

ETSI Remote NFV API Plugtests
February-April 2019



Keywords

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Executive Summary

The Remote NFV API Plugtests was organised by the ETSI Centre for Testing and Interoperability and run remotely from February 4th to April 15th, 2019.

The main goals were to:

- validate and provide feedback on NFV TST010 NFV API Conformance Test Specification and associated Robot Test Suite before its publication,
- allow participants to assess the conformance of their NFV API server implementations with NFV SOL002, SOL003 and SOL005 API Specifications,
- ultimately, validate and gather feedback on NFV SOL002, SOL003 and SOL005 API Specifications and their associated OpenAPI definitions.

A total of 12 organisations participated to the remote event with 12 Functions Under Test and 15 API servers, in detail:

- 2 VNFs exposing a SOL002 API server
- 4 VNFM s exposing a SOL002 and/or SOL003 API server
- 6 NFVOs exposing SOL003 and/or SOL005 API servers
- 3 Test Environments offering NFVI & VIM functionality to support the API Testing.

The participating Functions Under Test were able to interact remotely with the different Test Environments and the Test Systems operated by Plugtests Experts the NFV Plugtests Programme through HIVE (Hub for Interoperability and Validation at ETSI) which provides a secure framework to interconnect participants' labs and implementations and was key to the success of the first fully remote NFV Plugtests.

Results

Overall 12 unique Test Sessions were run, one per FUT, and a total of 809 test results were reported. Among these, 731 test cases were executed and 611 were pass, which shows:

- An execution rate of 90,4%
- An overall success rate of 83,6 %

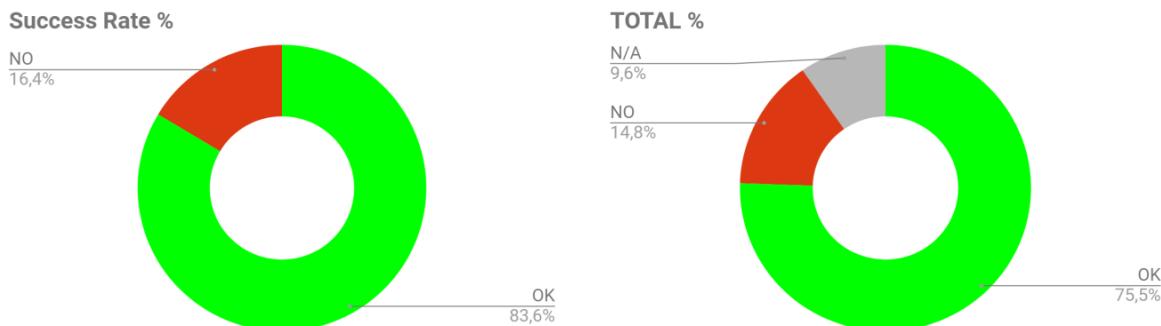


Figure 1. Remote NFV API Plugtests Overall results (%)

A more detailed analysis of the results per SOL Specification shows that:

- SOL003 APIs are those with the higher number of Test Cases run (507) and success rate (87,57%). The execution rate for SOL003 was 92,52%.

- SOL002 APIs has a total of 103 Test Cases run, show the higher execution rate (99,04%) and also a high success rate (85,44%)
- SOL005 APIs, with a total of 121 Test Cases run, shows the lowest execution (77,07%) and success (65,29%) rates, which are still relatively high numbers given the later release of the associated OpenAPIs and Robot Test Suites by ETSI NFV (only one month before the end of the Plugtests).

per-SOL Spec Results - Totals

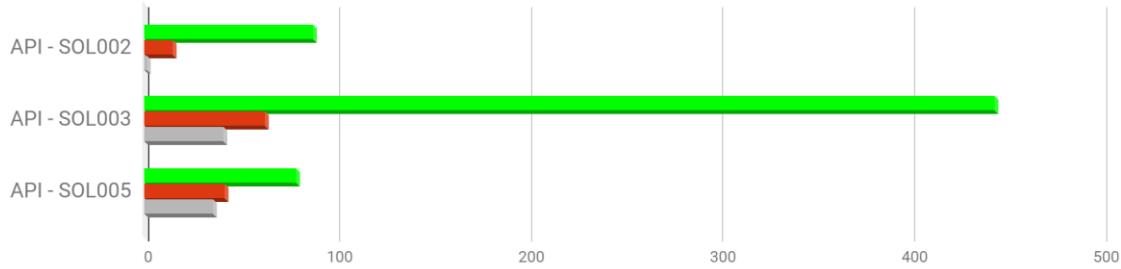


Figure 2. Test Results per-SOL Specification

A detailed look at the results per type of Function Under Test will show us that:

- VNFs, with an overall total of 79 Test Cases run had the higher execution rate (100%) and a success rate of 81%
- VNFM, with a total of 273 Test Cases run and 97,15% execution rate, showed the higher success rate (95,24%)
- NFVOs had the higher amount of Test Cases run (379), and good execution (84%) and success (75,73%) rates.

Results per FUT type - Totals

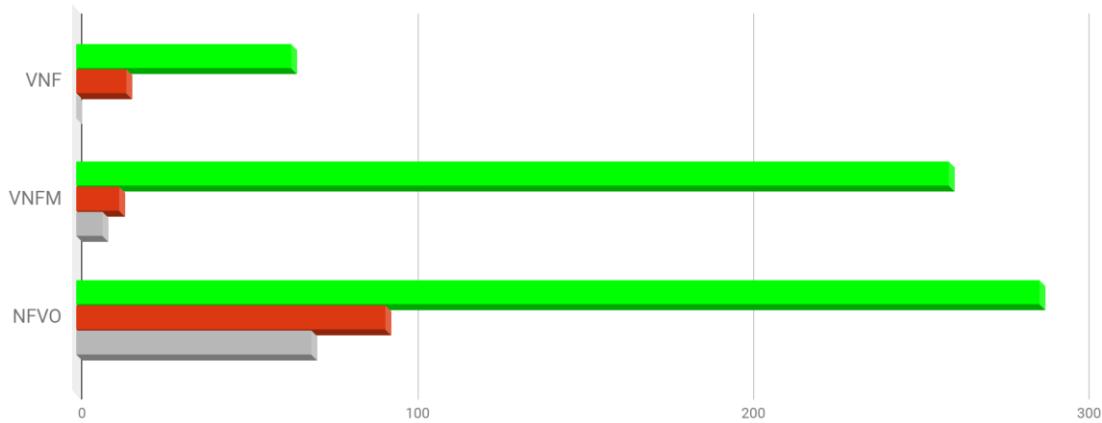


Figure 3. Test Results per-FUT type (totals)

Clause 9 provides a comprehensive overview and analysis of the Plugtests results.

Outcome

The Remote NFV API Plugtests was not only the first fully remote NFV Plugtests but also the first entirely dedicated to the testing of NFV APIs.

As described in Clause 10, this Plugtests allowed to capture, document and fix issues in:

- NFV SOL API Specifications
- NFV SOL OpenAPIs definitions
- NFV API Robot Test Suites, developed for the NFV API Conformance Test Specification.

Overall, a total of 69 different issues on NFV APIs and associated Conformance Test Suites were reported back to ETSI NFV Industry Specification Group. The Remote NFV API Plugtests has been key to validate and ensure the highest quality of TST010 NFV API Conformance Test Specification prior to its publication.

1 Introduction

This Plugtests aimed at validating the Robot Test Suites for the NFV API Conformance Test Specification (NFV TST010) and assessing the level of conformance with NFV SOL002, SOL003, and SOL005 APIs of the participating Functions Under Test.

In order to enable remote interaction among participating Functions Under Test, Test Environments and the Test System operated and Plugtests experts, a dedicated VPN based network was built to interconnect local and remote implementations in a reliable and secure way: the NFV Plugtests HIVE: Hub for Interoperability and Validation at ETSI. All the participating implementations, Functions Under Test, Test Environments and the Test System were connected and/or accessible through the HIVE network

All the information required to organise, coordinate and manage the Remote NFV API Plugtests was compiled and shared with participants in a dedicated private WIKI. Most of the information presented in this document has been extracted from the NFV Plugtests wiki: <https://wiki.plugtests.net/NFV-PLUGTESTS> (login required).

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

- [TST010] ETSI GS NFV-TST 010: “Network Function Virtualisation (NFV) Release 2; Testing; API Conformance Testing Specification” draft
- [SOL002] ETSI GS NFV-SOL 002 V2.4.1: “Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Ve-Vnfm Reference Point”
- [SOL003] ETSI GS NFV-SOL 002 V2.4.1: “Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point”
- [SOL005] ETSI GS NFV-SOL 005 V2.4.1: “Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point”
- [TRT] Test Reporting Tool <http://trt.plugtests.net> (login required)
- [PYTHON] <https://www.python.org/>
- [PIP] <https://pip.pypa.io>
- [JAVA] <https://www.java.com/>
- [MOCK] <http://www.mock-server.com/>
- [TCP-DUMP] <https://www.tcpdump.org/>
- [WIRESHARK] <https://www.wireshark.org/>
- [RF] <https://robotframework.org/>
- [JSON-SCH-LIB] <https://pypi.org/project/robotframework-jsonschemalibrary/>
- [DEP-LIB] <https://pypi.org/project/robotframework-dependencylibrary/>
- [JSON-LIB] <https://github.com/nottyo/robotframework-jsonlibrary>
- [MOCK-LIB] <https://github.com/etsi-cti-admin/robotframework-mockserver>
- [FORGE] ETSI Forge <https://forge.etsi.org>
- [ROBOT-TS] Robot Test Suite for NFV API Conformance <https://forge.etsi.org/gitlab/nfv/api-tests>
- [ISSUE-TR] Issue Tracker for the Robot Test Suite for NFV API Conformance
<https://forge.etsi.org/gitlab/nfv/api-tests/issues>
- [BUGZILLA] ETSI Forge Bugzilla <https://forge.etsi.org/bugzilla/>

3 Abbreviations

For the purposes of the present document, the terms and definitions given in [NFV003] and [TST002] apply.

4 Technical and Project Management

4.1 Scope

The main goal of the remote NFV API Plugtests was to run individual Test Sessions between participants and experts in the Plugtests team allowing to:

- validate the Robot Test Suites (run by Plugtests experts) for the NFV API Conformance Test Specification: NFV TST010
- asses the level of conformance of participating Functions Under Test of VNFs, VNFMs, and NFVOs (operated by participants) with NFV SOL002, SOL003, and SOL005 APIs and OpenAPIs

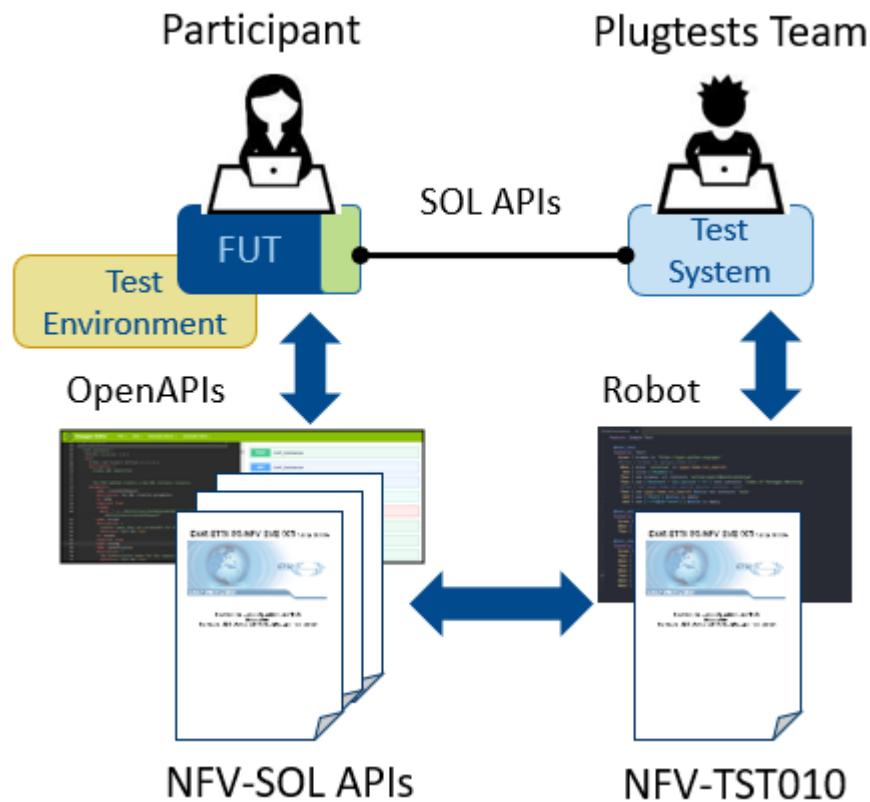


Figure 4. Remote NFV API Plugtests scope

4.2 Timeline

The Remote NFV API Plugtests preparation started at the end of 2018 and run through different phases as described in the figure below.

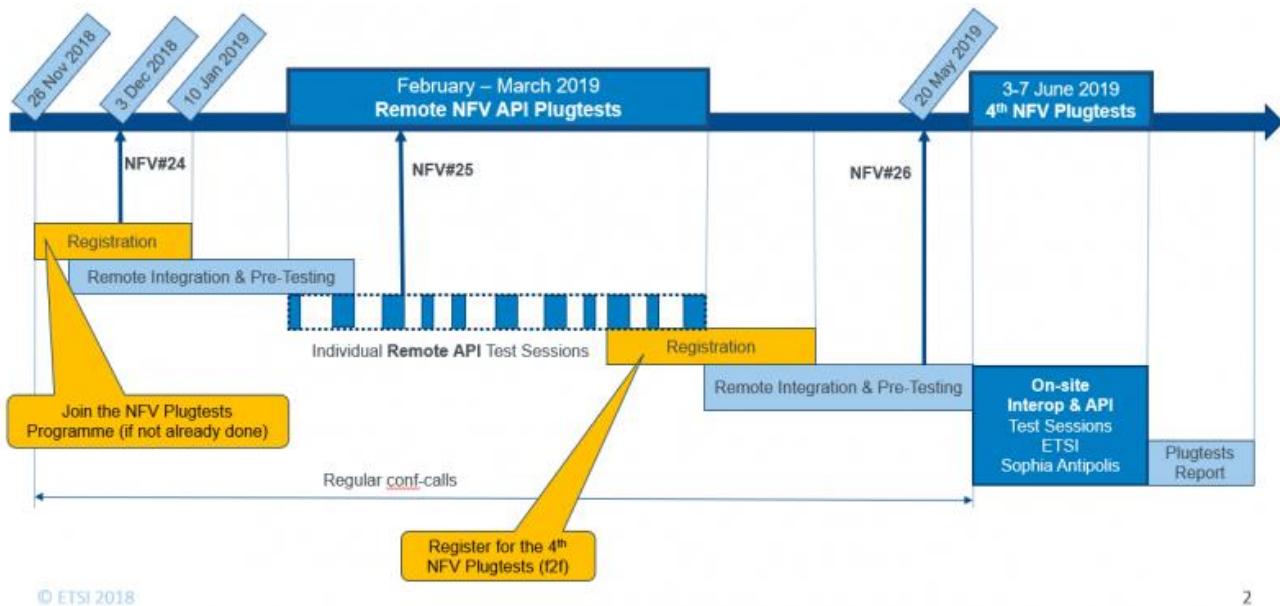


Figure 5. Remote NFV API Plugtests timeline

Registration to Plugtests was free and open until early January 2019 for any organisation willing to participate with a Function Under Test, or to support the testing.

Following a phase of remote integration and pre-testing, individual test sessions were scheduled and run between Plugtests experts and participants.

The remote event was also extremely useful to prepare for the upcoming face to face event planned for the first week of June 2019.

