

VNFM API

V0.1

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1.Scope

The scope of the present document is to describe the VNFM exposed API specification over Or-Vnfm Reference Point.

2.Terms, Definitions and Abbreviations

For the purposes of the present document, the following abbreviations apply:

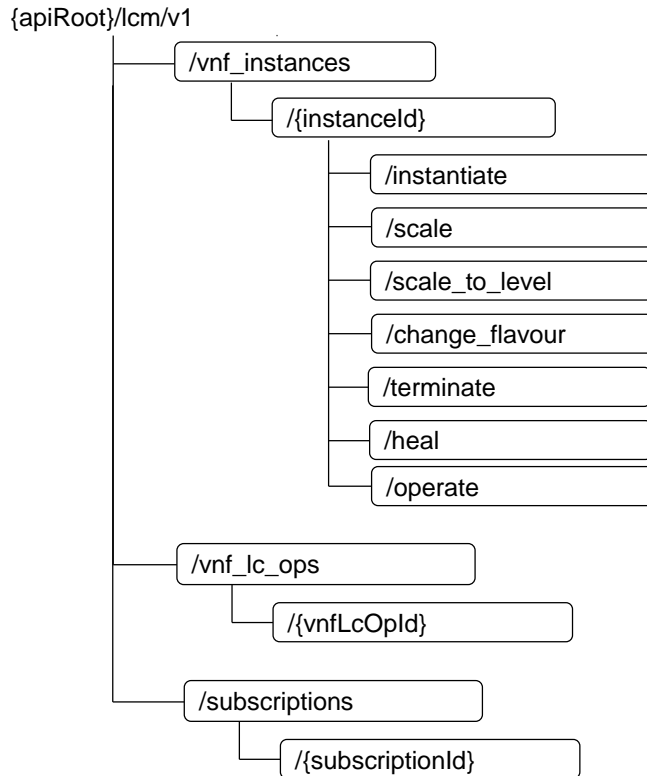
Abbreviation	
NFVO	Network Functions Virtualization Orchestrator
VNFM	Virtual Network Function Manager
VNF	Virtual Network Function

Table 2-1 abbreviations

3.Interfaces provided by VNFM_(Or-Vnfm/Ve-Vnfm-vnf)

Interfaces use RESTful API and the format is as follows:

`http(s)://[hostname][:port]/gvnfmapi/lcm/v1/[.....]`



{apiRoot} is `http(s)://[hostname][:port]/gvnmfapi`

3.1 Create VNF Identifier

If Definition	Description
URI	<code>http(s)://[hostname][:port]/gvnmfapi/lcm/v1/vnf_instances</code>
Operation	POST
Direction	NFVO->VNFM/LCM

3.1.1 Request

Parameter	Qualifier	Cardinality	Content	Description
vnfdId	M	1	Identifier	Identifier that identifies the VNFD which defines the VNF instance to be created.
vnfInstanceName	M	1	String	Human-readable name of the VNF instance to be created.
vnfInstanceDescription	O	0..1	String	Human-readable description of the VNF instance to be created.

```

{
  "vnfdId": "zte_vFW_51610",
  "vnfInstanceName": "vFW_01",

```

```
"vnfInstanceDescription": "vFW in Nanjing TIC Edge"
}
```

3.1.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfInstanceId	M	1	Identifier	VNF instance identifier just created.

```
{
  "vnfInstanceId": "1"
}
```

3.1.3 Response Code

Code	Meaning	Description
201	Created	A VNF Instance identifier was created successfully.
4xx/5xx	<name from RFC7231>	<description>

3.2 Delete VNF Identifier

If Definition	Description
URI	http(s)://[hostname][:port]/gvnfmapi/lcm/v1/vnf_instances/{vnfInstanceId}
Operation	DELETE
Direction	NFVO->VNFM LCM

3.2.1 Request

Parameter	Qualifier	Cardinality	Content	Description
n/a				

3.2.2 Response

Parameter	Qualifier	Cardinality	Content	Description
n/a				

3.2.3 Response Code

Code	Meaning	Description
------	---------	-------------

204	No Content	The VNF instance resource and the associated VNF identifier were deleted successfully.
4xx/5xx	<name from RFC7231>	<description>

3.3 Instantiate VNF

If Definition	Description
URI	http(s)://[hostname][:port]/gvnfmaplcm/v1/vnf_instances/{vnfInstanceId}/instantiate
Operation	POST
Direction	NFVO->VNFM/LCM

3.3.1 Request

Parameter	Qualifier	Cardinality	Content	Description
flavourId	M	1	IdentifierInVnfd	Identifier of the VNF deployment flavour to be instantiated.
instantiationLevelId	O	0..1	IdentifierInVnfd	Identifier of the instantiation level of the deployment flavour to be instantiated. If not present, the default instantiation level as declared in the VNFD is instantiated. Reserved
extVirtualLinks	O	0..N	ExtVirtualLinkData	Information about external VFs to connect the VNF to.
extManagedVirtualLinks	O	0..N	ExtManagedVirtualLinkData	Information about internal VFs that are managed by other entities than the VNFM. Reserved
localizationLanguage	O	0..1	String	Localization language of the VNF to be instantiated can be declared in the VNFD. The value shall comply with the format defined in IETF RFC 5646 [6].

