



Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification

[ETSI GS NFV-IFA 007 V4.4.1 \(2023-03\)](https://standards.iteh.ai/catalog/standards/sist/fea4e1d7-001e-4e2c-8ca9-5dc719fc51ac/etsi-gs-nfv-ifa-007-v4-4-1-2023-03)

<https://standards.iteh.ai/catalog/standards/sist/fea4e1d7-001e-4e2c-8ca9-5dc719fc51ac/etsi-gs-nfv-ifa-007-v4-4-1-2023-03>

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.

ReferenceRGS/NFV-IFA007ed441

Keywordsinterface, management, MANO, NFV,
orchestration, virtualisation

ETSI650 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:

<https://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://standards.iteh.ai> <https://portal.etsi.org/People/CommitteeSupportStaff.aspx> [9-5dc719fc51ac/etsi-](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 2023.
All rights reserved.

Contents

Intellectual Property Rights	18
Foreword.....	18
Modal verbs terminology.....	18
1 Scope	19
2 References	19
2.1 Normative references	19
2.2 Informative references.....	19
3 Definition of terms, symbols and abbreviations.....	20
3.1 Terms.....	20
3.2 Symbols.....	20
3.3 Abbreviations	20
4 Overview of interfaces and information elements associated to the Or-Vnfm reference point	21
4.1 Introduction	21
4.2 Relation to other NFV Group Specifications.....	21
4.3 Conventions.....	22
5 Reference point and interface requirements	22
5.1 Introduction	22
5.2 Or-Vnfm reference point requirements	23
5.3 Interface requirements.....	23
5.3.1 VNF Package Management interface requirements.....	23
5.3.2 VNF Lifecycle Operation Granting interface requirements.....	24
5.3.3 Virtualised Resources Management interfaces requirements	24
5.3.3.1 Virtualised Resources Information Management interfaces requirements.....	24
5.3.3.2 Virtualised Resources Management interfaces requirements.....	25
5.3.3.3 Virtualised Resources Reservation Management interface requirements	25
5.3.3.4 Virtualised Resources Reservation Change Notification interface requirements.....	25
5.3.3.5 Virtualised Resources Change Notification interfaces requirements	26
5.3.3.6 Virtualised Resources Performance Management interface requirements	26
5.3.3.7 Virtualised Resources Fault Management interface requirements	27
5.3.3.8 Virtualised Resources Quota Management interfaces requirements	27
5.3.3.9 Virtualised Resources Quota Change Notification interface requirements	27
5.3.3.10 Virtualised Resources Quota Available Notification interface requirements.....	28
5.3.4 VNF Lifecycle Management interface requirements	28
5.3.5 Void	29
5.3.6 VNF Performance Management interface requirements.....	30
5.3.7 VNF Fault Management interface requirements.....	30
5.3.8 Void	31
5.3.9 VNF Indicator interface requirements	31
5.3.10 Policy Management interface requirements.....	31
5.3.11 VNF Snapshot Package Management interface requirements	32
6 NFVO exposed interfaces	33
6.1 Introduction	33
6.2 VNF Package Management interface.....	33
6.2.1 Description.....	33
6.2.2 Query VNF Package Info operation	33
6.2.2.1 Description	33
6.2.2.2 Input parameters.....	33
6.2.2.3 Output parameters	34
6.2.2.4 Operation results	34
6.2.3 Subscribe operation.....	34
6.2.3.1 Description	34
6.2.3.2 Input parameters.....	34
6.2.3.3 Output parameters	34

