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| ToR STF 624 (ISG NFV) |
| Version: 0.8 |
| Author: Arturo Martin de Nicolas – Date:2023-02-09 |
| Last updated by:ETSI Secretariat– Date: 2023-02-27 |
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Terms of Reference –Specialist Task Force Proposal

STF 624 (ISG NFV)

OpenAPI representations for NFV

Summary information

|  |  |  |  |
| --- | --- | --- | --- |
| Approval status | Approved by remote consensus by Ref. Body ISG NFV (NFV(21)000175r1 ) on September 22, 2021  New version approved by remote consensus by Ref> Body ISG NFV (NFV(23)000055) on March the 16th 2023 | | **YES** |
| Approved by Board#134 (2021-09-22) | | **YES** |
| Reference Body | ISG NFV | | |
| ETSI Funding | **Maximum budget :48 000  EUR** | | |
| Minimum of 4 ETSI Members Support | **YES** | | |
| Time scale | **From** | July 2023 | |
| **To** | August 2024 | |
| Work Items | RMI/NFV-SOL008ed2023 | | |
| 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 a large number APIs, considering the multiple versions, which will increase with the advent of Release 5 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 thus 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, STF 586 and STF 598 resources have been used during the past 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 598 in 2021-2023.

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 and Release 3 specifications and the development of the initial sets of Release 4 specifications have been performed with the support of STF 563, 586 and 598.

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”, and TTF T015 “NFV API Conformance test specification maintenance and development”. This work is expected to continue during the 2023/2024 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. Ovum, now part of Omdia, 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. Furthermore, automated generation of conformance test specifications would not be possible if OpenAPI representations were not available. Indeed STF 557, STF 583 and TTF T015 have made a direct use of the OpenAPI representations delivered by STF 563, STF 586 and STF 598 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 | Nokia Germany | Uwe Rauschenbach |
| 3 | DOCOMO Communication Labs. | Yuya Kuno |
| 4 | ZTE | Manchang Ju |
| 5 | Huawei | Xu Yang |

# Deliverables

## Base documents

|  |  |  |
| --- | --- | --- |
| **Document** | **Title** | **Status** |
| ETSI GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point | To be Published  (v4.5.1) |
| ETSI GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point | To be Published  (v5.1.1) |
| ETSI GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point | To be Published (v4.5.1) |
| ETSI GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point | To be Published (v5.1.1) |
| 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 | To be Published (v4.5.1) |
| ETSI GS NFV-SOL 005 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point | To be Published (v5.1.1) |
| ETSI GS NFV-SOL 009 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO | To be Published (v4.5.1) |
| ETSI GS NFV-SOL 009 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; RESTful protocols specification for the management of NFV-MANO | To be Published (v5.1.1) |
| ETSI GS NFV-SOL 012 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface | To be Published (v4.5.1) |
| ETSI GS NFV-SOL 012 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; RESTful protocols specification for the Policy Management Interface | To be Published (v5.1.1) |
| ETSI GS NFV-SOL 013 | Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs | To be Published (v4.5.1) |
| ETSI GS NFV-SOL 013 | Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; Specification of common aspects for RESTful NFV MANO APIs | To be Published (v5.1.1) |
| ETSI GS NFV-SOL 015 | Network Functions Virtualisation (NFV); Protocols and Data Models; Specification of Patterns and Conventions for RESTful NFV-MANO APIs | Published  (v1.2.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 002 – Release 4  (<https://forge.etsi.org/rep/nfv/SOL002>) | To be Published  (v4.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 002 – Release 5  (<https://forge.etsi.org/rep/nfv/SOL002>) | To be Published  (v5.1.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 003 – Release 4  (<https://forge.etsi.org/rep/nfv/SOL003>) | To be Published (v4.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 003 – Release 5  (<https://forge.etsi.org/rep/nfv/SOL003>) | To be Published (v5.1.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 005 – Release 4  (<https://forge.etsi.org/rep/nfv/SOL005>) | To be Published (v4.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 005 – Release 5  (<https://forge.etsi.org/rep/nfv/SOL005>) | To be Published (v5.1.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 009 – Release 4  (<https://forge.etsi.org/rep/nfv/SOL009>) | To be Published  (v4.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 009 – Release 5  (<https://forge.etsi.org/rep/nfv/SOL009>) | To be Published  (v5.1.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 012 – Release 4  (<https://forge.etsi.org/rep/nfv/SOL012>) | To be Published  (v4.5.1) |
| OpenAPI Representations | OpenAPI representation for ETSI GS NFV-SOL 012 – Release 5  (<https://forge.etsi.org/rep/nfv/SOL012>) | To be Published  (v5.1.1) |
| NFV SOL Wiki | Working title: ETSI NFV OpenAPI Governance – Release 4 & Release 5.  ([[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-SOL008ed2023 | Working title: OpenAPI Work Programme 2023  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 August 2024 |

