ETSI GS NFV-IFA 052 V5.2.1 (2024-11)

Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Interface and Information Model Specification for supporting CIS cluster resource management

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Foreword

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**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 specifies the interfaces supported for interoperability between the Container Infrastructure Service (CIS) Cluster Management (CCM) function and Virtualised Infrastructure Manager (VIM), and between the CCM and Physical Infrastructure Management (PIM) function in the NFV-MANO architecture framework, as well as information elements exchanged over these interfaces, to support the provisioning and management of resources for CIS clusters.

2 References

2.1 Normative 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 in the ETSI docbox.

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 necessary for the application of the present document.

[1] ETSI GS NFV-IFA 005: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Or-Vi reference point - Interface and Information Model Specification".

[2] ETSI GS NFV-IFA 006: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Vi-Vnfm reference point - Interface and Information Model Specification".

[3] ETSI GS NFV-IFA 010: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Functional requirements specification".

[4] ETSI GS NFV-IFA 053: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Requirements and interface specification for Physical Infrastructure Management".

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 GR NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.2] ETSI GS NFV-IFA 036: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Requirements for service interfaces and object model for container cluster management and orchestration specification".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GR NFV 003 [i.1] apply.

NOTE: A term defined in the present document takes precedence over the definition of the same term, if any, in ETSI GR NFV 003 [i.1].

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GR NFV 003 [i.1] apply.

4 Overview

4.1 Introduction

NFV-MANO services produced by the VIM and PIM can be consumed by the CCM in context of CIS cluster management. The CCM utilizes these services to manage virtualised compute, storage and network resources for CIS clusters as specified in clause 4.2.5 of ETSI GS NFV-IFA 036 [i.2], and further support the CIS cluster lifecycle management and FCAPS management to its northbound consumers.

The following interfaces are used for exchanges between the CCM and the VIM:

- Virtualised Resources Information Management, composed of:
  - Virtualised Compute Resources Information Management.
  - Virtualised Network Resources Information Management.
  - Virtualised Storage Resources Information Management.
- Virtualised Resources Management, composed of:
  - Virtualised Compute Resources Management.
  - Virtualised Network Resources Management.
  - Virtualised Storage Resources Management.
- Virtualised Resources Change Notification, composed of:
  - Virtualised Compute Resources Change Notification.
  - Virtualised Network Resources Change Notification.
  - Virtualised Storage Resources Change Notification.
- Virtualised Resources Performance Management.
- Virtualised Resources Fault Management.

All the interfaces above are produced by the VIM and consumed by the CCM.

The following service interfaces are used for exchanges between the CCM and the PIM:

- Physical resource provisioning and lifecycle management.
- Physical resource inventory management.
- Physical resource topology management.
- Physical resource performance management.
- Physical resource fault management.

All the interfaces above are produced by the PIM and consumed by the CCM.

4.2 Relation to other NFV Group Specifications

The present document is referencing information from the following NFV Group Specifications:

- Management and Orchestration - Or-Vi reference point - Interface and Information Model Specification ETSI GS NFV-IFA 005 [1].
- Management and Orchestration - Vi-Vnfm reference point - Interface and Information Model Specification ETSI GS NFV-IFA 006 [2]:
  - ETSI GS NFV-IFA 005 [1], ETSI GS NFV-IFA 006 [2] and the present document are all specifying interfaces provided by the VIM. All these specifications are therefore related.
- Management and Orchestration - Requirements and interface specification for Physical Infrastructure Management ETSI GS NFV-IFA 053 [4].
  - ETSI GS NFV-IFA 053 [4] and the present document are all specifying interfaces provided by the PIM. Both specifications are therefore related.
- Management and Orchestration - Functional requirements specification ETSI GS NFV-IFA 010 [3].

The key functional requirements from ETSI GS NFV-IFA 010 [3] provide the guidance and need to be fulfilled by the interfaces between the CCM and the VIM.

4.3 Conventions

The conventions stated in clause 4.3 of ETSI GS NFV-IFA 005 [1] apply for information elements of interfaces specified in the present document.

5 Interoperability and Interface requirements

5.1 Introduction

This clause defines or references requirements applicable to interfaces in the specific context of the interoperability between the CCM and VIM and between the CCM and PIM.

5.2 General interoperability requirements

Table 5.2-1 specifies general requirements applicable to the interoperability between the CCM and VIM.

Table 5.2-1: General interoperability requirements between the CCM and VIM

Number	Functional requirement description
Ccm-Vim.001	The reference point between the CCM and VIM shall support the Virtualised Compute Resources Management interface provided by the VIM.
Ccm-Vim.002	The reference point between the CCM and VIM shall support the Virtualised Network Resources Management interface provided by the VIM.
Ccm-Vim.003	The reference point between the CCM and VIM shall support the Virtualised Storage Resources Management interface provided by the VIM.
Ccm-Vim.004	The reference point between the CCM and VIM shall support the Virtualised Resources Fault Management interface provided by the VIM.
Ccm-Vim.005	The reference point between the CCM and VIM shall support the Virtualised Resources Performance Management interface provided by the VIM.
Ccm-Vim.006	The reference point between the CCM and VIM shall support the Virtualised Compute Resources Information Management interface provided by the VIM.
Ccm-Vim.007	The reference point between the CCM and VIM shall support the Virtualised Network Resources Information Management interface provided by the VIM.
Ccm-Vim.008	The reference point between the CCM and VIM shall support the Virtualised Storage Resources Information Management interface provided by the VIM.
Ccm-Vim.009	The reference point between the CCM and VIM shall support the Virtualised Compute Resources Change Notification interface provided by the VIM.
Ccm-Vim.010	The reference point between the CCM and VIM shall support the Virtualised Network Resources Change Notification interface provided by the VIM.
Ccm-Vim.011	The reference point between the CCM and VIM shall support the Virtualised Storage Resources Change Notification interface provided by the VIM.
Ccm-Vim.012	All operations on interfaces supported for the reference point between the CCM and VIM require authentication and authorization of the consumer.