6.2.3.4	Operation results	35
6.2.4	Notify operation	35
6.2.4.1	Description	35
6.2.5	Void	35
6.2.6	Fetch VNF Package operation	35
6.2.6.1	Description	35
6.2.6.2	Input parameters	35
6.2.6.3	Output parameters	36
6.2.6.4	Operation results	36
6.2.7	Fetch VNF Package Artifacts operation	36
6.2.7.1	Description	36
6.2.7.2	Input parameters	36
6.2.7.3	Output parameters	37
6.2.7.4	Operation results	37
6.2.8	Terminate Subscription operation	37
6.2.8.1	Description	37
6.2.8.2	Input parameters	37
6.2.8.3	Output parameters	37
6.2.8.4	Operation results	37
6.2.9	Query Subscription Info operation	38
6.2.9.1	Description	38
6.2.9.2	Input parameters	38
6.2.9.3	Output parameters	38
6.2.9.4	Operation results	38
6.3	VNF Lifecycle Operation Granting interface	38
6.3.1	Description	38
6.3.2	Grant VNF Lifecycle Operation	38
6.3.2.1	Description	38
6.3.2.2	Input parameters	41
6.3.2.3	Output parameters	43
6.3.2.4	Operation results	45
6.4	Virtualised Resources Management interfaces in indirect mode	45
6.4.1	Introduction	45
6.4.2	Virtualised Compute interfaces	45
6.4.2.1	Virtualised Compute Resources Management interface	45
6.4.2.2	Virtualised Compute Resources Change Notification interface	46
6.4.2.3	Virtualised Compute Resources Information Management interface	46
6.4.3	Virtualised Network interfaces	46
6.4.3.1	Virtualised Network Resources Management interface	46
6.4.3.2	Virtualised Network Resources Change Notification interface	47
6.4.3.3	Virtualised Network Resources Information Management interface	47
6.4.4	Virtualised Storage interfaces	47
6.4.4.1	Virtualised Storage Resources Management interface	47
6.4.4.2	Virtualised Storage Resources Change Notification interface	47
6.4.4.3	Virtualised Storage Resources Information Management interface	48
6.4.5	Virtualised Resource Performance Management interface	48
6.4.6	Virtualised Resource Fault Management interface	48
6.4.7	Virtualised Resources Quota Management interfaces	49
6.4.7.1	Virtualised Compute Resources Quota Management interface	49
6.4.7.2	Virtualised Network Resources Quota Management interface	49
6.4.7.3	Virtualised Storage Resources Quota Management interface	49
6.4.7.4	Virtualised Resources Quota Change Notification interface	49
6.4.8	Virtualised Resource Reservation interfaces	49
6.4.8.1	Virtualised Compute Resources Reservation Management interface	49
6.4.8.2	Virtualised Network Resources Reservation Management interface	49
6.4.8.3	Virtualised Storage Resources Reservation Management interface	50
6.4.8.4	Virtualised Resources Reservation Change Notification interface	50
6.5	Virtualised Resources Quota Available Notification interface	50
6.5.1	Description	50
6.5.2	Subscribe operation	50
6.5.2.1	Description	50
6.5.2.2	Input parameters	50

6.5.2.3	Output parameters	51
6.5.2.4	Operation results	51
6.5.3	Notify operation	51
6.5.3.1	Description	51
6.5.4	Terminate Subscription operation	51
6.5.4.1	Description	51
6.5.4.2	Input parameters	52
6.5.4.3	Output parameters	52
6.5.4.4	Operation results	52
6.5.5	Query Subscription Info operation	52
6.5.5.1	Description	52
6.5.5.2	Input parameters	52
6.5.5.3	Output parameters	52
6.5.5.4	Operation results	53
6.6	VNF Snapshot Package Management interface	53
6.6.1	Description	53
6.6.2	Fetch VNF Snapshot Package operation	53
6.6.2.1	Description	53
6.6.2.2	Input parameters	53
6.6.2.3	Output parameters	53
6.6.2.4	Operation results	53
6.6.3	Fetch VNF Snapshot Package Artifacts operation	54
6.6.3.1	Description	54
6.6.3.2	Input parameters	54
6.6.3.3	Output parameters	54
6.6.3.4	Operation results	54
6.6.4	Query VNF Snapshot Package Information operation	54
6.6.4.1	Description	54
6.6.4.2	Input parameters	55
6.6.4.3	Output parameters	55
6.6.4.4	Operation results	55
7	VNFM exposed interfaces	56
7.1	Introduction	56
7.2	VNF Lifecycle Management interface	56
7.2.1	Description	56
7.2.2	Create VNF Identifier operation	57
7.2.2.1	Description	57
7.2.2.2	Input parameters	57
7.2.2.3	Output parameters	57
7.2.2.4	Operation results	57
7.2.3	Instantiate VNF operation	58
7.2.3.1	Description	58
7.2.3.2	Input parameters	58
7.2.3.3	Output parameters	59
7.2.3.4	Operation results	59
7.2.4	Scale VNF operation	60
7.2.4.1	Description	60
7.2.4.2	Input parameters	61
7.2.4.3	Output parameters	62
7.2.4.4	Operation results	62
7.2.5	Scale VNF to Level operation	62
7.2.5.1	Description	62
7.2.5.2	Input parameters	62
7.2.5.3	Output parameters	63
7.2.5.4	Operation results	63
7.2.6	Change VNF Flavour operation	63
7.2.6.1	Description	63
7.2.6.2	Input parameters	64
7.2.6.3	Output parameters	65
7.2.6.4	Operation results	65
7.2.7	Terminate VNF operation	66