5 Participation

5.1 Functions Under Test

The tables below summarise the different Functions Under Test provided by the Plugtests participants, and the location from where they were supported or connected to the HIVE network:

5.1.1 VNFs (SOL002)

Organisation	Solution	Team Location	Short Description
Mahindra Comviva	EMS	India	Messaging Solutions
Mobileum	vNTR	India	Virtual NTR, Roaming

Table 1. VNFs Under Test (SOL002)

5.1.2 VNFMs (SOL002/SOL003)

Organisations	Name	Location	Short Description
Cisco	ESC – Elastic Services Controller	UK	Generic VNFM
Ericsson	R-VNFM	Sweden	Generic VNFM
Italtel	Italtel VNFM	Italy	VNFM
ZTE	CloudStudio	China	Generic VNFM + NFVO

Table 2. VNMFs Under Test (SOL002/SOL003)

5.1.3 NFVOs (SOL003/SOL005)

Organisations	Name	Location	Short Description
Cisco	Cisco NFVO	USA	NFVO
Ericsson	Cloud Manager	Ireland	NFVO + G-VNFM
RIFT	RIFT.ware	USA	NFVO + G-VNFM
Ubique	OpenMSA	Ireland	Network and Security Automation Framework
Whitestack	WhiteNFV		OSM Rel FIVE (NFVO + G-VNFM)
ZTE	CloudStudio		NFVO + G-VNFM

Table 3. NFVOs Under Test (SOL003/SOL005)

5.2 Test Environments (NFVI&VIM)

Organisations	Name	HW	Location	Short Description
Whitestack Intel	WhiteCloud	Intel @OSM Remote Lab	CA, USA	OpenStack Queens
Wind River	Titanium 5	Wind River @OSM Remote Lab	CA, USA	OpenStack Newton + OF 1.3
Wind River Lenovo	Titanium 5	Wind River @Lenovo Lab	NC, USA	OpenStack Newton + OF 1.3

Table 4. Test Environments (NFVI&VIM)

5.3 Technical Support

The organisations below provided technical support and expertise to the Plugtests Team and contributed actively to prepare and run the Test Sessions during the Plugtests.

Organisation	Role
Nextworks	Technical Support
Tekvizion	Technical Support

Table 5. Technical Support

5.4 Open Source Communities

The Open Source communities listed below were actively involved in the Plugtests preparation and provided Functions their solutions were widely present in the Test Sessions through one or multiple distributions:

Organisation	Role	Details
Open Source MANO	MANO	https://osm.etsi.org
Open Stack	VIM&NFVI	https://www.openstack.org

Table 6 Supporting Open Source communities

6 Test Infrastructure

6.2 HIVE

The remote integration, pre-testing and test sessions were fully enabled by the NFV Plugtests Programme's HIVE network



Figure 6. NFV Plugtests HIVE network

The NFV HIVE (Hub for Interoperability and Validation at ETSI) network interconnects securely participants' remote labs and Functions under Test and allows for remote multi-party interoperability testing and validation activities. A total of 46 remote locations including several OSM Remote Labs participating to the Plugtests leveraged the HIVE network to make their Functions Under Test and Test Environments available for the test sessions.

As shown in the figure below, all the elements and actors in the Test Sessions: Functions Under Test, Test Environments, Test System, Participants and Plugtests experts were interconnected remotely through the HIVE network and several collaborative tools: WIKI, Slack, G2M ..

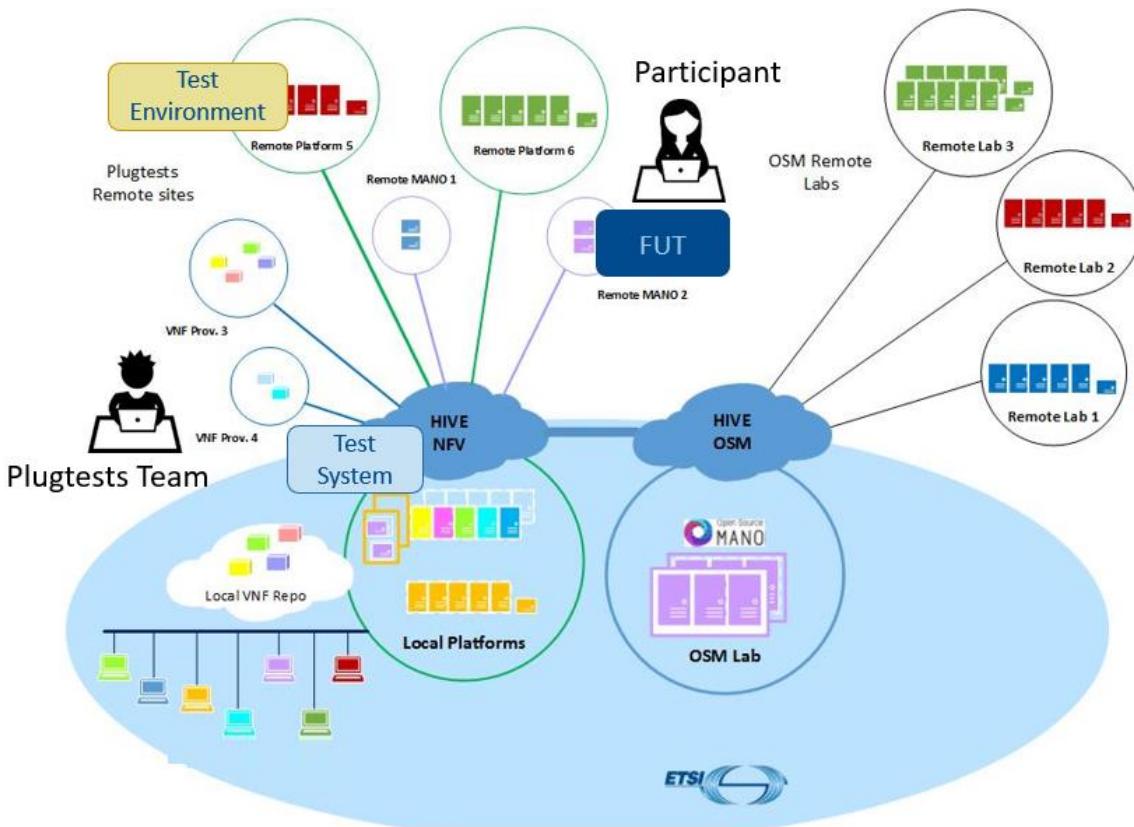


Figure 7. Remote Test Infrastructure

6.2 Test System

The Remote NFV API Plugtests relied on a Test System acting as API consumer for the NFV APIs in scope, exposed by different NFV components over different reference points. The capabilities required for the test system were:

- Sending configurable HTTP(S) requests
- Allowing custom payloads to be exchanged
- Automatically applying headers validation on the response payloads
- Automatically applying schema validation on the response payloads

The test system was deployed as a virtual machine connected to HIVE and able to run the Robot Framework Test Suites developed in the context of [TST010] NFV API Conformance Test Specifications. The Test Suites were developed from the OpenAPI definitions provided with ETSI NFV SOL API Specifications [SOL002], [SOL003] and [SOL005] by ETSI NFV SOL WG. The VM was based on ubuntu 16-04. The following software and python libraries were installed as required to run the test suites:

- Software:
 - o python3[PYTHON] and pip [PIP] to run RobotFramework Test Suites
 - o Java JRE[JAVA] and MockServer [MOCK] application to handle notifications server
 - o Packet capturing software [TCP-DUMP] and [WIRESHARK] to perform manual network traffic and data packets verification.
- Libraries:

- Robot Framework[RF], JSONSchemaLibrary[JSON-SCH-LIB] and DependencyLibrary[DEP-LIB] through pip
- JSONLibrary[JSON-LIB] and MockServerLibrary[MOCK-LIB] through source code (git repo) to apply extensions.

The execution of the tests was performed via command line leveraging on the utilities provided by the Robot Framework tools to run the test suites as a collection of individual and automated API Conformance test cases.

7 Test Procedures

The NFV API Plugtests aimed at validating the conformance of the participants FUTs to the SOL002, SOL003 and SOL005 API specifications, while validating the API Conformance Robot Test Suite. As described in clause 6.2, the Plugtests was run in a fully remote way, with the Test System running in ETSI premises and connected to HIVE, which provided the connectivity to the participating FUTs.. The Test System run the Robot Framework Test Suites developed for the NFV API Conformance Test Specification [TST010] and made available in the ETSI Forge [ROBOT-TS]. It is worth mentioning that the development of the NFV API Conformance Test Specification was in progress at the time of this Plugtests, and the feedback of the NFV API Plugtests activities was fundamental input for the validation and consolidation of the Robot Framework Test Suites before publication, as detailed in clause 10.

1. The following Test Procedures were defined to make sure the testing was run in an efficient and consistent way across remote test sessions. Four different phases were foreseen: Preparation Phase
2. Runtime Phase
3. Results Processing Phase
4. Results Reporting Phase

The planned duration for each test session was set to a total 3hrs, and each phase was planned with an estimated duration of:

- Phase 1: 30mins to 1hr
- Phase 2-3-(4): 2hr to 2h30min

For each remote test session, phases 1,2 and 3 were expected to be performed live during the session. Dedicated gotomeeting webrooms and private slack channels were setup to ease the communication between the Plugtests Team and the participants during the remote test session.

Preparation Phase

The preparation phase is intended to cover all the preliminary steps to make sure the tests could be executed smoothly. This phase covered also the check of the connectivity and reachability from the ETSI-hosted API Test System to the participating FUT. Even if most of the preparatory actions could be performed online, in the first part of the Test Session, the Implementation Conformance Statements (ICS) and a set of configuration information was required from each participant. This information allowed to prepare and configure in advance the Test System for the given Test Session, including the selection of the conformance tests applicable for each FUT.

For this purpose, the Plugtests Team prepared the ICS and Configuration Parameters tables (see Annex A) and participants were requested to fill them in ahead of the Test Sessions considering the capabilities of their FUTs, in terms of support of applicable SOL specifications interfaces and operations.

The main outcome of the Preparation Phase was therefore the preparation and configuration of the API Test System with the applicable set of Robot Framework tests for the given FUT.

Runtime Phase

The main goal of the runtime phase was to execute the actual Robot Framework conformance tests. The execution of the tests was carried out in subsequent steps, according to the capabilities of the given FUT and the set of applicable Robot Framework tests. Where applicable indeed, the Plugtests team selected an order of execution of the tests with the aim of easing their automation.

As a general guideline, the API conformance tests were run subsequently for each applicable SOL specification resource endpoint, according to the set of tests available in the Test Plan described in clause 8.

The verdict of each test was considered OK (pass) if the FUT was compliant with the expected behaviour described in the applicable NFV SOL specifications in terms of:

- 1) Response code, headers and body
- 2) Resource status and/or post-condition

Results Processing Phase

For each run, Robot Framework generates a set of outputs to report on the execution of the tests. These outputs are:

- *report.html* : summary execution info & statistics
- *log.html* : detailed per test case log trace
- *output.xml* : detailed per test case output

In this phase, the Plugtests Team, with the support of the participants, was responsible to check and validate for each test execution these outputs, as a mean to assess the result of each applicable API conformance test.

Results Reporting Phase

All the test results were reported in the ETSI Test Reporting Tool [TRT], for analysis and statistics purposes, as reported in clause 9. For this, the Plugtests Team filled the TRT with results of the test sessions, and the participants were requested to confirm and approve the results.

8 Test Plan Overview

8.1 Introduction

This NFV API Plugtests test plan was based on the Robot Framework Test Cases developed for [TST010] NFV API Conformance Test Specification, addressing FUT API Conformance to [SOL002], [SOL003] and [SOL005] specifications.

The test system acted as consumer for the NFV API produced by the FUTs, thus focusing only on testing the server-side of the [NFV API under Test].

The following clauses summarise the test cases in scope for this NFV API Plugtests, and how they were grouped to optimise the remote test session executions.

The complete Test Specification can be found in [TST010] and the associated Robot Test Cases are available in the ETSI Forge [ROBOT-TS]

8.2 VNF/EM – SOL002

8.2.1 Test Configuration

The test configuration as described in the figure below was defined to test the interfaces exposed by a VNF/EM towards the VNFM, such as VNF Configuration API and VNF Indicator API. The test system acts as the VNFM (SOL002 API Client)

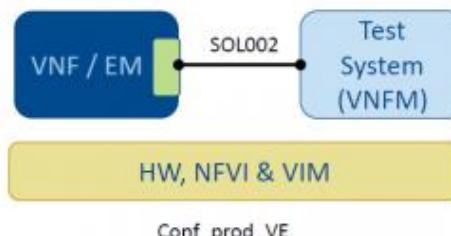


Figure 8: Test configuration SUT_1_API_VNF

8.2.2 Test Groups

8.2.2.1 VNF Configuration API

Group ID	Test IDs	# Test Cases
API_VNF_SOL002_VNF_CONF	TD_API_VNF_SOL002_VNF_CONF_1 .. 6	6

The complete list of Test Cases can be found in [TST010] Clause 6.3.1

8.2.3.2 VNF Indicator API

Group ID	Test IDs	# Test Cases
API_VNF_SOL002_VNF_IND_ALL	TD_API_VNF_SOL002_VNF_IND_1 .. 8	8
API_VNF_SOL002_VNF_IND_VNF_INST	TD_API_VNF_SOL002_VNF_IND_9 .. 16	8
API_VNF_SOL002_VNF_IND_VNF_INST_IND_ID	TD_API_VNF_SOL002_VNF_IND_17 .. 22	6
API_VNF_SOL002_VNF_IND_SUB_ALL	TD_API_VNF_SOL002_VNF_IND_23 .. 29	7

API_VNF_SOL002_VNF_IND_SUB_ID	TD_API_VNF_SOL002_VNF_IND_30 ..36	7
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The complete list of Test Cases can be found in [TST010] Clause 6.3.2

8.2 VNFM - SOL002

8.2.1 Test Configuration

The test configuration as described below was defined to test the interfaces exposed by a VNFM towards VNF/EM, such as VNF Fault Management, VNF Life Cycle Management, and VNF Performance Management. The test system is acting as VNF/EM.