The scope of each OpenAPI 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
* UI (Swagger UI visualization)
* API PDF file

NOTE: The RMI/NFV-SOL008ed2023 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) |
|
| T0 – Project Management | 3 000 |
| T1 – OpenAPI Representations Quality Management | 5 000 |
| T2– VNF LCM API producer emulation | 8 000 |
| T3– Update Release 4 GS OpenAPI Representations | 7 000 |
| T4– Create OpenAPI Representations of ETSI NFV-MANO Release 5 GS APIs | 13 000 |
| T5– Maintenance of published OpenAPI Representations | 3 000 |
| **TOTAL** | 39 000 |

## Travel budget

All tasks can be performed 100% remotely. There is a requirement on the STF resources to participate in the 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

NA

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-SOL008ed2023 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 624 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 009GS NFV-SOL 012, as well as new GSs that might be created by the ISG during the 2021/2022 timeframe*.*

Experience during the past 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, STF 586 and STF 598 resources have been used during the past three 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 and related SOL API development 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** | Update the LCM API producer emulation to align with new API versions to be determined by the Steering Committee and add support for new features (e.g..allow user to upload their own VNFD, support of multiple VDUs, support of multiple DFs, support more scaling scenarios, etc.) to be to be selected by the Steering Committee |
| **Input** | * OpenAPI representations of the VNF LCM API version 4.4.1. * The first version of the LCM API emulation tool developed as part of STF598. |
| **Output** | * An updated version of the software module emulating the VNF LCM API producer, integrated with the Swagger UI exhibiting the new agreed features. 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 – Update Release 4 GS OpenAPI Representations** |
| **Objectives** | Update OpenAPI representations of Release 4 GSs to align with the latest published versions (beyond what is developed by STF598) within the 2023-2024 timeframe. |
| **Input** | * The last approved/published versions of the relevant ETSI GS NFV-SOL Release 4 specifications. * OpenAPIs for the previous version of ETSI GS NFV-SOL Release 4 specifications. |
| **Output** | * Final versions of OpenAPI representations for all APIs defined for 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** | 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 OpenAPI Representations of ETSI NFV-MANO Release 5 GS APIs** |
| **Objectives** | Develop and maintain OpenAPI representations for the latest version of the APIs defined in relevant ETSI GS NFV-SOL Release 5 specifications within the 2023-2024 timeframe. |
| **Input** | * The last approved/published versions of the relevant ETSI GS NFV-SOL Release 5 specifications. * OpenAPIs for the first release package of ETSI GS NFV-SOL Release 4 specifications. |
| **Output** | * Final versions of OpenAPI representations for all APIs defined for Release 5 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** | 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 #5** | **T5 – Maintenance of published OpenAPI Representations** |
| **Objectives** | Maintenance of all published OpenAPI representations for Release 3, 4 and 5 versions of the relevant ETSI GS NFV-SOL specifications. 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. |
| **Input** | * All published versions of OpenAPI representations of the relevant ETSI GS NFV-SOL Release 3, Release 4 and Release 5 specifications. |
| **Output** | * Maintenance of all published Release 3, 4 and 5 versions of OpenAPI representations. |
| **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. |

## Milestones

STF 624 Kick-off Meeting

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| --- | --- | --- |
|  | **Description** | **Cut-Off Date** |
|  | STF 624 Kick-off Meeting | 01/07/2023 |
|  |  |
|  | Start of work planned for MM/DD/YYYY |

Check Point 1.1 – Updated/extended specification of the VNF LCM API producer emulation tool

* Updated/extended specification of the “VNF LCM API producer emulation tool”.
* Available by end of (30/09/2023).
* No approval is required.
* This milestone is associated with Task #2.

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| **Check Point** | **Description** | **Cut-Off Date** |
| **1.1** | Updates and extensions specification of the “VNF LCM API producer emulation tool”. | 30/09/2023 |

Check Point 1.2 – Proof of Concept version of the VNF LCM API producer emulation tool

* Test version of the “VNF LCM API producer emulation tool”.
* Available by (30/11/2023).
* No approval is required. The STF shall perform a demo of the tool.
* This milestone is associated with Task #2.

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| **Check Point** | **Description** | **Cut-Off Date** |
| **1.2** | Test version of the software. | 30/11/2023 |
|  | Demonstration. |

Milestone B – 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 (31/12/2023).
* No approval is required. The STF shall perform a demo of the tool.
* This milestone is associated with Task #2.