Table 5.2-2 specifies general requirements applicable to the interoperability between the CCM and PIM.

Table 5.2-2: General interoperability requirements between the CCM and PIM

Number	Functional requirement description
Ccm-Pim.001	The reference point between the CCM and PIM shall support the physical resource provisioning and lifecycle management interface provided by the PIM.
Ccm-Pim.002	The reference point between the CCM and PIM shall support the physical resource inventory management interface provided by the PIM.
Ccm-Pim.003	The reference point between the CCM and PIM shall support the physical resource topology management interface provided by the PIM.
Ccm-Pim.004	The reference point between the CCM and PIM shall support the physical resource performance management interface provided by the PIM.
Ccm-Pim.005	The reference point between the CCM and PIM shall support the physical resource fault management interface provided by the PIM.

5.3 Interface requirements

5.3.1 Virtualised Resources Management interface requirements

The reference point between the CCM and VIM shall support Virtualised Resource Management interface requirements defined in ETSI GS NFV-IFA 005 [1], clause 5.3.5.

5.3.2 Virtualised Resources Change Notification interface requirements

The reference point between the CCM and VIM shall support Virtualised Resources Change Notification interface requirements defined in ETSI GS NFV-IFA 005 [1], clause 5.3.7.

5.3.3 Virtualised Resources Information Management interface requirements

The reference point between the CCM and VIM shall support Virtualised Resources Information Management interface requirements defined in ETSI GS NFV-IFA 005 [1], clause 5.3.2.

5.3.4 Virtualised Resources Performance Management interface requirements

The reference point between the CCM and VIM shall support Virtualised Resources Performance Management interface requirements defined in ETSI GS NFV-IFA 005 [1], clause 5.3.9.

5.3.5 Virtualised Resources Fault Management interface requirements

The reference point between the CCM and VIM shall support Virtualised Resources Fault Management interface requirements defined in ETSI GS NFV-IFA 005 [1], clause 5.3.10.

5.3.6 Physical resource provisioning and lifecycle management interface requirements

The reference point between the CCM and PIM shall support physical resource provision and lifecycle management interface requirements PimPrLcmMgt.001, PimPrLcmMgt.002, PimPrLcmMgt.003, PimPrLcmMgt.004, PimPrLcmMgt.005 and PimPrLcmMgt.006 defined in ETSI GS NFV-IFA 053 [4], clause 7.3.

5.3.7 Physical resource inventory management interface requirements

The reference point between the CCM and PIM shall support physical resource inventory management interface requirements PimPrImMgt.001, PimPrImMgt.002 and PimPrImMgt.003 defined in ETSI GS NFV-IFA 053 [4], clause 7.4.

5.3.8 Physical resource topology management interface requirements

The reference point between the CCM and PIM shall support physical resource topology management interface requirements PimPrTmMgt.001, PimPrTmMgt.002 and PimPrTmMgt.003 defined in ETSI GS NFV-IFA 053 [4], clause 7.5.

5.3.9 Physical resource performance management interface requirements

The reference point between the CCM and PIM shall support physical resource performance management interface requirements PimPrPmMgt.001, PimPrPmMgt.002, PimPrPmMgt.003 and PimPrPmMgt.004 defined in ETSI GS NFV-IFA 053 [4], clause 7.6.

5.3.10 Physical resource fault management interface requirements

The reference point between the CCM and PIM shall support physical resource fault management interface requirements PimPrFmMgt.001, PimPrFmMgt.002, PimPrFmMgt.003 and PimPrFmMgt.004 defined in ETSI GS NFV-IFA 053 [4], clause 7.7.

6 VIM exposed Interfaces

6.1 Introduction

Clause 6 of the present document defines the interfaces exposed by VIM towards CCM over the reference point between the CCM and VIM. Interface operations can be reused from corresponding definitions in ETSI GS NFV-IFA 005 [1] on per case by case basis.

6.2 Virtualised Compute Resources Management interface

This interface enables the CCM to invoke virtualised compute resources management operations towards the VIM.

The virtualised compute resources management operations in clause 7.3.1 of ETSI GS NFV-IFA 005 [1] apply for virtualised compute resources management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.3 Virtualised Network Resources Management interface

This interface enables the CCM to invoke virtualised network resources management operations towards the VIM.

The virtualised network resources management operations in clause 7.4.1 of ETSI GS NFV-IFA 005 [1] apply for virtualised network resources management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.4 Virtualised Storage Resources Management interface

This interface enables the CCM to invoke virtualised storage resources management operations towards the VIM.

The virtualised storage resources management operations in clause 7.5.1 of ETSI GS NFV-IFA 005 [1] apply for virtualised storage resources management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.5 Virtualised Compute Resources Change Notification interface

This interface enables the CCM to invoke virtualised compute resources change notification operations towards the VIM.

The virtualised compute resources change notification operations in clause 7.3.2 of ETSI GS NFV-IFA 005 [1] apply for virtualised compute resources change notification interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.6 Virtualised Network Resources Change Notification interface

This interface enables the CCM to invoke virtualised network resources change notification operations towards the VIM.

The virtualised network resources change notification operations in clause 7.4.2 of ETSI GS NFV-IFA 005 [1] apply for virtualised network resources change notification interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.7 Virtualised Storage Resources Change Notification interface

This interface enables the CCM to invoke virtualised storage resources change notification operations towards the VIM.