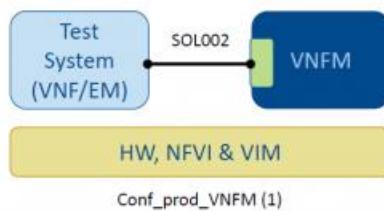


Figure 9: Test configuration FUT_API_VNFM

8.2.2 Test Groups

8.2.2.1 VNF Fault Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL002_VNF_FM_ALARMS_ALL	TD_API_SOL002_VNF_FM_1..7	7
API_VNFM_SOL002_VNF_FM_ALARMS_ID	TD_API_SOL002_VNF_FM_8..14	7
API_VNFM_SOL002_VNF_FM_ALARMS_ESCALATE	TD_API_SOL002_VNF_FM_15..19	5
API_VNFM_SOL002_VNF_FM_SUB_ALL	TD_API_SOL002_VNF_FM_20..28	9
API_VNFM_SOL002_VNF_FM_SUB_ID	TD_API_SOL002_VNF_FM_29..33	5
API_VNFM_SOL002_VNF_FM_NOTIF	TD_API_SOL002_VNF_FM_34..39	6

The complete list of Test Cases can be found in [TST010] Clause 6.3.4

8.2.2.2 VNF Life Cycle Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL002_VNF_LCM_VNF_INST_ALL	TD_API_SOL002_VNF_LCM_1..7	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID	TD_API_SOL002_VNF_LCM_8..15	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_INSTITUTE	TD_API_SOL002_VNF_LCM_16..21	6
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_SCALE	TD_API_SOL002_VNF_LCM_22..29	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_SCALE_TO_LEVEL	TD_API_SOL002_VNF_LCM_30..37	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_OPERATOR	TD_API_SOL002_VNF_LCM_38..45	8

Group ID	Test IDs	# Test Cases
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_CHANNEL_EXT_CONN	TD_API_SOL002_VNF_LCM_46..51	6
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_CHANNEL_FLAVOR	TD_API_SOL002_VNF_LCM_52..59	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_HEAL	TD_API_SOL002_VNF_LCM_60..67	8
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_TERMINATE	TD_API_SOL002_VNF_LCM_68..74	7
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ALL	TD_API_SOL002_VNF_LCM_75..81	7
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID	TD_API_SOL002_VNF_LCM_82..86	5
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_CANCEL	TD_API_SOL002_VNF_LCM_87..94	8
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_FAIL	TD_API_SOL002_VNF_LCM_95..102	8
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_RETRY	TD_API_SOL002_VNF_LCM_103..110	8
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_ROLLBACK	TD_API_SOL002_VNF_LCM_111..118	8
API_VNFM_SOL002_VNF_LCM_SUB_ALL	TD_API_SOL002_VNF_LCM_119..127	9
API_VNFM_SOL002_VNF_LCM_SUB_ID	TD_API_SOL002_VNF_LCM_128..132	5
API_VNFM_SOL002_VNF_LCM_NOTIF	TD_API_SOL002_VNF_LCM_133..139	7

The complete list of Test Cases can be found in [TST010] Clause 6.3.5

8.2.2.3 VNF Performance Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL002_VNF_PM_JOBS_ALL	TD_API_SOL002_VNF_PM_1..13	14
API_VNFM_SOL002_VNF_PM_JOBS_ID	TD_API_SOL002_VNF_PM_14..20	7
API_VNFM_SOL002_VNF_PM_THRESHOLDS_ALL	TD_API_SOL002_VNF_PM_21..28	8
API_VNFM_SOL002_VNF_PM_THRESHOLDS_ID	TD_API_SOL002_VNF_PM_29..35	7
API_VNFM_SOL002_VNF_PM_JOBS_REPORT_ID	TD_API_SOL002_VNF_PM_36..41	6
API_VNFM_SOL002_VNF_PM_SUB_ALL	TD_API_SOL002_VNF_PM_42..51	10
API_VNFM_SOL002_VNF_PM_SUB_ID	TD_API_SOL002_VNF_PM_52..56	5
API_VNFM_SOL002_VNF_PM_NOTIF	TD_API_SOL002_VNF_PM_57..64	8

The complete list of Test Cases can be found in [TST010] Clause 6.3.3

8.3 VNFM - SOL003

8.3.1 Test Configuration

The test configuration as described below was defined to test the interfaces exposed by a VNFM towards the NFVO such as VNF Fault Management API, VNF Indicator API, VNF Lifecycle Management API, and VNF Performance Management API. The test system is acting as the NFVO.

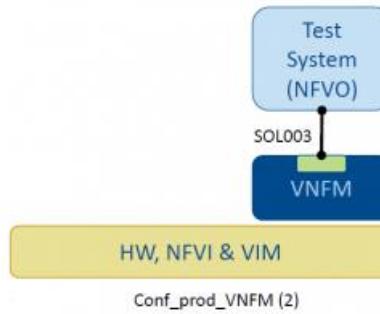


Figure 102: Test configuration FUT_API_VNFM

8.3.2 Test Groups

8.3.2.1 VNF Fault Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL003_VNF_FM_ALARMS_ALL	TD_API_SOL003_VNF_FM_1..7	8
API_VNFM_SOL003_VNF_FM_ALARMS_ID	TD_API_SOL003_VNF_FM_8..14	7
API_VNFM_SOL003_VNF_FM_SUB_ALL	TD_API_SOL003_VNF_FM_15..23	9
API_VNFM_SOL003_VNF_FM_SUB_ID	TD_API_SOL003_VNF_FM_24..28	5
API_VNFM_SOL003_VNF_FM_NOTIF	TD_API_SOL003_VNF_FM_29..33	5

The complete list of Test Cases can be found in [TST010] Clause 7.3.5

8.3.2.2 VNF Indicator API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL003_VNF_IND_ALL	TD_API_SOL003_VNF_IND_1..8	8
API_VNFM_SOL003_VNF_IND_VNF_INST	TD_API_SOL003_VNF_IND_9..16	8
API_VNFM_SOL003_VNF_IND_VNF_INST_IND_ID	TD_API_SOL003_VNF_IND_17..22	6
API_VNFM_SOL003_VNF_IND_SUB_ALL	TD_API_SOL003_VNF_IND_23..29	7
API_VNFM_SOL003_VNF_IND_SUB_ID	TD_API_SOL003_VNF_IND_30..36	7
API_VNFM_SOL003_VNF_IND_NOTIF	TD_API_SOL003_VNF_IND_37..42	6

The complete list of Test Cases can be found in [TST010] Clause 7.3.6

8.3.2.3 VNF Performance Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL003_VNF_PM_JOBS_ALL	TD_API_SOL003_VNF_PM_1..12	13
API_VNFM_SOL003_VNF_PM_JOBS_ID	TD_API_SOL003_VNF_PM_13..19	7
API_VNFM_SOL003_VNF_PM_THRESHOLDS_ALL	TD_API_SOL003_VNF_PM_20..27	8
API_VNFM_SOL003_VNF_PM_THRESHOLDS_ID	TD_API_SOL003_VNF_PM_28..34	7
API_VNFM_SOL003_VNF_PM_JOBS_ID_REPORT_ID	TD_API_SOL003_VNF_PM_35..40	6
API_VNFM_SOL003_VNF_PM_SUB_ALL	TD_API_SOL003_VNF_PM_41..50	10

Group ID	Test IDs	# Test Cases
API_VNFM_SOL003_VNF_PM_SUB_ID	TD_API_SOL003_VNF_PM_51..56	6
API_VNFM_SOL003_VNF_PM_NOTIF	TD_API_SOL003_VNF_PM_57..64	8

The complete list of Test Cases can be found in [TST010] Clause 7.3.4

8.3.2.4 VNF Lifecycle Management API

Group ID	Test IDs	# Test Cases
API_VNFM_SOL003_VNF_LCM_VNF_INST_ALL	TD_API_SOL003_VNF_LCM_1..7	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID	TD_API_SOL003_VNF_LCM_8..15	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_INSTANTIATE	TD_API_SOL003_VNF_LCM_16..21	6
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_SCALE	TD_API_SOL003_VNF_LCM_22..29	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_SCALE_TO_LEVEL	TD_API_SOL003_VNF_LCM_30..37	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_OPERATE	TD_API_SOL003_VNF_LCM_38..45	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_CHANGE_EXT_CONN	TD_API_SOL003_VNF_LCM_46..51	6
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_CHANGE_FLAVOR	TD_API_SOL003_VNF_LCM_52..59	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_HEAL	TD_API_SOL003_VNF_LCM_60..67	8
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_TERMINATE	TD_API_SOL003_VNF_LCM_68..74	7
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_ALL	TD_API_SOL003_VNF_LCM_75..81	7
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_ID	TD_API_SOL003_VNF_LCM_82..86	5
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_ID_CAN_CEL	TD_API_SOL003_VNF_LCM_87..94	8
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_ID_FAIL	TD_API_SOL003_VNF_LCM_95..102	8
API_VNFM_SOL003_VNF_LCM_VNF_OPOCCS_ID_RETRY	TD_API_SOL003_VNF_LCM_103..110	8
API_VNFM_SOL003_VNF_LCM_VNF_OPOCCS_ID_ROLLBACK	TD_API_SOL003_VNF_LCM_111..118	8
API_VNFM_SOL003_VNF_LCM_SUB_ALL	TD_API_SOL003_VNF_LCM_119..127	9
API_VNFM_SOL003_VNF_LCM_SUB_ID	TD_API_SOL003_VNF_LCM_128..132	5
API_VNFM_SOL003_VNF_LCM_NOTIF	TD_API_SOL003_VNF_LCM_133..139	7

The complete list of Test Cases can be found in [TST010] Clause 7.3.1

8.4 NFVO - SOL003

8.4.1 Test Configuration

The test configuration as described below was defined to test the interfaces exposed by NFVOs towards the VNFM such as Virtualised Resources Quota Available Notification API, VNF Lifecycle Operation Granting API and VNF Package Management. The test system is acting as the VNFM.

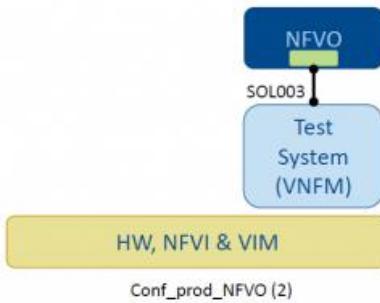


Figure 11: Test configuration SUT_1_API_NFVO

8.4.2 Test Groups

8.4.2.1 VNF Package Management API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL003_VNF_PCKGM_ALL	TD_API_SOL003_VNF_PCKGM_1..14	14
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_ID	TD_API_SOL003_VNF_PCKGM_15..20	6
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_CONTENT	TD_API_SOL003_VNF_PCKGM_21..30	10
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_ARTIFACTS_ID	TD_API_SOL003_VNF_PCKGM_31..40	10
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_VNF	TD_API_SOL003_VNF_PCKGM_41..50	10
API_NFVO_SOL003_VNF_PCKGM_SUB_ALL	TD_API_SOL003_VNF_PCKGM_51..60	10
API_NFVO_SOL003_VNF_PCKGM_SUB_ID	TD_API_SOL003_VNF_PCKGM_61..67	7
API_NFVO_SOL003_VNF_PCKGM_NOTIF	TD_API_SOL003_VNF_PCKGM_68..75	8

The complete list of Test Cases can be found in [TST010] Clause 7.3.3

8.4.2.2 VNF Lifecycle Operation Granting API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL003_VNF_LCM_GRANT_ALL	TD_API_SOL003_VNF_LCM_GRANT_1..7	7
API_NFVO_SOL003_VNF_LCM_GRANT_ID	TD_API_SOL003_VNF_LCM_GRANT_8..14	7

The complete list of Test Cases can be found in [TST010] Clause 7.3.2

8.4.2.3 VNF Virtual Resource Quota Available Notification API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL003_VR_QUOTA_NOTIF_SUB_ALL	TD_API_SOL003_VR_QUOTA_NOTIF_1..9	9
API_NFVO_SOL003_VR_QUOTA_NOTIF_SUB_ID	TD_API_SOL003_VR_QUOTA_NOTIF_10..14	5
API_SOL003_VR_QUOTA_NOTIF	TD_API_SOL003_VR_QUOTA_NOTIF_15..19	5

The complete list of Test Cases can be found in [TST010] Clause 7.3.7

8.5 NFVO - SOL005

8.5.1 Test Configuration

The test configuration as described below was defined to test the interfaces exposed by NFVOs towards the OSS such as the NSD Management API, NS Performance Management, VNF Package Management, and VNF Fault Management. The test system is acting as the OSS.

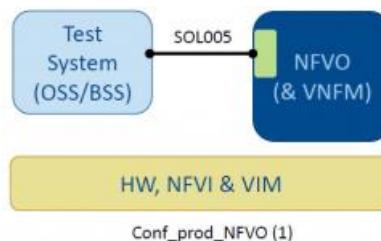


Figure 12: Test configuration SUT_1_API_NFVO

8.5.2 Test Groups

8.5.2.1 NSD Management API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL005_NSD_MGMT_NSD_ALL	TD_API_SOL005_NSD_MGMT_1..13	13
API_NFVO_SOL005_NSD_MGMT_NSD_ID	TD_API_SOL005_NSD_MGMT_14..23	10
API_NFVO_SOL005_NSD_MGMT_NSD_CONTENT	TD_API_SOL005_NSD_MGMT_24..35	10
API_NFVO_SOL005_NSD_MGMT_PNFD_ALL	TD_API_SOL005_NSD_MGMT_36..48	13
API_NFVO_SOL005_NSD_MGMT_PNFD_ID	TD_API_SOL005_NSD_MGMT_49..54	6
API_NFVO_SOL005_NSD_MGMT_PNFD_CONTENT	TD_API_SOL005_NSD_MGMT_55..62	8
API_NFVO_SOL005_NSD_MGMT_SUB_ALL	TD_API_SOL005_NSD_MGMT_63..72	10
API_NFVO_SOL005_NSD_MGMT_SUB_ID	TD_API_SOL005_NSD_MGMT_73..79	7
API_NFVO_SOL005_NSD_MGMT_NOTIF	TD_API_SOL005_NSD_MGMT_80..91	12

The complete list of Test Cases can be found in [TST010] Clause 5.3.1

8.5.2.2 NS Performance Management API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL005_NS_PM_JOB_ALL	TD_API_SOL005_NS_PM_1..12	12
API_NFVO_SOL005_NS_PM_JOB_ID	TD_API_SOL005_NS_PM_13..19	7
API_NFVO_SOL005_NS_PM_JOB_REPORT_ID	TD_API_SOL005_NS_PM_20..25	6
API_NFVO_SOL005_NS_PM_THRESHOLD_ALL	TD_API_SOL005_NS_PM_26..33	8
API_NFVO_SOL005_NS_PM_THRESHOLD_ID	TD_API_SOL005_NS_PM_34..40	7
API_NFVO_SOL005_NS_PM_SUB_ALL	TD_API_SOL005_NS_PM_41..50	10
API_NFVO_SOL005_NS_PM_SUB_ID	TD_API_SOL005_NS_PM_51..56	6
API_NFVO_SOL005_NS_PM_NOTIF	TD_API_SOL005_NS_PM_57..64	8

The complete list of Test Cases can be found in [TST010] Clause 5.3.4

8.5.2.3 VNF Package Management API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL005_VNF_PCKGM_ALL	TD_API_SOL005_VNF_PCKGM_1..14	14
API_NFVO_SOL005_VNF_PCKGM_ID	TD_API_SOL005_VNF_PCKGM_15..22	8
API_NFVO_SOL005_VNF_PCKGM_VNFD	TD_API_SOL005_VNF_PCKGM_23..32	10
API_NFVO_SOL005_VNF_PCKGM_VNFD_CONTENT	TD_API_SOL005_VNF_PCKGM_33..43	11
API_NFVO_SOL005_VNF_PCKGM_VNFD_UPLOAD_URI	TD_API_SOL005_VNF_PCKGM_44..49	6
API_NFVO_SOL005_VNF_PCKGM_PCKGS_ARTIFACTS	TD_API_SOL005_VNF_PCKGM_50..59	10
API_NFVO_SOL005_VNF_PCKGM_SUB_ALL	TD_API_SOL005_VNF_PCKGM_60..69	10
API_NFVO_SOL005_VNF_PCKGM_SUB_ID	TD_API_SOL005_VNF_PCKGM_70..76	7
API_NFVO_SOL005_VNF_PCKGM_NOTIF	TD_API_SOL005_VNF_PCKGM_77..84	8

The complete list of Test Cases can be found in [TST010] Clause 5.3.5

8.5.2.4 VNF Fault Management API

Group ID	Test IDs	# Test Cases
API_NFVO_SOL005_VNF_FM	TD_API_SOL005_VNF_FM_1	1

The complete list of Test Cases can be found in [TST010] Clause 5.3.3.

9 Results

9.1 Overall Results

During the Remote API Plugtests, a total of 19 Test Sessions (including 7 re-runs) were run. The API conformance tests were executed for three different Functions Under Test (FUTs): VNFs, VNFMs and NFVOs. A total of 12 FUTs participated to the Remote API Plugtests, distributed in this way:

- 2 VNFs
- 4 VNFM
- 6 NFVOs

To facilitate the analysis, results are presented as follows:

Result	Meaning
OK	Test Case run. Test Purpose successfully achieved.
NO	Test Case run. Test Purpose not achieved.
NA	Not Applicable: Feature not supported
Run	Total number of Test Cases Run = OK + NO
Total	Total number of Test Cases = OK + NO + NA = Run + Not Run

Table 7: Results Interpretation

Note that the tests cases for which no result was reported (i.e. when the test session run out of time) are not taken into account in the Total Results.