7.2.7.1	Description	66
7.2.7.2	Input parameters	66
7.2.7.3	Output parameters	67
7.2.7.4	Operation results	67
7.2.8	Delete VNF Identifier operation	68
7.2.8.1	Description	68
7.2.8.2	Input parameters	68
7.2.8.3	Output parameters	68
7.2.8.4	Operation results	68
7.2.9	Query VNF operation	68
7.2.9.1	Description	68
7.2.9.2	Input parameters	69
7.2.9.3	Output parameters	69
7.2.9.4	Operation results	69
7.2.10	Heal VNF operation	69
7.2.10.1	Description	69
7.2.10.2	Input parameters	69
7.2.10.3	Output parameters	70
7.2.10.4	Operation results	70
7.2.11	Operate VNF operation	70
7.2.11.1	Description	70
7.2.11.2	Input parameters	71
7.2.11.3	Output parameters	72
7.2.11.4	Operation results	72
7.2.12	Modify VNF Information operation	72
7.2.12.1	Description	72
7.2.12.2	Input parameters	73
7.2.12.3	Output parameters	73
7.2.12.4	Operation results	73
7.2.13	Get Operation Status operation	73
7.2.13.1	Description	73
7.2.13.2	Input parameters	74
7.2.13.3	Output parameters	74
7.2.13.4	Operation results	74
7.2.14	Subscribe operation	74
7.2.14.1	Description	74
7.2.14.2	Input parameters	74
7.2.14.3	Output parameters	75
7.2.14.4	Operation results	75
7.2.15	Notify operation	75
7.2.15.1	Description	75
7.2.16	Terminate Subscription operation	75
7.2.16.1	Description	75
7.2.16.2	Input parameters	76
7.2.16.3	Output parameters	76
7.2.16.4	Operation results	76
7.2.17	Query Subscription Info operation	76
7.2.17.1	Description	76
7.2.17.2	Input parameters	76
7.2.17.3	Output parameters	76
7.2.17.4	Operation results	77
7.2.18	Change External VNF Connectivity operation	77
7.2.18.1	Description	77
7.2.18.2	Input parameters	77
7.2.18.3	Output parameters	78
7.2.18.4	Operation results	78
7.2.19	Query Snapshot Information operation	79
7.2.19.1	Description	79
7.2.19.2	Input parameters	79
7.2.19.3	Output parameters	79
7.2.19.4	Operation results	79
7.2.20	Create Snapshot operation	80

7.2.20.1	Description	80
7.2.20.2	Input parameters.....	80
7.2.20.3	Output parameters	80
7.2.20.4	Operation results	80
7.2.21	Revert-to Snapshot operation.....	81
7.2.21.1	Description	81
7.2.21.2	Input parameters.....	81
7.2.21.3	Output parameters	81
7.2.21.4	Operation results	81
7.2.22	Delete Snapshot Information operation	81
7.2.22.1	Description	81
7.2.22.2	Input parameters.....	82
7.2.22.3	Output parameters	82
7.2.22.4	Operation results	82
7.2.23	Change current VNF package operation.....	82
7.2.23.1	Description	82
7.2.23.2	Input parameters.....	83
7.2.23.3	Output parameters	84
7.2.23.4	Operation results	85
7.2.24	Fetch VNF state snapshot	85
7.2.24.1	Description	85
7.2.24.2	Input parameters.....	85
7.2.24.3	Output parameters	85
7.2.24.4	Operation results	86
7.3	Void.....	86
7.4	VNF Performance Management interface.....	86
7.4.1	Description.....	86
7.4.2	Create PM Job operation.....	86
7.4.2.1	Description	86
7.4.2.2	Input parameters.....	87
7.4.2.3	Output parameters	87
7.4.2.4	Operation results	88
7.4.3	Delete PM Jobs operation.....	88
7.4.3.1	Description	88
7.4.3.2	Input parameters.....	88
7.4.3.3	Output parameters	88
7.4.3.4	Operation results	88
7.4.4	Subscribe operation.....	88
7.4.4.1	Description	88
7.4.4.2	Input parameters.....	89
7.4.4.3	Output parameters	89
7.4.4.4	Operation results	89
7.4.5	Notify operation.....	89
7.4.5.1	Description	89
7.4.6	Query PM Job operation.....	90
7.4.6.1	Description	90
7.4.6.2	Input parameters.....	90
7.4.6.3	Output parameters	90
7.4.6.4	Operation results	90
7.4.7	Create Threshold operation.....	90
7.4.7.1	Description	90
7.4.7.2	Input parameters.....	91
7.4.7.3	Output parameters	91
7.4.7.4	Operation results	91
7.4.8	Delete Thresholds operation	91
7.4.8.1	Description	91
7.4.8.2	Input parameters.....	92
7.4.8.3	Output parameters	92
7.4.8.4	Operation results	92
7.4.9	Query Threshold operation	92
7.4.9.1	Description	92
7.4.9.2	Input parameters.....	92