The virtualised storage resources change notification operations in clause 7.5.2 of ETSI GS NFV-IFA 005 [1] apply for virtualised storage resources change notification interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.8 Virtualised Compute Resources Information Management interface

This interface enables the CCM to invoke virtualised compute resources information management operations towards the VIM.

The virtualised compute resources information management operations in clause 7.3.3 of ETSI GS NFV-IFA 005 [1] apply for virtualised compute resources information management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.9 Virtualised Network Resources Information Management interface

This interface enables the CCM to invoke virtualised network resources information management operations towards the VIM.

The virtualised network resources information management operations in clause 7.4.3 of ETSI GS NFV-IFA 005 [1] apply for virtualised network resources information management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.10 Virtualised Storage Resources Information Management interface

This interface enables the CCM to invoke virtualised storage resources information management operations towards the VIM.

The virtualised storage resources information management operations in clause 7.5.3 of ETSI GS NFV-IFA 005 [1] apply for virtualised storage resources information management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.11 Virtualised Storage Resources Information Management interface

This interface enables the CCM to invoke virtualised storage resources information management operations towards the VIM.

The virtualised storage resources information management operations in clause 7.5.3 of ETSI GS NFV-IFA 005 [1] apply for virtualised storage resources information management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.12 Virtualised Resources Performance Management interface

This interface enables the CCM to invoke virtualised resources performance management operations towards the VIM.

The virtualised resources performance management operations in clause 7.7 of ETSI GS NFV-IFA 005 [1] apply for virtualised resources performance management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

6.13 Virtualised Resources Fault Management interface

This interface enables the CCM to invoke virtualised resources fault management operations towards the VIM.

The virtualised resources fault management operations in clause 7.6 of ETSI GS NFV-IFA 005 [1] apply for virtualised resources fault management interface in the present document, except that the producer is the VIM and the consumer is the CCM.

7 Information elements exchanged

The information elements defined in clause 8 of ETSI GS NFV-IFA 005 [1] are referred by information elements of interfaces specified in the present document.

Annex A (informative): Operational flow examples

A.1 Introduction

The present clause describes operational flow examples of the CCM and VIM interaction, by utilizing the interface operations specified in clause 6.

A.2 Virtualised Resource Management

A.2.1 Virtualised Resource Allocation

Figure A.2.1-1 illustrates an operational flow for the CCM to request the VIM to allocate virtualised resources, to support the CIS cluster creation or modification.

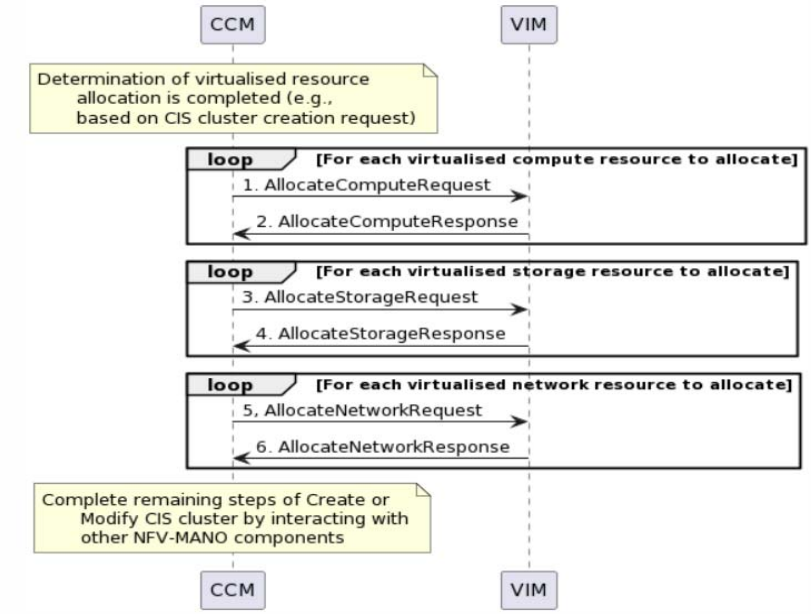

Figure A.2.1-1: Virtualised resource allocation

When the CCM receives a request to create or modify the CIS cluster, it processes and determines the necessary virtualised resources to be allocated from the input request and CIS cluster descriptors. Based on this determination, it further triggers the following steps (which can be loops or collective operations) of virtualised resource allocation by interacting with the VIM:

1) For each of the virtualised compute resources to allocate, the CCM requests the VIM to allocate Virtual Machine (VM) resources used as the CIS cluster nodes, by invoking the Allocate Virtualised Compute Resource operation.

2) The VIM responds to the CCM with the information of VM resources allocated for the CIS cluster.

3) For each of the virtualised storage resources to allocate, the CCM requests the VIM to allocate virtual storage resources for the CIS cluster nodes, by invoking the Allocate Virtualised Storage Resource operation.

4) The VIM responds to the CCM with the information of virtual storage resources allocated for the CIS cluster.

5) For each of the virtualised network resources to allocate, the CCM requests the VIM to allocate virtual network resources for the CIS cluster nodes networking, by invoking the Allocate Virtualised Network Resource operation.

6) The VIM responds to the CCM with the information of virtual network resources allocated for the CIS cluster.

NOTE: The order of Steps 1-2, Steps 3-4 and Steps 5-6 can vary or even be executed in parallel.

After the virtualised resources associated to the CIS cluster creation or modification are allocated, the CCM interacts with other NFV-MANO functional components to complete the remaining steps of CIS cluster management operation.

A.2.2 Virtualised Resource Update

Figure A.2.2-1 illustrates an operational flow for the CCM to request the VIM to update virtualised resources, to support the CIS cluster modification or configuration.

