



Network Functions Virtualisation (NFV) Release 3; Testing; Guidelines on Interoperability Testing for MANO

[ETSI GR NFV-TST 007 V3.1.1 \(2022-05\)](https://standards.iteh.ai/catalog/standards/sist/0efa12f8-baf6-4cdf-ab3d-1d7d105d62d9/etsi-gr-nfv-tst-007-v3-1-1-2022-05)
[https://standards.iteh.ai/catalog/standards/sist/0efa12f8-
baf6-4cdf-ab3d-1d7d105d62d9/etsi-gr-nfv-tst-007-v3-
1-1-2022-05](https://standards.iteh.ai/catalog/standards/sist/0efa12f8-baf6-4cdf-ab3d-1d7d105d62d9/etsi-gr-nfv-tst-007-v3-1-1-2022-05)

Disclaimer

The present document has been produced and approved by the Network Functions Virtualisation (NFV) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG.
It does not necessarily represent the views of the entire ETSI membership.

Reference

RGR/NFV-TST007ed311

Keywords

interoperability, management, MANO, NFV, testing

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our

Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2022.

All rights reserved.

Contents

Intellectual Property Rights	7
Foreword.....	7
Modal verbs terminology.....	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	8
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	9
3.3 Abbreviations	9
4 Interoperability Features Statement (IFS)	10
4.1 Introduction	10
4.2 IFS for VIM.....	10
4.2.1 Software Image Management	10
4.2.2 VNF Package Management	11
4.2.3 VNF Lifecycle Management.....	11
4.2.4 Fault Management	12
4.2.5 Performance Management	13
4.2.6 NS Lifecycle Management	14
4.3 IFS for VNFM.....	16
4.3.1 Software Image Management	16
4.3.2 VNF Package Management	16
4.3.3 VNF Lifecycle Management.....	17
4.3.4 Fault Management	19
4.3.5 Performance Management	20
4.3.6 NS Lifecycle Management	21
4.4 IFS for NFVO.....	22
4.4.1 Software Image Management	22
4.4.2 VNF Package Management	23
4.4.3 VNF Lifecycle Management.....	23
4.4.4 Fault Management	24
4.4.5 Performance Management	25
4.4.6 NS Lifecycle Management	26
4.5 IFS for EM/VNF	28
4.5.1 Software Image Management	28
4.5.2 VNF Package Management	29
4.5.3 VNF Lifecycle Management.....	29
4.5.4 Fault Management	29
4.5.5 Performance Management	29
4.5.6 NS Lifecycle Management	29
5 System Under Test (SUT).....	30
5.1 SUT Configuration 1	30
5.2 SUT Configuration 2	30
5.3 SUT Configuration 3	31
5.4 SUT Configuration 4	31
6 Test Suite Structure	32
6.1 Introduction	32
6.2 Software Image Management Test Cases Overview	32
6.3 VNF Package Management Test Cases Overview	32
6.4 VNF Lifecycle Management Test Cases Overview	33
6.5 Fault Management Test Cases Overview	33
6.6 Performance Management Test Cases Overview	34