7.4.9.3	Output parameters	93
7.4.9.4	Operation results	93
7.4.10	Terminate Subscription operation.....	93
7.4.10.1	Description	93
7.4.10.2	Input parameters.....	93
7.4.10.3	Output parameters	93
7.4.10.4	Operation results	93
7.4.11	Query Subscription Info operation.....	93
7.4.11.1	Description	93
7.4.11.2	Input parameters.....	94
7.4.11.3	Output parameters	94
7.4.11.4	Operation results	94
7.5	VNF Fault Management interface	94
7.5.1	Description.....	94
7.5.2	Subscribe operation.....	95
7.5.2.1	Description	95
7.5.2.2	Input parameters.....	95
7.5.2.3	Output parameters	95
7.5.2.4	Operation results	95
7.5.3	Notify operation.....	96
7.5.3.1	Description	96
7.5.4	Get Alarm List operation.....	96
7.5.4.1	Description	96
7.5.4.2	Input parameters.....	96
7.5.4.3	Output parameters	96
7.5.4.4	Operation results	97
7.5.5	Terminate Subscription operation.....	97
7.5.5.1	Description	97
7.5.5.2	Input parameters.....	97
7.5.5.3	Output parameters	97
7.5.5.4	Operation results	97
7.5.6	Query Subscription Info operation.....	97
7.5.6.1	Description	97
7.5.6.2	Input parameters.....	98
7.5.6.3	Output parameters	98
7.5.6.4	Operation results	98
7.5.7	Acknowledge alarms operation.....	98
7.5.7.1	Description	98
7.5.7.2	Input parameters.....	99
7.5.7.3	Output parameters	99
7.5.7.4	Operation results	99
7.6	Void.....	99
7.7	VNF Indicator interface.....	99
7.7.1	Description.....	99
7.7.2	Subscribe operation.....	100
7.7.2.1	Description	100
7.7.2.2	Input parameters.....	100
7.7.2.3	Output parameters	100
7.7.2.4	Operation results	100
7.7.3	Notify operation.....	100
7.7.3.1	Description	100
7.7.4	Get Indicator Value operation.....	101
7.7.4.1	Description	101
7.7.4.2	Input parameters.....	101
7.7.4.3	Output parameters	101
7.7.4.4	Operation results	101
7.7.5	Terminate Subscription operation.....	101
7.7.5.1	Description	101
7.7.5.2	Input parameters.....	102
7.7.5.3	Output parameters	102
7.7.5.4	Operation results	102
7.7.6	Query Subscription Info operation.....	102

7.7.6.1	Description	102
7.7.6.2	Input parameters	102
7.7.6.3	Output parameters	102
7.7.6.4	Operation results	103
7.8	Policy Management interface	103
7.8.1	Description	103
7.8.2	Transfer Policy operation	103
7.8.2.1	Description	103
7.8.2.2	Input parameters	103
7.8.2.3	Output parameters	104
7.8.2.4	Operation results	104
7.8.3	Delete Policy operation	104
7.8.3.1	Description	104
7.8.3.2	Input parameters	104
7.8.3.3	Output parameters	105
7.8.3.4	Operation results	105
7.8.4	Query Policy operation	105
7.8.4.1	Description	105
7.8.4.2	Input parameters	105
7.8.4.3	Output parameters	106
7.8.4.4	Operation results	106
7.8.5	Activate Policy operation	106
7.8.5.1	Description	106
7.8.5.2	Input parameters	106
7.8.5.3	Output parameters	106
7.8.5.4	Operation results	107
7.8.6	Deactivate Policy operation	107
7.8.6.1	Description	107
7.8.6.2	Input parameters	107
7.8.6.3	Output parameters	107
7.8.6.4	Operation results	107
7.8.7	Subscribe operation	107
7.8.7.1	Description	107
7.8.7.2	Input parameters	108
7.8.7.3	Output parameters	108
7.8.7.4	Operation results	108
7.8.8	Notify operation	108
7.8.8.1	Description	108
7.8.9	Terminate Subscription operation	109
7.8.9.1	Description	109
7.8.9.2	Input parameters	109
7.8.9.3	Output parameters	109
7.8.9.4	Operation results	109
7.8.10	Query Subscription Info operation	109
7.8.10.1	Description	109
7.8.10.2	Input parameters	109
7.8.10.3	Output parameters	110
7.8.10.4	Operation results	110
7.8.11	Associate Policy operation	110
7.8.11.1	Description	110
7.8.11.2	Input parameters	110
7.8.11.3	Output parameters	110
7.8.11.4	Operation results	111
7.8.12	Disassociate Policy operation	111
7.8.12.1	Description	111
7.8.12.2	Input parameters	111
7.8.12.3	Output parameters	111
7.8.12.4	Operation results	111
7.9	Void	112
8	Information elements exchanged	112
8.1	Introduction	112

