



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

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Reference

DGR/NFV-TST007

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# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references .....	7
3 Definitions and abbreviations.....	8
3.1 Definitions .....	8
3.2 Abbreviations .....	8
4 Interoperability Features Statement (IFS) .....	9
4.1 Introduction .....	9
4.2 IFS for VIM.....	9
4.2.1 Software Image Management .....	9
4.2.2 VNF Package Management .....	10
4.2.3 VNF Lifecycle Management.....	10
4.2.4 Fault Management .....	12
4.2.5 Performance Management .....	13
4.2.6 NS Lifecycle Management .....	14
4.3 IFS for VNFM.....	17
4.3.1 Software Image Management .....	17
4.3.2 VNF Package Management .....	17
4.3.3 VNF Lifecycle Management.....	18
4.3.4 Fault Management .....	20
4.3.5 Performance Management .....	20
4.3.6 NS Lifecycle Management .....	21
4.4 IFS for NFVO.....	24
4.4.1 Software Image Management .....	24
4.4.2 VNF Package Management .....	25
4.4.3 VNF Lifecycle Management.....	25
4.4.4 Fault Management .....	27
4.4.5 Performance Management .....	27
4.4.6 NS Lifecycle Management .....	28
4.5 IFS for EM/VNF .....	31
4.5.1 Software Image Management .....	31
4.5.2 VNF Package Management .....	31
4.5.3 VNF Lifecycle Management.....	31
4.5.4 Fault Management .....	31
4.5.5 Performance Management .....	32
4.5.6 NS Lifecycle Management .....	32
5 System Under Test (SUT).....	32
5.1 SUT Configuration 1 .....	32
5.2 SUT Configuration 2 .....	33
5.3 SUT Configuration 3 .....	33
6 Test Suite Structure .....	34
6.1 Introduction .....	34
6.2 Software Image Management Test Cases Overview .....	34
6.3 VNF Package Management Test Cases Overview .....	34
6.4 VNF Lifecycle Management Test Cases Overview .....	35
6.5 Fault Management Test Cases Overview .....	35
6.6 Performance Management Test Cases Overview .....	36
6.7 NS Lifecycle Management Test Cases Overview .....	37

7	Test Descriptions .....	38
7.1	Introduction .....	38
7.2	Software Image Management .....	38
7.2.1	Add Software Image .....	38
7.2.2	Query Software Image .....	38
7.2.2.1	Query Software Image by NFVO .....	38
7.2.2.2	Query Software Image by VNFM .....	39
7.2.3	Update Software Image .....	39
7.2.4	Delete Software Image .....	40
7.3	VNF Package Management .....	40
7.3.1	On-board VNF Package .....	40
7.3.2	Delete VNF Package .....	41
7.3.3	Abort VNF Package Delete Operation .....	41
7.4	VNF Lifecycle Management .....	42
7.4.1	Instantiate VNF with an EM Request .....	42
7.4.2	Query VNF with an EM Request .....	43
7.4.3	Modify VNF Configuration Information with an EM Request .....	44
7.4.4	Start VNF/VNFC with an EM Request .....	44
7.4.5	Stop VNF/VNFC with an EM Request .....	45
7.4.6	VNF Healing with an EM/VNF Request .....	46
7.4.7	VNF Scale Out with an EM/VNF Request .....	47
7.4.8	VNF Scale In with an EM/VNF Request .....	48
7.4.9	Terminate VNF with an EM Request .....	49
7.5	Fault Management .....	50
7.5.1	Virtualised Resource Fault Management .....	50
7.5.1.1	Virtualised Resource Fault Alarm Notification .....	50
7.5.1.2	Virtualised Resource Fault Alarm Clearance Notification .....	51
7.5.2	VNF Fault Management .....	52
7.5.2.1	VNF Fault Alarm Notifications .....	52
7.5.2.2	VNF Fault Alarm Clearance Notifications .....	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 .....	56
7.6.1.4	Virtualised Resource PM Threshold Deletion .....	56
7.6.2	VNF Performance Management .....	57
7.6.2.1	VNF PM Job Creation and Notification Monitoring .....	57
7.6.2.2	VNF PM Job Creation and Threshold Monitoring .....	58
7.6.2.3	VNF PM Job Deletion .....	59
7.6.2.4	VNF PM Threshold Deletion .....	60
7.7	NS Lifecycle Management .....	61
7.7.1	NS Instantiation .....	61
7.7.1.1	Standalone NS Instantiation .....	61
7.7.1.2	Nested NS Instantiation .....	62
7.7.2	NS Scaling .....	63
7.7.2.1	NS Scale Out .....	63
7.7.2.1.1	NS Scale out with an Operator Action .....	63
7.7.2.1.2	NS Scale out with a VNF Indicator .....	64
7.7.2.1.3	NS Scale out with a VIM KPI .....	65
7.7.2.2	NS Scale In .....	66
7.7.2.2.1	NS Scale In with an Operator Action .....	66
7.7.2.2.2	NS Scale in with a VNF Indicator .....	67
7.7.2.2.3	NS Scale in with a VIM KPI .....	68
7.7.2.3	NS VNF Scale Out .....	69
7.7.2.3.1	NS VNF Scale Out with an Operator Action .....	69
7.7.2.3.2	NS VNF Scale Out with a VNF Indicator .....	70
7.7.2.3.3	NS VNF Scale Out with a VIM KPI .....	71
7.7.2.4	NS VNF Scale In .....	72
7.7.2.4.1	NS VNF Scale In with an Operator Action .....	72
7.7.2.4.2	NS VNF Scale In with a VNF Indicator .....	73
7.7.2.4.3	NS VNF Scale In with a VIM KPI .....	74

