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| ETSI_logo_Office_Colour_Small | ToR STF CK (ISG NFV / TST) |
| Version: 0.6 |
| Author: Pierre Lynch – Date:01 March 2018 |
| Last updated by: ETSI Secretariat – Date:09 March 2018 |
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Terms of Reference - Specialist Task Force

STF CK (ISG NFV/TST)

NFV API Conformance test specification

Summary information

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| --- | --- |
| Approval status | Approved by ISG NFV 02 March 2018(doc ref: NFV(18)000055 (will be approved by remote consensus. The document was introduced to the ISG NFV during the NFV#21 closing plenary)  To be presented for approval at Board#117 (20 April 2018) |
| Funding | **Maximum budget: 57000 € ETSI FWP** |
| Time scale | Mid June 2018 to June 2019 |
| Work Items | DGS/NFV-TST010 |
| Board priority | Standards enablers/facilitators (e.g. conformance test/interoperability/methodology)  Recommendations: CTI supervision |

Part I – Reason for proposing the STF

# Rationale

ETSI ISG NFV has completed the specifications of a set of critically important APIs as part of their stage 3 work defining the NFV architecture. This is the culmination of thousands of person hours of work by countless participating individuals and companies, and is highly anticipated by the industry as a major step forward towards interoperability. It is an actionable result that will impact the community because building NFV components that comply with this work can now begin.

In an effort to support the industry with this endeavor, and to allow companies to accurately measure their progress towards support of the ISG NFV standards, the ISG has also decided to construct (via an NFV work item) a comprehensive compliance test plan. The test plan will allow designers and consumers alike to accurately demonstrate their compliance to the APIs as defined by the ISG. It is vital that the industry has such a standard test plan that is agreed to by the NFV community, and subsequently referred to the industry at large in order to validate their designs in commercial situations.

The test plan will be an immediately usable work item, agreed to by community consensus, that will greatly help the adoption of the ISG NFV specifications by allowing a uniform way to prove compliance.

In order to facilitate and accelerate the completion of this work item, we find that the addition of expertise by means of an STF would be critical. The work item requires some specific expertise to complement the existing expertise of the ISG NFV TST and SOL working groups. In addition, time to completion is of vital importance for this valuable test plan. The faster it is available to the industry after completion of the APIs themselves, the faster the adoption of the API specifications will be.

# Objective

The objective of this present STF proposal is to specify a conformance test plan (with associated test cases) for the APIs exposed by the following reference points of the NFV architectural framework:

* Os-Ma-nfvo (with associated APIs specified in ETSI GS NFV-SOL 005)
* Or-Vnfm (with associated APIs specified in ETSI GS NFV-SOL 003)
* Ve-Vnfm (with associated APIs specified in ETSI GS NFV-SOL 002)

It is the intent that the NFV TST working group of the ISG NFV will define the methodologies, system under test and high level test cases for the work item, while the STF will construct the test descriptions in machine readable language, which can then be translated into code that is executable for test execution automation.

# Relation with ETSI strategy and priorities

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

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

This action has a priority category of:

* Standards enablers/facilitators (conformance testing, interoperability, methodology)

# Context of the proposal

## ETSI Members support

|  |  |  |
| --- | --- | --- |
| **ETSI Member** | **Supporting delegate** | **Motivation** |
| Orange | Bruno Chatras | The publication of a set of API specifications for NFV management and orchestration was a major step towards interoperability between the components of an NFV system. Developing conformance test suites for these APIs is an additional step that ETSI must perform as soon as possible to make interoperability a reality and facilitate the procurement of NFV components from different providers. |
| DOCOMO Communications Lab | Joan Triay | ETSI NFV standards are regarded by NTT DOCOMO as a key instrument to facilitate the introduction of virtualization in operators’ network. The completion of a set of API specifications among different components of the NFV management and orchestration framework is a major step forward towards ensuring interoperability. The development of the conformance test suites for these APIs will further facilitate the implementation and test of the implemented APIs, and ease the tasks of integration, testing and verification of NFV components delivered by different suppliers. |
| Keysight Technologies | Pierre Lynch | The ability to provide the industry automated tests for the very important APIs defined by ETSI NFV ISG is critical. It provides the industry a standard, uniform and agreed upon method to measure compliance. This will certainly foster adoption to a higher degree. |
| Telefonica | Diego Lopez | The availability of conformance testing for the NFV management and orchestration APIs is a key issue for fostering the adoption of NFV ISG specifications, by providing the means for guaranteeing interoperability among different implementations in the fast growing and highly dynamic market of NFV frameworks. |
| CableLabs | Don Clarke | Now that ETSI NFV Stage 3 specifications are available it is vitally important to encourage testing by users and implementors across the NFV ecosystem. Diversity of testing is key. By providing common test scripts developed by industry experts, ETSI NFV will lower the cost of testing for all users and boost industry perceptions that ETSI NFV is committed to implementation of our specifications. |

