

**Oracle® Communications Application  
Orchestrator**  
REST API Guide  
Release 1.1

August 2016

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# About This Guide

This document and other product-related documents are described in the Related Documentation table.

## Related Documentation

**Table 1: Oracle Communications Application Orchestrator Library**

Document Name	Document Description
Release Notes	Contains feature support information, and known issues pertaining to this release.
Installation Guide	Contains instructions for installing Oracle Communications Application Orchestrator as a standalone application or installing Oracle Communications Application Orchestrator together with Oracle Communications Session Delivery Manager.
Plug-in Guide for Session Delivery Network Elements	Describes how to use Oracle session delivery product plug-ins with Oracle Communications Application Orchestrator.
User Guide	<p>Describes how to centrally manage and automate your virtual and physical network environment of composite network functions (CNFs). The Oracle Communications Application Orchestrator application is implemented by doing the following:</p> <ul style="list-style-type: none"><li>• Use the Security Manager to create new users and new user groups, and set group-based authorization.</li><li>• Configure X.509 certificate authentication.</li><li>• Add a virtual infrastructure management (VIM) system to manage VNF life-cycles.</li><li>• Register an Element Manager (EM) with Oracle Communications Application Orchestrator in order to stage a CNF from its CNF descriptor (CNFD).</li><li>• Manually use the CNF onboarding workflow to choose, stage, and promote a pre-existing CNF plug-in, and configure the CNF to deploy and make this CNF operational.</li><li>• Automate the manual process of making a CNF operational by using the hierarchical service configuration (HSC) feature.</li><li>• Monitor Oracle Communications Application Orchestrator real-time KPI thresholds, device status and performance information for CNFs.</li><li>• Use the Fault Manager to view events, alarms and trap event settings.</li></ul>
REST API Guide	The Oracle Communications Application Orchestrator REST API interface interacts with the Northbound Interface (NBI) to get the available fault alarms.
Security Guide	<p>Provides the following security guidelines and topics:</p> <ul style="list-style-type: none"><li>• Guidelines for performing a secure installation of Oracle Communications Application Orchestrator on your server, which includes methods for securing the server, firewall settings, system support for encryption and random number generators (RNG), using HTTPS, and password guidelines.</li><li>• An overview of the Security Manager features that are used to configure groups, users, operations, privileges, and manage access to the system.</li></ul>

## About This Guide

Document Name	Document Description
	<ul style="list-style-type: none"><li>Security maintenance, which includes a checklist to securely deploy Oracle Communications Application Orchestrator on your network, maintaining security updates, and security considerations for developers.</li></ul>

## Revision History

Date	Description
August 2015	<ul style="list-style-type: none"><li>Initial release.</li></ul>
April 2016	<ul style="list-style-type: none"><li>Existing sections in the Oracle Communications Application Orchestrator REST API Overview chapter were updated and Input and Output Parameters, URL Request Methods, and Viewing the XML Schema for a REST API Resource Object sections were added.</li><li>The name of the Accessing the Application Orchestrator REST API chapter was changed to Configure and Access Application Orchestrator REST API. Existing sections were updated and added to the Configure the REST Client section.</li><li>The following chapters were added:<ul style="list-style-type: none"><li>VIM and VDC Resources</li><li>VM Image Retrieval</li><li>NF Resources</li><li>Application Orchestrator Scaling Events</li><li>Fault Retrieval</li><li>Application Orchestrator REST API Examples</li></ul></li></ul>
August 2016	<ul style="list-style-type: none"><li>A note was added to the <i>Application Orchestrator REST API Overview</i> chapter that says if you are using JSON for your REST implementation, the root element should be excluded in the request payload.</li></ul>




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# Application Orchestrator REST API Overview

Oracle Communications Application Orchestrator provides a REST API interface that allows a northbound client application, such as a network service orchestrator (NSO), to interact with Oracle Communications Application Orchestrator.

## Pre-Requisites

Any application that needs to interact with Oracle Communications Application Orchestrator through the REST API interface must be able to send HTTP/HTTPS requests and receive HTTP/HTTPS responses. The application must have a software development toolkit that can generate the HTTP requests and receive HTTP responses. The request and response body are available in either XML or JSON formats. A XML and JSON parser toolkit is needed in the application to be able to parse the XML or JSON data.

 **Note:** The REST API resource examples provided in this guide are represented in XML format only.

 **Note:** If you are using JSON for your REST implementation, the root element should be excluded in the request payload. The JSON response example below contains the root element, which is highlighted in bold.

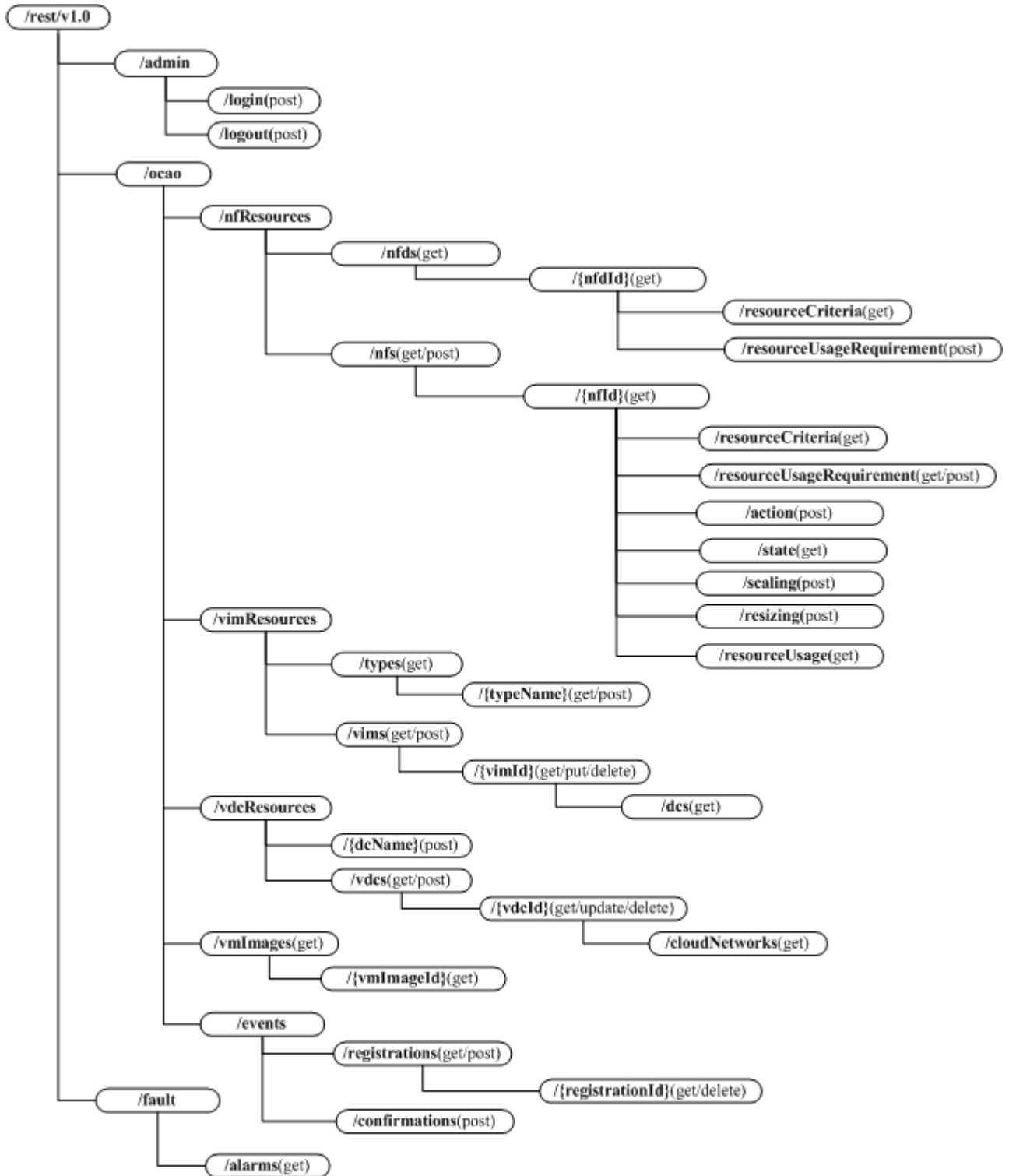
```
{
  "session": {
    "userName": "admin",
    "password": "NextGen"
  }
}
```

The JSON response example below has the root element removed:

```
{
  "userName": "admin",
  "password": "NextGen"
}
```

The following sections describe the URL resources and request and response information that are used in each REST API in this guide.

## Application Orchestrator REST API Resource Tree



## URL Parameters

The URL parameters for any Oracle Communications Application Orchestrator API contains either the server IP address or the DNS name of the server, the port number on which Oracle Communications Application Orchestrator is running, and its uniform resource identifier (URI).

The following example shows a full URL directory path for an Oracle Communications Application Orchestrator REST resource used to list the catalog of CNFDs:

```
https://<OCAO ip-address or DNS name>:8443/rest/v1.0/ocao/nfResources/nfds
```

The following example shows a full URL for the login REST API:

```
https://<OCAO ip-address or DNS name>:8443/rest/v1.0/admin/login
```

- The instance portion of the URL (**https://<OCAO-ip-address>:8443/**) specifies the Oracle Communications Application Orchestrator server IP address and its designated port number (8443) that was defined during the installation of Oracle Communications Application Orchestrator. See the Configure Web Server Security section in the *Oracle Communications Application Orchestrator Installation Guide* for more information.
- The **Uniform resource identifier (URI)** portion of the fixed URL starts with **/rest**, the major and minor version (**/v1.0**) of the API, the API category name (**/admin**), and the resource (**/login**).



**Note:** Minor versions expand the interface and do not change the request and response body format. For example, everything in v1.1 is available in v1.2 and all existing request and response message formats are the same.

## HTTP Request Methods



**Note:** Request and response messages support both XML and JSON formats and have the same formats.

Request	Description
GET	The specified read-only operation passes query parameters to the resource and retrieves data from the resource without changing it. Unless otherwise specified, this operation returns the configured state of the resource.
POST	This operation submits data to be processed by the specified resource in the request body, and is also able to create a new resource with the details contained in the JSON or XML request body.
PUT	This operation updates the specified resource with new information that replaces or modifies the previous data with the following conditions: <ul style="list-style-type: none"> <li>• This operation cannot be used to create a new resource.</li> <li>• The request body must contain the complete representation of mandatory attributes of the resource.</li> </ul>
DELETE	This operation deletes a resource. If the resource has already been deleted, a "404 Not Found" response is returned.

### Request and Response Message Format

---

The Oracle Communications Application Orchestrator REST API supports both XML and JSON data formats in the request and response message. Request and response data formats are always same.

A request to the API resource always returns a response code through HTTP/HTTPS. Error response codes typically have two types: 4xx series status codes for client side issues and 5xx series status codes for server side issues. An error response also contains an error body in either XML or JSON format containing the http status code, server error code, error label and error message that are defined by Oracle Communications Application Orchestrator server.

For example, the following server error response (in XML format) shows that the server failed to get alarms:

```
<errorCode>15034</errorCode>
<errorLabel>DBS_QUERY_EXCEPTION</errorLabel>
<message>Database query encountered an exception.</message>
```

### Request or Response Parameter Object

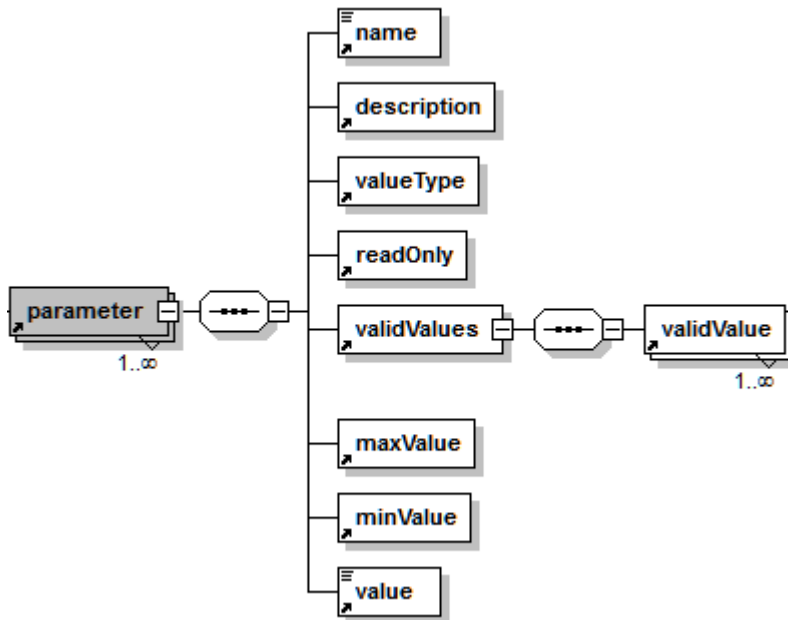
---

Oracle Communications Application Orchestrator is supported by various VIMs and element managers (EMs) to orchestrate a variety of NFs through plug-ins. The REST API uses a parameter object in a request and response to accommodate the differences in the system and facilitate a REST client application.