8.2	Information elements and notifications related to VNF Package Management	112
8.2.1	Introduction.....	112
8.2.2	VnfPkgInfo information element	112
8.2.2.1	Description	112
8.2.2.2	Attributes.....	112
8.2.3	Vnfd information element.....	113
8.2.3.1	Description	113
8.2.3.2	Attributes.....	113
8.2.4	VnfPackageOnBoardingNotification	114
8.2.4.1	Description	114
8.2.4.2	Trigger Conditions	114
8.2.4.3	Attributes.....	114
8.2.5	VnfPackageChangeNotification	114
8.2.5.1	Description	114
8.2.5.2	Trigger Conditions	114
8.2.5.3	Attributes.....	114
8.2.6	Void	115
8.2.7	VnfPackageSoftwareImageInfo information element.....	115
8.2.7.1	Description	115
8.2.7.2	Attributes.....	115
8.2.8	VnfPackageArtifactInformation information element	116
8.2.8.1	Description	116
8.2.8.2	Attributes.....	116
8.2.9	Void	116
8.3	Information elements related to VNF Lifecycle Operation Granting.....	116
8.3.1	Introduction.....	116
8.3.2	ResourceDefinition information element.....	117
8.3.2.1	Description	117
8.3.2.2	Attributes.....	117
8.3.3	GrantInfo information element	118
8.3.3.1	Description	118
8.3.3.2	Attributes.....	118
8.3.4	ZoneInfo information element	119
8.3.4.1	Description	119
8.3.4.2	Attributes.....	120
8.3.5	ZoneGroupInfo information element.....	120
8.3.5.1	Description	120
8.3.5.2	Attributes.....	120
8.3.6	PlacementConstraint information element.....	120
8.3.6.1	Description	120
8.3.6.2	Attributes.....	121
8.3.7	VimConstraint information element	121
8.3.7.1	Description	121
8.3.7.2	Attributes.....	122
8.3.8	ConstraintResourceRef information element.....	122
8.3.8.1	Description	122
8.3.8.2	Attributes.....	122
8.3.9	VimAssets information element	123
8.3.9.1	Description	123
8.3.9.2	Attributes.....	123
8.3.10	VimComputeResourceFlavour information element	123
8.3.10.1	Description	123
8.3.10.2	Attributes.....	123
8.3.11	VimSoftwareImage information element.....	124
8.3.11.1	Description	124
8.3.11.2	Attributes.....	124
8.3.12	VimSnapshotResource information element	125
8.3.12.1	Description	125
8.3.12.2	Attributes.....	125
8.3.13	SnapshotResourceDefinition information element	125
8.3.13.1	Description	125
8.3.13.2	Attributes.....	125