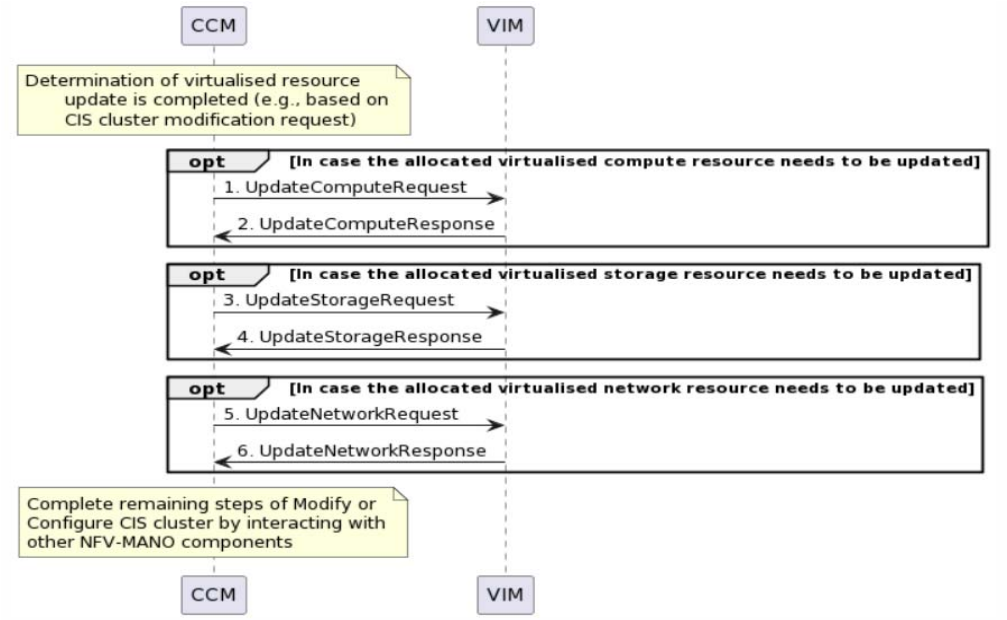

Figure A.2.2-1: Virtualised resource update

When the CCM receives a request to modify (e.g. modifying the network related configuration of the CIS cluster) or configure the CIS cluster (e.g. configuring the CIS cluster nodes of a CIS cluster), it processes and determines which allocated virtualised resources need to be updated based on the input request and CIS cluster descriptors and runtime information. Based on this determination, it further triggers the following steps of virtualised resource updates by interacting with the VIM:

1) In case the allocated virtualised compute resource needs to be updated, the CCM requests the VIM to update the configuration of Virtual Machine (VM) resource instances associated to the CIS cluster (CIS cluster nodes), by invoking the Update Virtualised Compute Resource operation.

2) The VIM responds to the CCM with the updated information of VM resource instances.

3) In case the allocated virtualised storage resource needs to be updated, the CCM requests the VIM to update the configuration of virtual storage resource instances associated to the CIS cluster (CIS cluster storage), by invoking the Update Virtualised Storage Resource operation.

4) The VIM responds to the CCM with the updated information of virtual storage resource instances.

5) In case the allocated virtualised network resource needs to be updated, the CCM requests the VIM to update the configuration of virtual network resource instances associated to the CIS cluster (CIS cluster nodes network), by invoking the Update Virtualised Network Resource operation.

6) The VIM responds to the CCM with the updated information of virtual network resource instances.

NOTE: Which updates are feasible for each type of virtualised resource is defined by the referenced interface operation in the flow.

After the configuration of virtualised resource instances associated to the CIS cluster modification or configuration is updated, the CCM interacts with other NFV-MANO functional components to complete the remaining steps of CIS cluster management operation.

A.2.3 Virtualised Resource Termination

Figure A.2.3-1 illustrates an operational flow for the CCM to request the VIM to terminate virtualised resources, to support the CIS cluster deletion or modification.

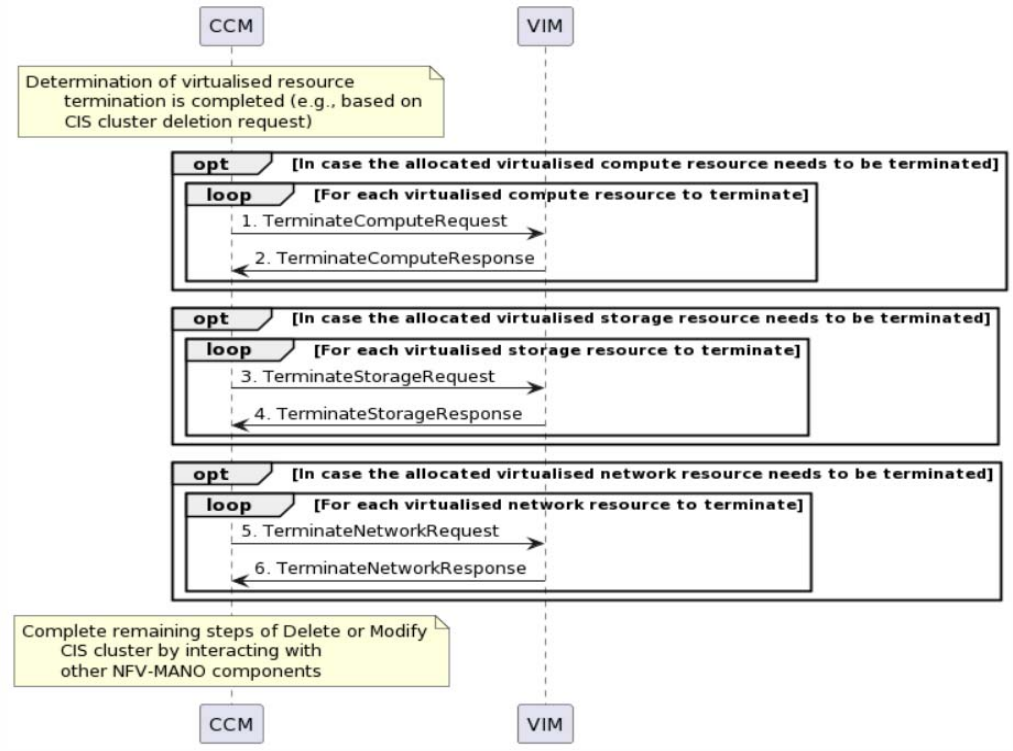

Figure A.2.3-1: Virtualised resource termination

When the CCM receives a request to delete or modify the CIS cluster, it processes and determines which allocated virtualised resources need to be terminated based on the input request, CIS cluster descriptors and runtime information. Based on this determination, it further triggers the following steps of virtualised resource termination (which can be loops or collective operations) by interacting with the VIM:

1) In case the allocated virtualised compute resource needs to be terminated, for each of the virtualised compute resources to terminate, the CCM requests the VIM to terminate the Virtual Machine (VM) resource instances associated to the CIS cluster (CIS cluster nodes), by invoking the Terminate Virtualised Compute Resource operation.

2) The VIM responds to the CCM with the identifier of VM resource instances successfully terminated.

3) In case the allocated virtualised storage resource needs to be terminated, for each of the virtualised storage resources to terminate, the CCM requests the VIM to terminate the virtual storage resource instances associated to the CIS cluster (CIS cluster storage), by invoking the Terminate Virtualised Storage Resource operation.

4) The VIM responds to the CCM with the identifier of virtual storage resource instances successfully terminated.

5) In case the allocated virtualised network resource needs to be terminated, for each of the virtualised network resources to terminate, the CCM requests the VIM to terminate the virtual network resource instances associated to the CIS cluster (CIS cluster nodes network), by invoking the Terminate Virtualised Network Resource operation.

6) The VIM responds to the CCM with the identifier of virtual storage resource instances successfully terminated.

NOTE: The order of Steps 1-2, Steps 3-4 and Steps 5-6 can vary or even be executed in parallel.

After the virtualised resource instances associated to the CIS cluster deletion or modification are terminated, the CCM interacts with other NFV-MANO functional components to complete the remaining steps of CIS cluster management operation.

A.2.4 Virtualised Resource Scaling

Figure A.2.4-1 illustrates an operational flow for the CCM to request the VIM to scale virtualised resources, to support the CIS cluster modification or configuration.

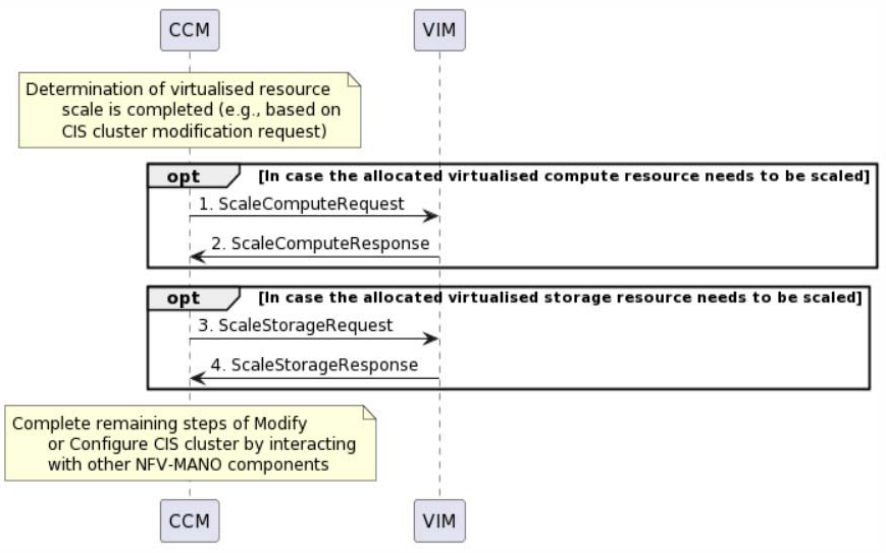

Figure A.2.4-1: Virtualised resource scaling

When the CCM receives a request to modify or configure the CIS cluster (e.g. modifying the storage-related configuration of the CIS cluster, or changing the compute flavour of the CIS cluster node), it processes and determines which allocated virtualised resources need to be scaled based on the input request, CIS cluster descriptors and runtime information. Based on this determination, it further triggers the following steps of virtualised resource scaling by interacting with the VIM:

1) In case the allocated virtualised compute resource needs to be scaled, the CCM requests the VIM to scale Virtual Machine (VM) resource instances associated to the CIS cluster (CIS cluster nodes), by invoking the Scale Virtualised Compute Resource operation.

2) The VIM responds to the CCM with the information of the scaled VM resource instances.

3) In case the allocated virtualised storage resource needs to be scaled, the CCM requests the VIM to scale virtual storage resource instances associated to the CIS cluster (CIS cluster storage), by invoking the Scale Virtualised Storage Resource operation.

4) The VIM responds to the CCM with the information of scaled storage resource instances.

After virtualised resource instances associated to the CIS cluster modification are scaled, the CCM interacts with other NFV-MANO functional components to complete the remaining steps of CIS cluster management operation.

A.2.5 Virtualised Resource Query

Figure A.2.5-1 illustrates an operational flow for the CCM to request the VIM to query information about virtualised resources associated to the CIS cluster.