A parameter object can contain the following attributes:

- name—The parameter name.
- valueType—Any of the following supported parameter types:
  - String
  - NumberString
  - BooleanString
  - IPV4String
  - IPV6String
  - MACAddressString
  - SubnetGatewayString
  - SubnetMaskString
  - SingleSelection
  - MultiSelection
- description—Parameter description.
- minValue—The minimum allowed value for a NumberString parameter type.
- maxValue—The maximum allowed value for a NumberString parameter type.
- Value—The current parameter value.
- ValueList—The current parameter value list if the parameter is multiSelectionList.
- validValues—The valid value options for the selection type parameter.
- readOnly—This parameter informs users whether a parameter accepts user input.

The following example shows how request or response parameters can be represented in a schema:



**Figure 1: Request or response parameter schema example**

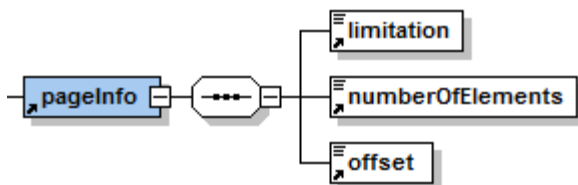
 **Note:** When a parameter object is used for configuration input, users only need to provide name and value attributes, the rest of the attributes in the parameter can be ignored.

## REST API Pagination Parameters

The following pagination parameters can be found in Oracle Communications Application Orchestrator REST API resources:

- limitation—Total number of objects allowed. The default is 50.
- numberOfElements—Number of elements per page allowed.
- offset—The page offset within a data structure object that is a number indicating the distance (displacement) from the beginning of the object up until a given element within the same object. The default page offset is one.

The following example shows how response page display parameters can be represented in a schema:



**Figure 2: Page display parameters**

## Success Response Status Codes

The table below lists all possible HTTP/HTTPS success status codes that appear in the message.

Response Code	Description
200 (OK)	The standard response for successful requests. The actual response depends on the request method used. GET, PUT and POST are successful request methods. For example,

## Application Orchestrator REST API Overview

Response Code	Description
	in a GET request, the response contains an entity corresponding to the requested resource and in a POST request, the response contains an entity describing or containing the result of the action.
202 (Accepted)	The request has been accepted for processing, but the processing has not been completed. The request may not be acted upon, as it might be disallowed when processing actually takes place.
204 (No Content)	The server successfully processed the request, but is not returning any content. This code is usually used as a response to a successful delete request.

## Error Response Status Codes

The table below lists all possible HTTP/HTTPS error response codes that appear in the message.

HTTP/HTTPS Response Code	Description
400 (Bad Request)	The server cannot or does not process the request due to something that is perceived to be a client error (For example, malformed request syntax, invalid request message framing, or deceptive request routing).
401 (Unauthorized)	Similar to <b>403</b> , this response is used when authentication (login) is required and has failed (invalid user or password, or both) or has not yet been provided, or the request has no valid session ID. The response must include a WWW-Authenticate header field containing a challenge applicable to the requested resource.
403 (Forbidden)	The request was a valid request, but the server is refusing to respond to it. Unlike a <b>401</b> response, authenticating makes no difference. The user is forbidden access to the resource or operation on the resource due to insufficient privileges.
404 (Not Found)	The requested resource could not be found or deleted, but may be available again in the future. Subsequent requests by the client are permissible.
405 (Method Not Allowed )	A request was made of a resource using a request method not supported by that resource; for example, using GET on a form which requires data to be presented through POST, or using PUT on a read-only resource.
500 (Internal Server Error)	There is an internal server error.

## Sample Client Code

This section provides examples for using the REST API with various client-side libraries and cURL. The REST API can be utilized in several different programming languages. The development environment determines how to access the REST API.

## Jersey Client Package Example

You must download a Jersey release and put the JARs in your class path to use the Jersey package. If using the JSON message format, you must also retrieve any additional JARs described in the Jersey User Guide. The following JARs are required to support MOXy as your JSON provider:

```
jersey-entity-filtering-2.9.jar
jersey-media-moxy-2.9.jar
org.eclipse.persistence.moxy-2.5.0.jar
org.eclipse.persistence.core-2.5.0.jar
org.eclipse.persistence.antlr-2.5.0.jar
org.eclipse.persistence.asm-2.5.0.jar
```

## Java JDK Net Package Example

No additional 3rd party JARs are required to make REST API calls using the JDK net package.

## cURL Example

This section provides some samples using the cURL command-line tool to make REST API calls.

The following login example shows the input and output of the user.xml file:

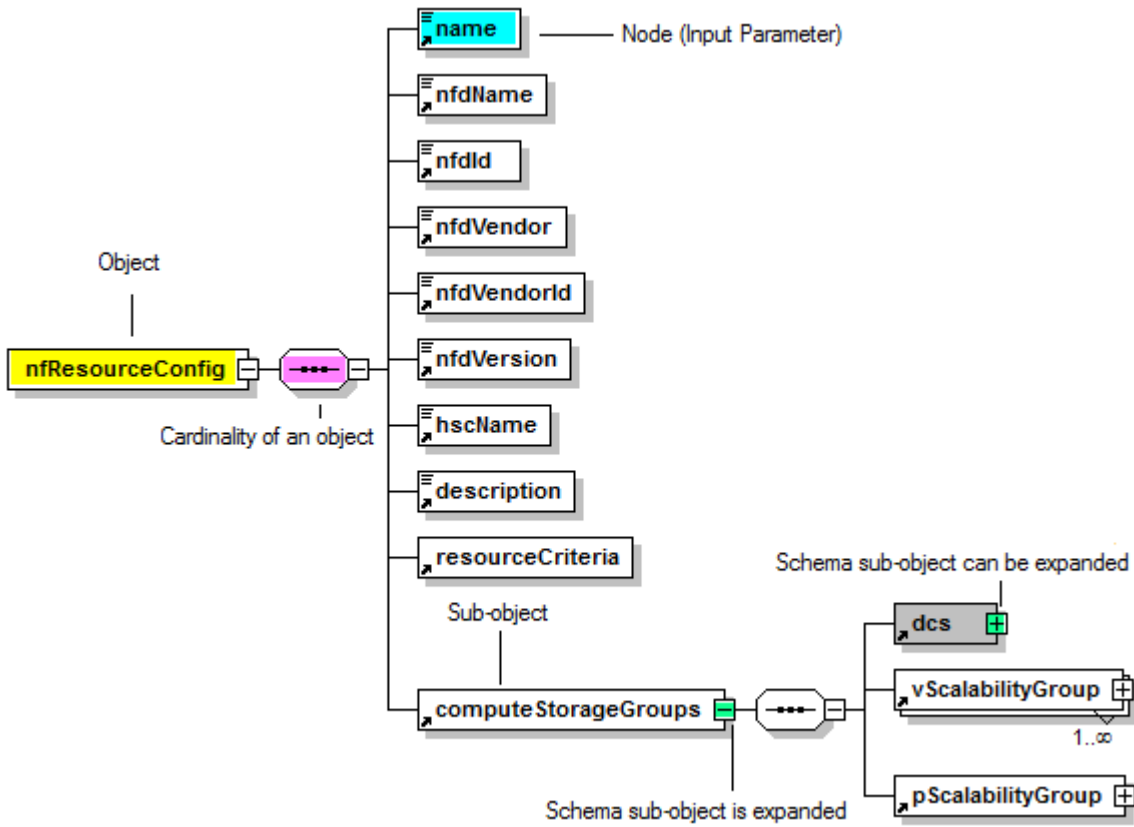
```
curl -v -c sessionid.txt -X POST -d@user.xml -H"Content-Type: application/xml" -H"Accept: application/xml" http://localhost:8080/rest/v1.0/admin/login
```

```
<?xml version="1.0" encoding="UTF-8"?>
<session>
  <userName>admin</userName>
  <password>admin</password>
</session>
```

## View the Schema for a REST API Request or Response Message

The XML schema of a REST API request or response message contains a variety of input parameters and has the following attributes:

- The "+" plus attribute shows where the schema can be expanded.
- The "..." symbol indicates cardinality (there can be one or more) of an object or sub-object
- The "-" minus attribute indicates where the schema is expanded.
- An example of the expanded resource object schema is shown in the following figure. The major components of an object are its sub-object(s) and node(s). Each node is an input parameter.



**Figure 3: Request/Response Message Schema**



## Administrative Resources

Use this chapter to log into and out of the Oracle Communications Application Orchestrator REST API.

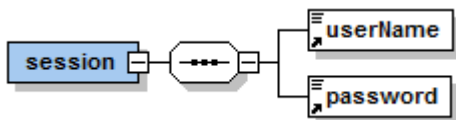
### Log Into Application Orchestrator User Account

The following REST API resource URI can be used to log into an Oracle Communications Application Orchestrator valid user account session.

#### URL

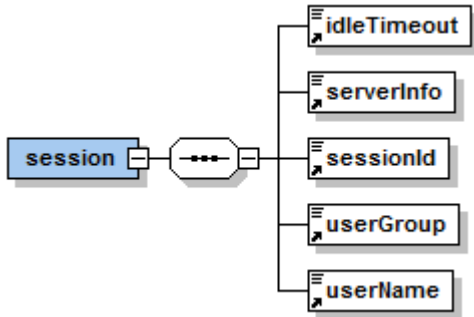
URI	Request Method	Description
/v1.0/admin/login	POST	Initiates a client/server session and returns a valid session ID. For example: <code>https://OCAO_ipaddress:8443/rest/v1.0/admin/login</code> <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

#### Request Schema



Parameter	Type	Description
userName	String	The Oracle Communications Application Orchestrator user name.
password	String	The Oracle Communications Application Orchestrator user password.

Response Schema




Parameter	Type	Description
idleTimeout	Long	Idle time before the server closes the session, if no request from the client is received.
serverInfo	String	Server-generated information.
sessionId	String	Server-generated session ID
userGroup	String	User group to which the user belongs.
userName	String	User name.

## Logout of an Application Orchestrator User Account

The following REST API resource URI can be used to logout of an Oracle Communications Application Orchestrator valid user account session.

URL

URI	Request Method	Description
/v1.0/admin/logout	POST	<p>Tears down a session with a valid session ID. When logging out of a user account, always ensure that the REST client is called on an active login session so that Oracle Communications Application Orchestrator can properly clean up resources.</p> <ul style="list-style-type: none"> <li>• Normal response code: 204 (No content)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 500 (Internal Server Error)</li> </ul>

 **Note:** There is no request or response output for this API resource.

## VIM and VDC Resources

You can use Oracle Communications Application Orchestrator REST API to retrieve and configure both virtual infrastructure manager (VIM) and virtual data center (VDC) resources.

### VIM Resources

Oracle Communications Application Orchestrator manages the life-cycle of a VNF through the Oracle OpenStack virtual infrastructure manager (VIM) or VMWare vCloud Director VIM. The VIM is an orchestration engine that manages a data center, and is required for deploying a Network Function (NF). You can use the REST API to retrieve, change, add, or delete Oracle OpenStack or VMWare vCloud Director VIM.


#### Retrieve All VIM Types

The following REST API resource URI can be used to list all valid VIM types that are available.

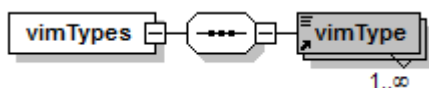
##### URL

URI	Request Method	Description
/ocao/vimResources/types	GET	<p>The resource lists all the supported VIM types.</p> <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

##### Request Schema

 **Note:** There are no request parameters for this API resource.

##### Response Schema



## VIM and VDC Resources

Parameter	Type		Description
vimType	String	Output	Lists all valid VIM types, which can be vCloud Director, or Oracle OpenStack.