8.3.14	StorageAsset information element	126
8.3.14.1	Description	126
8.3.14.2	Attributes	126
8.4	Information elements and notifications related to Virtualised Resources Management in indirect mode.....	127
8.4.1	Introduction.....	127
8.4.2	Information elements related to Virtualised Compute	127
8.4.2.1	Introduction	127
8.4.2.2	ComputeResourceWithRpInfo information element.....	127
8.4.2.2.1	Description	127
8.4.2.2.2	Attributes	127
8.4.2.3	ComputeResourceWithRpId information element	128
8.4.2.3.1	Description	128
8.4.2.3.2	Attributes	128
8.4.2.4	VirtualComputeResourceWithRpInfo information element	128
8.4.2.4.1	Description	128
8.4.2.4.2	Attributes	128
8.4.3	Information elements related to Virtualised Network.....	128
8.4.3.1	Introduction.....	128
8.4.3.2	NetworkResourceWithRpInfo information element	129
8.4.3.2.1	Description	129
8.4.3.2.2	Attributes	129
8.4.3.3	NetworkResourceWithRpId information element.....	129
8.4.3.3.1	Description	129
8.4.3.3.2	Attributes	129
8.4.3.4	VirtualNetworkResourceWithRpInfo information element	129
8.4.3.4.1	Description	129
8.4.3.4.2	Attributes	129
8.4.4	Information elements related to Virtualised Storage	130
8.4.4.1	Introduction.....	130
8.4.4.2	StorageResourceWithRpInfo information element	130
8.4.4.2.1	Description	130
8.4.4.2.2	Attributes	130
8.4.4.3	StorageResourceWithRpId information element	130
8.4.4.3.1	Description	130
8.4.4.3.2	Attributes	130
8.4.4.4	VirtualStorageResourceWithRpInfo information element.....	131
8.4.4.4.1	Description	131
8.4.4.4.2	Attributes	131
8.4.5	Notifications related to changes of virtualised resources.....	131
8.4.5.1	Introduction.....	131
8.4.5.2	VirtualisedResourceWithRpChangeNotification	131
8.4.5.2.1	Description	131
8.4.5.2.2	Trigger conditions	131
8.4.5.2.3	Attributes	131
8.4.5.3	InformationWithRpChangeNotification.....	132
8.4.5.3.1	Description	132
8.4.5.3.2	Trigger conditions	132
8.4.5.3.3	Attributes	132
8.4.6	Notifications related to Virtualised Resource Performance Management	132
8.4.6.1	Introduction.....	132
8.4.6.2	PerformanceInformationWithRpAvailableNotification	132
8.4.6.2.1	Description	132
8.4.6.2.2	Trigger conditions	132
8.4.6.2.3	Attributes	132
8.4.6.3	ThresholdCrossedWithRpNotification.....	133
8.4.6.3.1	Description	133
8.4.6.3.2	Trigger conditions	133
8.4.6.3.3	Attributes	133
8.4.7	Information elements and notifications related to Virtualised Resource Fault Management	133
8.4.7.1	Introduction.....	133
8.4.7.2	AlarmWithRpInfo information element.....	133
8.4.7.2.1	Description	133

8.4.7.2.2	Attributes	134
8.4.7.3	AlarmWithRpNotification.....	134
8.4.7.3.1	Description	134
8.4.7.3.2	Trigger conditions	134
8.4.7.3.3	Attributes	134
8.4.7.4	AlarmClearedWithRpNotification	134
8.4.7.4.1	Description	134
8.4.7.4.2	Trigger conditions	134
8.4.7.4.3	Attributes	135
8.4.8	Information elements and notifications related to Virtualised Resources Quota	135
8.4.8.1	Introduction	135
8.4.8.2	VirtualComputeQuotaWithRpInfo information element.....	135
8.4.8.2.1	Description	135
8.4.8.2.2	Attributes	135
8.4.8.3	VirtualNetworkQuotaWithRpInfo information element	135
8.4.8.3.1	Description	135
8.4.8.3.2	Attributes	136
8.4.8.4	VirtualStorageQuotaWithRpInfo information element	136
8.4.8.4.1	Description	136
8.4.8.4.2	Attributes	136
8.4.8.5	VirtualisedResourceQuotaWithRpChangeNotification.....	136
8.4.8.5.1	Description	136
8.4.8.5.2	Trigger conditions	136
8.4.8.5.3	Attributes	136
8.4.9	Information elements and notifications related to Virtualised Resources Reservation.....	137
8.4.9.1	Introduction.....	137
8.4.9.2	ReservedVirtualComputeWithRpInfo information element	137
8.4.9.2.1	Description	137
8.4.9.2.2	Attributes	137
8.4.9.3	ReservedVirtualNetworkWithRpInfo information element	137
8.4.9.3.1	Description	137
8.4.9.3.2	Attributes	137
8.4.9.4	ReservedVirtualStorageWithRpInfo information element	138
8.4.9.4.1	Description	138
8.4.9.4.2	Attributes	138
8.4.9.5	VirtualisedResourceReservationWithRpChangeNotification	138
8.4.9.5.1	Description	138
8.4.9.5.2	Trigger conditions	138
8.4.9.5.3	Attributes	138
8.5	Information elements related to VNF Lifecycle Management	139
8.5.1	Introduction.....	139
8.5.2	VnfInfo information element	139
8.5.2.1	Description	139
8.5.2.2	Attributes.....	139
8.5.3	InstantiatedVnfInfo information element.....	141
8.5.3.1	Description	141
8.5.3.2	Attributes.....	141
8.5.4	VnfcResourceInfo information element.....	143
8.5.4.1	Description	143
8.5.4.2	Attributes.....	143
8.5.5	VnfVirtualLinkResourceInfo information element.....	144
8.5.5.1	Description	144
8.5.5.2	Attributes.....	144
8.5.6	VirtualStorageResourceInfo information element	145
8.5.6.1	Description	145
8.5.6.2	Attributes.....	145
8.5.7	ResourceHandle information element.....	146
8.5.7.1	Description	146
8.5.7.2	Attributes.....	146
8.5.8	ScaleInfo information element.....	147
8.5.8.1	Description	147
8.5.8.2	Attributes.....	147