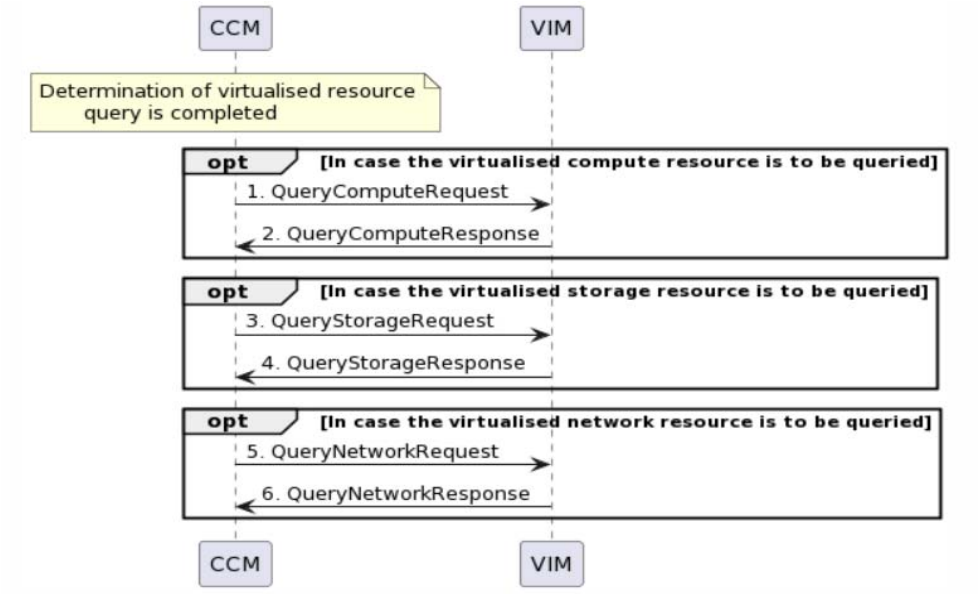

Figure A.2.5-1: Virtualised resource query

When the CCM determines which virtualised resources to query, it further triggers the following steps of virtualised resource query by interacting with the VIM:

1) In case the virtualised compute resource is to be queried, the CCM requests the VIM to query information about Virtual Machine (VM) resource instances associated to the CIS cluster (CIS cluster nodes), by invoking the Query Virtualised Compute Resource operation with certain query filters.

2) The VIM responds to the CCM with the information of VM resource instances as the query result.

3) In case the virtualised storage resource is to be queried, the CCM requests the VIM to query information about virtual storage resource instances associated to the CIS cluster (CIS cluster storage), by invoking the Query Virtualised Storage Resource operation with certain query filters.

4) The VIM responds to the CCM with the information of virtualised storage resource instances as the query result.

5) In case the virtualised network resource is to be queried, the CCM requests the VIM to query information about virtual network resource instances associated to the CIS cluster (CIS cluster nodes network), by invoking the Query Virtualised Network Resource operation with certain query filters.

6) The VIM responds to the CCM with the information of virtualised network resource instances as the query result.

A.2.6 Virtualised Resources change notification

Figure A.2.6-1 illustrates an operational flow for the CCM to request subscription to virtualised resources change notifications and the VIM provides such notifications to the CCM.

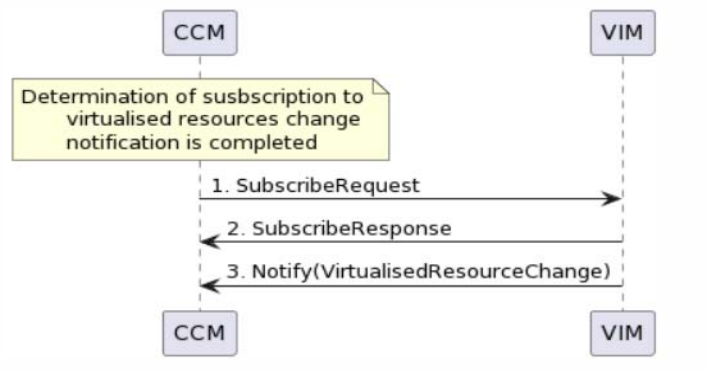

Figure A.2.6-1: Virtualised resources change notification

The CCM determines the need to receive the notifications about virtualised resource changes. It further triggers the following steps of subscription/notification by interacting with the VIM:

1) The CCM subscribes to notifications on virtualised resources (either compute, storage or network) change from the VIM, by invoking the Subscribe operation with necessary input filter.

2) The VIM responds to the CCM with the identifier of the subscription realized.

3) When the event of virtualised resources change occurs, the VIM sends the notification on virtualised resources change to the CCM by invoking Notify operation.

A.3 Virtualised Resource Information Management

A.3.1 Virtualised Resources information changes notification

Figure A.3.1-1 illustrates an operational flow for the CCM to request subscription to notifications related to information changes about consumable virtualised resources and the VIM provides such notifications to the CCM.

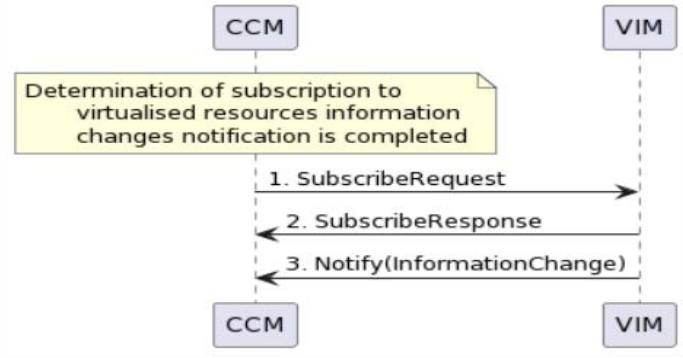

Figure A.3.1-1: Virtualised resources information changes notification

The CCM determines the need to receive notifications related to information changes about consumable virtualised resources. It further triggers the following steps of subscription/notification by interacting with the VIM:

1) The CCM subscribes to notifications on information changes about consumable virtualised resources from the VIM, by invoking the Subscribe operation with necessary input filter.