### Retrieve Initial VIM Configuration Parameters

The following REST API resource URI can be used to retrieve the initial VIM configuration parameters before you create a VIM.

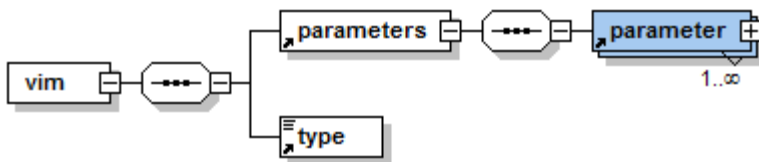
#### URL

URI	Request Method	Description
/ocao/vimResources/types/{vimTypeName}	GET	<p>The resource retrieves initial configuration parameters, including the credential parameters necessary for the creation of a VIM.</p> <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 404(Not Found), 500 (Internal Server Error)</li> </ul>

#### Request Schema

 **Note:** There are no request parameters for this API resource.

#### Response Schema



Parameter	Description
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.

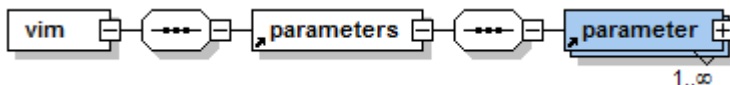
### Retrieve Dynamic VIM Configuration Parameters and Required User Credentials

The following REST API resource URI can be used to retrieve any of the dynamic VIM configuration parameters that cannot be returned after retrieving the initial VIM configuration parameters before you create a VIM.

**URL**

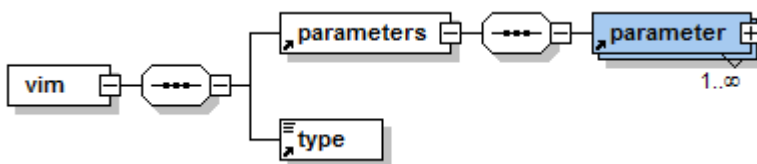
URI	Request Method	Description
/ocao/vimResources/types/{vimTypeName}	POST	<p>The resource gathers the dynamic configuration parameters and user credentials that are needed before you can create a VIM.</p> <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404(Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**




Parameter	Description
type	Lists the VIM type. For example, vCloud Director, or Oracle OpenStack.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.

**Response Schema**



Parameter	Description
type	Lists the VIM type. For example, vCloud Director, or Oracle OpenStack.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimCatalog	<p>The vCloud Director catalog.</p> <p>The caller needs to select a valid value from the response.</p>

## VIM and VDC Resources

Parameter	Description
vimProject	<p>The project that end-users use for authentication for an OpenStack VIM.</p> <p> <b>Note:</b> An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.</p>


### Retrieve All VIMs

The following REST API resource URI can be used to retrieve information for all existing VIMs.

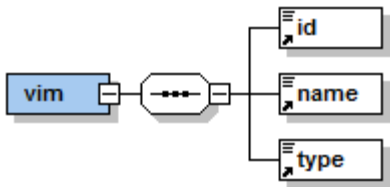
#### URL

URI	Request Method	Description
/ocao/vimResources/vims	GET	The resource lists all existing VIMs.

#### Request Schema

 **Note:** There are no request parameters for this API resource.

#### Response Schema



Parameter	Type	Description
name	String	The VIM name.
id	String	The VIM object ID.
type	String	The VIM type. For example, vCloud Director, or Oracle OpenStack.


### Retrieve a VIM Configuration

The following REST API resource URI can be used to retrieve the configuration of a specified VIM.

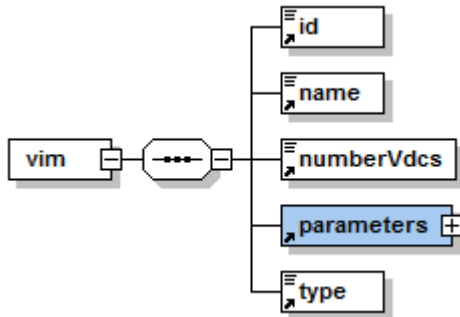
#### URL


URI	Request Method	Description
/ocao/vimResources/vims/{vimID}	GET	<p>Retrieve the VIM configuration.</p> <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema



Parameter	Description
id	The VIM object ID.
name	The VIM name.
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
vimUsername	The user name used to login to the VIM server application account.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimOrganization	The organization used by a vCloud Director VIM only.
vimCatalog	The vCloud Director catalog. The caller needs to select a valid value from the response.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimProject	The project that end-users use for authentication for an OpenStack VIM.   <b>Note:</b> An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.

### Create a VIM

The following REST API resource URI can be used to create a new VIM.

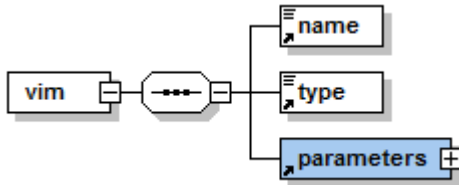
#### URL


URI	Request Method	Description
/ocao/vimResources/vims	POST	The resource creates a new VIM. <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> </ul>

## VIM and VDC Resources

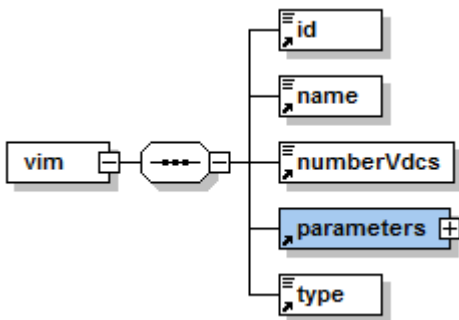
URI	Request Method	Description
		<ul style="list-style-type: none"> <li>Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

### Request Schema




Parameter	Description
name	The VIM name.
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimCatalog	The vCloud Director catalog. The caller needs to select a valid value from the response.
vimProject	The project that end-users use for authentication for an OpenStack VIM.  <b>Note:</b>  An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.

### Response Schema






Parameter	Description
id	The VIM object ID.
name	The VIM name.
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
numOfVdcs	The number of virtual data centers associated with this VIM.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimUserID	The user ID of the VIM.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimDomainId	The domain ID number used for an OpenStack VIM only.
vimCatalog	The vCloud Director catalog. The caller needs to select a valid value from the response.
vimProjectID	The project ID for the OpenStack VIM.
vimProject	The project that end-users use for authentication for an OpenStack VIM.   <b>Note:</b> An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.

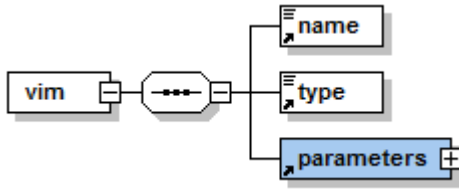
## Update the Configuration of a VIM

The following REST API resource URI can be used to update the configuration of an existing VIM.

### URL

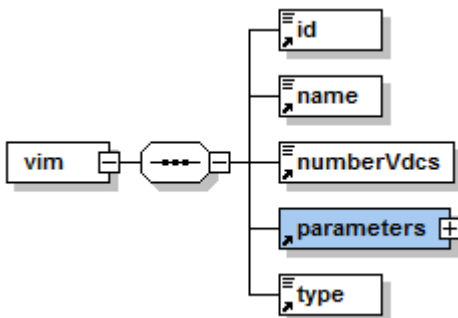
URI	Request Method	Description
/ocao/vimResources/vims/{vimID}	PUT	The resource updates the VIM configuration.   <b>Note:</b> You can change both the catalog and password parameters for a VMWare vCloud VIM type. However, if you have an OpenStack VIM type, you can only change password parameter. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**




Parameter	Description
name	The VIM name.
id	The VIM object ID.
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimCatalog	The vCloud Director catalog. The caller needs to select a valid value from the response.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimProject	The project that end-users use for authentication for an OpenStack VIM.  <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">👉</div> <div> <p><b>Note:</b></p> <p>An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.</p> </div> </div>

**Response Schema**



Parameter	Description
id	The VIM object ID.
name	The VIM name.

Parameter	Description
type	The VIM type. For example, vCloud Director, or Oracle OpenStack.
numberOfVdcs	The number of virtual data centers (VDCs) associated with the VIM.
vimURL	The base URL address to the cloud service. For example: https://mycloud.com:443
vimUsername	The user name used to login to the VIM server application account.
vimPassword	The password used to login to the VIM server application account.
vimOrganization	The organization used by a vCloud Director VIM only.
vimCatalog	The vCloud Director catalog. The caller needs to select a valid value from the response.
vimDomain	The domain IP address or name used for the authentication of OpenStack VIM users only. A domain can represent an individual, company, or operator-owned space.
vimProject	The project that end-users use for authentication for an OpenStack VIM.   <b>Note:</b> An error message displays if a validated certificate has not been uploaded to Oracle Communications Application Orchestrator for the connection to the VIM.


## Retrieve the Available DCs for a VIM

The following REST API resource URI can be used to retrieve the available data centers (DCs) for a specified VIM.

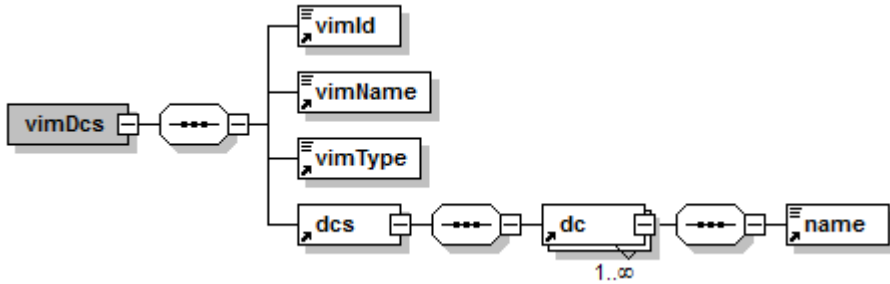
### URL

URI	Request Method	Description
/ocao/vimResources/vims/{vimID}/dcs	GET	The resource lists the available DCs from the specified VIM. <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

**Response Schema**



Parameter	Description
vimID	The VIM object ID.
vimName	The VIM name.
vimType	The VIM type.
name	The DC name in the VIM.
Descriptions	The description of the VIM DC.
cloudId	The cloud ID for the VIM DC.

**Delete a VIM**

The following REST API resource URI can be used to delete a specified VIM.

**URL**

URI	Request Method	Description
/ocao/vimResources/vims/{vimID}	DELETE	The resource deletes a VIM. <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**

**Note:** There are no request parameters for this API resource.

**Response Schema**

**Note:** There are no response parameters for this API resource.

**VDC Resources**

Use the information in this chapter to retrieve, change, add, or delete Virtual Data Center (VDC) resources through the Oracle Communications Application Orchestrator REST API.


**Retrieve All VDCs that are Associated with VIMs**

The following REST API resource URI can be used to retrieve all VDCs that are associated with VIMs.

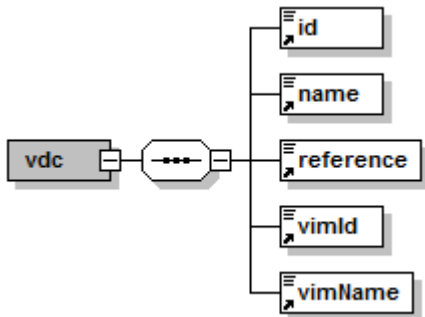
**URL**

URI	Request Method	Description
/ocao/vdcResources/vdcs	GET	Retrieve all VDCs that are associated with VIMs.

**Request Schema**

 **Note:** There are no request parameters for this API resource.

**Response Schema**



Parameter	Description
id	The VDC ID.
name	The VDC name.
reference	The DC that the VDC references.
vimID	The VIM ID that owns the VDC.
vimName	The VIM name that owns the VDC.


**Retrieve a VDC Configuration**

The following REST API resource URI can be used to retrieve configuration parameters for a specific VDC in the VIM.