				Reserved
additionalParams	O	0..N	KeyValuePair	Additional input parameters for the instantiation process, specific to the VNF being instantiated.

ExtVirtualLinkData:

Attribute	Qualifier	Cardinality	Content	Description
vlInstancelid	O	0..1	Identifier	Identifier of the VL instance.
vim	CM	0..1	VimInfo	Information about the VIM that manages this resource. This attribute shall be supported and present if VNF-related resource management in direct mode is applicable.
resourceProviderId	CM	0..1	Identifier	Identifies the entity responsible for the management of this resource. This attribute shall be present if VNF-related resource management in indirect mode is applicable. Reserved
resourceId	M	1	IdentifierInVim	The identifier of the resource in the scope of the VIM or the resource provider.
extCps	M	1..N	VnfExtCpData	External CPs of the VNF to be connected to this external VL.

VimInfo:

Attribute	Qualifier	Cardinality	Content	Description
vimInfolid	M	1	Identifier	The identifier of this VimInfo instance, for the purpose of referencing it from other information elements.
vimId	M	1	Identifier	The identifier of the VIM.
interfaceInfo	M	0..N	KeyValuePair	Information about the interface to the VIM, including VIM provider type, API version, and protocol type.
accessInfo	M	0..N	KeyValuePair	Authentication credentials for accessing the VIM. Examples may include those to support different authentication schemes, e.g., OAuth,

				Token, etc.
interfaceEndpoint	M	1	String	Information about the interface endpoint. An example is a URL.

interfaceInfo:

Key Define	Content	Description
vimType	String	The type of the VIM.
apiVersion	String	The Version of the api of the VIM.
protocolType	String	http https

accessInfo:

Key Define	Content	Description
tenant	String	Tenant Name of tenant
username	String	Username for login
password	String	Password of login user

VnfExtCpData:

Attribute	Qualifier	Cardinality	Content	Description
cpdId	M	1	IdentifierInVnfd	The identifier of the CPD in the VNFD.
addresses	O	0..N	NetworkAddress	List of (fixed) network addresses that need to be configured on the CP. This attribute shall be present if fixed addresses need to be configured.
numDynamicAddresses	O	0..1	Integer	Number of network addresses to be assigned dynamically. This attribute shall be present if dynamic addresses need to be configured. Reserved

NetworkAddress:

Attribute	Qualifier	Cardinality	Content	Description
addressType	M	1	Enum	Describes the type of the address to be assigned to the CP instantiated from the parent CPD. Permitted values: - MAC - IP
i2AddressData	CM	0..1	String	Provides the information on the MAC addresses to be assigned to the CP(s) instantiated from the parent CPD. Shall be present when the addressType is MAC address.
i3AddressData	CM	0..1	L3AddressData	Provides the information on the IP addresses to be assigned to the CP instantiated from the parent CPD. Shall be present when the addressType is IP address.

L3AddressData:

Attribute	Qualifier	Cardinality	Content	Description
iPAddressType	M	1	ENUM	IP address type. Permitted values: - IPv4 - IPv6
iPAddress	M	1	String	IP address

```
{
  "flavourId": "flavour_1",
  "instantiationLevelId": "instantiationLevel_1",
  "extVirtualLinks": [
    {
      "vlInstancelId": "1",
      "vim": {
        "vimInfold": "1",
        "vimId": "1",
        "interfaceInfo": {
          "vimType": "vim",
          "apiVersion": "v2",

```

```

        "protocolType": "http"
    },
    "accessInfo": {
        "tenant": "tenant_vCPE",
        "username": "vCPE",
        "password": "vCPE_321"
    },
    "interfaceEndpoint": "http://10.43.21.105:80/"
},
"resourceId": "1246",
"extCps": [
    {
        "cpdId": "11",
        "addresses": [
            {
                "addressType": "MAC",
                "I2AddressData": "00:f3:43:20:a2:a3"
            },
            {
                "addressType": "IP",
                "I3AddressData": {
                    "iPAddressType": "IPv4",
                    "iPAddress": "192.168.104.2"
                }
            }
        ]
    },
    "numDynamicAddresses": 0
}
]
},
"localizationLanguage": "en_US",
"additionalParams": {...}
}