2) The VIM responds to the CCM with the identifier of the subscription realized.

3) When the event of virtualised resources information changes occurs, the VIM sends the notification on information change to the CCM by invoking Notify operation.

A.3.2 Query information about consumable Virtualised Resource

Figure A.3.2-1 illustrates an operational flow for the CCM to query the information about consumable virtualised resources from the VIM.

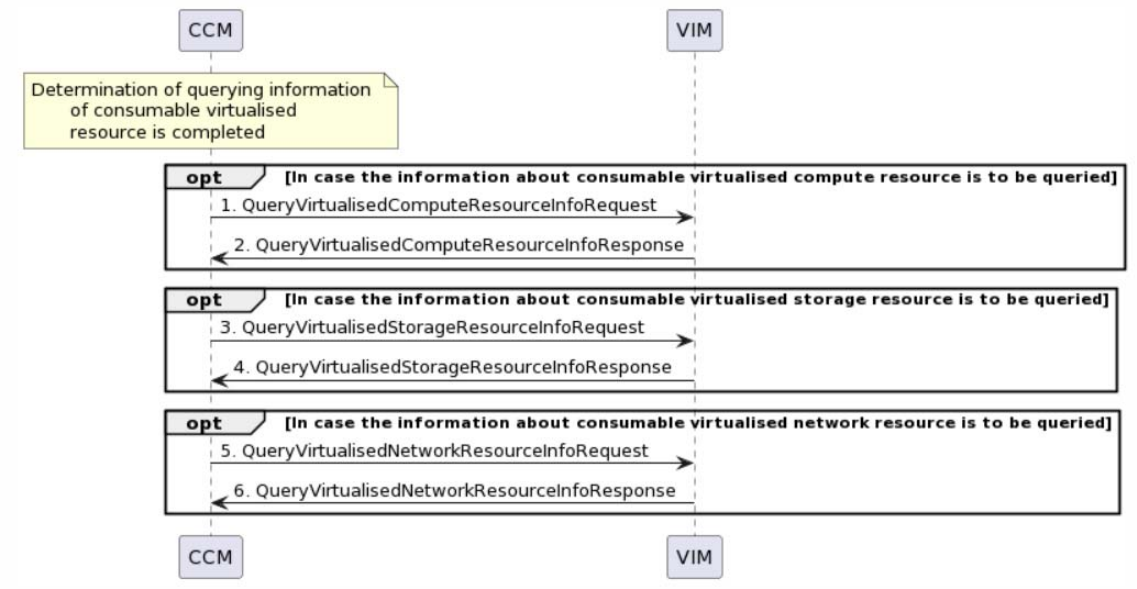

Figure A.3.2-1: Query information about consumable Virtualised Resource

The CCM determines to query the information about consumable virtualised resources. It further triggers the following steps of querying the information about different types of virtualised resources by interacting with the VIM:

1) In case the information about consumable virtualised compute resource is to be queried, the CCM queries the information about consumable virtualised compute resource from the VIM, by invoking the QueryVirtualisedComputeResourceInfo operation with certain query filters.

2) The VIM responds to the CCM with the information of consumable virtualised compute resources as the query result.

3) In case the information about consumable virtualised storage resource is to be queried, the CCM queries the information about consumable virtualised storage resource from the VIM, by invoking the QueryVirtualisedStorageResourceInfo operation with certain query filters.

4) The VIM responds to the CCM with the information of consumable virtualised storage resources as the query result.

5) In case the information about consumable virtualised network resource is to be queried, the CCM queries the information about consumable virtualised network resource from the VIM, by invoking the QueryVirtualisedNetworkResourceInfo operation with certain query filters.

6) The VIM responds to the CCM with the information of consumable virtualised network resources as the query result.

A.4 Virtualised Resource Performance Management

A.4.1 Create PM job

Figure A.4.1-1 illustrates an operational flow for the CCM to request the VIM to create a Performance Management (PM) job for monitoring virtualised resources associated to the CIS cluster, to support CCM layer PM activities such as creating PM job specifying the CIS cluster performance information to be collected.

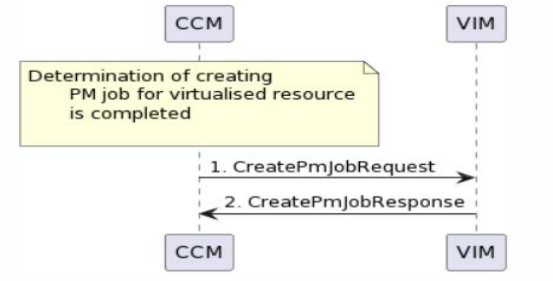

Figure A.4.1-1: Create PM job

The CCM determines to create a PM job for monitoring virtualised resources:

1) The CCM requests the VIM to create a PM job, enabling the CCM to specify a set of virtualised resources that the VIM is managing, for which the CCM wants to receive performance information, by invoking the Create PM Job operation.

2) The VIM responds to the CCM with identifier of the created PM job.

A.4.2 Delete PM job

Figure A.4.2-1 illustrates an operational flow for the CCM to request the VIM to deleting one or more Performance Management (PM) job monitoring virtualised resources associated to the CIS cluster, to support CCM layer PM activities such as deleting PM job specifying the CIS cluster performance information to be collected.

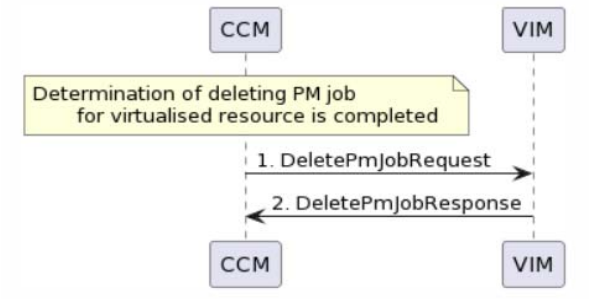

Figure A.4.2-1: Delete PM job

The CCM determines to delete a PM job monitoring virtualised resources:

1) The CCM requests the VIM to delete one or more PM jobs monitoring performance information of virtualised resources associated to the CIS cluster, by invoking the Delete PM Job operation.