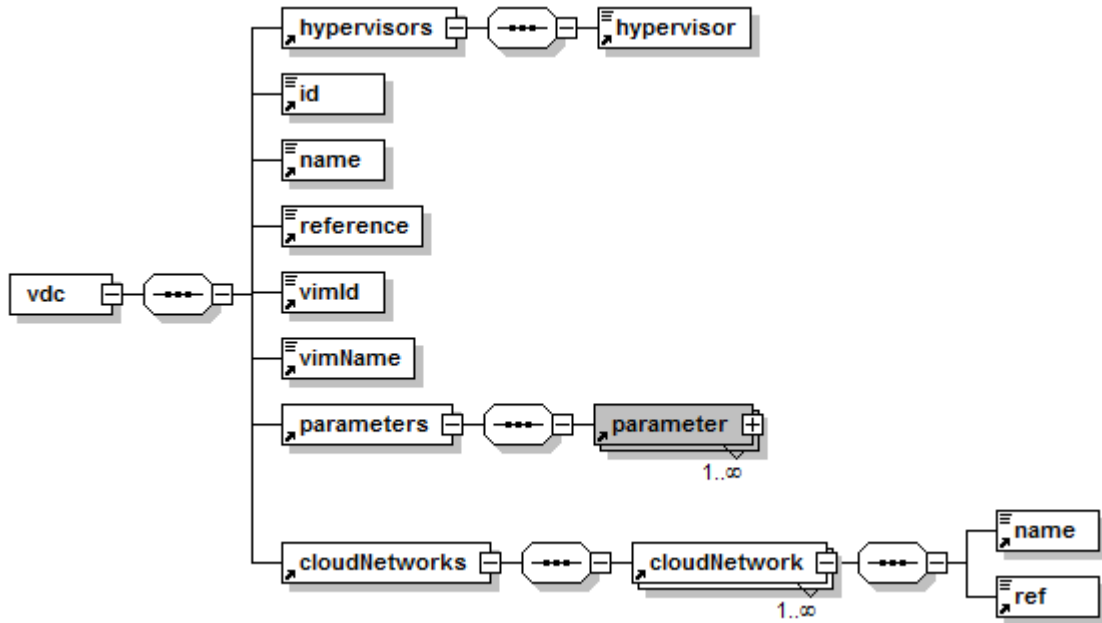
**URL**

URI	Request Method	Description
/ocao/vdcResources/vdcs/{vdcID}	GET	Retrieve the VDC configuration. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**

 **Note:** There are no request parameters for this API resource.

Response Schema



Parameter	Description
hypervisor	The hypervisor that the VDC supports.
id	The VDC ID.
name	The VDC name.
reference	The DC that the VDC references.
description	The description that uniquely identifies this DC.
vimID	The VIM ID that owns the VDC.
vimName	The VIM name that owns the VDC.
name (cloudNetwork)	The cloud network name.
ref	The reference of the cloud network. For example: <a href="https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498">https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498</a>


Retrieve VDC Cloud Networks

The following REST API resource URI can be used to retrieve virtual data center (VDC) cloud networks.

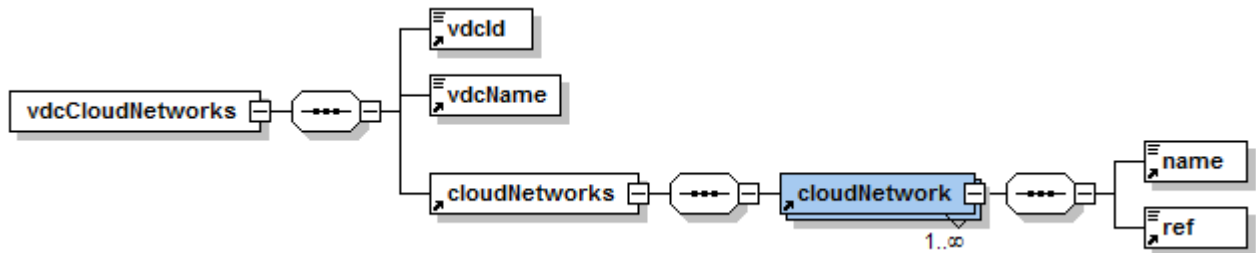
URL

URI	Request Method	Description
/ocao/vdcResources/vdcs/{vdcID}/cloudNetworks	GET	Retrieve the VDC cloud networks. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema



Parameter	Description
vdcName	The VDC name.
vdcId	The VDC ID.
name (cloudNetwork)	The cloud network name.
ref	The reference of the cloud network. For example: <a href="https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498">https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498</a>

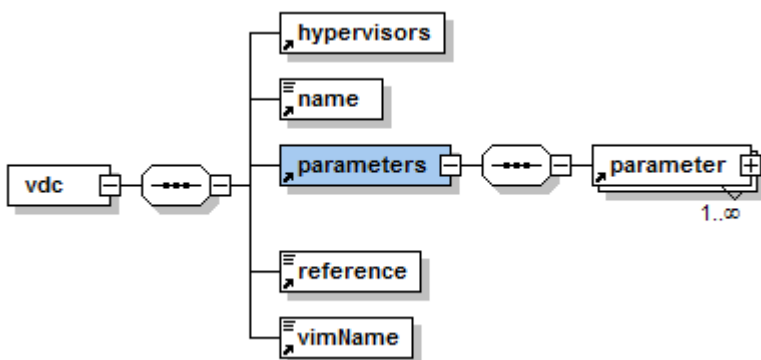
## Create and Associate a VDC to a VIM

The following REST API resource URI can be used to create and associate a virtual data center (VDC) with a supported VIM.

### URL


URI	Request Method	Description
/ocao/vdcResources/vdcs	POST	Associate a VDC with a VIM. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

### Request Schema



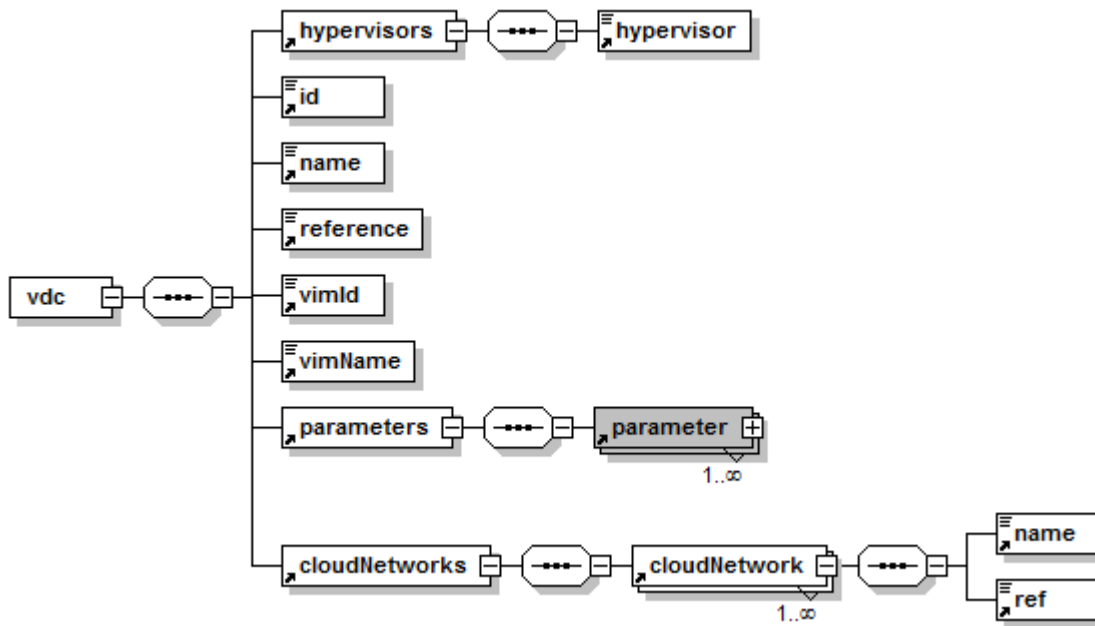
Parameter	Description
hypervisors	The hypervisor that the VDC supports.

## VIM and VDC Resources

Parameter	Description
name	The unique name for the DC. This name must be unique among all DCs and VIMs in Oracle Communications Application Orchestrator and have no spaces.
vimName	The VIM that belongs to this VDC.
reference	The DC that the VDC references. The reference name for the data center that was assigned by the cloud administrator. This name is the logical entity in the cloud that Oracle Communications Application Orchestrator considers to be a datacenter. For example, the vCloud cloud manager refers to the name of an OrgVDC.
description	The description that uniquely identifies this DC.
dcStorageProfile	The vCloud Director data center (DC) storage profile identifier.
dcEnableAA	<p>The value "true" or "false" to enable or disable anti-infinity rules for high-availability (HA) paired VMs. An anti-affinity rule for VM pairs specify that individual VMs should not run on the same host.</p> <p> <b>Note:</b> If the anti-affinity parameter is enabled (true) this storage profile must be backed by shared storage (storage volumes accessible to all hosts in the data center). If the storage provider contains any host local storage (storage not accessible by all hosts in the Datacenter), Anti-Affinity DRS rules may fail resulting in VM deployment failure.</p>
vCenterUrl	The web link for the base URL to the vCenter server instance that backs the chosen Org VDC. Each Org VDC is backed by a Provider vDC, which is backed by an instance of vCenter. This parameter is required if anti-affinity rules are enabled.
vCenterUser	The vCenter user name. This name does not necessarily need to be an administrator user, but must have access rights to create anti-affinity DRS rules for the VMs created by the vCloud user name.
vCenterPassword	The vCenter user password.
useKVM	The value "true" or "false" to enable or disable the kernel-based virtual machine (KVM) type Linux kernel module that allows the system to act as a hypervisor.
useOVM	The Oracle Virtual Machine (OVA) hypervisor.
securityGroup	The security group(s) defined in Oracle OpenStack.



**Response Schema**



Parameter	Description
id	The VDC ID.
name	The VDC name.
vimID	The VIM ID that owns the VDC.
vimName	The VIM name that owns the VDC.
reference	The DC that the VDC references.
description	The description that uniquely identifies this DC.
hypervisor	The hypervisor that the VDC supports.
dcStorageProfile	The vCloud Director data center (DC) storage profile identifier.
dcEnableAA	The anti-infinity rules for HA paired VMs.
vCenterUrl	The web link for the base URL to the vCenter server instance that backs the chosen Org VDC.
vCenterUser	The vCenter user name.
vCenterPassword	The vCenter user password.
dcStorageProfileRef	The vCloud Director data center (DC) storage profile identifier web address.
name	The cloud network name.
ref	The reference of the cloud network. For example: <a href="https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498">https://10.196.120.51/api/network/fbf77107-7f53-4aeb-9613-8ddc82edf498</a>

**Update a VDC**

The following REST API resource URI can be used to update a virtual data center (VDC).

## VIM and VDC Resources

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### URL

URI	Request Method	Description
/ocao/vdcResources/vdcs / {vdcId}	PUT	Update a specified VDC. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li></ul>

 **Note:** See the *Create and Associate a VDC to a VIM* section for the request and response schema information.


### Delete a VDC from a VIM

The following REST API resource URI can be used to disassociate a VDC from a VIM.


### URL

URI	Request Method	Description
/ocao/vdcResources/vdcs/ {vdcID}	DELETE	Delete a VDC from a VIM. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li></ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema

 **Note:** There are no response parameters for this API resource.

## VIM and VDC REST API Usage Call Flow Examples

---

The REST call flows described in this chapter are used to create or update a VIM, and create a VDC with a VIM.

### Create a VIM: Example

1. Log into a valid user account session:

```
/rest/v1.0/admin/login
```

2. List the supported VIM types:

```
ocao/vimResources/types:get
```

A list of supported VIM types is provided.

3. Get configuration parameters for a VIM type:

```
ocao/vimResources/types/{vimTypeName}:get
```

The output provides the VIM configuration parameters for the specified VIM type.

4. Get dynamic configuration parameters for a VIM type.

```
ocao/vimResources/types/{vimTypeName}:post
```

The output VIM configuration parameters with dynamic parameters are retrieved from the server for the specified VIM type.

5. Create a VIM with input based on the configuration parameters of the VIM type.

```
ocao/vimResources/vims:post
```

The input is based on configuration parameters. The output contains the created VIM configurations.

## Update a VIM: Example

1. Log into a valid user account session:

```
/rest/v1.0/admin/login
```

2. List the existing VIMs to get the VIM ID that needs to be modified:

```
ocao/vimResources/vims:get
```

The output lists all the existing VIMs in the Oracle Communications Application Orchestrator database.