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| **Milestone** | **Description** | **Cut-Off Date** |
| **B** | Final documentation of the software design of the “VNF LCM API producer emulation tool”. | 31/12/2023 |
|  | User manual of the tool. |
|  | Final version of the software. |
|  | Demonstration. |
|  | Progress report approved by Steering Committee  (Reporting on Task 2) |  |

Check Point 2.1 – First drafts available for the updated OpenAPI representations of the latest relevant GS NFV-SOL Release 4 specifications

First draft of the updates for all OpenAPI representations covering relevant Release 3 GS NFV-SOL specifications available on the ETSI Forge platform.

Available by end of .

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.

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| **Check Point** | **Description** | **Cut-Off Date** |
| **2.1** | First drafts available for the updated OpenAPI representations of relevant ETSI GS NFV-SOL Release 4 specifications. | 31/10/2023 |
|  | Updated drafts of latest Release 4 version available on the ETSI Forge platform for verification. |

Milestone A – Final versions available for the updated OpenAPI representations of ETSI GS NFV-SOL Release 4 specifications

Associated to Task #3:

Final versions of the updates for all OpenAPI representations covering all latest ETSI GS NFV-SOL Release 3 specifications available on the ETSI Forge platform.

Available by (30/11/2023).

SOL WG approval of these OpenAPI representations is planned for 30/10/2023.

Associated to Task #5

Maintenance of all published OpenAPI representations covering the latest versions of the relevant ETSI GS NFV-SOL specifications available on the ETSI Forge platform.

Available by (30/11/2023).

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.

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| **Milestone** | **Description** | **Cut-Off Date** |
| **A** | Final versions available for the updated OpenAPI representations of ETSI GS NFV-SOL Release 4 specifications. | 30/11/2023 |
|  | Final versions of latest updated Release 4 version available on the ETSI Forge platform for verification. |
|  | Final Release 3 versions approved by SOL WG. |
|  | Maintenance of all published OpenAPI representations covering the latest versions of the relevant ETSI GS NFV-SOL specifications. |
|  | Final versions available on the ETSI Forge platform for verification. |
|  | Progress report to be approved by ISG Steering Committee (Reporting on Check Points 1.1 & 1.2) |  |

Check Point 2.2 – First drafts available for OpenAPI representations of the latest version of relevant ETSI GS NFV-SOL Release 5 specifications.

First draft of all OpenAPI representations covering the latest relevant versions of ETSI GS NFV-SOL Release 4 specifications available on the ETSI Forge platform.

Available by 30/06/24.

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.

|  |  |  |
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| **Check Point** | **Description** | **Cut-Off Date** |
| **2.2** | First drafts available for OpenAPI representations of the latest version of the relevant ETSI GS NFV-SOL Release 5 specifications | 30/06/2024 |
|  | First Drafts available on the ETSI Forge platform for verification. |

Milestone C – Final versions available for OpenAPI representations of the latest versions of the ETSI GS NFV-SOL Release 5 specifications.

Associated to Task #4:

Final versions of all OpenAPI representations covering the latestversions of the ETSI GS NFV-SOL Release 5 specifications available on the ETSI Forge platform.

Available by (31/08/2024).

SOL WG approval of these OpenAPI representations is planned for (31/07/2024).

This milestone is associated with Task #4.

Associated to Task #5

Maintenance of all published OpenAPI representations covering the latest versions of the relevant ETSI GS NFV-SOL specifications available on the ETSI Forge platform. This includes also the maintenance of published OpenAPI representations output from Task #2.

Available (31/08/2024).

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.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **C** | Final versions available for OpenAPI representations of the latest versions of ETSI GS NFV-SOL Release 4 specs. | 31/08/2024 |
|  | Final versions available on the ETSI Forge platform for verification. |
|  | Final versions approved by SOL WG. |
|  | Maintenance of all published OpenAPI representations covering the latest versions of the relevant ETSI GS NFV-SOL specifications. |
|  | Final versions available on the ETSI Forge platform for verification. |
|  | Final report to be approved by ISG Steering Committee and ISG NFV |  |

**Milestone D – STF Closed**

Planned at the end of M14.

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Description** | **Cut-Off Date** |
| **D** | STF Closed | 31/08/2024 |
|  | Planned STF concluded. |