Note also that for those sessions which required a re-run (i.e. to make some fixes in the Test Suite) only the latest results were kept.

The table below provides the overall results (aggregated data) for all the tests run during the Remote API Test Sessions, from all participating organisations. The total number of test sessions reported is 12 and not 19, because in those sessions where a re-run was needed (i.e. to make some fixes in the Test Suite) only the latest results were kept.

Overall Results	Number of (unique) Test Sessions	API Conformance (TCs Run)		TCs Not Run	TCs Totals	
		OK	NO		Run	Total
	12	611	120	78	731	809

Table 8: Remote API Plugtests Overall Results

During each remote Test Session, depending on the involved FUT and the features to be tested, a different number of test cases were offered to the involved participants.

Overall, the test plan included 1061 API conformance test cases, organised in different groups as described in chapter 8. Through the 12 Test Sessions run, a total of 809 Test Results were reported. This figure includes both the executed and non-executed test cases. Overall, a total of 731 individual API conformance test cases were run and results reported for them.

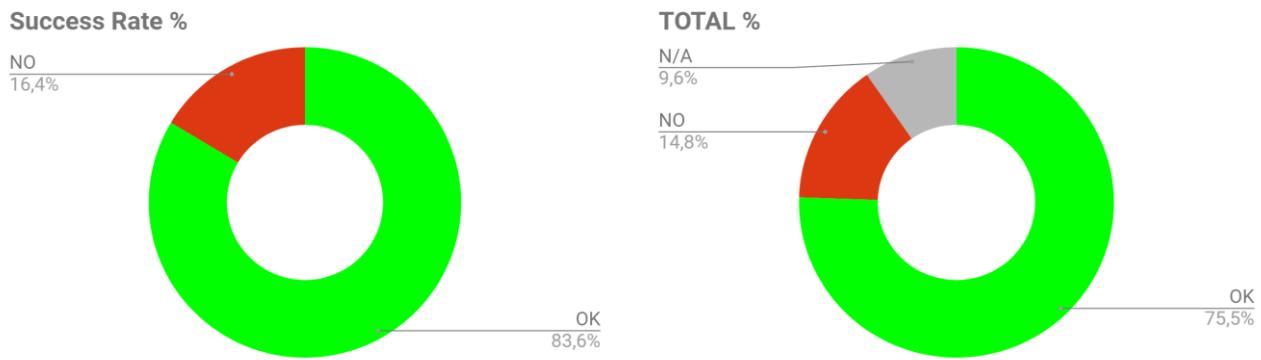


Figure 33. Remote API Plugtests Overall results (%)

The next clauses present more detailed results per SOL Specification, per FUT type, per SUT configuration and per test group and will allow to identify the areas and APIs with higher execution and conformance rates.

9.2 Results per SOL Specification

The tables and figures below provide an overview of the results for the API conformance per SOL specifications, i.e. SOL002, SOL003 and SOL005. Overall the SOL003 APIs have been those with the higher number of Test Cases run and success rate and SOL002 had the higher execution rate and similar success rate. It is worth noting that SOL005 Test Cases were the last ones made available during the Plugtests, which may explain the lower execution and success rates.

	API Conformance		Not Executed	Totals		%			
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
SOL002	88	15	1	103	104	99,04%	85,44%	14,56%	0,96%
SOL003	444	63	41	507	548	92,52%	87,57%	12,43%	7,48%
SOL005	79	42	36	121	157	77,07%	65,29%	34,71%	22,93%
TOTAL	611	120	78	731	809	90,36%	83,58%	16,42%	9,64%

Table 9: Test Results summary per-SOL Specification

per-SOL Spec Results - Totals

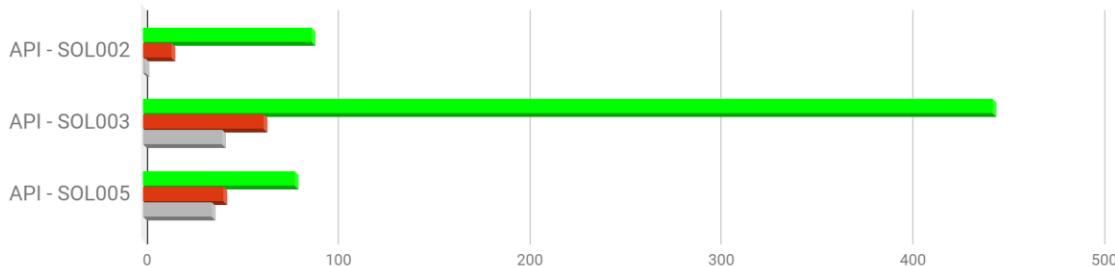


Figure 14. Test results per-SOL Specification (totals)

per-SOL Spec Results - %

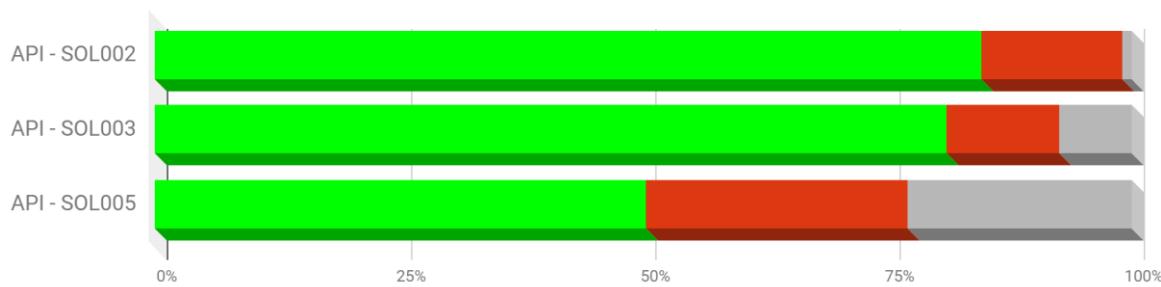


Figure 15. Test Results per-SOL specification (%)

9.3 Results per FUT Type

The tables and figures below summarize the results for the API conformance tests per type of FUT involved in the remote test sessions, i.e. VNF, VNFM and NFVO. Overall, VNFM related tests produced excellent results in terms of success rate, while for VNFs a 100% execution rate was achieved. NFVO related tests also achieved good results.

	API Conformance		Not Executed	Totals			%		
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
VNF	64	15	0	79	79	100,00%	81,01%	18,99%	0,00%
VNFM	260	13	8	273	281	97,15%	95,24%	4,76%	2,85%
NFVO	287	92	70	379	449	84,41%	75,73%	24,27%	15,59%
TOTAL	611	120	78	731	809	90,36%	83,58%	16,42%	9,64%

Table 10: Test Results summary per-FUT type

Results per FUT type - Totals

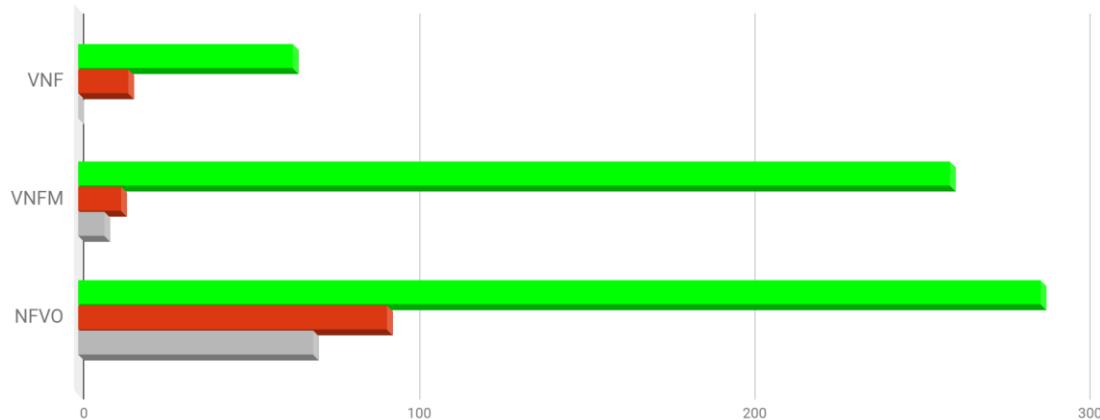


Figure 16. Test Results per- FUT type (totals)

Results per FUT type - %

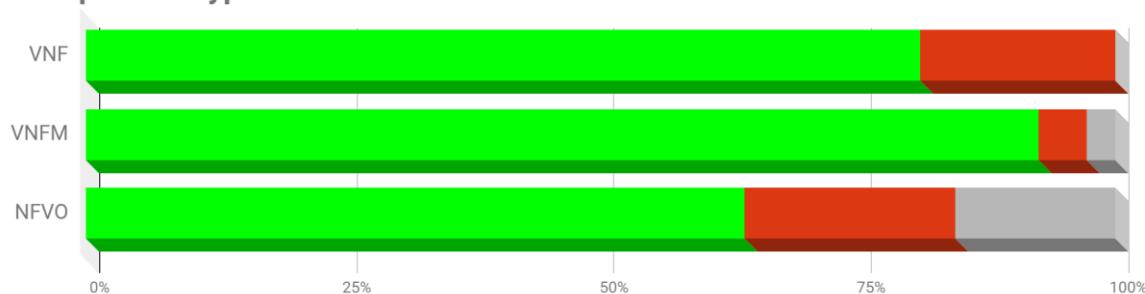


Figure 17. Test Results per-FUT type (%)

9.4 Results per Test Group

The following clauses provide tables and figures which summarize the results for the API conformance tests for the different groups in each test configuration tested in the remote test sessions, i.e. VNF SOL002, VNFM SOL003, NFVO SOL003 and NFVO SOL005.

9.4.1 VNF - SOL002

	API Conformance		Not Executed	Totals		%			
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
API_VNF_SOL002_VNF_CONF	8	2	0	10	10	100,00%	80,00%	20,00%	0,00%
API_VNF_SOL002_VNF_IND_ALL	12	4	0	16	16	100,00%	75,00%	25,00%	0,00%
API_VNF_SOL002_VNF_IND_VNF_INST	13	1	0	14	14	100,00%	92,86%	7,14%	0,00%
API_VNF_SOL002_VNF_IND_VNF_INST_IND_ID	11	1	0	12	12	100,00%	91,67%	8,33%	0,00%
API_VNF_SOL002_VNF_IND_SUB_ALL	10	3	0	13	13	100,00%	76,92%	23,08%	0,00%
API_VNF_SOL002_VNF_IND_SUB_ID	10	4	0	14	14	100,00%	71,43%	28,57%	0,00%
API_VNF_SOL002_VNF_IND_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
TOTAL	64	15	0	79	79	100,00%	81,01%	18,99%	0,00%

Table 11: VNF SOL002 test results summary

SOL002 VNF - Totals

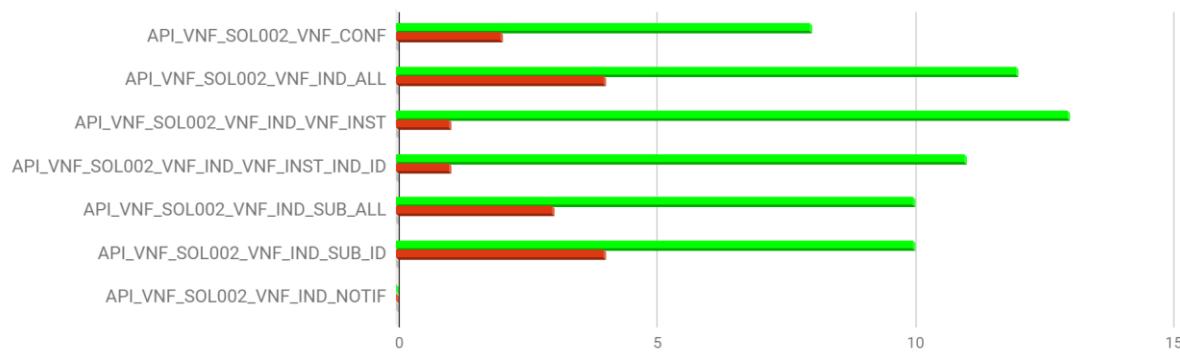


Figure 18. VNF SOL002 test results (totals)

Results per FUT type - %

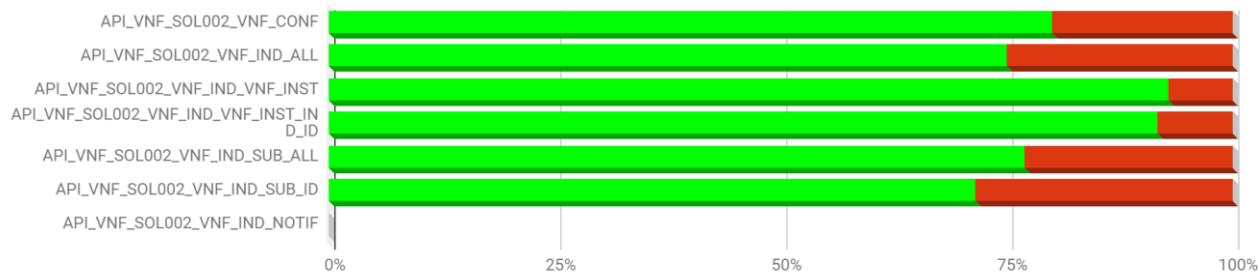


Figure 19. VNF SOL002 test results (%)

9.4.2 VNFM - SOL002

	API Conformance		Not Executed	Totals		%			
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
API_VNFM_SOL002_VNF_FM_ALARMS_ALL	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_FM_ALARMS_ID	4	0	0	4	4	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_FM_ALARMS_ESCALATE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_FM_SUB_ALL	8	0	1	8	9	88,89%	100,00%	0,00%	11,11%
API_VNFM_SOL002_VNF_FM_SUB_ID	5	0	0	5	5	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_FM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

API_VNFM_SOL002_VNF_LCM_VNF_INST_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_IN_STANTIMATE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_SC_ALE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_SC_ALE_TO_LEVEL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_OPERATE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_CHANGE_EXT_CONN	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_CHANGE_FLAVOUR	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_HEAL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_INST_ID_TERMINATE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_CANCEL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_FAIL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_RETRY	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

API_VNFM_SOL002_VNF_LCM_VNF_OP_OCCS_ID_ROLLBACK	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_LCM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_JOBS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_JOBS_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_THRESHOLDS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_THRESHOLDS_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_JOBS_REPORT_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL002_VNF_PM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
TOTAL	24	0	1	24	25	96,00%	100,00%	0,00%	4,00%