6.7	NS Lifecycle Management Test Cases Overview	34
6.8	Virtualised Resource Management Test Cases Overview	36
7	Test Descriptions	37
7.1	Introduction	37
7.2	Software Image Management	37
7.2.1	Add Software Image	37
7.2.2	Query Software Image	37
7.2.2.1	Query Software Image by NFVO	37
7.2.2.2	Query Software Image by VNFM	38
7.2.3	Update Software Image	38
7.2.4	Delete Software Image	39
7.3	VNF Package Management	39
7.3.1	On-board VNF Package	39
7.3.2	Delete VNF Package	40
7.3.3	Abort VNF Package Delete Operation	40
7.4	VNF Lifecycle Management	40
7.4.1	Instantiate VNF with an EM Request	40
7.4.2	Query VNF with an EM Request	42
7.4.3	Modify VNF Configuration Information with an EM Request	42
7.4.4	Start VNF/VNFC with an EM Request	43
7.4.5	Stop VNF/VNFC with an EM Request	44
7.4.6	VNF Healing with an EM/VNF Request	45
7.4.7	VNF Scale Out with an EM/VNF Request	46
7.4.8	VNF Scale In with an EM/VNF Request	47
7.4.9	Terminate VNF with an EM Request	48
7.5	Fault Management	49
7.5.1	Virtualised Resource Fault Management	49
7.5.1.1	Virtualised Resource Fault Alarm Notification	49
7.5.1.2	Virtualised Resource Fault Alarm Clearance Notification	49
7.5.2	VNF Fault Management	50
7.5.2.1	VNF Fault Alarm Notifications	50
7.5.2.2	VNF Fault Alarm Clearance Notifications	51
7.5.3	NS Fault Management	51
7.5.3.1	NS Fault Alarm Subscription Creation	51
7.5.3.2	NS Fault Alarm Subscription Deletion	52
7.5.3.3	NS Fault Alarm Notification	52
7.5.3.4	NS Fault Alarm Notification Clearance	53
7.5.3.5	NS Fault Alarm Query	53
7.6	Performance Management	54
7.6.1	Virtualised Resource Performance Management	54
7.6.1.1	Virtualised Resource PM Job Creation and Notification Monitoring	54
7.6.1.2	Virtualised Resource PM Job Creation and Threshold Monitoring	55
7.6.1.3	Virtualised Resource PM Job Deletion	55
7.6.1.4	Virtualised Resource PM Threshold Deletion	56
7.6.2	VNF Performance Management	56
7.6.2.1	VNF PM Job Creation and Notification Monitoring	56
7.6.2.2	VNF PM Job Creation and Threshold Monitoring	57
7.6.2.3	VNF PM Job Deletion	59
7.6.2.4	VNF PM Threshold Deletion	60
7.6.3	NS Performance Management	60
7.6.3.1	NS PM Monitoring Job Creation	60
7.6.3.2	NS PM Performance Metrics Query	61
7.6.3.3	NS PM Threshold Creation	62
7.6.3.4	NS PM Subscription Creation for Threshold Information	62
7.6.3.5	NS PM Subscription Creation for Performance Information	63
7.6.3.6	NS PM Threshold Notification	63
7.6.3.7	NS PM Monitoring Information Notification	64
7.6.3.8	NS PM Subscription Deletion	64
7.6.3.9	NS PM Monitoring Job Deletion	65
7.6.3.10	NS PM Performance Metrics Threshold Deletion	65
7.7	NS Lifecycle Management	66