```

3.3.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfLcOpId	M	1	Identifier	Identifier of the VNF lifecycle operation occurrence.

```

{
    "vnfLcOpId": "1"
}

```

3.3.3 Response Code

Code	Meaning	Description
202	Accepted	The request is accepted for processing, but the processing has not been completed.
4xx/5xx	<name from RFC7231>	<description>

3.4 Terminate VNF

If Definition	Description
URI	http(s)://[hostname][:port]/gvnfmap/api/lcm/v1/vnf_instances/{vnfInstanceId}/terminate
Operation	POST
Direction	NFVO->VNFM/LCM

3.4.1 Request

Parameter	Qualifier	Cardinality	Content	Description
terminationType	M	1	Enum	<p>Indicates whether forceful or graceful termination is requested.</p> <p>Permitted values:</p> <ul style="list-style-type: none">- FORCEFUL: The VNFM will shut down the VNF and release the resources immediately after accepting the request.- GRACEFUL: The VNFM will first arrange to take the VNF out of service after accepting the request. Once the operation is successful or once the timer value specified in the

				“gracefulTerminationTimeout” attribute expires, the VNFM will shut down the VNF and release the resources.
gracefulTerminationTimeout	O	0..1	Integer	<p>This attribute is only applicable in case of graceful termination. It defines the time to wait for the VNF to be taken out of service before shutting down the VNF and releasing the resources. The unit is seconds.</p> <p>If not given and the "terminationType" attribute is set to "GRACEFUL", it is expected that the VNFM waits for the successful taking out of service of the VNF, no matter how long it takes, before shutting down the VNF and releasing the resources.</p>

```
{
  "terminationType": "GRACEFUL",
  "gracefulTerminationTimeout": 120
}
```

3.4.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfLcOpId	M	1	Identifier	Identifier of the VNF lifecycle operation occurrence.

```
{
  "vnfLcOpId": "2"
}
```

3.4.3 Response Code

Code	Meaning	Description
202	Accepted	The request is accepted for processing, but the processing has not been completed.
4xx/5xx	<name from RFC7231>	<description>

3.5 Query multiple VNF

If Definition	Description
URI	http(s)://[hostname][:port]/gvnfmap/lcm/v1/vnf_instances
Operation	GET
Direction	NFVO->VNFM/LCM

3.5.1 Request

Parameter	Qualifier	Cardinality	Content	Description
n/a				

3.5.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfInstanceInfos	M	0..N	VnfInstanceInfo	Returned if information about zero or more VNF instances was queried successfully.

VnfInstanceInfo:

Attribute	Qualifier	Cardinality	Content	Description
		y		

vnfInstanceid	M	1	Identifier	VNF instance identifier.
vnfInstanceName	M	1	String	VNF instance name.
vnfInstanceDescription	M	1	String	Human-readable description of the VNF instance.
onboardedVnfPkgInfoId	M	1	Identifier	Identifier of information held by the NFVO about the specific VNF Package on which the VNF is based. This identifier was allocated by the NFVO.
vnfdId	M	1	Identifier	Identifier of the VNFD on which the VNF instance is based.
vnfdVersion	M	1	Identifier	Identifies the version of the VNFD. The value is copied from the VNFD.
vnfSoftwareVersion	M	1	String	Software version of the VNF. The value is copied from the VNFD.
vnfProvider	M	1	String	Name of the person or company providing the VNF. The value is copied from the VNFD.
vnfProductName	M	1	String	Name to identify the VNF Product. The value is copied from the VNFD.
vnfConfigurableProperties	O	0..N	KeyValuePair	Current values of the configurable properties of the VNF instance. Configurable properties as declared in the VNFD.
instantiationState	M	1	Enum	The instantiation state of the VNF. Permitted values: - NOT_INSTANTIATED: The VNF instance is terminated or not instantiated. - INSTANTIATED: The VNF instance is instantiated.
instantiatedVnfInfo	CM	0..1	InstantiatedVnfInfo	Information specific to an instantiated VNF instance. This attribute shall be present if the instantiateState attribute value is INSTANTIATED.
metadata	O	0..N	KeyValuePair	Additional metadata describing the VNF instance. This attribute can be modified with the Modify VNF information operation.
extensions	O	0..N	KeyValuePair	VNF-specific attributes. This attribute can be modified with the Modify VNF information operation.