3. Get configuration information for a VIM:

```
ocao/vimResources/vims/{vimID}:get
```

The output provides the VIM configuration values and parameter option information.

4. Update the VIM with the input based on the parameter options.

```
ocao/vimResources/vims/{vimID}:put
```

The input is based on the parameter options. For a vCloud VIM type, the password and catalog parameters can be changed. For an OpenStack VIM type, the password parameter can be changed only.

## Create a VDC Reference to the VIM: Example

1. Log into a valid user account session:

```
/rest/v1.0/admin/login
```

2. List the available data centers from a targeted VIM:

```
ocao/vimResources/vims/{vimID}/dcs:get
```

The output lists available data centers from the specified VIM.

3. Get data center configuration parameters:

```
ocao/vdcResources/{dcName}:post
```

The input specifies the VIM name. The output provides configuration parameters for the specified data center.

4. Use the input configuration parameters to create a Oracle Communications Application Orchestrator logical VDC that references the VIM.

```
ocao/vimResources/vdcs/:post
```

The output displays the logical VDC configuration.



---

## VM Image Retrieval

The REST API resources in this chapter are used to list VM images and retrieve VM image information.

### Retrieve All VM Images

---

The following REST API resource URI can be used to list all VM images from the Oracle Communications Application Orchestrator image archive.

#### URL

URI	Request Method	Description
/ocao/vmImages	GET	List all existing VM images. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li></ul>

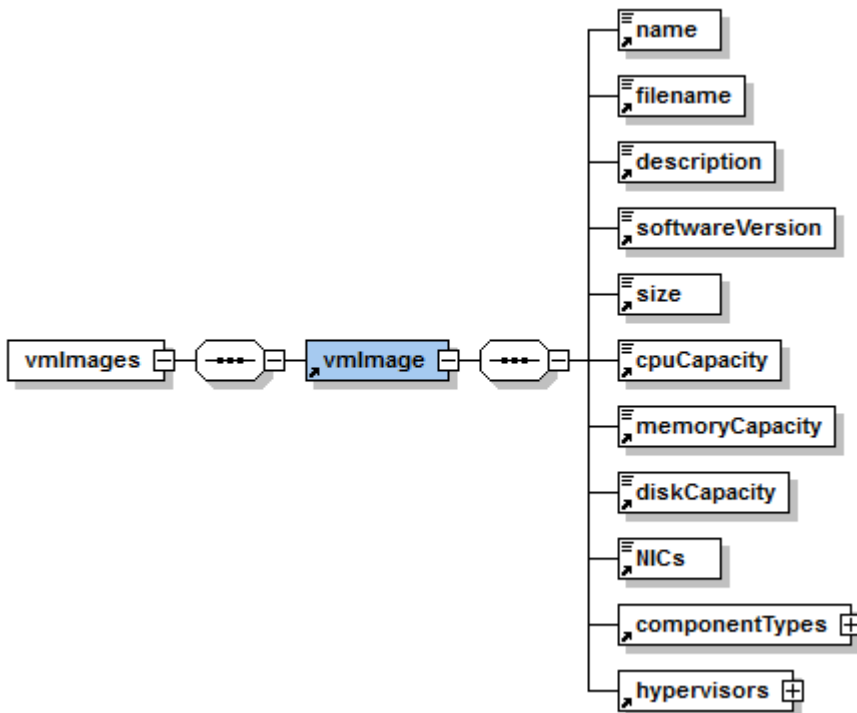
#### Request Schema




**Note:**

There are no request parameters for this REST API.

## Response Schema



Parameter	Description
name	The name of the VM application image.
filename	The VM application image file name.
description	The description of the VM application image.
softwareVersion	The VM application image version number appears automatically once the VM application image is uploaded.
size	The software image file size in bytes.
cpuCapacity	The required CPU capacity necessary to run the application.
memoryCapacity	The required memory resources necessary to run the application.
diskCapacity	The required disk resources necessary to run the application.
NICs	The number of network interface cards (NICs) that are supported by the software.
componentType	<p>List of component types supported by the Oracle Communications Application Orchestrator plug-ins.</p> <p> <b>Note:</b> Refer to the appropriate plug-in user documentation for more information about the component types associated with your CNF.</p>
hypervisor	<p>One of the following supported hypervisors on which the VM application can run:</p> <ul style="list-style-type: none"> <li>ESXi—A VMware ESXi type is an enterprise-class, type-1 hypervisor developed by VMware for deploying and serving virtual computers.</li> <li>KVM—A Kernel-based Virtual Machine (KVM) type is a Linux kernel that can be turned into a hypervisor.</li> <li>OVM_PV— An Oracle Virtual Machine (OVA) para-virtualization (PV) type.</li> </ul>

Parameter	Description
	<ul style="list-style-type: none"> <li>OVM_HVM—An Oracle Virtual Machine (OVA) hardware virtualized machine (HVM) type.</li> </ul>

## Retrieve a Specified VM Image

The following REST API resource URI can be used to list a specified VM from Oracle Communications Application Orchestrator image archive.

### URL

URI	Request Method	Description
/ocao/vmImages/{vmImageId}	GET	Retrieve the specified VM image information. <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found)</li> </ul>

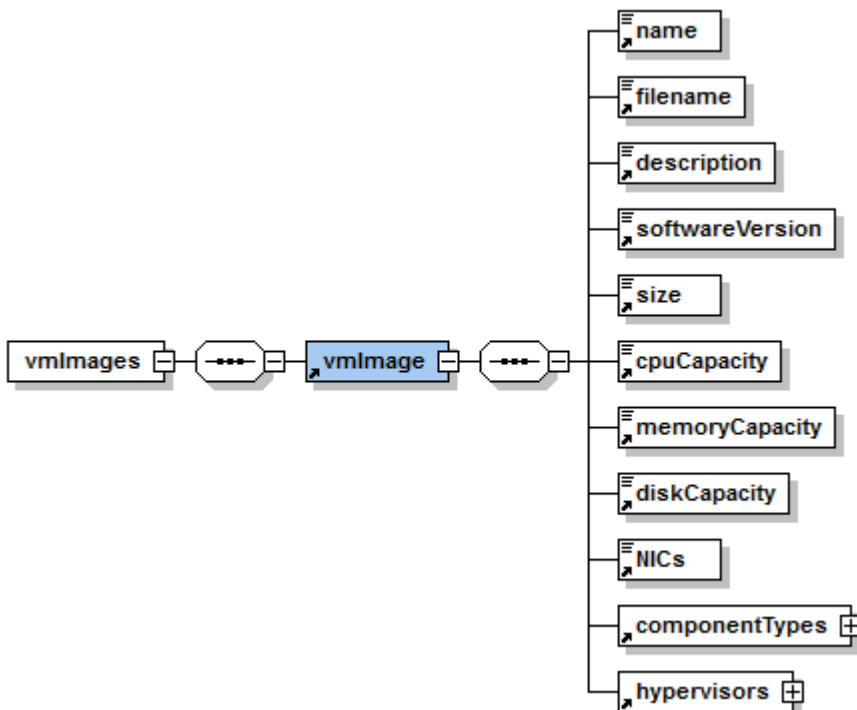
### Request Schema




**Note:**

There are no request parameters for this REST API.

### Response Schema



## VM Image Retrieval

Parameter	Description
name	The name of the VM application image.
id	The VM application image ID.
fileName	The VM application image file name.
description	The description of the VM application image.
softwareVersion	The VM application image version number appears automatically once the VM application image is uploaded.
size	The software image file size in bytes.
cpuCoreCapacity	The required CPU capacity (number of CPU cores) necessary to run the application.
memoryCapacityMB	The required memory resources in megabytes (MB) necessary to run the application.
diskCapacityGB	The required disk resources in gigabytes (GB) necessary to run the application.
nics	The number of network interface cards (NICs) that are supported by the software.
componentType	<p>List of component types supported by the Oracle Communications Application Orchestrator plug-ins.</p> <p> <b>Note:</b> Refer to the appropriate plug-in user documentation for more information about the component types associated with your CNF.</p>
hypervisor	<p>One of the following supported hypervisors on which the VM application can run:</p> <ul style="list-style-type: none"> <li>• ESXi—A VMware ESXi type is an enterprise-class, type-1 hypervisor developed by VMware for deploying and serving virtual computers.</li> <li>• KVM—A Kernel-based Virtual Machine (KVM) type is a Linux kernel that can be turned into a hypervisor.</li> <li>• OVM_PV— An Oracle Virtual Machine (OVA) para-virtualization (PV) type.</li> <li>• OVM_HVM—An Oracle Virtual Machine (OVA) hardware virtualized machine (HVM) type.</li> </ul>



## NF Resources

The REST APIs in this chapter are used for network functions (NFs).


### Retrieve a Specified NF Descriptor

The following REST API resource URI can be used to retrieve a preexisting or onboarded network function descriptor (NFD). It also supports query parameters to narrow the results.

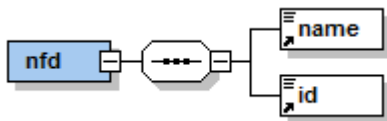
#### URL

URI	Request Method	Description
/oao/nfResources/nfds? vendorName={ <b>vendorName</b> }& vendorId={ <b>vendorId</b> }&version ={ <b>version</b> }	GET	NFD(s) that are associated with a NF are listed. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

#### Request Schema

 **Note:** There are no request parameters for this API resource.

#### Response Schema



Parameter	Description
name	The NFD name. For example, IMS-core.
id	The NFD ID in Oracle Communications Application Orchestrator.


## Retrieve an NF Descriptor

The following REST API resource URI can be used to retrieve an NF descriptor (NFD).

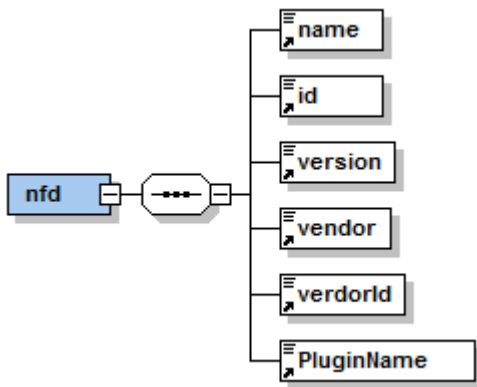
### URL

URI	Request Method	Description
/ocao/nfResources/nfds/{nfdID}	GET	Retrieve the preexisting NFD. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema



Parameter	Description
name	The NFD name. For example, IMS-core.
id	The NFD ID number that is provided by Oracle Communications Application Orchestrator
version	The NFD version.
vendor	The NFD vendor name.
vendorID	The NFD vendor ID.
PluginName	The unique name of the NF plug-in.


## Retrieve the Resource Criteria for an NF

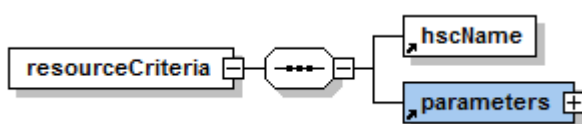
The following REST API resource URI can be used to retrieve the resource criteria for an NF, which is calculated and resized by default criteria values.

**URL**

URI	Request Method	Description
/ocao/nfResources/nfds/{nfdId}/resourceCriteria	GET	The resource criteria is retrieved for an NF. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**

 **Note:** There are no request parameters for this API resource.

**Response Schema**

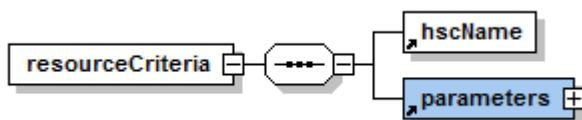
Parameter	Description
hscName	The HSC name used when the resource criteria retrieves usage requirements.
parameters	The resource criteria output parameters.

**Get Resource Usage Requirements to Deploy an NF**

The following REST API resource URI can be used to calculate the resource usage requirement when preparing to deploy a new NF.