## Task summary

**Milestones Schedule**

| **Code** | **Task / Milestone** | **Target Date** |  | **Estimated Cost (EUR)** |
| --- | --- | --- | --- | --- |
|  |  | From | To |  |
|  | Start of work | 01/07/2023 |  |  |
| T0 | Project management | 01/07/2023 | 31/08/2024 | 3 000 |
| T1 | OpenAPI representations Quality Management | 01/07/2023 | 31/08/2024 | 5 000 |
| T2 | VNF LCM API producer emulation | 01/07/2023 | 31/12/2023 | 8 000 |
| Check Point 1.1 | Requirements and Design specification of the VNF LCM API producer emulation tool |  | 30/09/2023 |  |
| Check Point 1.2 | Proof-of-concept version of the VNF LCM API producer emulation tool |  | 30/11/2023 |  |
| Milestone B | Final version of the VNF LCM API producer emulation tool  Progress report approved by Steering Committee  (Reporting on Task 2) |  | 31/12/2023 |  |
| T3 | Update Release 4 GS OpenAPI representations | 01/09/2023 | 30/11/2023 | 7 000 |
| T5 | Maintenance of published OpenAPI representations. Note: related to milestones E and G | 01/07/2023 | 31/08/2024 | 3 000 |
| Check Point 2.1 | First drafts available for OpenAPI representations of the latest relevant Release 4 ETSI GS NFV-SOL specifications. |  | 31/10/2023 |  |
| Milestone A | Final versions available for OpenAPI representations of the latest relevant Release 4 ETSI GS NFV-SOL specifications.  First round of maintenance of published OpenAPI representations. Progress Report approved by the Steering Committee  (Reporting on Check-points 1.1 & 1.2) |  | 30/11/2023 |  |
| T4 | Update Release 5 GS OpenAPI representations | 30/11/2024 | 31/08/2024 | 13000 |
| Check Point 2.2 | First drafts available for OpenAPI representations of the latest relevant Release54 ETSI GS NFV-SOL specifications. |  | 30/06/2024 |  |
| Milestone C | Final versions available for OpenAPI representations of the latest relevant Release 5 ETSI GS NFV-SOL specifications.  Second round of maintenance of published OpenAPI representations. Final Report approved by the ISG Steering Committee and ISG NVF |  | 31/08/2024 |  |
| Milestone D | Deliverable released internally, STF closed |  | 31/08/2024 |  |
|  | | | | **39 000** |

**Gantt Chart**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2023 | | | | | |  | 2024 | | | | | | | |
|  | J | A | S | O | N | D |  | J | F | M | A | M | J | J | A |
|  | M1 | M2 | M3 | M4 | M5 | M6 |  | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 |
| Timeline |  |  | Check Point 1.1 | Check Point  2.1 | Check Point  1.2 |  |  |  |  |  |  |  | Check Point 2.2 |  |  |
|  |  |  |  | **MA** | **MB** |  |  |  |  |  |  |  |  | **MC MD** |
| T0 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

# 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.

At least 2 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 the last Open API Specification version 3.0.3) |
| 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 2022-23 | 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 | 2021-06-22 | Zarrar Yousaf |  | Initial draft of ToR. |
| 0.1 | 2021-07-06 | Zarrar Yousaf |  | Further updates. Removed references to Release 2. Included a task for Rel 5.Revised budget with a reduction by EUR 4000. |
| 0.2 | 2021-07-19 | Zarrar Yousaf |  | Included details for T2. |
| 0.3 | 2021-07-26 | Zarrar Yousaf |  | Implemented comments from DOCOMO and Ericsson |
| 0.4 | 2021-08-12 | Zarrar Yousaf |  | Implemented comments from Nokia |
| 0.5 | 2021-09-02 | ETSI Secretariat |  | Update before submission to Board |
| 0.6 | 2023-02-13 | Arturo Martin de Nicolas |  |  |
| 0.7 | 2023-02-21 | ETSI Secretariat |  | Update before ISG NFV approval |
| 0.8 | 2023-04-18 | ETSI Secretariat | Final | Update before CL publication |

Annex I Response to the Request for Proposals  
CfE – STF 624 (ISG NFV) Deadline: 17 May 2023

**If you are an ETSI Member \***

**ETSI membership status (Indicate your status):**

 Full

 Associate

 Observer

**If you are not an ETSI Member \***

Please indicate:

**Full name of the ETSI member supporting the application (list of ETSI members on etsi.org):**

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Official contact name of the ETSI member supporting the application:**

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Note: A formal confirmation of the support from the Official contact is required (e.g. by e-mail sent to STFLINK@etsi.org) and an “ETSI Member Support Letter” will be required if you are selected.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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 STF 624 creation? | | o  Indicate in which position:  ----------------------------------- | | o |
| **If you are self-employed candidate:**  Do you currently have other contracts in progress with ETSI? | | o | | o |

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 | 3000 | . | . |
| 01 | OpenAPI Representations Quality Management | 5000 | . | . |
| 02 | VNF LCM API producer emulation | 8000 | . | . |
| 03 | Update Release 4 GS OpenAPI Representations | 7000 | . | . |
| 04 | Create OpenAPI Representations of ETSI NFV-MANO Release 5 GS APIs | 13000 | . | . |
| 05 | Maintenance of published OpenAPI Representations | 3000 | . | . |
|  | **TOTAL** | **39 000** |  |  |

**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 – STF 624 (ISG NFV) Deadline: 17 May 2023

**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>