InstantiatedVnflInfo:

Attribute	Qualifier	Cardinality	Content	Description
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flavourId	M	1	IdentifierInVnfd	Identifier of the VNF deployment flavour to be instantiated. Reserved
vnfState	M	1	ENUM	State of the VNF instance. Permitted values: - STARTED: The VNF instance is up and running. - STOPPED: The VNF instance has been shut down.
scaleStatus	O	0..N	ScaleInfo	Scale status of the VNF, one entry per aspect. Represents for every scaling aspect how "big" the VNF has been scaled w.r.t. that aspect. This attribute shall be present if the VNF supports scaling.
extCpInfo	O	0..N	CpInfo	Information about the external CPs exposed by the VNF instance.
extVirtualLink	O	0..N	ExtVirtualLinkInfo	Information about the external VLs the VNF instance is connected to.
extManagedVirtualLink	O	0..N	extManagedVirtualLinkInfo	Information about the externally-managed internal VLs of the VNF instance. Reserved
monitoringParameters	O	0..N	MonitoringParameter	Active monitoring parameters. Reserved
localizationLanguage	O	0..1	String	Localization language of the VNF to be instantiated. The value shall comply with the format defined in IETF RFC 5646 [6].
vimInfo	CM	0..N	VimInfo	Information about VIM(s) managing resources for the VNF instance. This attribute shall be supported and present if VNF-related resource management in direct mode is applicable.
vnfcResourceInfo	CM	0..N	VnfcResourceInfo	Information about the virtualised compute and storage resource(s) used by the VNFCs of the VNF instance. This attribute shall be supported and present if VNF-related resource management in direct mode is applicable.

virtualLinkResourceInfo	CM	0..N	VirtualLinkResourceInfo	Information about the virtualised network resource(s) used by the VLs of the VNF instance. This attribute shall be supported and present if VNF-related resource management in direct mode is applicable.
virtualStorageResourceInfo	CM	0..N	VirtualStorageResourceInfo	Information about the virtualised storage resource(s) used as storage for the VNF instance. This attribute shall be supported and present if VNF-related resource management in direct mode is applicable.

ScaleInfo:

Attribute	Qualifier	Cardinality	Content	Description
aspectId	M	1	IdentifierInVnfd	Identifier of the scaling aspect.
scaleLevel	M	1	Integer	Indicates the scale level. The minimum value shall be 0 and the maximum value shall be \leq maxScaleLevel as described in the VNFD.

CpInfo:

Attribute	Qualifier	Cardinality	Content	Description
cpInstanceId	M	1	Identifier	Identifier of the CP instance.
cpId	M	1	IdentifierInVnfd	Identifier of the CPD, in the VNFD.
addresses	O	0..N	NetworkAddresses	List of network addresses that have been configured on the CP.

ExtVirtualLinkInfo:

Attribute	Qualifier	Cardinality	Content	Description
extVirtualLinkId	M	1	Identifier	Identifier of the external VL.
resourceHandle	M	1	ResourceHandle	Identifier of the resource realizing this VL.
linkPorts	O	0..N	VnfLinkPort	Link ports of this VL.

ResourceHandle:

Attribute	Qualifier	Cardinality	Content	Description

vimId	CM	0..1	Identifier	Identifier of the VimInfo information element defining the VIM who manages the resource. This attribute shall be present if VNF-related resource management in direct mode is applicable. The value refers to a vimInfo item in the VnfInstance.
resourceProviderId	CM	0..1	Identifier	Identifier of the entity responsible for the management of the resource. This attribute shall be present when VNF-related resource management in indirect mode is applicable. Reserved
resourceId	M	1	IdentifierInVim	Identifier of the resource in the scope of the VIM or the resource provider.

VnfLinkPort:

Attribute	Qualifier	Cardinality	Content	Description
resourceHandle	M	1	ResourceHandle	Identifier of the virtualised network resource realizing this link port.
cpInstanceId	M	1	IdentifierInVnf	External CP of the VNF to be connected to this link port. There shall be at most one link port associated with any external connection point instance. The value refers to an extCpInfo item in the VnfInstance.

VnfcResourceInfo:

Attribute	Qualifier	Cardinality	Content	Description

vnfcInstanceId	M	1	IdentifierInVnf	Identifier of this VNFC instance.
vduId	M	1	IdentifierInVnfd	Reference to the applicable Vdu information element in the VNFD.
computeResource	M	1	ResourceHandle	Reference to the VirtualCompute resource.
storageResources	M	1..N	IdentifierInVnf	Reference(s) to the VirtualStorage resource(s). The value refers to a VirtualStorageResourceInfo item in the VnfInstance.
reservationId	O	0..1	Identifier	The reservation identifier applicable to the resource. It shall be present when an applicable reservation exists. Reserved

VirtualStorageResourceInfo:

Attribute	Qualifier	Cardinality	Content	Description
virtualStorageInstanceId	M	1	IdentifierInVnf	Identifier of this virtual storage resource instance.
virtualStorageDescId	M	1	IdentifierInVnfd	Identifier of the VirtualStorageDesc in the VNFD.
storageResource	M	1	ResourceHandle	Reference to the VirtualStorage resource.
reservationId	M	0..1	Identifier	The reservation identifier applicable to the resource. It shall be present when an applicable reservation exists. Reserved

VirtualLinkResourceInfo:

Attribute	Qualifier	Cardinality	Content	Description
-----------	-----------	-------------	---------	-------------

virtualLinkInstanceId	M	1	IdentifierInVnf	Identifier of this VL instance.
virtualLinkDescId	M	1	IdentifierInVnfd	Identifier of the Virtual Link Descriptor (VLD) in the VNFD.
networkResource	M	1	ResourceHandle	Reference to the VirtualNetwork resource.
reservationId	M	0..1	Identifier	The reservation identifier applicable to the resource. It shall be present when an applicable reservation exists. Reserved

```
[
  {
    "vnfInstanceId": "1",
    "vnfInstanceName": "vFW_01",
    "vnfInstanceDescription": "vFW in Nanjing TIC Edge",
    "onboardedVnfPkgInfoId": "1",
    "vnfdId": "zte_vFW_51610",
    "vnfdVersion": "V1.0",
    "vnfSoftwareVersion": "V1.0",
    "vnfProvider": "ZTE",
    "vnfProductName": "vFW",
    "vnfConfigurableProperties": {...},
    "instantiationState": "INSTANTIATED",
    "instantiatedVnfInfo": {
      "flavourId": "1",
      "vnfState": "STARTED",
      "scaleStatus": [
        {
          "aspectId": "aspect1",
          "scaleLevel": 1
        }
      ],
    },
    "extCplInfo": [
      {
        "cpInstanceId": "1",
        "cpId": "1",
        "addresses": [
          {
            "addressType": "MAC",
            "I2AddressData": "00:f3:43:20:a2:a3"
          }
        ],
      }
    ],
  }
]
```

```
        {
            "addressType": "IP",
            "l3AddressData": {
                "iPAddressType": "IPv4",
                "address": "192.168.104.2"
            }
        }
    ]
},
"extVirtualLink": [
    {
        "extVirtualLinkId": "extvl1",
        "resourceHandle": {
            "vimId": "1",
            "resourceId": "1111"
        },
        "linkPorts": [
            {
                "resourceHandle": {
                    "vimId": "1",
                    "resourceId": "2121"
                },
                "cpInstanceId": "1"
            }
        ]
    }
],
"monitoringParameters": {...},
"localizationLanguage": "en_US",
"vimInfo": [
    {
        "vimInfoId": "1",
        "vimId": "1",
        "interfaceInfo": {
            "vimType": "vim",
            "apiVersion": "v2",
            "protocolType": "http"
        },
        "accessInfo": {
            "tenant": "tenant_vCPE",
            "username": "vCPE",
            "password": "vCPE_321"
        }
    }
],
```

```
        "interfaceEndpoint": "http://10.43.21.105:80/"
      }
    ],
    "vnfcResourceInfo": [
      {
        "vnfcInstanceId": "vm1",
        "vduId": "vdu1",
        "computeResource": {
          "vimId": "1",
          "resourceId": "3333"
        },
        "storageResourceIds": [
          "storage1"
        ]
      }
    ],
    "virtualLinkResourceInfo": [
      {
        "virtualLinkInstanceId": "vl01",
        "virtualLinkDescId": "vl01",
        "networkResource": {
          "vimId": "1",
          "resourceId": "4444"
        }
      }
    ],
    "virtualStorageResourceInfo": [
      {
        "virtualStorageInstanceId": "storage1",
        "virtualStorageDescId": "storage1",
        "storageResource": {
          "vimId": "1",
          "resourceId": "555"
        }
      }
    ]
  },
  "metadata": {...},
  "extensions": {...}
}
]
```

3.5.3 Response Code

Code	Meaning	Description
200	Ok	The request has succeeded.
4xx/5xx	<name from RFC7231>	<description>

3.6 Query single VNF

If Definition	Description
URI	http(s)://[hostname][:port]/gvnmapi/lcm/v1/vnf_instances/{vnfInstanceId}
Operation	GET
Direction	NFVO->VNFM/LCM

3.6.1 Request

Parameter	Qualifier	Cardinality	Content	Description
n/a				

3.6.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfInstanceInfo	M	1	VnfInstanceInfo	The information of the VNF instance