**URL**

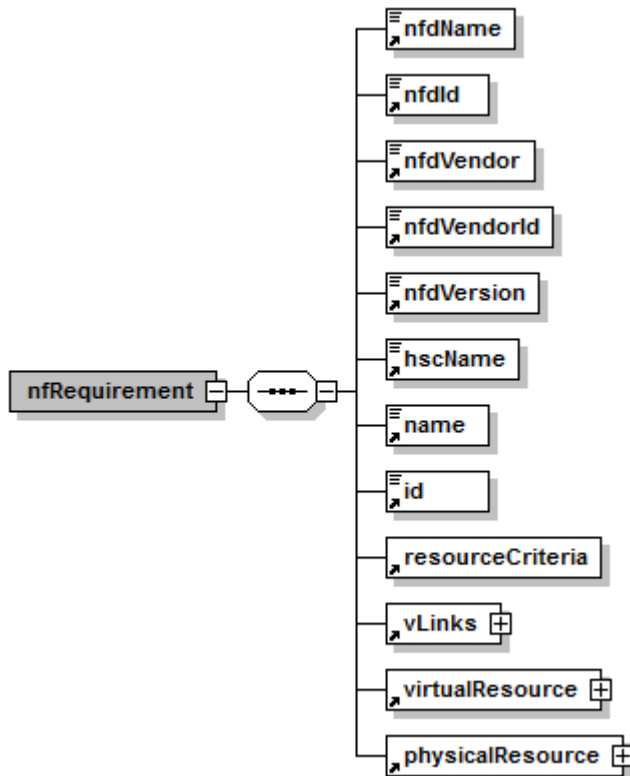
URI	Request Method	Description
/ocao/nfResources/nfds/{nfdId}/resourceUsageRequirement	POST	Calculates the resource usage requirement before deploying a new NF. <ul style="list-style-type: none"> <li>• Normal response code: 200 (Accepted)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

**Request Schema**

## NF Resources

Parameter	Description
hscName	The hierarchical service configuration (HSC) name used when the resource criteria retrieves usage requirements.
parameters	The resource criteria output parameters.

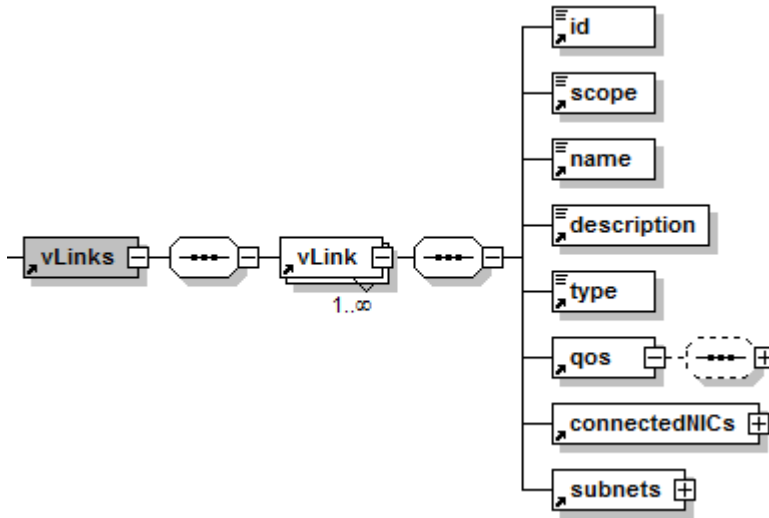
### Response Schema: nfRequirement Parameters



Parameter	Description
nfdName	The name of the network function descriptor (NFD) on which the NF is based.
nfdId	The ID of the network function descriptor (NFD) on which the NF is based.
nfdVendor	The vendor of the NFD on which the NF based.
nfdVendorId	The vendor ID of the NFD on which the NF based.
nfdVersion	The version of the NFD on which the NF based.
hscName	The HSC name.
name	The NF name.
id	The NF ID.
resourceCriteria	Not used.
vLinks	This option is used to configure vLinks parameters.
virtualResource	This option is used to configure virtual resources.
physicalResource	This option is used to configure physical resources.

**Response Schema: vLink Parameters**

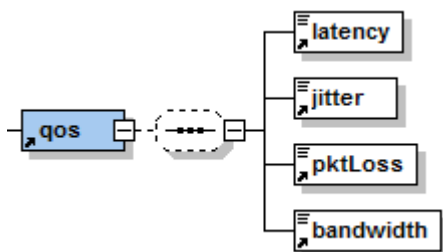
nfRequirement > vLinks > vLink



**Figure 4: vLink Node**

Parameter	Description
id	The vLink ID.
scope	Not used.
name	The vLink name.
description	The description of the vLink.
type	The type of vLink.
qos	This option is used to configure QoS parameters for the vLink.
connectedNIC	This option is used to configure connected network interface card (NIC) name for the vLink.
subnets	This option is used to configure subnet parameters for the vLink, which include its name, ID, VLAN ID, protocol, default gateway, etc.

nfRequirement > vLinks > vLink > qos



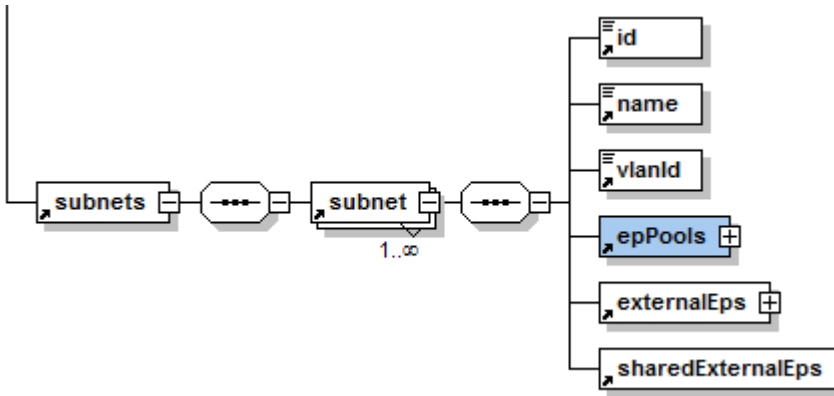
**Figure 5: qos Node**

Parameter	Description
latency	The latency requirement for the vLink.

## NF Resources

Parameter	Description
jitter	The jitter requirement for the vLink.
pktLoss	The packet loss requirement for the vLink.
bandwidth	The bandwidth requirement for the vLink.

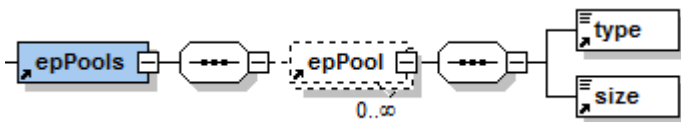
nfRequirement > vLinks > vLink > subnets > subnet



**Figure 6: subnet Node**

Parameter	Description
id	The ID of the subnet.
name	The name of the subnet.
vlanId	The VLAN ID of the subnet.
epPools	This option is used to configure end point (EP) pools for the vLink.
externalEps	This option is used to configure EP points for the vLink.
sharedExternalEps	The list of the shared external EPs.

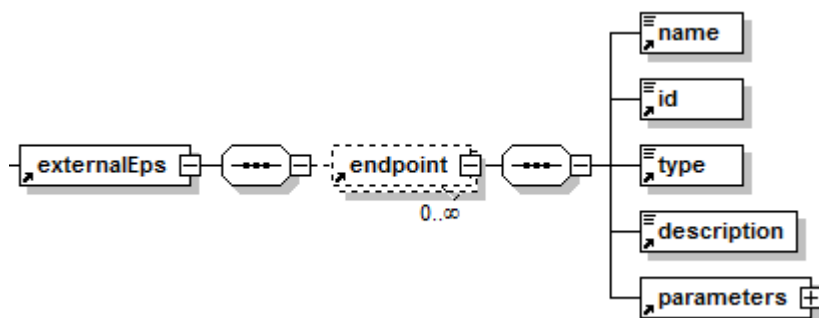
nfRequirement > vLinks > vLink > subnets > subnet > epPools > epPool



**Figure 7: epPools Node**

Parameter	Description
type	The type of EP pool. For example, IPv4, IPv6 or MAC address EP pool.
size	The size of the pool.

nfRequirement > vLinks > vLink > subnets > subnet > externalEPS > endpoint

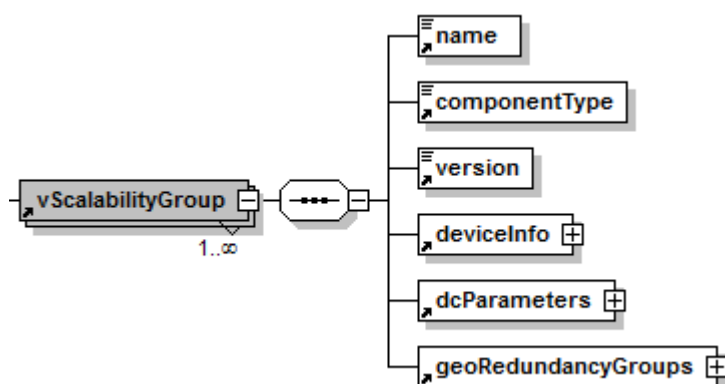


**Figure 8: endpoint Node**

Parameter	Description
name	The name of the EP.
id	The ID of the EP.
type	The type of EP.
description	The description of the EP.
parameters	A list of parameters required by the EP.

### Response Schema: virtualResource Parameters

nfRequirement > virtualResource > virtualGroups > vScalabilityGroup



**Figure 9: vScalabilityGroup Node**

Parameter	Description
name	The scalability group name.
componentType	The scalability group component type. For example, CSM, SLRM, etc.
version	The version of the scalability group.
deviceInfo	This option is used to configure device information parameters for the virtual scalability group.
dcParameters	This option is used to configure datacenter parameters for the virtual scalability group.
geoRedundancyGroups	This option is used to configure geographic redundancy group parameters for the virtual scalability group.

nfRequirement > virtualResource > virtualGroups > vScalabilityGroup > geoRedundancyGroups > geoRedundancyGroup

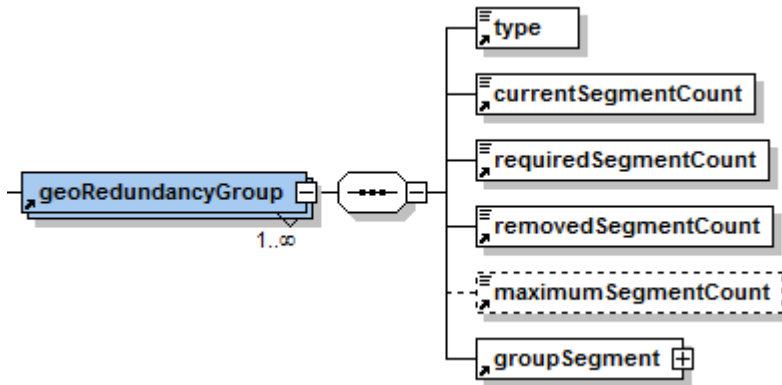


Figure 10: geoRedundancyGroup Node

Parameter	Description
type	The type of geo-redundancy group, which is Preferred or Fault Tolerant.
currentSegmentCount	The segmentation count is currently used.
requiredSegmentCount	The required segmentation count.
removedSegmentCount	The segmentation count needs to be removed.
maximumSegmentCount	The maximum segmentation count that the groups can grow.
groupSegment	This option is used to configure the geo-redundancy group segment parameters.

nfRequirement > virtualResource > virtualGroups > vScalabilityGroup > geoRedundancyGroups > geoRedundancyGroup > groupSegment

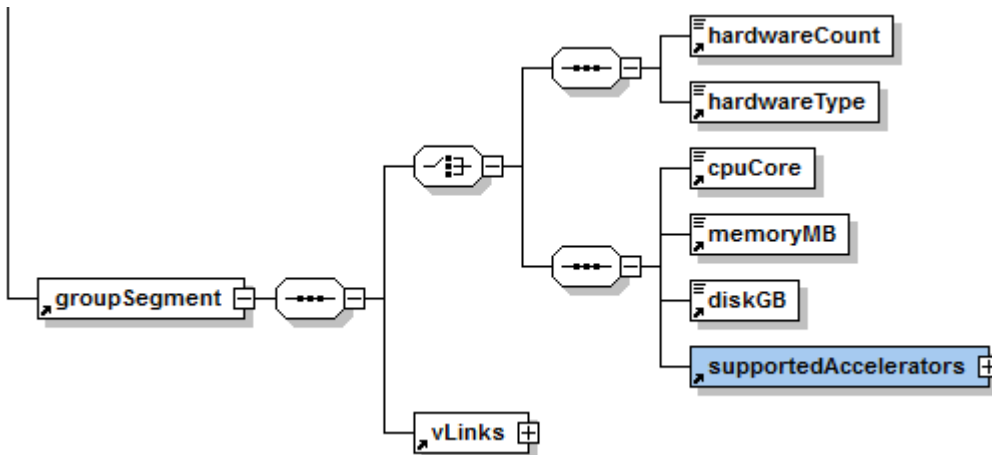


Figure 11: groupSegment Node

Parameter	Description
hardwareCount	The number of physical devices.
hardwareType	The physical device type.
cpuCore	The number of CPU cores used for segmentation.