2) The VIM responds to the CCM with identifiers of PM jobs successfully deleted.

A.4.3 Query PM job

Figure A.4.3-1 illustrates an operational flow for the CCM to query the VIM about information of one or more PM jobs monitoring virtualised resources associated to the CIS cluster.

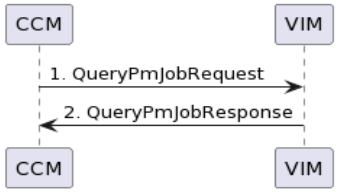

Figure A.4.3-1: Query PM job

1) The CCM queries the VIM about information of one or more PM jobs monitoring virtualised resources associated to the CIS cluster, by invoking the Query PM Job operation with certain query filters.

2) The VIM responds to the CCM with details of PM jobs matching query filters.

NOTE: Querying PM jobs monitoring virtualised resources associated to the CIS cluster is independent from querying PM jobs monitoring the associated CIS cluster.

A.5 Virtualised Resource Fault Management

A.5.1 Virtualised Resources alarm notification

Figure A.5.1-1 illustrates an operational flow for the CCM to request subscription to notifications related to alarms and their state changes resulting from the virtualised resources faults and the VIM provides such notifications to the CCM.

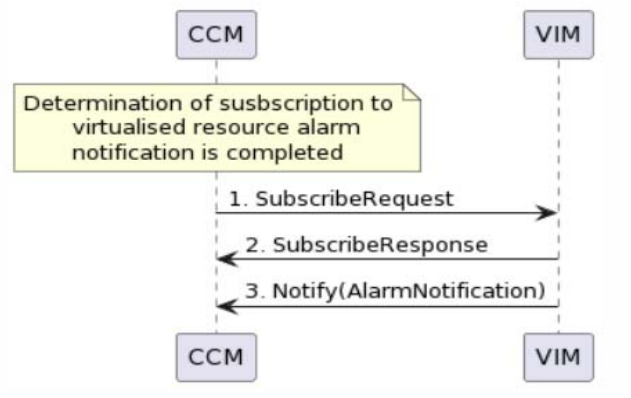

Figure A.5.1-1: Virtualised resources alarm notification

The CCM determines to receive the notifications on alarms and their state changes resulting from the virtualised resources faults. It further triggers the following steps of subscription/notification by interacting with the VIM:

1) The CCM subscribes to notifications on alarms and their state changes resulting from the virtualised resources faults from the VIM, by invoking the Subscribe operation with necessary input filter.

2) The VIM responds to the CCM with the identifier of the subscription realized.

3) When the alarms and their state changes occur, the VIM sends the notification on virtualised resource alarms to the CCM by invoking Notify operation.

A.5.2 Get alarm list

Figure A.5.2-1 illustrates an operational flow for the CCM to query for active alarms (associated to virtualised resources) from the VIM.

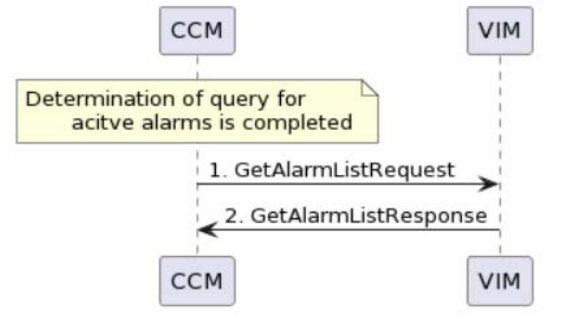

Figure A.5.2-1: Get alarm list

The CCM determines to query for active alarms associated to virtualised resources. It further triggers the following steps of getting alarm list by interacting with the VIM:

1) The CCM queries active alarms (associated to virtualised resources) from the VIM, by invoking the GetAlarmList operation with input filters to select alarms.

2) The VIM responds to the CCM with the information about one or more alarms.

Annex B (informative): Change history

Date	Version	Information about changes
January 2023	V0.0.1	First draft, introducing the document skeleton and scope.
March 2023	V0.0.2	Early draft including the following contributions until IFA#325 meeting: NFVIFA(23)000094r1, NFVIFA(23)000095, NFVIFA(23)000100r1, NFVIFA(23)000101r1, NFVIFA(23)000114, NFVIFA(23)000115r1.
June 2023	V0.1.0	Stable draft including the following contributions until IFA#337 meeting: NFVIFA(23)000255, NFVIFA(23)000256r2, NFVIFA(23)000285r1, NFVIFA(23)000286r2, NFVIFA(23)000287r2, NFVIFA(23)000288r2, NFVIFA(23)000289r1, NFVIFA(23)000290r1, NFVIFA(23)000292r1, NFVIFA(23)000343r1, NFVIFA(23)000344r1, NFVIFA(23)000345r2.
July 2023	V0.2.0	Stable draft including the following contributions until IFA#340 meeting: NFVIFA(23)000468, NFVIFA(23)000469r1, NFVIFA(23)000470r1, NFVIFA(23)000491.
November 2023	V5.0.1	Release 5 initial draft version created from published version 4.5.1.
June 2024	V5.1.2	Initial ed521 draft version created from published version 4.5.1.
September 2024	V5.1.3	Stable draft including the following contributions until IFA#395 interim F2F meeting: NFVIFA(24)000452r1, NFVIFA(24)000454r3.

History

Document history		
V5.2.1	November 2024	Publication