7.7.1	NS Instantiation	66
7.7.1.1	Standalone NS Instantiation	66
7.7.1.2	Nested NS Instantiation.....	68
7.7.1.3	Multi-Site NS Instantiation	70
7.7.1.4	SFC NS Instantiation.....	72
7.7.2	NS Scaling	73
7.7.2.1	NS Scale Out.....	73
7.7.2.1.1	NS Scale out with an Operator Action	73
7.7.2.1.2	NS Scale out with a VNF Indicator notification.....	74
7.7.2.1.3	NS Scale out with a VIM KPI	76
7.7.2.1.4	NS Scale out with a query to VNF Indicator by VNFM.....	77
7.7.2.1.5	NS Scale out for Multi-Site with an Operator Action.....	78
7.7.2.2	NS Scale In.....	79
7.7.2.2.1	NS Scale In with an Operator Action	79
7.7.2.2.2	NS Scale in with a VNF Indicator notification.....	80
7.7.2.2.3	NS Scale in with a VIM KPI	81
7.7.2.2.4	NS Scale in with a query to VNF Indicator by VNFM.....	83
7.7.2.2.5	NS Scale in for Multi-Site with an Operator Action.....	84
7.7.2.3	NS VNF Scale Out.....	85
7.7.2.3.1	NS VNF Scale Out with an Operator Action.....	85
7.7.2.3.2	NS VNF Scale Out with a VNF Indicator notification	86
7.7.2.3.3	NS VNF Scale Out with a VIM KPI	87
7.7.2.3.4	NS VNF Scale Out with a query to VNF Indicator by VNFM.....	89
7.7.2.3.5	NS VNF Scale Out for Multi-Site with an Operator Action.....	90
7.7.2.4	NS VNF Scale In.....	91
7.7.2.4.1	NS VNF Scale In with an Operator Action	91
7.7.2.4.2	NS VNF Scale In with a VNF Indicator notification.....	93
7.7.2.4.3	NS VNF Scale In with a VIM KPI.....	94
7.7.2.4.4	NS VNF Scale In with a query to VNF indicator by VNFM.....	95
7.7.2.4.5	NS VNF Scale In for Multi-Site with an Operator Action.....	96
7.7.2.5	NS Scale to Level.....	97
7.7.2.5.1	NS Scale to Level with an Operator Action	97
7.7.2.5.2	NS Scale to Level from VNF Indicator notification.....	98
7.7.2.5.3	NS Scale to Level from a VIM KPI.....	99
7.7.2.5.4	NS Scale to Level with an Operator Action for Multi-Site.....	101
7.7.2.6	NS VNF Scale to Level.....	102
7.7.2.6.1	NS VNF Scale to Level with an Operator Action.....	102
7.7.2.6.2	NS VNF Scale to Level from VNF Indicator notification.....	103
7.7.2.6.3	NS VNF Scale to Level with a VIM KPI	104
7.7.2.6.4	NS VNF Scale to Level with an Operator Action for Multi-Site.....	105
7.7.3	NS Update.....	106
7.7.3.1	Start VNF Instance.....	106
7.7.3.2	Stop VNF Instance	107
7.7.3.3	Instantiate VNF and Add Instance to NS Instance	108
7.7.3.4	Remove VNF Instances from a NS Instance	109
7.7.3.5	Add Shared VNF Instances to NS Instance.....	109
7.7.3.6	Remove Shared VNF Instances from NS Instance.....	110
7.7.3.7	Change VNF Deployment Flavour	111
7.7.3.8	VNF Configuration update on runtime	112
7.7.4	NS Healing.....	113
7.7.4.1	Partial NS Healing with an Operator Action.....	113
7.7.4.2	Complete NS Healing with an Operator Action.....	114
7.7.5	NS Termination	115
7.7.5.1	Standalone NS Termination	115
7.7.5.2	Nested NS Termination.....	115
7.7.5.3	Multi-Site NS Termination	116
7.7.5.4	SFC NS Termination.....	117
7.8	Virtualised Resource Management.....	118
7.8.1	Virtualised Compute Resource Management	118
7.8.1.1	Generic Virtualised Compute Resource Allocation	118
7.8.1.2	ARM Virtualised Compute Resource Allocation.....	118
7.8.1.3	x86 Virtualised Compute Resource Allocation.....	119

7.8.1.4	Anti-affinity Virtualised Compute Resource Allocation.....	119
7.8.1.5	NUMA Virtualised Compute Resource Allocation.....	120
7.8.1.6	Compute Resource Allocation in Huge Page Memory Mode	121
7.8.1.7	Virtualised Compute Resource Using SR-IOV.....	121
7.8.2	Virtualised Network Resource Management	122
7.8.2.1	Allocate an IPv6 Address to virtualised network interface via DHCP.....	122
7.8.3	Virtualised Storage Resource Management	123
7.8.3.1	Generic Virtualised Storage Resource Allocation.....	123
7.8.3.2	RDMA Virtualised Storage Resource Allocation	123
Annex A:	Technical Report Card Sample	124
Annex B:	Document Usage Process Diagram.....	125
Annex C:	Interoperability Features Statement (IFS) Diagram	126
C.0	General	126
C.1	IFS for VIM.....	126
C.2	IFS for VNFM.....	127
C.3	IFS for NFVO.....	128
C.4	IFS for EM/VNF	129
Annex D:	Void	130
Annex E:	Usage of test tools.....	131
History		132

**ITeH STANDARD
PREVIEW
(standards.iteh.ai)**

ETSI GR NFV-TST 007 V3.1.1 (2022-05)
<https://standards.iteh.ai/catalog/standards/sist/0efa12f8-baf6-4cdf-ab3d-1d7d105d62d9/etsi-gr-nfv-tst-007-v3-1-1-2022-05>

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Foreword

This Group Report (GR) has been produced by ETSI Industry Specification Group (ISG) Network Functions Virtualisation (NFV).