## Market impact

One of the multiple goals for the NFV architecture is to allow operators to build systems with best of breed components. This is the objective of standardizing APIs between NFV components: it allows this goal to be met.

However, experience in standards has shown us that even with specifications for interfaces, implementations will often differ enough to make interoperability a challenge. This can lead to inflated integration cycles between implementations in the NFV system for operators, and a lack of confidence in the ecosystem itself. The lack of standardized compliance testing in the industry would contribute to this situation.

The presence of a uniform compliance test plan and solution would help NFV component suppliers to validate their interpretation of the standards, and at the same time, give confidence to the operators that implementations that they are looking at are conformant. It would also help to reduce costly integration and verification cycles when purchasing components to build or enhance their system. A tested, compliant component has a far greater chance of being interoperable with other components.

## Tasks for which the STF support is necessary

Experience with the development of other standards has shown that involvement of expertise on conformance testing of APIs with high number of operations requires highly specialised knowledge in testing methodology and testing languages.

The development of conformance testing specifications requires significant, concentrated effort. In particular, the involvement of STF resources is needed in order to assure the timely completion and high quality of the Test Specifications (review of API testing methodology, development of test descriptions, validation). The ISG NFV TST working group can’t develop such specifications in a reasonable timeframe on the sole basis of voluntary resources.

## Related voluntary activities in the TB

Delegates within the ISG NFV TST working group will periodically review the STF deliverable and will deal with any Change Requests to the base specifications that this action may produce. Delegates will also guide the construction of the test descriptions by the STF in order to maintain compatibility with the defined methodology and intent of the work item.

## Previous funded activities in the same domain

None

## Consequences if not agreed

The production of test specifications as described in the present document is key to the testing and potential certification activities that should assure the conformance (and thus interoperability) of NFV implementations.

Without the recourse of an STF team, the production of such conformance test specifications will not be possible or will be significantly delayed, at the risk of making them irrelevant to the industry.

Without a standard test plan to demonstrate API compliance in a uniform way, there is a risk that implementations will not be interoperable.

This can lead 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.

Part II - Execution of the work

# Technical Bodies and other stakeholders

## Reference ISG

The leading body is ISG NFV.

The TST WG within the ISG NFV will be the lead working group for the Work Item and will approve the work before submission to ISG NFV.

## Other interested ETSI Technical Bodies

ISG MEC.

## Other stakeholders

Potentially 3GPP and multiple Open Source projects.

# Base documents and deliverables

## Base documents

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| --- | --- | --- | --- |
| **Document** | **Title** | **Current Status** | **Expected date for stable document** |
| GS NFV-SOL 002 | Network Functions Virtualisation (NFV) Release 2;  Protocols and Data Models;  RESTful protocols specification for the Ve-Vnfm Reference Point | Published | n/a |
| GS NFV-SOL 003 | Network Functions Virtualisation (NFV) Release 2;  Protocols and Data Models;  RESTful protocols specification for the Or-Vnfm Reference Point | Published | n/a |
| 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 | n/a |