Parameter	Description
memoryMB	The memory resources in megabytes (MB) used for segmentation.
diskGB	The disk resources in gigabytes (GB) used for segmentation.
supportedAccelerators	This option is used to configure software or hardware-based accelerators for a group segment.
vLinks	This option is used to configure vLink parameters for a group segment. See Response Schema: vLink Parameters above for a description of these parameters.

nfRequirement > virtualResource > virtualGroups > vScalabilityGroup > geoRedundancyGroups > geoRedundancyGroup > groupSegment > supportedAccelerators

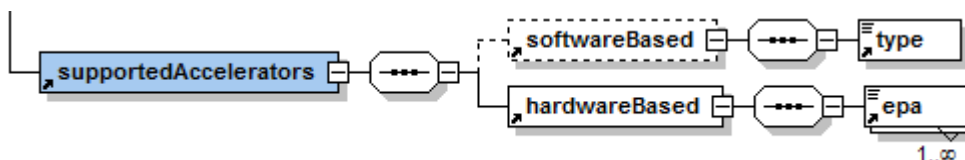
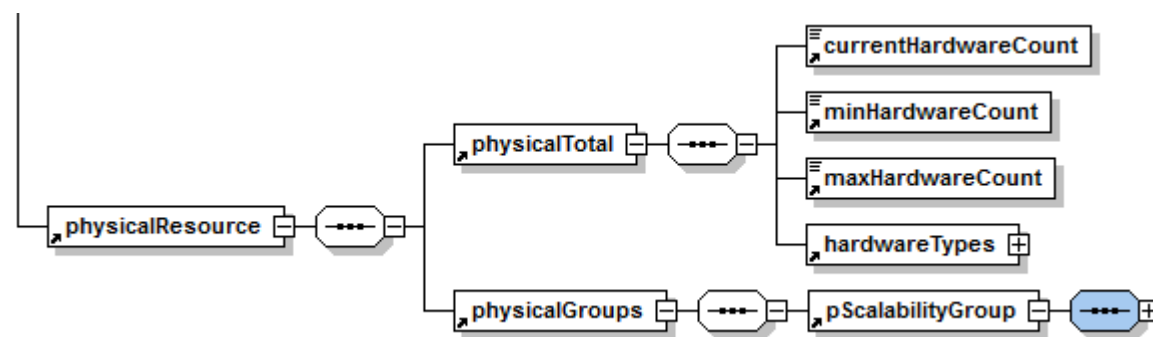



Figure 12: supportedAccelerators Node

Parameter	Description
type	This option is used to configure the software-based <b>type</b> parameter of supported accelerator.
epa	This option is used to configure the hardware-based <b>epa</b> parameter that is used Enhanced platform awareness (EPA) for OpenStack for platform capability detection, instruction sets such as AVX, PCIe hardware accelerators, core count, core affinity, core pinning, etc., and provisioning templates through Nova.

### Response Schema: physicalResource Parameters

nfRequirement > physicalResource



 **Note:** The response schema and parameters for the physicalTotal and physicalGroups options are the same as they are for the virtualTotal and physicalGroups options above.

## Deploy an NF

The following REST API resource URI can be used to deploy a new NF. Once the request is submitted successfully, Oracle Communications Application Orchestrator creates a new NF (based on the resource usage requirement), configures the NF using the configurations provided in the request, and deploys the NF to an operational ready state.

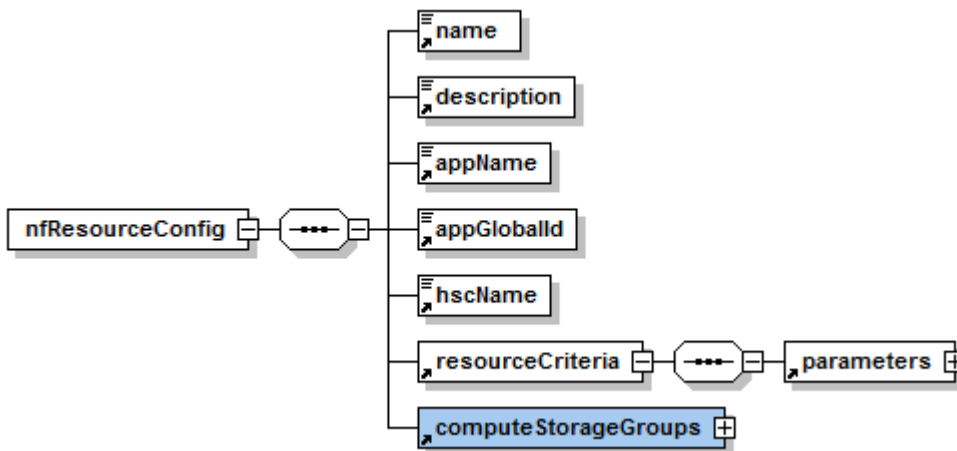
## NF Resources

This API is asynchronous, which means that once the server accepts the request, the caller application can either poll the NF status or wait for the NF state change event to occur. The northbound client application needs to register the event topic and implement callback REST API in order to receive Oracle Communications Application Orchestrator events.

### URL

URI	Request Method	Description
/ocao/nfResources/nfs	POST	This resource initiates the creation of a NF. <ul style="list-style-type: none"> <li>• Normal response code: 202 (Accepted)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

### Request Schema: Root Parameters

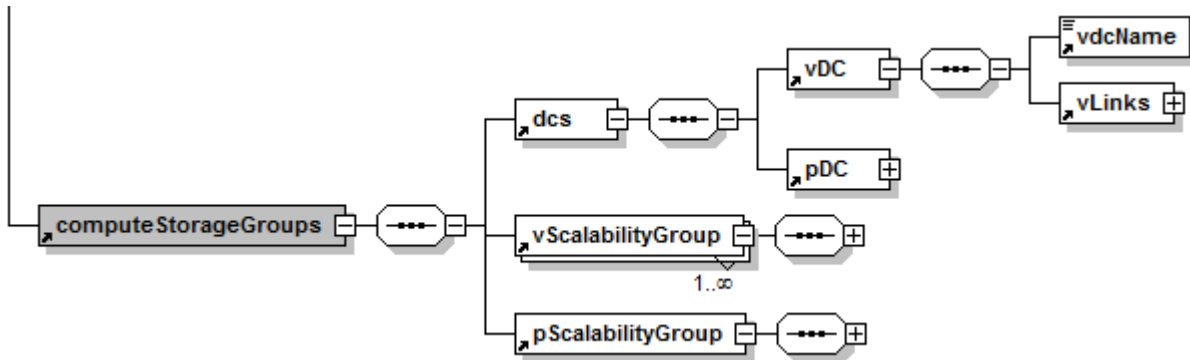


Parameter	Description
appGlobalId	The global ID of the application that deployed the NF. For example, NSOBoston.
appName	The application name of the application that deployed the NF. For example, NSO.
name	The NF name.
nfdName	The NF descriptor (NFD) name on which the NF is based.
nfdid	The NFD ID in the Oracle Communications Application Orchestrator database.
nfdVendor	The NFD vendor name. For example, Oracle.
nfdVendorId	The NFD vendor ID. For example, ACME.
nfdVersion	The NFD version. For example, 1.1, that is Oracle Communications Application Orchestrator, Release 1.1.
hscName	The Hierarchical Service Configuration (HSC) name. For example, MyHSCNBApp.
description	The description of the NF. For example, "This NF is composed of a CSM and SLRM."
resourceCriteria	The resource criteria for an NF.

Parameter	Description
computeStorageGroups	This option is used to configure the dcs, vScalabilityGroup, and pScalabilityGroup options.

**Request Schema: vDC Parameters**

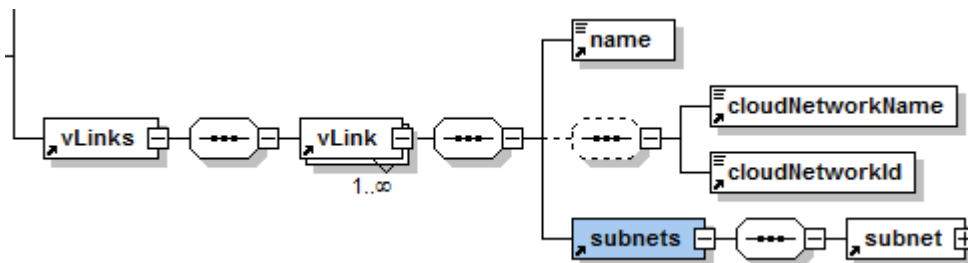
nfResourceConfig > computeStorageGroups > dcs > vDC



**Figure 13: vDC Node**

Parameter	Description
vdcName	The VDC name.
vLinks	This option is used to configure the vLink options.

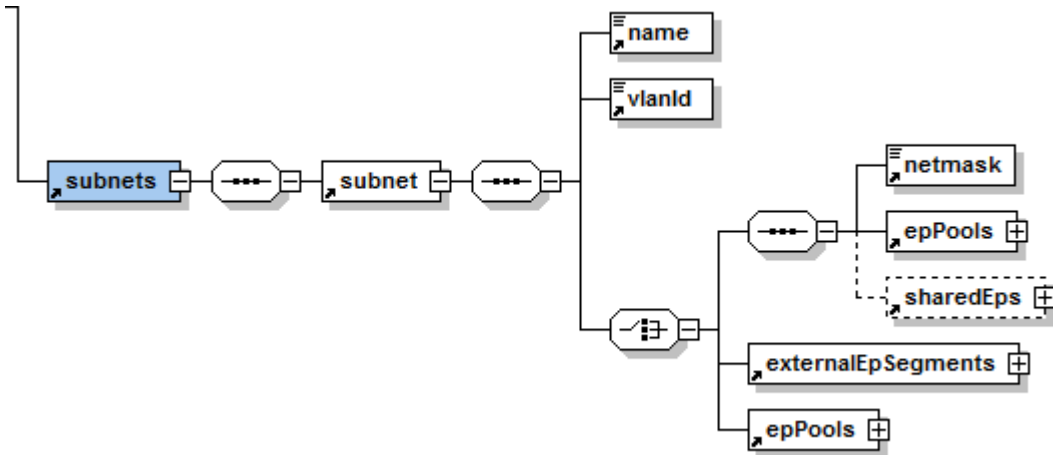
vDC nfResourceConfig > computeStorageGroups > dcs > vLinks > vLink



**Figure 14: vLink Node**

Parameter	Description
name	The vLink name.
cloudNetworkName	The cloud network name.
cloudNetworkId	The cloud network ID.
subnet	This option is used to configure options for a subnet.

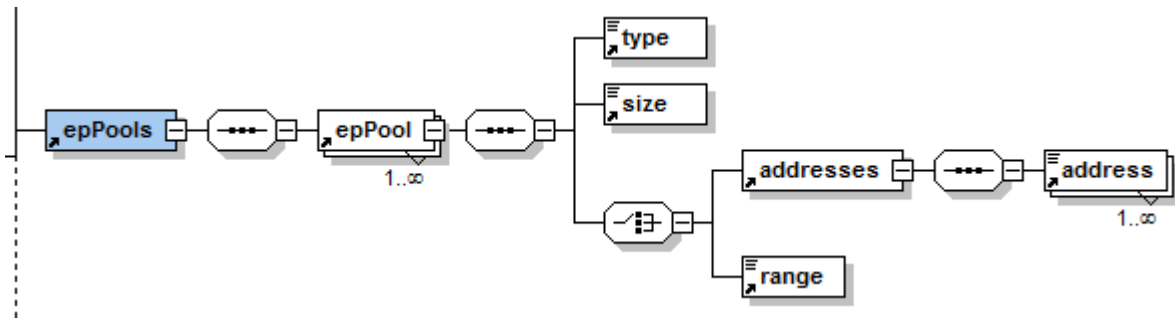
nfResourceConfig > computeStorageGroups > dcs > dcs > vDC > subnets > subnet



**Figure 15: vDC subnet Node**

Parameter	Description
name	Subnetwork name.
vlanId	VLAN ID for the subnet.
netmask	Subnetwork mask (if needed).
epPools	This option is used to configure the ePool option.
sharedEps	The shared end points.
externalEpSegments	This option is used to configure the externalEpSegments option.