<https://standards.iteh.ai/catalog/standards/sist/0efa12f8-baf6-4cdf-ab3d-1d7d105d62d9/etsi-gr-nfv-tst-007-v3-1-1-2022-05>

Modal verbs terminology

In the present document **"should"**, **"should not"**, **"may"**, **"need not"**, **"will"**, **"will not"**, **"can"** and **"cannot"** are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"must" and **"must not"** are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document describes a set of informative interoperability test guidelines for NFV capabilities that require interactions between the components implementing NFV functionality, namely, the NFVO, VNFM, EM-VNF and VIM-NFVI (Functions under Test).

The guidelines in the present document follow the interoperability testing methodology described in ETSI GS NFV-TST 002 [i.1] and are implementation agnostic. The capabilities in scope are enabled by the interfaces on the main NFV reference points between the Functions Under Test:

- Or-Vi;
- Or-Vnfm;
- Vi-Vnfm; and
- Ve-Vnfm.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative 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.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- | | |
|-------|--|
| [i.1] | ETSI GS NFV-TST 002 (V1.1.1): "Network Functions Virtualisation (NFV); Testing Methodology; Report on NFV Interoperability Testing Methodology". |
| [i.2] | ETSI GS NFV 003 (V1.6.1): "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV". |
| [i.3] | ETSI GS NFV-IFA 005 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification". |
| [i.4] | ETSI GS NFV-IFA 006 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification". |
| [i.5] | ETSI GS NFV-IFA 007 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification". |
| [i.6] | ETSI GS NFV-IFA 008 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification". |
| [i.7] | ETSI GS NFV-IFA 010 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Functional requirements specification". |

- [i.8] ETSI GS NFV-IFA 011 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification".
- [i.9] ETSI GS NFV-IFA 013 (V3.5.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; Os-Ma-nfvo reference point - Interface and Information Model Specification".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS NFV 003 [i.2] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS NFV 003 [i.2] and the following apply:

NOTE: An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in ETSI GS NFV 003 [i.2].

CRM	Compute Resource Management
DF	Deployment Flavour
EM	Element Manager
FM	Fault Management
IFS	Interoperability Features Statement
KPI	Key Performance Indicator
MANO	Management and Orchestration
NFV	Network Function Virtualisation
NFVI	NFV Infrastructure
NFVO	NFV Orchestrator
NIC	Network Interface Controller
NRM	Network Resource Management
NS	Network Service
NSD	NS Descriptor
NUMA	Non-Uniform Memory Access
PM	Performance Management
RDMA	Remote Direct Memory Access
SRM	Storage Resource Management
SUT	System Under Test
VIM	Virtual Infrastructure Manager
VL	Virtual Link
VLD	VL Descriptor
VM	Virtual Machine
VNF	Virtual Network Functions
VNFC	VNF Component
VNFD	VNF Descriptor
VNFFG	VNF Forwarding Graph
VNFFGD	VNFFG Descriptor
VNFM	VNF Manager
VR	Virtual Resource

4 Interoperability Features Statement (IFS)

4.1 Introduction

This clause compiles the Interoperability Features Statement (IFS) for VIM, VNFM, EM/VNF and NFVO according to clause 4.3.3 of ETSI GS NFV-TST 002 [i.1] and following the example in ETSI GS NFV-TST 002 [i.1], annex A.

The interoperability feature statement identifier starts with a reference to the relevant functional block that produces or consumes the interface:

- IDs starting with "VIM_" designate features on interfaces produced or consumed by the VIM.
- IDs starting with "VNFM_" designate features on interfaces produced or consumed by the VNFM.
- IDs starting with "NFVO_" designate features on interfaces produced or consumed by the NFVO.
- IDs starting with "EM_" designate features on interfaces produced or consumed by the EM/VNF.

The purpose of the Interoperable Features Statement (IFS) is to identify those standardized functions which a FUT supports, including those which are optional and those which are conditional on the support of other functions. Supported interoperability feature statements should be indicated by Y in the Support column (or N if not supported). The Details column can be used to add further support details when necessary.