3.6.3 Response Code

Code	Meaning	Description
200	Ok	The request has succeeded.
4xx/5xx	<name from RFC7231>	<description>

```
{
  "vnfInstanceId": "1",
  "vnfInstanceName": "vFW_01",
  "vnfInstanceDescription": "vFW in Nanjing TIC Edge",
  "onboardedVnfPkgInfo": "1",
  "vnfdId": "zte_vFW_51610",
  "vnfdVersion": "V1.0",
  "vnfSoftwareVersion": "V1.0",
  "vnfProvider": "ZTE",
  "vnfProductName": "vFW",
  "vnfConfigurableProperties": {...},
```

```
"instantiationState": "INSTANTIATED",
"instantiatedVnfInfo": {
  "flavourId": "1",
  "vnfState": "STARTED",
  "scaleStatus": [
    {
      "aspectId": "aspect1",
      "scaleLevel": 1
    }
  ],
  "extCpInfo": [
    {
      "cpInstanceId": "1",
      "cpId": "1",
      "addresses": [
        {
          "addressType": "MAC",
          "l2AddressData": "00:f3:43:20:a2:a3"
        },
        {
          "addressType": "IP",
          "l3AddressData": {
            "ipAddressType": "IPv4",
            "address": "192.168.104.2"
          }
        }
      ]
    }
  ],
  "extVirtualLink": [
    {
      "extVirtualLinkId": "extvl1",
      "resourceHandle": {
        "vimId": "1",
        "resourceId": "1111"
      },
      "linkPorts": [
        {
          "resourceHandle": {
            "vimId": "1",
            "resourceId": "2121"
          },
          "cpInstanceId": "1"
        }
      ]
    }
  ]
}
```



```
    ]
  }
],
"monitoringParameters": {...},
"localizationLanguage": "en_US",
"vimInfo": [
  {
    "vimInfold": "1",
    "vimId": "1",
    "interfaceInfo": {
      "vimType": "vim",
      "apiVersion": "v2",
      "protocolType": "http"
    },
    "accessInfo": {
      "tenant": "tenant_vCPE",
      "username": "vCPE",
      "password": "vCPE_321"
    },
    "interfaceEndpoint": "http://10.43.21.105:80/"
  }
],
"vnfcResourceInfo": [
  {
    "vnfcInstanceId": "vm1",
    "vduId": "vdu1",
    "computeResource": {
      "vimId": "1",
      "resourceId": "3333"
    },
    "storageResourceIds": [
      "storage1"
    ]
  }
],
"virtualLinkResourceInfo": [
  {
    "virtualLinkInstanceId": "vl01",
    "virtualLinkDescId": "vl01",
    "networkResource": {
      "vimId": "1",
      "resourceId": "4444"
    }
  }
]
```

```

    ],
    "virtualStorageResourceInfo": [
      {
        "virtualStorageInstanceId": "storage1",
        "virtualStorageDescId": "storage1",
        "storageResource": {
          "vimId": "1",
          "resourceId": "555"
        }
      }
    ]
  },
  "metadata": {...},
  "extensions": {...}
}

```

3.7 Get Operation Status

If Definition	Description
URI	http(s)://[hostname][:port]/gvnfmap/lcm/v1/vnf_lc_ops/{vnfLcOpId}&responseId={responseId}
Operation	GET
Direction	NFVO->GVNFM

3.7.1 Request

None

3.7.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfLcOpId	M	1	String	Identifier of a VNF lifecycle operation occurrence
vnfInstanceId	M	1	String	Identifier of the VNF instance to which the operation applies
lcmOperationType	M	1	ENUM	Type of the actual LCM operation represented by this lcm operation occurrence. Permitted values:

				<ul style="list-style-type: none"> - INSTANTIATE:the Instantiate VNF LCM operation. - SCALE: the Scale VNF LCM operation. - SCALE_TO_LEVEL: the Scale VNF to Level LCM operation. - CHANGE_FLAVOUR: the Change VNF Flavour LCM operation. - TERMINATE: the Terminate VNF LCM operation. - HEAL: the Heal VNF LCM operation. - OPERATE: the Operate VNF LCM operation. - CHANGE_EXT_VLS: the Change VNF external VLS LCM operation. <p style="color: red;">(Reserved)</p>
startTime	M	1	String	Date-time of the start of the operation. Representation: String formatted according to RFC 3339 [13].
responseDescriptor	M	1	VnfLcOpResponseDescriptor	Including:responseId,progress,statusstatusDescription,errorCode,responseHistoryList

VnfLcOpResponseDescriptor:

Attribute	Qualifier	Cardinality	Content	Description
responseId	M	1	Integer	Response Identifier
progress	M	1	Integer	progress (1-100)
lcmOperationStatus	M	1	ENUM	Status of a VNF lifecycle operation occurrence Permitted values: <ul style="list-style-type: none"> - STARTING: The operation is starting.. - PROCESSING: The operation is