Table 12: VNFM SOL002 test results summary

SOL002 VNF Results - Totals

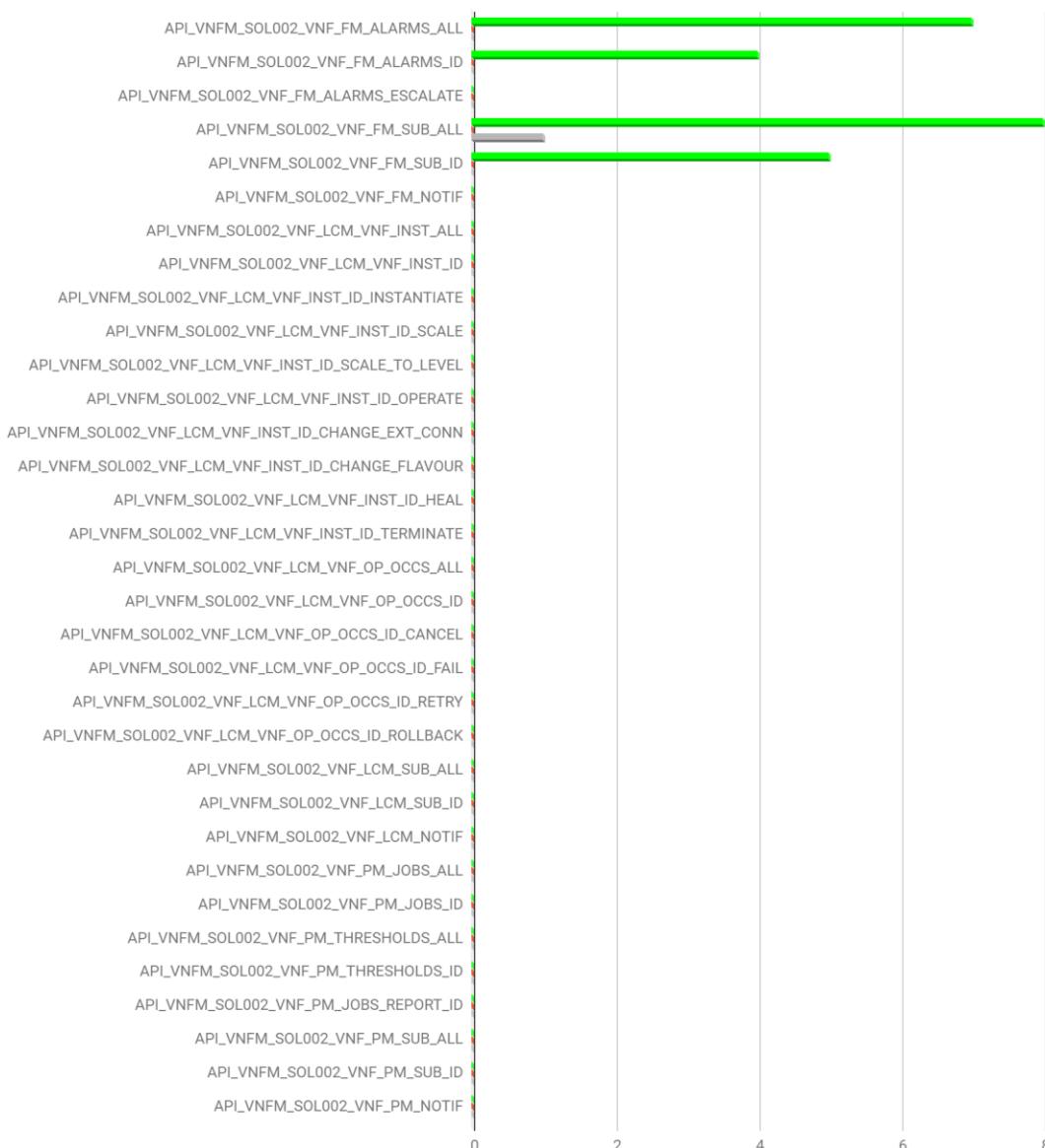


Figure 20. VNFM SOL002 test results (totals)

SOL002 VNF Results - %

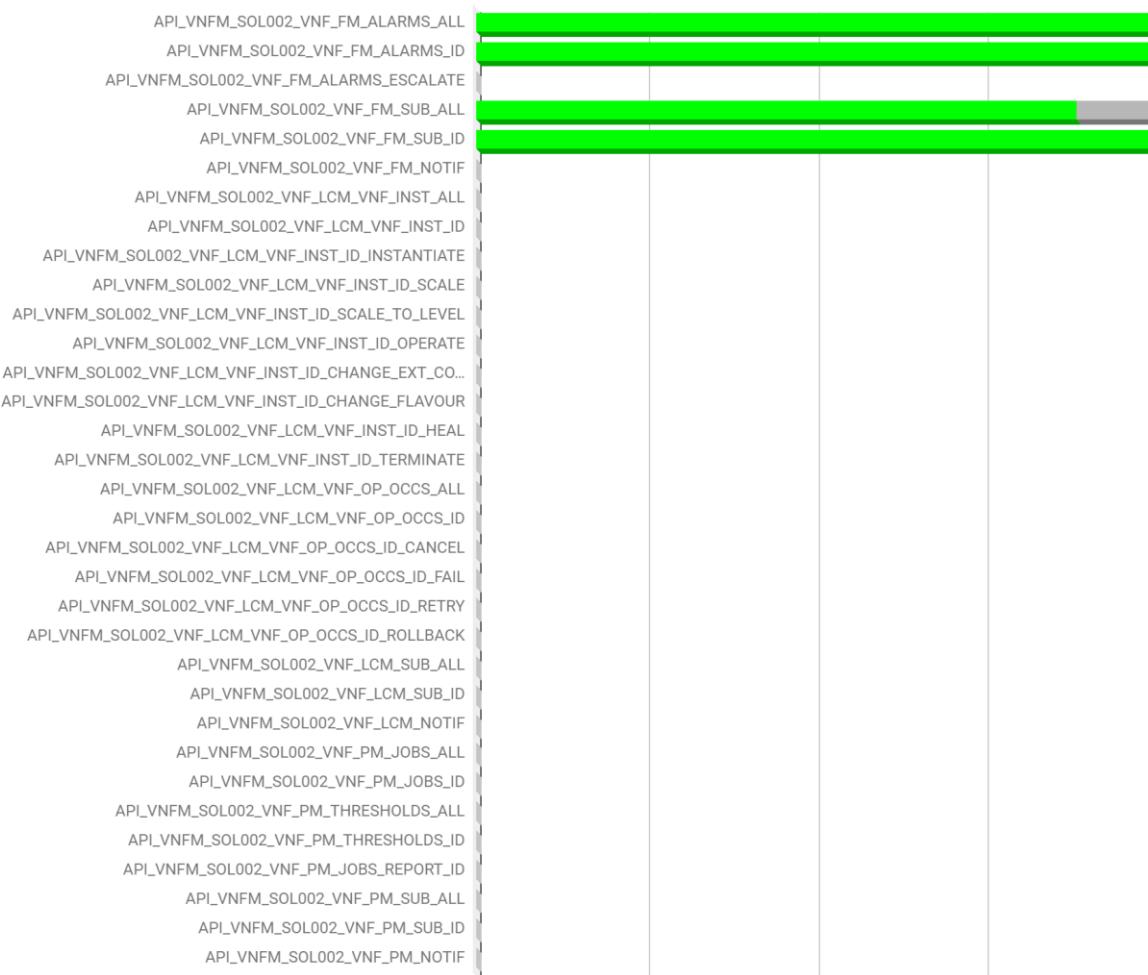


Figure 21. VNFM SOL002 test results (%)

9.4.3 VNFM - SOL003

	Interoperability		Not Executed	Totals		Totals			
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
API_VNFM_SOL003_VNF_FM_ALARMS_ALL	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_FM_ALARMS_ID	4	0	0	4	4	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_FM_SUB_ALL	9	2	1	11	12	91,67%	81,82%	18,18%	8,33%
API_VNFM_SOL003_VNF_FM_SUB_ID	5	2	0	7	7	100,00%	71,43%	28,57%	0,00%

API_VNFM_SOL003_VNF_FM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_VNF_INST	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_VNF_INST_IND_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_IND_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_JOBS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_JOBS_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_THRESHOLDS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_THRESHOLDS_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_JOBS_REPORT_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_PM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ALL	24	2	1	26	27	96,30%	92,31%	7,69%	3,70%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID	18	5	3	23	26	88,46%	78,26%	21,74%	11,54%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_INSTITUTE	18	0	0	18	18	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_SC	16	0	0	16	16	100,00%	100,00%	0,00%	0,00%

ALE									
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_SC ALE_TO_LEVEL	8	0	0	8	8	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_OP ERATE	15	0	0	15	15	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_CH ANGE_EXT_CONN	6	0	0	6	6	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_C HANGE_FLAVOUR	8	0	0	8	8	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_HE AL	8	0	0	8	8	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_INST_ID_TE RMINATE	14	0	0	14	14	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_A LL	12	1	1	13	14	92,86%	92,31%	7,69%	7,14%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_I D	10	0	0	10	10	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_I D_CANCEL	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_I D_FAIL	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_I D_RETRY	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_VNF_OP_OCCS_I D_ROLLBACK	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_SUB_ALL	16	1	1	17	18	94,44%	94,12%	5,88%	5,56%
API_VNFM_SOL003_VNF_LCM_SUB_ID	10	0	0	10	10	100,00%	100,00%	0,00%	0,00%
API_VNFM_SOL003_VNF_LCM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

TOTAL	236	13	7	249	256	97,27%	94,78%	5,22%	2,73%

Table 13: SOL003 VNFM test results summary**SOL003 VNFM Results - Totals****Figure 22. SOL003 VNFM test results (totals)**

SOL003 VNFM Results - %

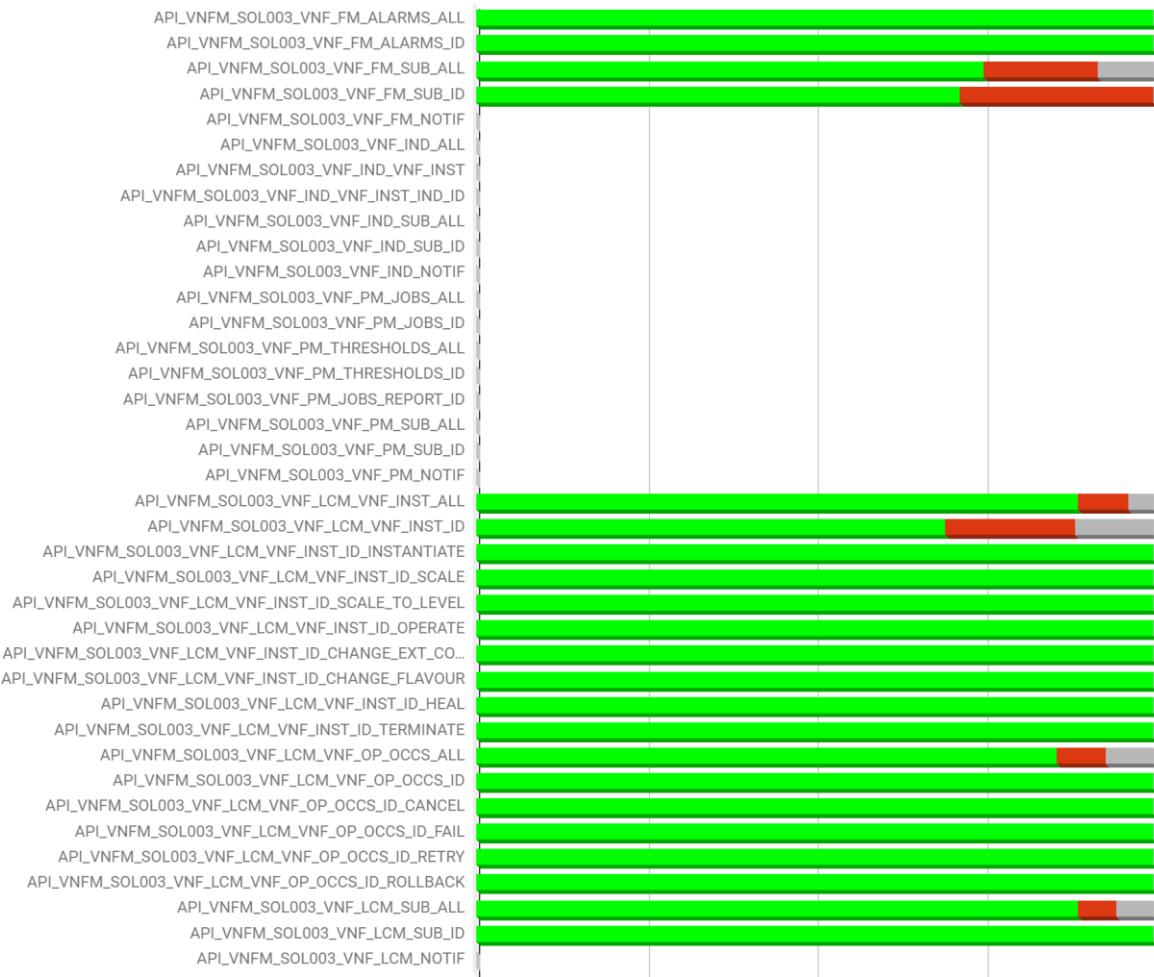
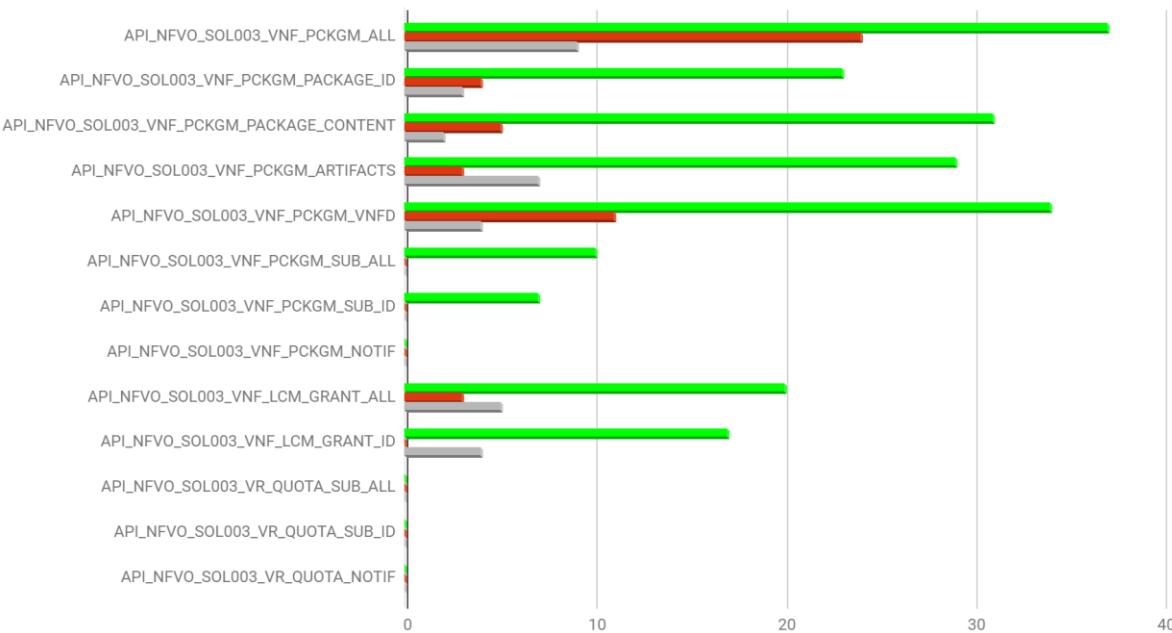


Figure 23. SOL003 VNFM test results (%)

9.4.4 NFVO - SOL003

	API Conformance		Not Executed	Totals		%				
	OK	NO		N/A	Run	Results	% Run	% OK	% NO	% N/A
API_NFVO_SOL003_VNF_PCKGM_ALL	37	24		9	61	70	87,14%	60,66%	39,34%	12,86%
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_ID	23	4		3	27	30	90,00%	85,19%	14,81%	10,00%
API_NFVO_SOL003_VNF_PCKGM_PACKAGE_CONTENT	31	5		2	36	38	94,74%	86,11%	13,89%	5,26%
API_NFVO_SOL003_VNF_PCKGM_ARTIFACTS	29	3		7	32	39	82,05%	90,63%	9,38%	17,95%