4.2 IFS for VIM

4.2.1 Software Image Management

Table 4.2.1-1

Functional Block	VIM			
Functional Area	Software Image Management			
Observed Reference Point	On-Vi			
Observed Interface	Software Image Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SWIM_QUERY_IM_BY_NFVO	VIM supports software image information queries by the NFVO	M		
VIM_SWIM_ADD_IM	VIM supports "add image" operations by the NFVO	M		
VIM_SWIM_UPDATE_IM	VIM supports "update image" operations by the NFVO	M		
VIM_SWIM_DELETE_IM	VIM supports "delete image" operations by the NFVO	M		

Table 4.2.1-2

Functional Block	VIM			
Functional Area	Software Image Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Software Image Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SWIM_QUERY_IM_BY_VNFM	VIM supports software image information queries by the VNFM	M		

4.2.2 VNF Package Management

No IFS needed for VNF Package Management on the VIM.

4.2.3 VNF Lifecycle Management

Table 4.2.3-1

Functional Block	VIM			
Functional Area	VNF Lifecycle Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Virtualised Compute Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_CRM_ALLOCATE_BY_VNFM	VIM supports "allocate compute resource" operation requests from the VNFM	M		
VIM_CRM_INFO_TO_VNFM	VIM can send compute resource information to the VNFM	M		
VIM_CRM_OPERATE_BY_VNFM	VIM supports "operate compute resource" operation requests from the VNFM	M		
VIM_CRM_TERMINATE_BY_VNFM	VIM supports "terminate compute resource" operation requests from the VNFM	M		

PREVIEW
(standards.iteh.ai)

Table 4.2.3-2

Functional Block	VIM			
Functional Area	Network Resource Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Virtualised Network Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_NRM_ALLOCATE_BY_VNFM	VIM supports "allocate network resource" operation requests from the VNFM	M		
VIM_NRM_INFO_TO_VNFM	VIM can send network resource information to the VNFM	M		
VIM_NRM_TERMINATE_BY_VNFM	VIM supports "terminate network resource" operation requests from the VNFM	M		

Table 4.2.3-3

Functional Block	VIM			
Functional Area	VNF Lifecycle Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Virtualised Storage Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SRM_ALLOCATE_BY_VNFM	VIM supports "allocate storage resource" operation requests from the VNFM	M		
VIM_SRM_INFO_TO_VNFM	VIM can send storage resource information to the VNFM	M		
VIM_SRM_TERMINATE_BY_VNFM	VIM supports "terminate storage resource" operation requests from the VNFM	M		

4.2.4 Fault Management

Table 4.2.4-1

Functional Block	VIM			
Functional Area	Fault Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Resources Fault Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_FM_SUBSCRIBE_BY_NFVO	VIM supports alarm notifications subscriptions by the NFVO	M		
VIM_FM_NOTIFY_BY_NFVO	VIM can generate virtualised resources fault alarm notifications to the NFVO	M		
VIM_FM_QUERY_BY_NFVO	VIM supports virtualised resource fault alarm list queries by the NFVO	M		

Table 4.2.4-2

Functional Block	VIM			
Functional Area	Fault Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Virtualised Resources Fault Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_FM_SUBSCRIBE_BY_VNFM	VIM supports alarm notifications subscriptions by the VNFM	M		
VIM_FM_NOTIFY_BY_VNFM	VIM can generate virtualised resources fault alarm notifications to the VNFM	M		
VIM_FM_QUERY_BY_VNFM	VIM supports virtualised resources fault alarm list queries by the VNFM	M		

4.2.5 Performance Management

Table 4.2.5-1

Functional Block	VIM			
Functional Area	Fault Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Resources Performance Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_PM_PMJOB_CREATE_BY_NFVO	VIM supports VR PM jobs creation by the NFVO	M		
VIM_PM_PMJOB_SUBSCRIBE_BY_NFVO	VIM supports VR PM job subscriptions from the NFVO	M		
VIM_PM_PMJOB_NOTIFY_BY_NFVO	VIM can generate VR PM notifications to the NFVO	M		
VIM_PM_PMJOB_QUERY_BY_NFVO	VIM supports VR PM job queries by the NFVO	M		
VIM_PM_PMJOB_DELETE_BY_NFVO	VIM supports VR PM jobs deletion by the NFVO	M		
VIM_PM_PMTN_CREATE_BY_NFVO	VIM supports VR PM thresholds creation by the NFVO	M		
VIM_PM_PMTN_QUERY_BY_NFVO	VIM supports VR PM threshold queries by the NFVO	M		
VIM_PM_PMTN_DELETE_BY_NFVO	VIM supports VR PM thresholds deletion by the NFVO	M		

