of maintenance of published OpenAPI representations Final Report approved by ISG NFV (including reporting on milestones I and L) |  | 31-Jul -22 |  |
| Milestone M | Deliverables published, STF closed |  | 31-Jul -22 |  |
|  | | | | **51 000** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Task/ Mil.** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |  | **J** | **F** | **M** | **A** | **M** | **J** | **J** |
| MA |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MB |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MC1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MC2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MD |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ME |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MF |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MG |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MH |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MI |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MJ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MK |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ML |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MM |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

# Expertise required

## Team structure

The team structure to develop the STF activities defined in this ToR will be provided at least for 2(two) participants to ensure the following mix of competences.

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

|  |  |
| --- | --- |
| **Priority** | **Qualifications and competences** |
| High | Expert knowledge of ETSI NFV Group Specifications |
| High | Expert knowledge of NFV Management and Orchestration (NFV MANO) |
| High | Expert knowledge of the OpenAPI specification language (RESTful API design and Open API Specification 3.0) |
| High | Experience with software engineering best practices and excellent knowledge of GitLab DevOps lifecycle tool, Git-repository management, and continuous integration/continuous deployment (CI/CD) pipeline features, Jenkins. |
| High | Expert knowledge of scripting languages (Bash, Python, Javascript, JSON) |
| High | Knowledge of the tools for OpenAPIs drafting and reporting (in particular Swagger open-source software framework and tools) |

Part IV: STF performance evaluation criteria

# Performance Indicators

The ToR Performance Indicators identified in the scope of this STF are described in the table below. The indicators will be used to assess the quality of the STF results. The STF Leader will collect the relevant information, as necessary to measure the performance indicators and the results must be presented in the Final Report.

The performance indicators must include qualitative and quantitative assessment of the following elements, as applicable:

|  |  |
| --- | --- |
| **Select relevant Performance indicators applicable for these ToR (X)** | |
| Contribution from ETSI Members to STF work | |
| Bi-weekly Steering Committee meetings | X |
| Contributions/comments received from the reference TBs | X |
|  |  |
| **Contribution from the STF to ETSI work** | |
| Contributions to SOL WG meetings throughout 2021 | X |
| Presentations in workshops, conferences, stakeholder meetings | X |
|  |  |
| **Liaison with other stakeholders** | |
| Comments received on OpenAPI representations via BugZilla | X |
| Propose resolution to comments received on the SOL WG mailing list and implement and approve the resolutions on GitLab | X |
|  |  |
| **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 TB | X |
| Comments from Quality review by ETSI Secretariat | X |
|  |  |

Time recording

For reporting purposes, the STF experts shall fill in the time sheet provided by ETSI with the days spent for the performance of the services

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

# Document history

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 0.0 | 2020-07-08 | Vlademir |  | Initial draft of ToR. |
| 0.1 | 2020-08-20 | Youssouf Sakho | ISG NFV approval pending |  |
| 0.2 | 2020-08-27 | Bruno | ISG NFV approval pending | Updated according to ETSI Secretariat’s comments |
| 0.3 | 2020-10-22 | ETSI Secretariat | Board Approved | Update before CL publication |
| 0.4 | 2021-01-25 | ETSI Secretariat | ISG NFV approved | Update before Preparatory Meeting |
| 0.5 | 2021-03-04 | ETSI Secretariat | Board Approved | Updates after Preparatory Meeting |
| 0.6 | 2021-03-08 | ETSI Secretariat | Board Approved | Updates after Preparatory Meeting: Milestone dates consistency. |