API_NFVO_SOL003_VNF_PCKGM_VNFD	34	11	4	45	49	91,84%	75,56%	24,44%	8,16%
API_NFVO_SOL003_VNF_PCKGM_SUB_ALL	10	0	0	10	10	100,00%	100,00%	0,00%	0,00%
API_NFVO_SOL003_VNF_PCKGM_SUB_ID	7	0	0	7	7	100,00%	100,00%	0,00%	0,00%
API_NFVO_SOL003_VNF_PCKGM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL003_VNF_LCM_GRANT_ALL	20	3	5	23	28	82,14%	86,96%	13,04%	17,86%
API_NFVO_SOL003_VNF_LCM_GRANT_ID	17	0	4	17	21	80,95%	100,00%	0,00%	19,05%
API_NFVO_SOL003_VR_QUOTA_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL003_VR_QUOTA_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL003_VR_QUOTA_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
TOTAL	208	50	34	258	292	88,36%	80,62%	19,38%	11,64%

Table 14: NFV SOL003 test results summary**SOL003 NFVO - Totals****Figure 24. NFVO SOL003 test results (totals)**

SOL003 NFVO Results - %

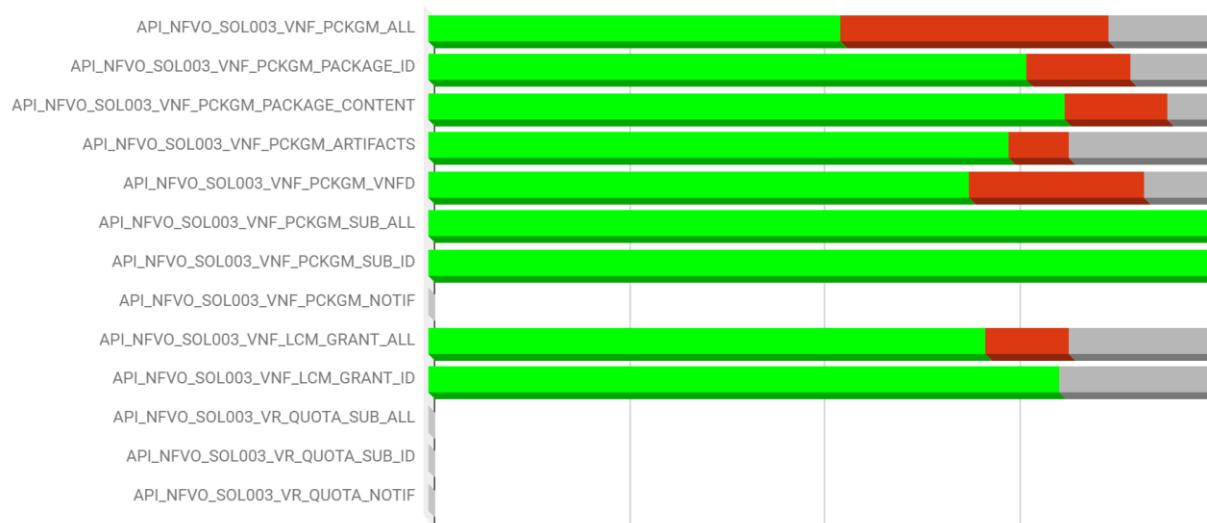


Figure 25. NFV SOL003 test results (%)

9.4.5 NFVO - SOL005

	API Conformance		Not Executed	Totals		%			
	OK	NO		Run	Results	% Run	% OK	% NO	% N/A
API_NFVO_SOL005_NS_D_MGMT_NSD_ALL	7	6	0	13	13	100,00%	53,85%	46,15%	0,00%
API_NFVO_SOL005_NS_D_MGMT_NSD_ID	4	6	0	10	10	100,00%	40,00%	60,00%	0,00%
API_NFVO_SOL005_NS_D_MGMT_NSD_CONTE NT	8	1	3	9	12	75,00%	88,89%	11,11%	25,00%
API_NFVO_SOL005_NS_D_MGMT_PNFD_ALL	0	0	13	0	13	0,00%	0,00%	0,00%	100,00%
API_NFVO_SOL005_NS_D_MGMT_PNFD_CONT ENT	0	0	8	0	8	0,00%	0,00%	0,00%	100,00%
API_NFVO_SOL005_NS_D_MGMT_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_D_MGMT_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_D_MGMT_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_PM_JOB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

API_NFVO_SOL005_NS _PM_JOB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_JOB_REPORT_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_THRESHOLD_AL L	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_THRESHOLD_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _PM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_VN F_PCKGM_ALL	6	6	2	12	14	85,71%	50,00%	50,00%	14,29%
API_NFVO_SOL005_VN F_PCKGM_ID	5	3	0	8	8	100,00%	62,50%	37,50%	0,00%
API_NFVO_SOL005_VN F_PCKGM_VNFD	7	3	0	10	10	100,00%	70,00%	30,00%	0,00%
API_NFVO_SOL005_VN F_PCKGM_VNFD_CON TENT	5	4	2	9	11	81,82%	55,56%	44,44%	18,18%
API_NFVO_SOL005_VN F_PCKGM_UPLOAD_U RI	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_VN F_PCKGM_ARTIFACT	8	0	2	8	10	80,00%	100,00 %	0,00%	20,00%
API_NFVO_SOL005_VN F_PCKGM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_VN F_PCKGM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_VN F_PCKGM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS D_MGMT_PNFD_ID	0	0	6	0	6	0,00%	0,00%	0,00%	100,00 %
API_NFVO_SOL005_NS _FM_ALARMS_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

<u>_FM_ALARM_ID</u>									
API_NFVO_SOL005_NS _FM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _FM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _FM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ALL	3	4	0	7	7	100,00%	42,86%	57,14%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID	5	1	0	6	6	100,00%	83,33%	16,67%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID_IN STANTIMATE	5	1	0	6	6	100,00%	83,33%	16,67%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID_SC ALE	4	2	0	6	6	100,00%	66,67%	33,33%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID_UP DATE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID_HE AL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_INST_ID_TE RMINATE	4	1	0	5	5	100,00%	80,00%	20,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_A LL	4	3	0	7	7	100,00%	57,14%	42,86%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_I D	4	1	0	5	5	100,00%	80,00%	20,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_I D_RETRY	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_I D_ROLLBACK	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_I D_CONTINUE	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS _LCM_NS_OP_OCCS_I	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%

D_FAIL									
API_NFVO_SOL005_NS_LCM_NS_OP_OCCS_ID_CANCEL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_LCM_SUB_ALL	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_LCM_SUB_ID	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
API_NFVO_SOL005_NS_LCM_NOTIF	0	0	0	0	0	0,00%	0,00%	0,00%	0,00%
TOTAL	79	42	36	121	157	77,07%	65,29%	34,71%	22,93%

Table 15: NFVO SOL005 test results summary

SOL005 NFVO - Totals



Figure 26. NFVO SOL005 test results (totals)

SOL005 NFVO Results - %

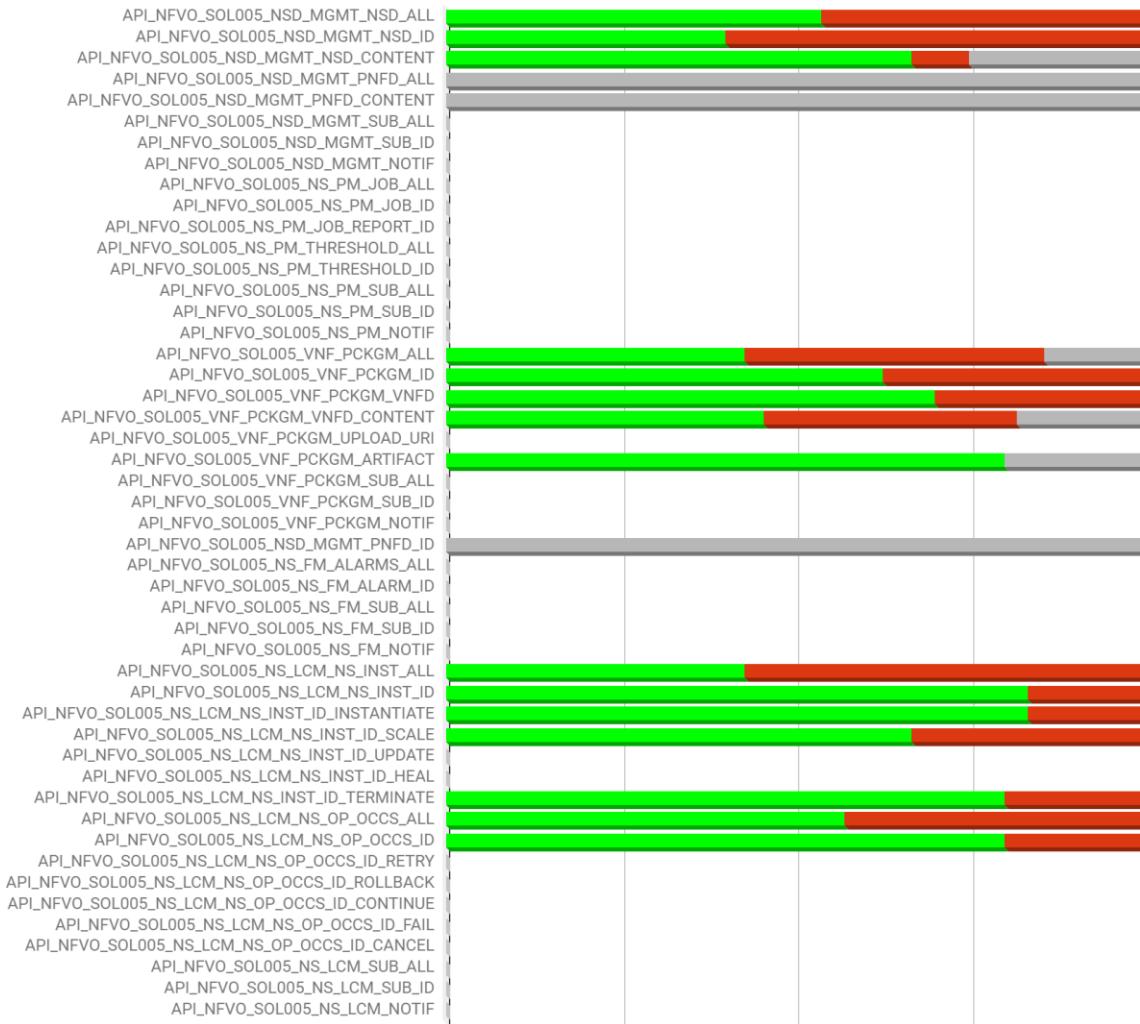


Figure 27. NFVO SOL005 test results (%)

9.5 Results per Test Case

The full list of results grouped per Test Case, is provided in Annex B.

10 Plugtests Outcome

During the Remote NFV API Plugtests 69 items were identified as potential issues and discussed with the participating community. This chapter compiles the outcome of these discussions, identifies some bugs and provides some recommendations on NFV Specifications, NFV OpenAPI definitions, and the Robot Test Suite developed for the NFV API Conformance Test Specification.

10.1 Feedback on NFV Specifications

10.1.1 API specification on Common errors

The Clause **4.3.5.4 Common error situations** in [SOL002], [SOL003] and [SOL005] use different statements to define the presence of the ProblemDetails data type in the responses.

The descriptions of error codes 400, 401, 404 state that “The ProblemDetails structure **may be provided**”, while the descriptions of error codes 405, 406 and 503 state that “The ProblemDetails structure **may be omitted**”. This may mislead the reader to a different interpretation during the implementation phase.

It would be advisable to consolidate Clause **4.3.5.4 Common error situations** across SOL Specifications

This item has been reported to NFV SOL Working Group as Issue [0007836](#)

10.2 Feedback on NFV OpenAPIs

10.2.1 _links property not mandatory on NsInstance data model

The property _links is mandatory on the NsInstance data model, as per Table 6.5.2.10-1 on SOL005 v2.4.1. In the OpenAPI definition this requirement is missing.

This issue has been reported as Bug #234 on the ETSI Forge [BUGZILLA] for NFV OpenAPIs.

10.2.2 Invalid property stateEnteredTime on NsLcmOpOcc data model

The property stateEnteredTime present on the OpenAPI definitions for the NsLcmOpOcc data model is inconsistent with the definition of the data model on [SOL005]. The property should be named statusEnteredTime as stated in the [SOL005] v2.4.1 - Table 6.5.2.3-1

This issue has been reported as Bug #235 on the ETSI Forge [BUGZILLA] for NFV OpenAPIs.

10.2.3 vimConnectionId property not mandatory on VNFFaultManagement data model

The property vimConnectionId is mandatory on the VNFFaultManagement data model, as per Table 4.4.1.7-1 on [SOL005] v2.4.1. In the OpenAPI definition this requirement is missing

This issue has been reported as Bug #185 on the ETSI Forge [BUGZILLA] for NFV OpenAPIs.

10.3 Feedback on the Robot Test Suite

Overall, the Remote NFV API Plugtests allowed to identify and file 65 issues on the Robot Test Suites under development. The table below summarises all the issues and indicates the impacted SOL Specification and the number under which the issue was filed in the [ISSUE-TRACKER] set up for that purpose in the ETSI Forge.

Issue	Description	SOL002	SOL003	SOL005
#1	Response code and typos on SOL002/VNFConfiguration-API/Configuration.robot	X		
#2	Missing variable on NEG_AUTHORIZATION in SOL002/VNFIIndicator-API/VNFIIndicators.robot	X		
#3	Typo on SOL002/VNFIIndicator-API/Subscriptions.robot	X		
#4	Missing "response body" when filtering response for DELETE operation on SOL002/VNFIIndicator-API/IndividualSubscription.robot	X		
#5	Issue with Request Methods, robot script not allowing POST,PUT,PATCH,DELETE requests in SOL003/VNFFaultManagement-API/Alarms.robot		X	
#6	Robot script expecting object types instead of arrays in SOL003/VNFFaultManagement-API/Alarms.robot		X	
#7	Robot script is expecting 200 for POST, PUT, PATCH where 405 should be expected as per SOL003 Spec in VNFFaultManagement-API/IndividualSubscription.robot		X	
#8	Missing Java and required packages on test system SOL003/VNFFaultManagementNotification-API/NotificatinEndpoint.robot		X	
#9	Robot script expecting object instead of an array in SOL003/VNFFaultManagement-API/Subscriptions.robot		X	
#10	Robot script is not allowing POST,PUT methods in SOL003/VNLFifecycleManagement-API/IndividualVNFInstance.robot		X	
#11	Robot script is expecting 'Etag' in response body, where it is not specified in the SOL003 spec in SOL003/VNLFifecycleManagement-API/IndividualVNFInstance.robot		X	
#12	Robot script is expecting 200 where 201 is required as per SOL003 spec in SOL003/VNLFifecycleManagement-API/VNFInstances.robot		X	
#13	Cannot download mockserver from Github	X	X	X
#14	SOL002-VNFFaultManagement-API/Alarms.robot: Typo on ETag	X		
#15	SOL002-VNFFaultManagement-API/Alarms.robot: ETag missing on PATCH requests	X		
#16	SOL003-VNLFifeManagement-API - IndividualVNFInstance.robot: Different vnfInstanceId are needed		X	
#17	SOL003-VNLFifeManagement-API - Instantiate		X	
#18	SOL003-VNLFifeManagement-API - Operate: Typo on json file		X	
#19	SOL003-VNLFifeManagement-API - Operate: Logic revise on task Operate a vnfInstance Conflict (parallel LCM operation)		X	
#20	Duplicate subscriptions for notifications	X	X	X
#21	SOL003-VNLFifeManagement-API - VNFInstances.robot: Typo on URI (Create a new vnfInstance)		X	
#22	SOL003-VNLFifeManagement-API - Subscriptions.robot: Typo on json file		X	