Table 4.2.5-2

Functional Block	VIM				
Functional Area	Performance Management				
Observed Reference Point	Vi-Vnfm				
Observed Interface	Virtualised Resources Performance Management				
Producer/Consumer	Producer				
References	ETSI GS NFV-IFA 006 [i.4]				
Interoperability Features					
Id	Feature	Status	Support	Details	
VIM_PM_PMJOB_CREATE_BY_VNFM	VIM supports VR PM jobs creation by the VNFM	M			
VIM_PM_PMJOB_SUBSCRIBE_BY_VNFM	VIM supports VR PM job subscriptions from the VNFM	M			
VIM_PM_PMJOB_NOTIFY_BY_VNFM	VIM can generate VR PM notifications to the VNFM	M			
VIM_PM_PMJOB_QUERY_BY_VNFM	VIM supports VR PM job queries by the VNFM	M			
VIM_PM_PMJOB_DELETE_BY_VNFM	VIM supports VR PM jobs deletion by the VNFM	M			
VIM_PM_PMTN_CREATE_BY_VNFM	VIM supports VR PM thresholds creation by the VNFM	M			
VIM_PM_PMTN_QUERY_BY_VNFM	VIM supports VR PM threshold queries by the VNFM	M			
VIM_PM_PMTN_DELETE_BY_VNFM	VIM supports VR PM thresholds deletion by the VNFM	M			

4.2.6 NS Lifecycle Management

Table 4.2.6-1

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Or-Vi			
Observed Interface	Software Image Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SWIM_QUERY_IM_BY_NFVO	VIM supports software image information queries by the NFVO	M		

Table 4.2.6-2

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Vi-Vnfm			
Observed Interface	Software Image Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 006 [i.4]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SWIM_QUERY_IM_BY_VNFM	VIM supports software image information queries by the VNFM	M		

Table 4.2.6-3

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Compute Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_CRM_ALLOCATE_BY_NFVO	VIM supports "allocate compute resource" operation requests from the NFVO	M		
VIM_CRM_TERMINATE_BY_NFVO	VIM supports "terminate compute resource" operation requests from the NFVO	M		
VIM_CRM_INFO_TO_NFVO	VIM can send compute resource information to the NFVO	M		
VIM_CRM_OPERATE_BY_NFVO	VIM supports "operate compute resource" operation requests from the NFVO	M		

Table 4.2.6-4

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Network Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_NRM_ALLOCATE_BY_NFVO	VIM supports "allocate network resource" operation requests from the NFVO	M		
VIM_NRM_TERMINATE_BY_NFVO	VIM supports "terminate network resource" operation requests from the NFVO	M		
VIM_NRM_INFO_TO_NFVO	VIM can send network resource information to the NFVO	M		

Table 4.2.6-5

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Storage Resource Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_SRM_ALLOCATE_BY_NFVO	VIM supports "allocate storage resource" operation requests from the NFVO	M		
VIM_SRM_TERMINATE_BY_NFVO	VIM supports "terminate storage resource" operation requests from the NFVO	M		
VIM_SRM_INFO_TO_NFVO	VIM can send storage resource information to the NFVO	M		

Table 4.2.6-6

Functional Block	VIM			
Functional Area	NS Lifecycle Management			
Observed Reference Point	Or-Vi			
Observed Interface	Virtualised Resources Performance Management			
Producer/Consumer	Producer			
References	ETSI GS NFV-IFA 005 [i.3]			
Interoperability Features				
Id	Feature	Status	Support	Details
VIM_PM_PMJOB_CREATE_BY_NFVO	VIM supports VR PM jobs creation by the NFVO	M		
VIM_PM_PMJOB_SUBSCRIBE_BY_NFVO	VIM supports VR PM job subscriptions from the NFVO	M		
VIM_PM_PMJOB_NOTIFY_BY_NFVO	VIM can generate VR PM notifications to the NFVO	M		
VIM_PM_PMT_H_CREATE_BY_NFVO	VIM supports VR PM thresholds creation by the NFVO	M		