## Deliverables

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| --- | --- | --- |
| **Deliv.** | **Work Item code**  **Standard number** | **Working title**  **Scope** |
| D1 | DGS/NFV-TST010 | **Working title**: Network Function Virtualisation (NFV) Release 2; Testing; API Conformance Testing Specification.  **Scope**: Test descriptions, procedures, methods and test configurations, along with precise expected outcomes that will comprise a conformance test plan for the APIs exposed on the following reference points: Os-Ma-Nfvo, Or-Vnfm, and Ve-Vnfm, defined in ETSI GS NFV-SOL 005, ETSI GS NFV-SOL 003, and ETSI GS NFV-SOL 002, respectively. Where possible, the tests will be specified using means to facilitate automation of the testing. |

## Deliverables schedule:

DGS/NFV-TST010 NFV; Testing; API Conformance Testing Specification

* Start of work Mid-June2018
* Early draft Mid-September-2018
* Stable draft December-2018
* WG+TB approval May-2019
* Publication June-2019

# Work plan, time scale and resources

## Organization of the work

As defined in the following sub clauses.

The work can be split into 4 main tasks:

* Task 0: Project Management
* Task 1: Review and development of API testing methodology
* Task 2: Development of test descriptions
* Task 3: Validation

Milestones:

* Milestone 1 : Early draft available
* Milestone 2 : Stable draft and Progress Report approved by ISG NFV/TST
* Milestone 3 : Deliverable and STF Final Report approved by ISG NFV/TST
* Milestone 4 : Deliverables published, STF closed

Service providers with the necessary competence will be selected to perform the work under the control of a steering committee comprising selected ISG officials and experts.

## Task description

Task 0 - Project management

Objectives

* Attending Technical Body and WG meetings and conference calls.
* Coordination, communication, reporting and leading of activities.

Output

* Progress reports
* Intermediate reports to the STF Steering Committee
* Final report

Interactions

* Peer-review
* Regular interaction between the experts and the STF Steering Committee

Resources required

* 3000 EUR

Task 1 – Review and development of API testing methodology

Objectives

* Review of test configurations, scope of the tests, automation and reusability capabilities with respect to capabilities of the practical technologies that will be indicated by TST WG.
* Development of required artefacts to enable the generation of test description templates from structured definitions of the APIs that are written in the OpenAPIs language, following the guidance by TST WG and supervision of ETSI CTI.
* Development of practical workflows and required artefacts to enable the development of test descriptions following the guidance by TST WG.

Input

* Deliverables of GS NFV-SOL specifications indicated in Sect. 6.1.

Output

* Early draft of DGS/NFV-TST010 containing reviewed test methodology.

Interactions

* Regular interaction between the experts and the STF Steering Committee.

Resources required

* 12000 EUR

Task 2 – Development of test descriptions

Objectives

* Generation of high level test description templates from the structured definitions of the APIs, using the technologies indicated by TST WG or developed during Task 1.
* Specification of test setup, test data and test tear down test steps for each test case identified to be in the conformance test suite i.e. for all the positive and negative test cases selected for each operation in any APIs by TST WG.
* Formalisation of the specified test steps for each test case using the technologies indicated by TST WG.
* Generation of software artefacts (documentation, machine readable code in test language) from the formalised test descriptions.
* Development of Clauses 5, 6 and 7 of the DGS/NFV-TST010 deliverable draft to contain the outcomes of the test descriptions development.

Input

* Deliverables of GS NFV-SOL specifications in scope
* OpenAPIs definitions of the NFV APIs in scope
* DGS/NFV-TST010 Clause 4 as reviewed during Task 1

Output

* Stable draft DGS/NFV-TST010 containing test descriptions in clauses 5, 6 and 7
* Machine readable description of tests using the selected test language

Interactions

* Peer-review
* Regular interaction between the experts and the STF Steering Committee

Resources required

* 27000 EUR

Task 3 – Validation

Objectives

* Provide documentation and support for the application of the test suite in Plugtests™ interoperability events.
* Validation of the automation capabilities and test case structure of the developed test descriptions.

Input

* Deliverables of GS NFV-SOL specifications in scope.
* OpenAPIs definitions of the NFV APIs in scope.
* Stable draft of DGS/NFV-TST010.

Output

* Updated stable draft DGS/NFV-TST010.
* Updated machine readable description of tests using the selected test language.

Interactions

* Bug fixing of stable draft according to the validation outcome. Optionally discussions with Plugtests™ event support team and participants.
* Regular interaction between the experts and the STF Steering Committee.