#23	Exclude only complex optional fields.	X	X	X
#24	Missing quotes on VNFDInIndividualVNFPackage		X	
#25	Variable '\${vnfPackageId}' not found.	X	X	X
#26	Error on handling varibales and keywords in SOL003/VNFLifeCycleOperationGranting/Grant.robot		X	
#27	Setup Suite issue in IndividualGrant.robot		X	
#28	DELETE on SOL003/VNFLifeCycleOperationGranting/IndividualGrant.robot Expected status code is 204, should be 405		X	
#29	SOL003-VNFLifeCycleManagement-API - IndividualSubscription.robot: DELETE method wrong		X	
#30	SOL003 - VNFPackageManagement-API - VNFPackages.robot: typo on URI query parameters		X	
#31	SOL003 - VNFPackageManagement-API - VNFPackageArtifacts.robot		X	
#32	SOL003 - VNFPackageManagement-API - Subscriptions.robot: Negative Filter error		X	
#33	SOL003-VNFLifeCycleManagement-API - IndividualVNFInstance.robot: typo on etag		X	
#34	Missing check of presence of "WWW-Authenticate HTTP header" when "401 Unauthorized" error code is received	X	X	X
#35	Keyword: "Check Resource existance" should be parametrized	X	X	X
#36	ETag in "GET individual VNF instance" on SOL003/VNFLifeCycleManagement-API/IndividualVNFInstances.robot should be optional		X	
#37	Keyword: "Parametrize Check resource not instantiated" should be parametrized	X	X	X
#38	Typo on VNFLifecycleManagement-API/TerminateVNFTask.robot		X	
#39	Schema issue on VnfLcmOpOccs.schema.json. It is not an array as expected		X	
#40	Typo on SOL003/VNFLifecycleManagement-API/Subscriptions.robot		X	
#41	Schema issue in subscriptions.schema.json. It is not an array as expected		X	
#42	All NO RANGE TD should be removed since are the same with the "classic" GET already provided in the test suites	X	X	X
#43	Synchronous Grant: Response is not treated as a valid json. Elements have single quote instead of double quotes.		X	
#44	SOL003-VNFLifeCycleManagement-API - subscriptions.schema.json: error on Permitted values of notificationTypes		X	
#45	SSL Verification need to be disabled on all test suites	X	X	X
#46	Wrong URI at SOL005/NSDManagement-API/NSDescriptors.robot			X
#47	Mismatching between Accept header and returned object	X	X	X
#48	Asynchronous vs Synchronous should be alternately executed based on	X	X	X

	availability			
#49	Handling text or ZIP vnfds		X	X
#50	Content-Type check on octet-stream should be removed in SOL003/VNFPackageManagement-API/VNFPackageArtifacts.robot		X	
#51	Wrong variable is used in the URI in SOL003/VNFPackageManagement-API/VNFPackageArtifacts.robot		X	
#52	Dependency not met: test case 'Send VNF configuration' not found, wanted 'PASS'		X	
#53	File not found error *.schema.json	X	X	X
#54	Resolving variable '\${response.body}' failed: AttributeError: 'list' object has no attribute 'body'		X	
#55	TypeError: argument of type 'int' is not iterable	X	X	X
#56	Invalid log level 'Postcondition indicators exist'.		X	
#57	Dictionary item '\${response[0]['headers'][['ETag']]} does not contain '=' separator		X	
#58	Content Type should not be checked on negative cases	X	X	X
#59	Typo on SOL005/VNFPackageManagement-API/VNFPackageContent.robot			X
#60	Wrong accept header on SOL005/VNFPackageManagement-API/VNFPackageContent.robot			X
#61	Schema jsons (IN SOL005) should not contain referenced elements			X
#62	Failure on Header check in SOL005/NSLifeCycleManagement-API/NSInstances.robot			X
#63	Failure on stauts check in SOL005/NSLifeCycleManagement-API/NSInstances.robot			X
#64	Filename not found on schemas/nsInstance.schema.json in SOL005/NSLifeCycleManagement-API/			X
#65	Error on checking status code in Grants.robot in SOL003/VNFLifeCycleGrantingoperation-API		X	

Table 16: Issues detected on Robot Test Suite

Annex A - ICS and Configuration Parameters

A.1 VNF - SOL002

Interface	Resource	Required info and data structures from FUT
VNF_CONF	/configuration	1. VNF endpoint 2. Authentication token 3. Suitable VNF configuration JSON
VNF_IND	/indicators	1. VNF Endpoint 2. Authentication token 3. Existing vnflInstanceld
VNF_IND	/indicators/\${vnflInstanceld}	1. VNF Endpoint 2. Authentication token 3. Existing vnflInstanceld
VNF_IND	/indicators/\${vnflInstanceld}/\${indicatorId}	1. VNF Endpoint 2. Authentication token 3. Existing vnflInstanceld 4. Existing indicatorId
VNF_IND	/subscriptions	1. VNF Endpoint 2. Authentication token 3. Existing vnflInstance 4. Existing indicatorId 5. Subscription json
VNF_IND	/subscriptions/{subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_IND (notif)	<async_notification>	1. Existing subscription for VNF indicators notifications

Table 17: VNF SOL002 ICS & CP

A.2 VNFM - SOL002

Interface	Resource	Required info and data structures from participant
VNF_FM	/alarms	1. VNFM Endpoint 2. Authorization token 3. Existing managed object identifier

VNF_FM	/alarms/\${alarmId}	1. VNFM Endpoint 2. Authorization token 3. Existing alarm identifier 4. AlarmModifications json 5. Etagging
VNF_FM	/subscriptions	1. VNFM Endpoint 2. Authorization token 3. Fault Management SubscriptionRequest json
VNF_FM	/subscriptions/{subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_FM	<async_notification>	1. Existing subscription for alarms notifications
VNF_IND	/indicators	1. VNFM Endpoint 2. Authorization token
VNF_IND	/indicators/\${vnfInstanceId}	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier
VNF_IND	/indicators/\${vnfInstanceId}/\${indicatorId}	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. Existing vnIndicator identifier
VNF_IND	/subscriptions	1. VNFM Endpoint 2. Authorization token 4. Duplication handling (boolean) 5. Subscriptions Json
VNF_IND	/subscriptions/{subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_IND	<async_notification>	1. Existing subscription for VNF indicators notifications
VNF_PM	/pm_jobs	1. VNFM Endpoint 2. Authorization token 3. Field option (boolean) 4. CreatePmJobRequest json
VNF_PM	/pm_jobs/{pmJobId}	1. VNFM Endpoint 2. Authorization token 3. Existing Performance Management identifier

VNF_PM	/thresholds	1. VNFM Endpoint 2. Authorization token 3. Filtering object 4. CreateThresholdRequest json
VNF_PM	/thresholds/\${thresholdId}	1. VNFM Endpoint 2. Authorization token 3. Existing threshold identifier
VNF_PM	/pm_jobs/\${pmJobId}/reports/\${reportId}	1. VNFM Endpoint 2. Authorization token 3. Existing pmJob identifier 4. Existing report identifier
VNF_PM	/subscriptions	1. VNFM Endpoint 2. Authorization token 3. Existing data to enable filter usage 4. Subscriptions json 5. Duplication option (boolean)
VNF_PM	/subscriptions/\${subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_PM	<async_notification>	1. Existing subscription for performance information notifications 2. Existing subscription for threshold crossed notifications
VNF_LCM	/vnf_instances	1. VNFM Endpoint 2. Authorization token 3. CreateVnfRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}	1. VNFM Endpoint 2. Authorization token 3. Existing vnf instance identifier 4. PatchBodyRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/instantiate	1. VNFM Endpoint 2. Authorization token 3. Existing vnf instance identifier 4. InstantiateVnfRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/scale	1. VNFM Endpoint 2. Authorization token 3. Existing vnf instance identifier 4. ScaleVnfRequest json

VNF_LCM	/vnf_instances/\${vnfInstanceId}/scale_to_level	1. VNFM Endpoint 2. Authorization token 3. Existing vnf instance identifier 4. ScaleVnfToLevelRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/operate	1. VNFM Endpoint 2. Authorization token 3. Existing vnf instance identifier 4. OperateVnFRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/change_ext_conn	1. VNFM Endpoint 2. Authorization token 3. Existing VNF instance identifier 4. ChangeExtVnfConnectivityRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/change_flavour	1. VNFM Endpoint 2. Authorization token 3. Existing VNF instance identifier 4. ChangeVnfFlavourRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/heal	1. VNFM Endpoint 2. Authorization token 3. Existing VNF instance identifier 4. healVnFRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/terminate	1. VNFM Endpoint 2. Authorization token 3. Existing VNF instance identifier 4. TerminateVnFRequest json
VNF_LCM	/vnf_lcm_op_occs	1. VNFM Endpoint 2. Authorization token
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/cancel	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/fail	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier

VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/retry	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/rollback	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier
VNF_LCM	/subscriptions	1. VNFM Endpoint 2. Authorization token 3. IccbSubscriptionRequest json
VNF_LCM	/subscriptions/\${subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_LCM	<async_notification>	1. Existing Subscription for operation occurrence notifications 2. Existing Subscription for VNF instance Id creation notifications 3. Existing Subscription for VNF instance Id deletion notifications

Table 18 VNFM – SOL002 ICS & CP

A.3 VNFM - SOL003

Interface	Resource	Required info and data structures from participant
VNF_FM	/alarms	1. VNF endpoint 2. Authentication token or credentials
VNF_FM	/alarms/\${alarmId}	1. VNF endpoint 2. Authentication token or credentials 3. Existing alarm resource ID
VNF_FM	/alarms/\${alarmId}/escalate	1. VNF endpoint 2. Authentication token or credentials 3. Existing alarm resource ID
VNF_FM	/subscriptions	1. VNF endpoint 2. Authentication token or credentials 3. FaultManagement Subscription request json
VNF_FM	/subscriptions/{subscriptionId}	1. VNF endpoint 2. Authentication token or credentials 3. Existing Alarm subscription ID

VNF_FM (notif)	<async_notification>	1. Existing subscription for alarms notifications
VNF_LCM	/vnf_instances	1. VNFM Endpoint 2. Authorization token 3. CreateVnfRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. PatchBodyRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/instantiate	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. InstantiateVnfRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/scale	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. ScaleVnfRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/scale_to_level	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. ScaleVnfToLevelRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/operate	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. OperateVnFRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/change_ext_conn	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. ChangeExtVnfConnectivityRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/change_flavour	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. ChangeVnfFlavourRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/heal	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. HealVnFRequest json
VNF_LCM	/vnf_instances/\${vnfInstanceId}/terminate	1. VNFM Endpoint 2. Authorization token 3. Existing vnfInstance identifier 4. TerminateVnFRequest json

VNF_LCM	/vnf_lcm_op_occs	1. VNFM Endpoint 2. Authorization token
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}	1. VNFM Endpoint 2. Authorization token 3. Existing vnfLcmOpOccId identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/cancel	1. VNFM Endpoint 2. Authorization token 3. Existing Vnf LCM Operation Occurrence identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/fail	1. VNFM Endpoint 2. Authorization token 3. Existing vnfLcmOpOccId identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/retry	1. VNFM Endpoint 2. Authorization token 3. Existing vnfLcmOpOccId identifier
VNF_LCM	/vnf_lcm_op_occs/\${vnfLcmOpOccId}/rollback	1. VNFM Endpoint 2. Authorization token 3. Existing vnfLcmOpOccId identifier
VNF_LCM	/subscriptions	1. VNFM Endpoint 2. Authentication token 3. Manage duplication subscriptions (boolean) 4. IccbSubscriptionRequest json
VNF_LCM	/subscriptions/\${subscriptionId}	1. VNFM Endpoint 2. Authentication token 3. Existing subscription Id
VNF_LCM (notif)	<async_notification>	1. Existing subscription for operation occurrence notifications 2. Existing subscription for VNF instance Id creation notifications 3. Existing subscription for VNF instance Id deletion notifications
VNF_PM	/pm_jobs	1. VNFM Endpoint 2. Authorization token 3. Manage fields (boolean) 4. CreatePmJobRequest json
VNF_PM	/pm_jobs/{pmJobId}	1. VNFM Endpoint 2. Authorization token 3. Existing pmJob Identifier

VNF_PM	/thresholds	1. VNFM Endpoint 2. Authorization token 3. CreateThresholdRequest json
VNF_PM	/thresholds/\${thresholdId}	1. VNFM Endpoint 2. Authorization token 3. Existing threshold identifier
VNF_PM	/pm_jobs/\${pmJobId}/reports/\${reportId}	1. VNFM Endpoint 2. Authorization token 3. Existing pmJob identifier 4. Existing report identifier
VNF_PM	/subscriptions	1. VNFM Endpoint 2. Authorization token 3. Filter name 4. Subscriptions json
VNF_PM	/subscriptions/\${subscriptionId}	1. VNFM Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_PM (notif)	<async_notification>	1. Existing subscription for performance information notifications 2. Existing subscription for threshold crossed notifications

Table 19 VNFM – SOL003 ICS & CP

A.4 NFVO - SOL003

Interface	Resource	Required info and data structures from participant
VNF_PCKGM	/vnf_packages	1. NFVO Endpoint 2. Authorization token 3. Filters (positive and negative cases) 4. Complex fields to get from NFVO
VNF_PCKGM	/vnf_packages/\${vnfPackageId}	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier
VNF_PCKGM	/vnf_packages/\${vnfPkgId}/package_content	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier 4. Range usage (boolean) 5. Existing VNF Package identifier NOT in "ONBOARDED" state
VNF_PCKGM	/vnf_packages/\${vnfPkgId}/artifacts/\${artifactPath}	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier 4. ArtifactPath 5. Range usage (boolean)

VNF_PCKGM	/vnf_packages/\${vnfPkgPlainVNFD}/vnfd	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package (Plain VNFD) identifier 4. Existing VNF Package (ZIP VNFD) identifier 5. Existing VNF Package identifier NOT in "ONBOARDED" state
VNF_PCKGM	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. Filters (Positive and negative filters) 4. Subscriptions json
VNF_PCKGM	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_PCKGM	<custom>	1. Existing subscription for VNF Package Onboarding notifications 2. Existing subscription for VNF Package Change notifications
VNF_LCM_GRANT	/grants	1. NFVO Endpoint 2. Authorization token 3. Granting mode (sync/async) 4. GrantRejectedRequest json 5. GrantRequest json
VNF_LCM_GRANT	/grants/\${grantId}	1. NFVO Endpoint 2. Authorization token 3. Existing grant identifier
VR_QUOTA_NOTIF	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. vrQuotaAvailSubscriptionRequest json 4. NFVO duplication (boolean) 5. Filters
VR_QUOTA_NOTIF	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
VR_QUOTA_NOTIF	<custom>	1. Existing subscription for Vr Quota Availability notifications

Table 20 NFVO – SOL003 ICS & CP

A.5 NFVO - SOL005

Interface	Resource	Required info and data structures from participant
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NSD_MGMT	/ns_descriptors	1. NFVO Endpoint 2. Authorization token 3. NSD to onboard 4. Examples of query filters
NSD_MGMT	/ns_descriptors/\${nsdInfoId}	1. NFVO Endpoint 2. Authorization token 3. Existing NSD identifier
NSD_MGMT	/ns_descriptors/\${nsdInfoId}/nsd_content	1. NFVO Endpoint 2. Authorization token 3. Existing NSD identifier
NSD_MGMT	/pnf_descriptors	1. NFVO Endpoint 2. Authorization token 3. PNFD to onboard 4. Examples of query filters
NSD_MGMT	/pnf_descriptors/\${pnfdInfoId}	1. NFVO Endpoint 2. Authorization token 3. Existing PNFD identifier
NSD_MGMT	/pnf_descriptors/\${pnfdInfoId}/pnfd_content	1. NFVO Endpoint 2. Authorization token 3. Existing PNFD identifier
NSD_MGMT	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. Duplication handling (boolean) 4. subscriptions Json
NSD_MGMT	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
NSD_MGMT	<custom>	Existing subscription for notifications
NS_PM	/pm_jobs	1. NFVO Endpoint 2. Authorization token 3. Field option (boolean) 4. CreatePmJobRequest json
NS_PM	/pm_jobs/\${pmJobId}	1. NFVO Endpoint 2. Authorization token 3. Existing Performance Management identifier
NS_PM	/pm_jobs/\${pmJobId}/reports/\${reportId}	1. NFVO Endpoint 2. Authorization token 3. Existing pmJob identifier 4. Existing report identifier
NS_PM	/thresholds	1. NFVO Endpoint 2. Authorization token 3. Filtering object 4. CreateThresholdRequest json
NS_PM	/thresholds/\${thresholdId}	1. NFVO Endpoint 2. Authorization token 3. Existing threshold identifier
NS_PM	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. Duplication handling (boolean) 4. subscriptions Json