				<p>currently in execution.</p> <ul style="list-style-type: none"> - COMPLETED: The operation has completed successfully. - FAILED: The operation has failed and it cannot be retried or rolled back, as it is determined that such action won't succeed. - FAILED_TEMP: The operation has failed and execution has stopped, but the execution of the operation is not considered to be closed. (Reserved) - ROLLING_BACK: The operation is currently being rolled back. (Reserved) - ROLLED_BACK: The state of the VNF prior to the original operation invocation has been restored as closely as possible. (Reserved)
statusDescription	O	0..1	String	Status Description of a VNF lifecycle operation occurrence
errorCode	O	0..1	Integer	Errorcode
responseHistoryList	O	0..N	VnfLcOpDetail	History Response Messages from the requested response to latest one.

VnfLcOpDetail:

Attribute	Qualifier	Cardinality	Content	Description
responseId	M	1	Integer	Response Identifier
progress	M	1	Integer	progress (1-100)
lcmOperationStatus	M	1	ENUM	<p>Status of a VNF lifecycle operation occurrence</p> <p>Permitted values:</p> <ul style="list-style-type: none"> - STARTING: The operation is starting.. - PROCESSING: The operation is currently in execution. - COMPLETED: The operation has completed successfully. - FAILED: The operation has failed and it

				<p>cannot be retried or rolled back, as it is determined that such action won't succeed.</p> <ul style="list-style-type: none"> - FAILED_TEMP: The operation has failed and execution has stopped, but the execution of the operation is not considered to be closed. (Reserved) - ROLLING_BACK: The operation is currently being rolled back. (Reserved) - ROLLED_BACK: The state of the VNF prior to the original operation invocation has been restored as closely as possible. (Reserved)
statusDescription	0	0..1	String	Status Description of a VNF lifecycle operation occurrence
errorCode	0	0..1	Integer	Errorcode

```

{
  "vnfLcOpId": "1234566",
  "vnfInstanceId": "1",
  "lcmOperationType": "INSTANTIATE",
  "startTime": "2017-01-01T12:00:27.87+00:20",
  "responseDescriptor": {
    "responseId": 3,
    "progress": 40,
    "lcmOperationStatus": "PROCESSING",
    "statusDescription": "OMC VMs are decommissioned in VIM",
    "errorCode": null,
    "responseHistoryList": [
      {
        "responseId": 1,
        "progress": 40,
        "lcmOperationStatus": "PROCESSING",
        "statusDescription": "OMC VMs are decommissioned in VIM",
        "errorCode": null
      },
      {
        "responseId": 2,
        "progress": 41,
        "lcmOperationStatus": "PROCESSING",
        "statusDescription": "OMC VMs are decommissioned in VIM",
        "errorCode": null
      }
    ]
  }
}

```

```

    ]
  }
}

```

3.7.3 Response Code

Code	Meaning	Description
200	Ok	The request has succeeded.
4xx/5xx	<name from RFC7231>	<description>

4. Interfaces provided by VNF (Ve-Vnfm-vnf)

4.1 Set Initial Configuration

If Definition	Description
URI	http(s)://[hostname][:port]/configuration
Operation	POST
Direction	VNFM->VNF

4.1.1 Request

Parameter	Qualifier	Cardinality	Content	Description
vnfInstanceId	M	1	Identifier	Identifier of the VNF instance which the VNF to set initial configuration.
vnfConfigurationData	O	0..1	VnfConfigur ation	Configuration data for the VNF instance.
vnfcConfigurationData	O	0..N	VnfcConfigu ration	Configuration data for VNFC instances.

VnfConfiguration:

Attribute	Qualifier	Cardinalit y	Content	Description
cp	O	0..N	CpConfiguratio n	External CPs
vnfSpecificData	O	0..1	VnfConfigurabl eProperties	Configuration object containing values of VNF configurable properties.

CpConfiguration:

Attribute	Qualifier	Cardinality	Content	Description
cpId	M	1	Identifier	Uniquely identifies a CP instance within the namespace of a specific VNF instance or VNFC instance.
cpIdId	M	1	Identifier	Uniquely identifies a type of CP instance within the namespace of a VNFD.
cpAddress	M	1..N	CpAddress	Address and Port assigned to the CP.