Resources required

* 12000 EUR

## Milestones

Milestone 1 – Early draft available

Early draft including the result of Task 1 (Review and development of the methodology).

Milestone 2 – Stable draft and Progress Report approved by ISG NFV/TST

Stable draft including the result of Task 2 (Test Descriptions) available for review.

Interim progress Report.

Milestone 3 – Deliverable and STF Final Report approved by ISG NFV/TST

Final draft including the result of Task 3 (Validation) available for review.

Final draft and final report.

Milestone 4 – Deliverables published, STF closed

Updates to the final draft arising from comments before publication (if any).

## Task summary

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| --- | --- | --- | --- | --- |
| **N** | **Task / Milestone / Deliverable** | Target date | Estimated cost | |
|  | EUR | Days (optional) |
| M0 | Start of work | Mid-June 2018 |  |  |
| T0 | Project management | Whole project duration | 3000 |  |
| T1 | Review and development of API testing methodology | Mid-September 2018 | 12000 |  |
| M1 | Early draft available | Mid-September 2018 |  |  |
| T2 | Development of test descriptions | December 2018 | 27000 |  |
| M2 | Stable draft and Progress Report | December 2018 |  |  |
| T3 | Validation | May 2019 | 12000 |  |
| M3 | Deliverable and STF Final Report accepted | May 2019 |  |  |
| M4 | Deliverables published, STF closed | June 2019 |  |  |
| **Total** | | | **54000** |  |

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| **Task Milest.** | **Description** | **2018** | | | | | | | **2019** | | | | | |
| **J** | **J** | **A** | **S** | **O** | **N** | **D** | **J** | **F** | **M** | **A** | **M** | **J** |
| T0 | Project Management |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 | Review and development of API testing methodology |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **M1** | Early draft available |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T2 | Development of test descriptions |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **M2** | Stable draft available |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T3 | Validation |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **M3** | Deliverable and STF Final Report approval |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **M4** | Deliverables published, STF closed |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Working methods and travel cost

Travel will be required to attend at least one NFV plenary for one team member.

# Expertise required

## Team structure

Up to 2-3 participants to ensure the following mix of competences:

* expert knowledge of ETSI NFV Group Specifications listed in clause 6.1;
* expert knowledge in REST API design and their testing;
* expert knowledge in REST API formal specifications methods;
* familiarity with machine readable code generation tools;
* knowledge of machine readable test definition languages

Part III: Financial conditions

# Maximum budget

## Manpower cost

54000 EUR

## Travel cost

3000 EUR to travel to 2 NFV ISG meetings: 1 in Europe + 1 oversea (US or Asia).

## Total Cost

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| --- | --- |
| **Description** | **Maximum estimated cost (€)** |
| Service Contracts | 54000€ |
| Travels | 3000€ |
| **Total cost** | **57000€** |

Part IV: STF performance evaluation criteria

# Key Performance Indicators

Contribution from ETSI Members to STF work

* Contributions/comments received from the STF steering committee.

Contribution from the STF to ETSI work

* Contributions to ISG/TST meetings (number of documents / meetings / participants).
* Usage of deliverable in the Plugtests™ events.

Quality of deliverables

* Approval of deliverables according to schedule.
* Respect of time scale, with reference to start/end dates in the approved ToR.
* Comments from Quality review by STF steering committee.
* Comments from Quality review by ETSI Secretariat.

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.

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

# Document history

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| --- | --- | --- | --- | --- |
|  | **Date** | **Author** | **Status** | **Comments** |
| 0.1 | 01-March-2018 | ETSI CTI |  |  |
| 0.2 | 02-March-2018 | Pierre Lynch |  |  |
| 0.3 | 02-March-2018 | Pierre Lynch |  | Presented at ISG NFV NFV#21 closing plenary |
| 0.4 | 02-March-2018 | Pierre Lynch |  | Refined for presentation to ETSI as first draft |
| 0.5 | 04-March-2018 | Pierre Lynch |  | Review comments, supporting motivations |
| 0.6 | 09-March-2018 | ETSI Secretariat |  | Addressing comments from ETSI Chief Finance Officer. |