8.5.9	ExtVirtualLinkInfo information element	148
8.5.9.1	Description	148
8.5.9.2	Attributes	148
8.5.10	ExtManagedVirtualLinkInfo information element	148
8.5.10.1	Description	148
8.5.10.2	Attributes	148
8.5.11	VnfLinkPortInfo information element	149
8.5.11.1	Description	149
8.5.11.2	Attributes	149
8.5.12	VnfExtCpInfo information element	150
8.5.12.1	Description	150
8.5.12.2	Attributes	150
8.5.13	ExtLinkPortInfo information element	151
8.5.13.1	Description	151
8.5.13.2	Attributes	151
8.5.14	VnfcCpInfo information element	151
8.5.14.1	Description	151
8.5.14.2	Attributes	152
8.5.15	CpProtocolInfo information element	152
8.5.15.1	Description	152
8.5.15.2	Attributes	152
8.5.16	VnfSnapshotInfo information element	153
8.5.16.1	Description	153
8.5.16.2	Attributes	153
8.5.17	VnfcSnapshotInfo information element	153
8.5.17.1	Description	153
8.5.17.2	Attributes	154
8.5.18	StorageSnapshotResource information element	154
8.5.18.1	Description	154
8.5.18.2	Attributes	154
8.5.19	TrunkPortsInfo information element	155
8.5.19.1	Description	155
8.5.19.2	Attributes	155
8.5.20	VipCpInfo information element	155
8.5.20.1	Description	155
8.5.20.2	Attributes	155
8.5.21	VnfStateSnapshotInfo information element	156
8.5.21.1	Description	156
8.5.21.2	Attributes	156
8.5.22	McioInfo information element	156
8.5.22.1	Description	156
8.5.22.2	Attributes	156
8.5.23	VirtualCpInfo information element	157
8.5.23.1	Description	157
8.5.23.2	Attributes	157
8.5.24	AdditionalServiceInfo information element	157
8.5.24.1	Description	157
8.5.24.2	Attributes	158
8.5.25	ServicePortInfo information element	158
8.5.25.1	Description	158
8.5.25.2	Attributes	158
8.5.26	NetAttDefResourceInfo information element	158
8.5.26.1	Description	158
8.5.26.2	Attributes	158
8.6	Information elements and notifications related to VNF Lifecycle Changes	159
8.6.1	Introduction	159
8.6.2	VnfLcmOperationOccurrenceNotification	159
8.6.2.1	Description	159
8.6.2.2	Trigger conditions	159
8.6.2.3	Attributes	160
8.6.3	AffectedVnfc information element	161
8.6.3.1	Description	161