CpAddress:

Attribute	Qualifier	Cardinality	Content	Description
address	M	0..N	NetworkAddress	The address assigned to the CP instance (e.g. IP address, MAC address, etc.). It shall be provided for configuring a fixed address.
useDynamicAddress	M	0..1	ENUM	It determines whether an address shall be assigned dynamically. It shall be provided if a dynamic address needs to be configured on the CP. A cardinality of "0" indicates that no dynamic address needs to be configured on the CP. Permitted values: - TRUE - FALSE
port	M	0..1	Not specified	The port assigned to the CP instance (e.g. IP port number, Ethernet port number, etc.). Reserved

VnfConfigurableProperties:

Attribute	Qualifier	Cardinality	Content	Description
-----------	-----------	-------------	---------	-------------

autoScalable	O	0..1	ENUM	It permits to enable (TRUE) / disable (FALSE) the auto-scaling functionality. A cardinality of "0" indicates that configuring this present VNF property is not supported. Permitted values: - TRUE - FALSE
autoHealable	O	0..1	ENUM	It permits to enable (TRUE) / disable (FALSE) the auto-healing functionality. A cardinality of "0" indicates that configuring this present VNF property is not supported. Permitted values: - TRUE - FALSE

VnfcConfiguration:

Attribute	Qualifier	Cardinality	Content	Description
vnfcId	M	1	Identifier	Uniquely identifies a VNFC instance within the namespace of a specific VNF instance.
cp	O	0..N	CpConfiguration	Internal CPs.
vnfcSpecificData	O	0..1	KeyValuePair	Configuration object containing values of VNFC configurable properties

```

{
  "vnfInstanceId": "1",
  "vnfConfigurationData": {
    "cp": [
      {
        "cpId": "cp-1",
        "cpId": "cpd-a",
        "cpAddress": [
          {
            "addresses": [
              {
                "addressType": "MAC",
                "l2AddressData": "00:f3:43:20:a2:a3"
              }
            ]
          }
        ]
      }
    ]
  }
}

```



```

        },
        {
            "addressType": "IP",
            "I3AddressData": {
                "iAddressType": "IPv4",
                "iAddress": "192.168.104.2"
            }
        }
    ],
    "useDynamicAddress": "FALSE"
}
]
}
],
"vnfSpecificData": {
    "autoScalable": "FALSE",
    "autoHealable": "FALSE"
}
},
"vnfcConfigurationData": {
    "vnfcId": "vnfc-1",
    "cp": [
        {
            "cpId": "cp-11",
            "cpdId": "cpd-1a",
            "cpAddress": [
                {
                    "addresses": [
                        {
                            "addressType": "MAC",
                            "I2AddressData": "00:f3:43:21:a2:a3"
                        },
                        {
                            "addressType": "IP",
                            "I3AddressData": {
                                "iAddressType": "IPv4",
                                "iAddress": "192.168.105.2"
                            }
                        }
                    ]
                }
            ],
            "useDynamicAddress": "FALSE"
        }
    ]
}
}

```

```

    ],
    "vnfcSpecificData": {}
  }
}

```

4.1.2 Response

Parameter	Qualifier	Cardinality	Content	Description
vnfConfigurationData	0	0..1	VnfConfiguration	Correspond to the vnfConfigurationData in the input information elements of the SetInitialConfiguration operation if it has.
vnfcConfigurationData	0	0..N	VnfcConfiguration	Correspond to the vnfcConfigurationData in the input information elements of the SetInitialConfiguration operation if it has.

```

{
  "vnfConfigurationData": {
    "cp": [
      {
        "cpId": "cp-1",
        "cpId": "cpd-a",
        "cpAddress": [
          {
            "addresses": [
              {
                "addressType": "MAC",
                "I2AddressData": "00:f3:43:20:a2:a3"
              },
              {
                "addressType": "IP",
                "I3AddressData": {
                  "iPAddressType": "IPv4",
                  "iPAddress": "192.168.104.2"
                }
              }
            ]
          }
        ]
      }
    ],
  }
}

```

```
        "useDynamicAddress": "FALSE"
      }
    ]
  },
],
"vnfSpecificData": {
  "autoScalable": "FALSE",
  "autoHealable": "FALSE",
  ...
}
},
"vnfcConfigurationData": {
  "vnfcId": "vnfc-1",
  "cp": [
    {
      "cpId": "cp-11",
      "cpdId": "cpd-1a",
      "cpAddress": [
        {
          "addresses": [
            {
              "addressType": "MAC",
              "l2AddressData": "00:f3:43:21:a2:a3"
            },
            {
              "addressType": "IP",
              "l3AddressData": {
                "ipAddressType": "IPv4",
                "ipAddress": "192.168.105.2"
              }
            }
          ]
        },
        ],
      "useDynamicAddress": "FALSE"
    }
  ]
}
```

```
    ]
  }
],
  "vnfcSpecificData": {...}
}
}
```

4.1.3 Response Code

Code	Meaning	Description
201	Created	A VNF Instance identifier was created successfully.
4xx/5xx	<name from RFC7231>	<description>