NS_PM	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
NS_PM	<custom>	1. Existing subscription for performance information notifications 2. Existing subscription for threshold crossed notifications
VNF_PCKGM	/vnf_packages	1. NFVO Endpoint 2. Authorization token 3. Filters (positive and negative cases) 4. Complex fields to get from NFVO 5. VNF Package to onboard
VNF_PCKGM	/vnf_packages/\${vnfPackageId}	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier
VNF_PCKGM	/vnf_packages/\${vnfPkgPlainVNFD}/vnfd	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package (Plain VNFD) identifier 4. Existing VNF Package (ZIP VNFD) identifier 5. Existing VNF Package identifier NOT in "ONBOARDED" state
VNF_PCKGM	/vnf_packages/\${vnfPkgId}/package_content	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier 4. Range usage (boolean) 5. Existing VNF Package identifier NOT in "ONBOARDED" state
VNF_PCKGM	/vnf_packages/\${vnfPackageId}/package_content/upload_from_uri, \${body}	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier 4. URI to upload from
VNF_PCKGM	/vnf_packages/\${vnfPkgId}/artifacts/\${artifactPath}	1. NFVO Endpoint 2. Authorization token 3. Existing VNF Package identifier 4. ArtifactPath 5. Range usage (boolean)
VNF_PCKGM	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. Filters (Positive and negative filters) 4. subscriptions json
VNF_PCKGM	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
VNF_PCKGM	<custom>	1. Existing subscription for VNF Package Onboarding notifications 2. Existing subscription for VNF Package Change notifications
NS_FM	/alarms	1. NFVO Endpoint 2. Authorization token 3. Existing managed object identifier

NS_FM	/alarms/\${alarmId}	1. NFVO Endpoint 2. Authorization token 3. Existing alarm identifier 4. alarmModifications json 5. Etagging
NS_FM	/subscriptions	1. NFVO Endpoint 2. Authorization token 3. Fault Management SubscriptionRequest json
NS_FM	/subscriptions/\${subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription identifier
NS_FM	<custom>	Existing subscription for alarms notifications
NS_LCM	/ns_instances	1. NFVO Endpoint 2. Authorization token 3. CreateNsRequest json
NS_LCM	/ns_instances/{nsInstanceId}	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier
NS_LCM	/ns_instances/{nsInstanceId}/instantiate	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier 4. InstantiateNsRequest json
NS_LCM	/ns_instances/{nsInstanceId}/scale	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier 4. ScaleNsRequest json
NS_LCM	/ns_instances/{nsInstanceId}/update	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier 4. updateNsRequest json
NS_LCM	/ns_instances/{nsInstanceId}/heal	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier 4. healNsRequest json
NS_LCM	/ns_instances/{nsInstanceId}/terminate	1. NFVO Endpoint 2. Authorization token 3. Existing NS instance identifier 4. terminateNsRequest json
NS_LCM	/ns_lcm_op_occs	1. NFVO Endpoint 2. Authorization token
NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier
NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}/retry	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier
NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}/rollback	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier

NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}/continue	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier
NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}/fail	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier
NS_LCM	/ns_lcm_op_occs/{nsLcmOpOccId}/cancel	1. NFVO Endpoint 2. Authorization token 3. Existing NS LCM Operation Occurrence identifier
NS_LCM	/subscriptions	1. NFVO Endpoint 2. Authorization token
NS_LCM	/subscriptions/{subscriptionId}	1. NFVO Endpoint 2. Authorization token 3. Existing subscription for notifications
NS_LCM	<custom>	1. NFVO Endpoint 2. Authorization token 3. Existing subscription for operation occurrence notifications 4. Existing subscription for NS instance Id creation notifications 5. Existing subscription for NS instance Id deletion notifications

Table 21 NFVO – SOL005 ICS & CP

Annex B – Results per Test Case

	API Conformance		Not Executed		Totals	
	OK	NO	NA	OT	Run	Results
TD_API_VNF_SOL002_VNF_CONF_1	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_CONF_2	1	0	0	0	1	1
TD_API_VNF_SOL002_VNF_CONF_3	1	0	0	0	1	1
TD_API_VNF_SOL002_VNF_CONF_4	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_CONF_5	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_CONF_6	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_1	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_2	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_3	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_4	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_5	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_6	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_7	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_8	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_10	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_9	1	0	0	0	1	1
TD_API_VNF_SOL002_VNF_IND_11	1	0	0	0	1	1
TD_API_VNF_SOL002_VNF_IND_12	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_13	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_14	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_15	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_16	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_17	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_18	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_19	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_20	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_21	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_22	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_23	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_24	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_25	1	1	0	0	2	2

TD_API_VNF_SOL002_VNF_IND_26	1	0	0	0	1	1
TD_API_VNF_SOL002_VNF_IND_27	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_28	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_29	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_30	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_31	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_32	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_33	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_34	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_35	1	1	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_36	2	0	0	0	2	2
TD_API_VNF_SOL002_VNF_IND_37	0	0	0	0	0	0
TD_API_VNF_SOL002_VNF_IND_38 .. 42	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_1	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_2	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_3	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_4	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_5	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_6	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_7	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_8	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_9	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_10	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_11	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_12	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_13	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_14	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_15	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_16	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_17	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_18	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_19	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_FM_20	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_21	0	0	1	0	0	1
TD_API_VNFM_SOL002_VNF_FM_22	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_23	1	0	0	0	1	1

TD_API_VNFM_SOL002_VNF_FM_24	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_25	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_26	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_27	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_28	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_29	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_30	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_31	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_32	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_33	1	0	0	0	1	1
TD_API_VNFM_SOL002_VNF_FM_34 .. 39	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_LCM_1 .. 139	0	0	0	0	0	0
TD_API_VNFM_SOL002_VNF_PM_1 .. 64	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_FM_1	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_2	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_3	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_4	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_5	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_6	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_7	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_8	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_9	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_FM_10	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_FM_11	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_FM_12	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_13	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_14	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_15	1	1	0	0	2	2
TD_API_VNFM_SOL003_VNF_FM_16	0	1	1	0	1	2
TD_API_VNFM_SOL003_VNF_FM_17	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_FM_18	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_19	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_20	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_21	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_22	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_23	1	0	0	0	1	1

TD_API_VNFM_SOL003_VNF_FM_24	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_25	1	1	0	0	2	2
TD_API_VNFM_SOL003_VNF_FM_26	1	1	0	0	2	2
TD_API_VNFM_SOL003_VNF_FM_27	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_28	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_FM_29 .. 33	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_IND_1 .. 42	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_PM_1 .. 64	0	0	0	0	0	0
TD_API_NFVO_SOL003_VNF_PCKGM_1	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_2	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_3	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_4	1	4	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_5	1	4	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_6	1	4	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_7	2	3	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_8	1	1	3	0	2	5
TD_API_NFVO_SOL003_VNF_PCKGM_9	2	0	3	0	2	5
TD_API_NFVO_SOL003_VNF_PCKGM_10	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_11	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_12	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_13	5	0	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_14	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_15	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_16	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_17	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_18	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_19	5	0	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_20	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_21	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_22	2	1	1	0	3	4
TD_API_NFVO_SOL003_VNF_PCKGM_23	2	0	0	0	2	2
TD_API_NFVO_SOL003_VNF_PCKGM_24	2	1	1	0	3	4
TD_API_NFVO_SOL003_VNF_PCKGM_25	3	1	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_26	2	2	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_27	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_28	4	0	0	0	4	4

TD_API_NFVO_SOL003_VNF_PCKGM_29	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_30	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_31	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_32	2	0	2	0	2	4
TD_API_NFVO_SOL003_VNF_PCKGM_33	3	0	0	0	3	3
TD_API_NFVO_SOL003_VNF_PCKGM_34	2	0	2	0	2	4
TD_API_NFVO_SOL003_VNF_PCKGM_35	3	1	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_36	2	2	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_37	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_PCKGM_38	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_PCKGM_39	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_40	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_PCKGM_41	3	1	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_42	4	1	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_43	4	1	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_44	1	3	0	0	4	4
TD_API_NFVO_SOL003_VNF_PCKGM_45	3	2	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_46	2	3	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_47	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_48	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_49	5	0	0	0	5	5
TD_API_NFVO_SOL003_VNF_PCKGM_50	4	0	1	0	4	5
TD_API_NFVO_SOL003_VNF_PCKGM_51	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_52	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_53	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_54	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_55	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_56	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_57	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_58	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_59	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_60	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_61	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_62	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_63	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_64	1	0	0	0	1	1

TD_API_NFVO_SOL003_VNF_PCKGM_65	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_66	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_67	1	0	0	0	1	1
TD_API_NFVO_SOL003_VNF_PCKGM_68 .. 75	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_1	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_2	4	0	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_3	3	1	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_4	2	1	1	0	3	4
TD_API_VNFM_SOL003_VNF_LCM_5	4	0	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_6	4	0	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_7	4	0	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_8	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_9	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_10	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_11	1	1	1	0	2	3
TD_API_VNFM_SOL003_VNF_LCM_12	1	1	1	0	2	3
TD_API_VNFM_SOL003_VNF_LCM_13	0	2	1	0	2	3
TD_API_VNFM_SOL003_VNF_LCM_14	3	1	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_15	4	0	0	0	4	4
TD_API_VNFM_SOL003_VNF_LCM_16	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_17	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_18	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_19	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_20	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_21	3	0	0	0	3	3
TD_API_VNFM_SOL003_VNF_LCM_22	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_23	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_24	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_25	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_26	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_27	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_28	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_29	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_30	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_31	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_32	1	0	0	0	1	1

TD_API_VNFM_SOL003_VNF_LCM_33	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_34	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_35	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_36	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_37	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_38	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_39	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_40	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_41	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_42	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_43	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_44	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_45	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_46	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_47	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_48	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_49	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_50	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_51	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_52	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_53	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_54	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_55	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_56	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_57	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_58	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_59	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_60	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_61	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_62	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_63	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_64	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_65	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_66	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_67	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_68	2	0	0	0	2	2

TD_API_VNFM_SOL003_VNF_LCM_69	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_70	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_71	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_72	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_73	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_74	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_75	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_76	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_77	1	1	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_78	1	0	1	0	1	2
TD_API_VNFM_SOL003_VNF_LCM_79	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_80	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_81	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_82	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_83	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_84	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_85	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_86	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_87	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_88	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_89	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_90	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_91	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_92	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_93	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_94	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_95	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_96	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_97	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_98	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_99	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_100	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_101	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_102	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_103	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_104	1	0	0	0	1	1

TD_API_VNFM_SOL003_VNF_LCM_105	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_106	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_107	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_108	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_109	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_110	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_111	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_112	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_113	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_114	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_115	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_116	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_117	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_118	1	0	0	0	1	1
TD_API_VNFM_SOL003_VNF_LCM_119	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_120	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_121	1	0	1	0	1	2
TD_API_VNFM_SOL003_VNF_LCM_122	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_123	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_124	1	1	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_125	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_126	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_127	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_128	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_129	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_130	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_131	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_132	2	0	0	0	2	2
TD_API_VNFM_SOL003_VNF_LCM_133	0	0	0	0	0	0
TD_API_VNFM_SOL003_VNF_LCM_134 .. 139	0	0	0	0	0	0
TD_API_NFVO_SOL003_VNF_LCM_GRANT_1	4	0	0	0	4	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_2	1	1	2	0	2	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_3	2	2	0	0	4	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_4	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_5	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_6	4	0	0	0	4	4

TD_API_NFVO_SOL003_VNF_LCM_GRANT_7	3	0	1	0	3	4
TD_API_NFVO_SOL003_VNF_LCM_GRANT_8	3	0	0	0	3	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_9	3	0	0	0	3	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_10	1	0	2	0	1	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_11	1	0	2	0	1	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_12	3	0	0	0	3	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_13	3	0	0	0	3	3
TD_API_NFVO_SOL003_VNF_LCM_GRANT_14	3	0	0	0	3	3
TD_API_NFVO_SOL003_VR_QUOTA_NOTIF_1 .. 19	0	0	0	0	0	0
TD_API_NFVO_SOL005_NSD_MGMT_1	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_2	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_3	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_4	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_5	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_6	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_7	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_8	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_9	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_10	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_11	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_12	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_13	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_14	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_15	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_16	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_17	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_18	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_19	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_20	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_21	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_22	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_23	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_24	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_25	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_26	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_27	0	0	1	0	0	1

TD_API_NFVO_SOL005_NSD_MGMT_28	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_29	0	1	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_30	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_31	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_32	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_33	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_34	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_35	1	0	0	0	1	1
TD_API_NFVO_SOL005_NSD_MGMT_36	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_37	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_38	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_39	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_40	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_41	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_42	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_43	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_44	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_45	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_46	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_47	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_48	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_49	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_50	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_51	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_52	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_53	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_54	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_55	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_56	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_57	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_58	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_59	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_60	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_61	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_62	0	0	1	0	0	1
TD_API_NFVO_SOL005_NSD_MGMT_63 ..	0	0	0	0	0	0

TD_API_NFVO_SOL005_NS_PM_1 .. 64	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_1	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_2	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_3	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_4	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_5	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_6	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_7	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_8	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_9	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_10	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_11	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_12	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_13	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_14	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_15	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_16	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_17	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_18	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_19	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_20	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_21	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_22	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_23	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_24	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_25	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_26	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_27	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_28	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_29	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_30	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_31	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_32	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_33	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_34	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_35	1	0	0	0	1	1

TD_API_NFVO_SOL005_VNF_PCKG_MGMT_36	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_37	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_38	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_39	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_40	0	1	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_41	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_42	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_43	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_44	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_45	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_46	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_47	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_48	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_49	0	0	0	0	0	0
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_50	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_51	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_52	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_53	0	0	1	0	0	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_54	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_55	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_56	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_57	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_58	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_59	1	0	0	0	1	1
TD_API_NFVO_SOL005_VNF_PCKG_MGMT_60 .. 84	0	0	0	0	0	0
TD_API_NFVO_SOL005_NS_FM_1 .. 36	0	0	0	0	0	0
TD_API_NFVO_SOL005_NS_LCM_1	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_2	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_3	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_4	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_5	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_6	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_7	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_8	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_9	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_10	1	0	0	0	1	1

TD_API_NFVO_SOL005_NS_LCM_11	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_12	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_13	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_14	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_15	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_16	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_17	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_18	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_19	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_20	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_21	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_22	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_23	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_24	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_25	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_26 .. 37	0	0	0	0	0	0
TD_API_NFVO_SOL005_NS_LCM_38	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_39	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_40	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_41	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_42	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_43	0	0	0	0	0	0
TD_API_NFVO_SOL005_NS_LCM_44	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_45	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_46	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_47	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_48	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_49	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_50	0	1	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_51	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_52	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_53	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_54	1	0	0	0	1	1
TD_API_NFVO_SOL005_NS_LCM_55	0	1	0	0	1	1

Table 22 Results per Test Case

History

Document history		
V1.0.0	10/05/2019	Publication