8.6.3.2	Attributes.....	161
8.6.4	AffectedVirtualLink information element	163
8.6.4.1	Description	163
8.6.4.2	Attributes.....	163
8.6.4a	AffectedExtLinkPort information element	164
8.6.4a.1	Description	164
8.6.4a.2	Attributes.....	164
8.6.5	AffectedVirtualStorage information element.....	164
8.6.5.1	Description	164
8.6.5.2	Attributes.....	165
8.6.6	AffectedVipCp information element	165
8.6.6.1	Description	165
8.6.6.2	Attributes.....	165
8.6.6a	AffectedVirtualCp information element	166
8.6.6a.1	Description	166
8.6.6a.2	Attributes.....	166
8.6.7	VnfIdentifierCreationNotification	166
8.6.7.1	Description	166
8.6.7.2	Trigger conditions	167
8.6.7.3	Attributes.....	167
8.6.8	VnfIdentifierDeletionNotification	167
8.6.8.1	Description	167
8.6.8.2	Trigger conditions	167
8.6.8.3	Attributes.....	167
8.7	Information elements and notifications related to VNF Performance Management	167
8.7.1	Introduction.....	167
8.7.2	ObjectSelection information element.....	167
8.7.2.1	Description	167
8.7.2.2	Attributes.....	168
8.7.3	PmJob information element	168
8.7.3.1	Description	168
8.7.3.2	Attributes.....	168
8.7.4	Threshold information element.....	169
8.7.4.1	Description	169
8.7.4.2	Attributes.....	169
8.7.5	PerformanceReport information element.....	170
8.7.5.1	Description	170
8.7.5.2	Attributes.....	170
8.7.6	PerformanceReportEntry information element.....	170
8.7.6.1	Description	170
8.7.6.2	Attributes.....	170
8.7.7	PerformanceValueEntry information element	171
8.7.7.1	Description	171
8.7.7.2	Attributes.....	171
8.7.8	PerformanceInformationAvailableNotification	171
8.7.8.1	Description	171
8.7.8.2	Trigger Conditions	171
8.7.8.3	Attributes.....	171
8.7.9	ThresholdCrossedNotification	172
8.7.9.1	Description	172
8.7.9.2	Trigger Condition.....	172
8.7.9.3	Attributes.....	172
8.8	Information elements and notifications related to VNF Fault Management	172
8.8.1	Introduction.....	172
8.8.2	AlarmNotification.....	172
8.8.2.1	Description	172
8.8.2.2	Trigger conditions	173
8.8.2.3	Attributes.....	173
8.8.3	AlarmClearedNotification	173
8.8.3.1	Description	173
8.8.3.2	Trigger conditions	173
8.8.3.3	Attributes.....	173

8.8.4	Alarm information element.....	174
8.8.4.1	Description.....	174
8.8.4.2	Attributes.....	174
8.8.5	FaultyResourceInfo information element	175
8.8.5.1	Description.....	175
8.8.5.2	Attributes.....	175
8.8.6	AlarmListRebuiltNotification	175
8.8.6.1	Description.....	175
8.8.6.2	Trigger conditions.....	175
8.8.6.3	Attributes.....	175
8.9	Void.....	176
8.10	Information elements and notifications related to VNF Indicators	176
8.10.1	Introduction.....	176
8.10.2	IndicatorValueChangeNotification	176
8.10.2.1	Description.....	176
8.10.2.2	Trigger conditions.....	176
8.10.2.3	Attributes.....	176
8.10.3	IndicatorInformation information element.....	176
8.10.3.1	Description.....	176
8.10.3.2	Attributes.....	176
8.10.4	SupportedIndicatorsChangeNotification.....	177
8.10.4.1	Description.....	177
8.10.4.2	Trigger conditions.....	177
8.10.4.3	Attributes.....	177
8.10.5	SupportedIndicatorInformation information element	177
8.10.5.1	Description.....	177
8.10.5.2	Attributes.....	177
8.11	Notifications related to Virtualised Resources Quota.....	177
8.11.1	Introduction.....	177
8.11.2	VirtualisedResourceQuotaAvailableNotification	177
8.11.2.1	Description.....	177
8.11.2.2	Trigger Conditions.....	178
8.11.2.3	Attributes.....	178
8.12	Information elements and notifications related to multiple interfaces.....	178
8.12.1	Introduction.....	178
8.12.2	ExtVirtualLinkData information element	178
8.12.2.1	Description.....	178
8.12.2.2	Attributes.....	178
8.12.2a	ExtLinkPortData information element.....	179
8.12.2a.1	Description.....	179
8.12.2a.2	Attributes.....	179
8.12.3	VnfExtCpData information element	180
8.12.3.1	Description.....	180
8.12.3.2	Attributes.....	180
8.12.3a	VnfExtCpConfig information element.....	180
8.12.3a.1	Description.....	180
8.12.3a.2	Attributes.....	180
8.12.4	ExtManagedVirtualLinkData information element	182
8.12.4.1	Description.....	182
8.12.4.2	Attributes.....	182
8.12.5	VimConnectionInfo information element.....	183
8.12.5.1	Description.....	183
8.12.5.2	Attributes.....	183
8.12.6	VnfLinkPortData information element	184
8.12.6.1	Description.....	184
8.12.6.2	Attributes.....	184
8.12.7	NetAttDefResourceData information element.....	185
8.12.7.1	Description.....	185
8.12.7.2	Attributes.....	185
8.12.8	IntVnfCpData information element	185
8.12.8.1	Description.....	185
8.12.8.2	Attributes.....	185