7.7.3	NS Update.....	75
7.7.3.1	Start VNF Instance.....	75
7.7.3.2	Stop VNF Instance.....	76
7.7.3.3	Instantiate VNF and Add Instance to NS Instance.....	77
7.7.3.4	Remove VNF Instances from a NS Instance.....	78
7.7.3.5	Add Shared VNF Instances to NS Instance.....	79
7.7.3.6	Remove Shared VNF Instances from NS Instance.....	80
7.7.3.7	Change VNF Deployment Flavour.....	81
7.7.4	NS Healing.....	82
7.7.4.1	Partial NS Healing with an Operator Action.....	82
7.7.4.2	Complete NS Healing with an Operator Action.....	83
7.7.5	NS Termination.....	84
7.7.5.1	Standalone NS Termination.....	84
7.7.5.2	Nested NS Termination.....	85
<b>Annex A:</b>	<b>Technical Report Card Sample.....</b>	<b>86</b>
<b>Annex B:</b>	<b>Document Usage Process Diagram.....</b>	<b>87</b>
<b>Annex C:</b>	<b>Authors &amp; Contributors.....</b>	<b>88</b>
History.....		89

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## Foreword

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

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## 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).

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# 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 (V1.2.1): "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".
- [i.3] ETSI GS NFV-IFA 005 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification".
- [i.4] ETSI GS NFV-IFA 006 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification".
- [i.5] ETSI GS NFV-IFA 007 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification".
- [i.6] ETSI GS NFV-IFA 008 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification".

- [i.7] ETSI GS NFV-IFA 010 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Functional requirements specification".
- [i.8] ETSI GS NFV-IFA 011 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; VNF Packaging Specification".
- [i.9] ETSI GS NFV-IFA 013 (V2.3.1): "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification".

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## 3 Definitions and abbreviations

### 3.1 Definitions

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

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

### 3.2 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 Indicators
MANO	Management and Orchestration
NFV	Network Function Virtualisation
NFVI	NFV Infrastructure
NFVO	NFV Orchestrator
NIC	Network Interface Controller
NS	Network Service
NSD	NS Descriptor
NRM	Network Resource Management
PM	Performance Management
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 Feature 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

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Software Image Management			
<b>Observed Reference Point</b>	Or-Vi			
<b>Observed Interface</b>	Software Image Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 005 [i.3]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Software Image Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Software Image Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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**

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

**Table 4.2.3-2**

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	VNF Lifecycle Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Virtualised Compute Resource Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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		

Table 4.2.3-3

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

Table 4.2.3-4

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Network Resource Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Virtualised Network Resource Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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 4.2.3-5

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

Table 4.2.3-6

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	VNF Lifecycle Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Virtualised Storage Resource Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Fault Management			
<b>Observed Reference Point</b>	Or-Vi			
<b>Observed Interface</b>	Virtualised Resources Fault Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 005 [i.3]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Fault Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Virtualised Resources Fault Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Fault Management			
<b>Observed Reference Point</b>	Or-Vi			
<b>Observed Interface</b>	Virtualised Resources Performance Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 005 [i.3]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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_PMTTH_CREATE_BY_NFVO	VIM supports VR PM thresholds creation by the NFVO	M		
VIM_PM_PMTTH_QUERY_BY_NFVO	VIM supports VR PM threshold queries by the NFVO	M		
VIM_PM_PMTTH_DELETE_BY_NFVO	VIM supports VR PM thresholds deletion by the NFVO	M		

Table 4.2.5-2

<b>Functional Block</b>	VIM			
<b>Functional Area</b>	Performance Management			
<b>Observed Reference Point</b>	Vi-Vnfm			
<b>Observed Interface</b>	Virtualised Resources Performance Management			
<b>Producer/Consumer</b>	Producer			
<b>References</b>	ETSI GS NFV-IFA 006 [i.4]			
<b>Interoperability Features</b>				
<b>Id</b>	<b>Feature</b>	<b>Status</b>	<b>Support</b>	<b>Details</b>
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_PMTTH_CREATE_BY_VNFM	VIM supports VR PM thresholds creation by the VNFM	M		
VIM_PM_PMTTH_QUERY_BY_VNFM	VIM supports VR PM threshold queries by the VNFM	M		
VIM_PM_PMTTH_DELETE_BY_VNFM	VIM supports VR PM thresholds deletion by the VNFM	M		