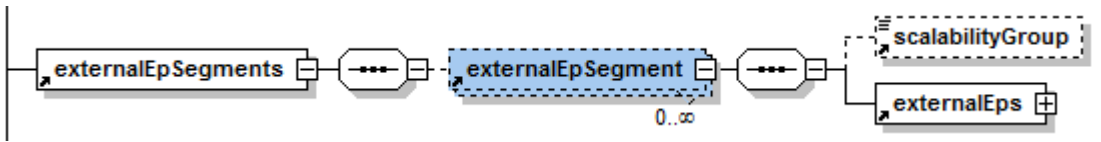
**nfResourceConfig > computeStorageGroups > dcs > dcs > vDC > subnets > subnet > epPools > epPool**



**Figure 16: epPool Node**

Parameter	Description
type	The type of end point pool addressing, for example (IPv4, IPv6, or MAC).
size	The size of the pool.
address	The EP IP address.
range	The IP address range. For example: 10.196.120.10-10.196.10.15

**nfResourceConfig > computeStorageGroups > dcs > dcs > vDC > subnets > subnet > externalEpSegments > externalEpSegment**

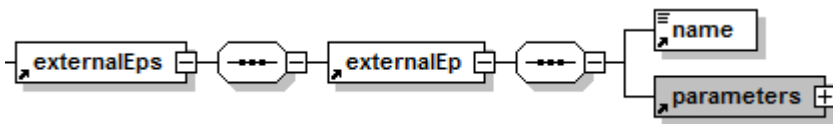


**Figure 17: externalEpSegment Node**

Parameter	Description
scalabilityGroup	The name of scalability group for which the externalEpSegment belongs.
externalEps	This option is used to configure the external end points (EPs).

nfResourceConfig > computeStorageGroups > dcs > dcs > vDC > subnets > subnet > externalEpSegments > externalEpSegment > externalEps > externalEp

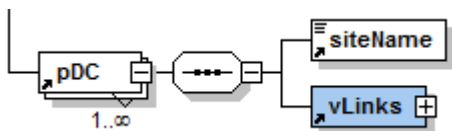
**Figure 18: externalEp Node**



Parameter	Description
name	The name of the external EP.
id	The EP ID.
type	The EP type.
description	The description of the EP.
parameters	This option is used to configure EP parameters.

**Request Schema: pDC Parameters**

nfResourceConfig > computeStorageGroups > dcs > pDC



**Figure 19: pDC Node**

Parameter	Description
siteName	The physical device site name.
vLinks	This option is used to configure the physical DC vLinks.



**Note:**

Each node in the expanded pDC schema has the same parameter types that the vDC schema has. See the vDC schema nodes above for schema diagrams and required inputs.

**Request Schema: vScalabilityGroup Parameters**

nfResourceConfig > computeStorageGroups > vScalabilityGroup

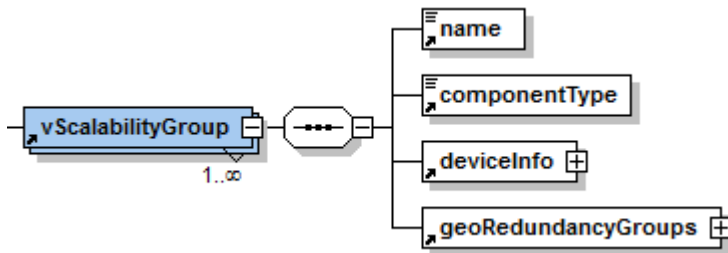


Figure 20: vScalabilityGroup Node Schema

Parameter	Description
name	The virtual scalability group name.
componentType	The virtual scalability group type. For example, CSM, SLRM, ASBC, etc.
deviceInfo	This option is used to configure the deviceInfo parameters.
geoRedundancyGroups	This option is used to configure the geoRedundancyGroups option.

nfResourceConfig > computeStorageGroups > vScalabilityGroup > geoRedundancyGroups > geoRedundancyGroup



Figure 21: geoRedundancyGroup Node Schema

Parameter	Description
type	The type of geo redundancy group. For example, <b>Preferred</b> or <b>Fault Tolerant</b> .
reservedDcs	This option is used to configure the reservedDcs parameters.

nfResourceConfig > computeStorageGroups > vScalabilityGroup > geoRedundancyGroups > geoRedundancyGroup > reservedDcs

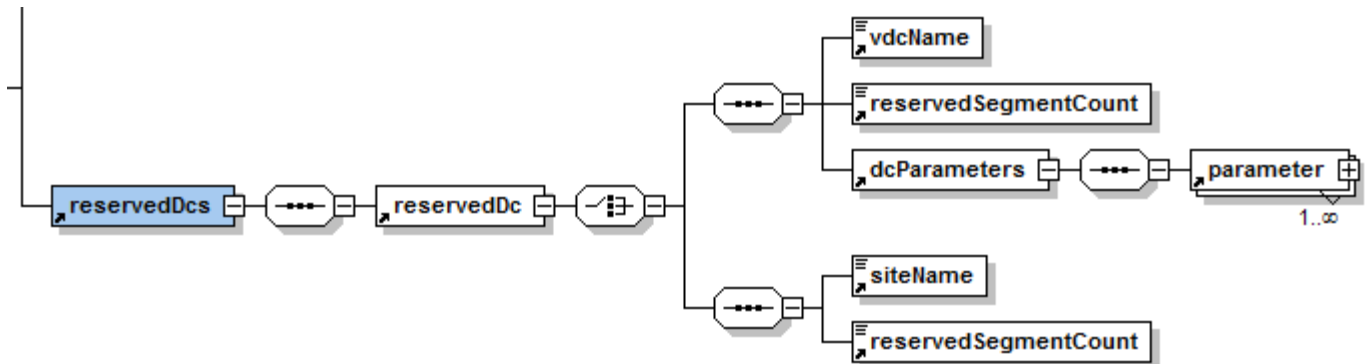


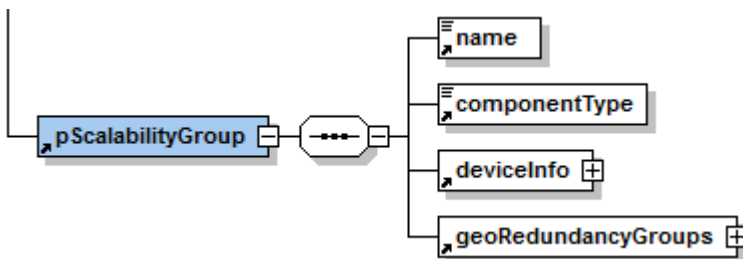
Figure 22: reservedDc Node Schema

Parameter	Description
vdcName	The name of the virtual data center (VDC).

Parameter	Description
reservedSegmentCount	The number of segments that are reserved for the VDC.
dcParameters	This option is used to configure the DC parameters below.
cpuCores	The total number of CPU cores needed for segmentation.
memoryMB	The total memory resources in MB needed for segmentation.
diskGB	Total disk usage in GB needed for segmentation.
epa	Enhanced platform awareness (EPA) for OpenStack for platform capability detection, instruction sets such as AVX, PCIe hardware accelerators, core count, core affinity, core pinning, etc., and provisioning templates through Nova.
hardwareCount	The physical device count for the physical device.
hardwareType	The physical device type for the physical device.
siteName	The site name for a data center.

### pScalabilityGroup Request Schema

nfResourceConfig > computeStorageGroups > pScalabilityGroup



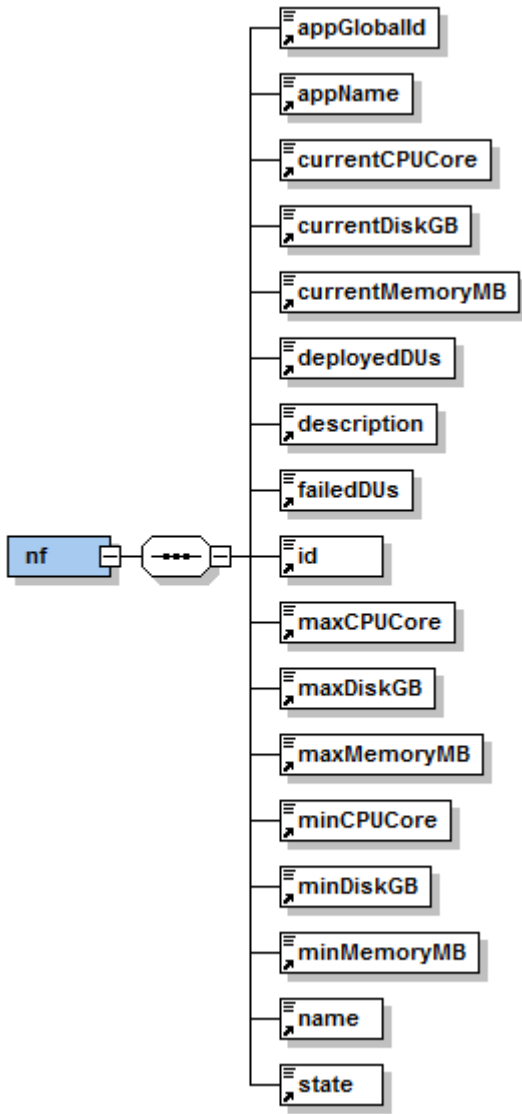
**Figure 23: pScalabilityGroup Node Schema**

Parameter	Description
name	The physical scalability group name.
componentType	The physical scalability group type. For example, CSM, SLRM, ASBC, etc.
deviceInfo	This option is used to configure the device information parameters.
geoRedundancyGroups	This option is used to configure the geoRedundancyGroups parameters. See the geoRedundancyGroup node schema section above for more information.

 **Note:**

Each node in the expanded pScalabilityGroup schema has the same parameter types that the vScalabilityGroup schema has. See the vScalabilityGroup schema nodes above for schema diagrams and required inputs.

Response Schema



Parameter	Description
appGlobalId	The global ID of the application that deployed the NF. For example, NSOBoston.
appName	The application name of the application that deployed the NF. For example, NSO.
currentCPUCore	The current number of CPUs that are used in the NF.
currentDiskGB	The current disk resource that is used by the NF.
currentMemMB	The current memory resource that is used by the NF.
deployedDUs	The number of Deployed Units (DUs) in the NF.
description	The description of the NF.
failedDUs	The number of failed DUs in the NF.
id	The NF ID Oracle Communications Application Orchestrator.



Parameter	Description
maxCPUCore	The maximum number of CPUs that can be used in the NF.
maxDiskGB	The maximum disk resources that can be used by the NF.
maxMemMB	The maximum memory resources that can be used by the NF.
minCPUCore	The minimum number of CPUs that is required for the NF.
minDiskGB	The minimum disk resources that are required by the NF.
minMemMB	The minimum memory resources that are required by the NF.
name	The NF name.
state	<p>The current deployment state of the NF:</p> <ul style="list-style-type: none"> <li>• NotConfigured—One or more child NF groups or DUs require user inputs.</li> <li>• NotDeployed—All required user inputs have been specified. The NF is ready to be deployed.</li> <li>• Deploying—The NF is in the process of being deployed.</li> <li>• Undeploying—The NF and its DUs are in the process of undeploying.</li> <li>• OperationalReady—The CNF has one or more DUs that are ready to be set to an operational state.</li> <li>• Running—The NF and all of its DUs are in an operational state.</li> <li>• Resizing—The NF is in the process of resizing. Resizing allows the minimum and maximum number of DUs to change over the lifecycle of the NF to meet future capacity requirements.</li> <li>• DeploymentError—An error was encountered while deploying the NF and its DUs.</li> <li>• UndeploymentError—An error was encountered while undeploying the NF.</li> <li>• Deleting—The NF is in the process of being permanently deleted from Oracle Communications Application Orchestrator. The NF must be in an Undeploying state before deletion.</li> </ul>


## List All Deployed NFs

The following REST API resource URI can be used to retrieve all existing deployed network functions (NFs).

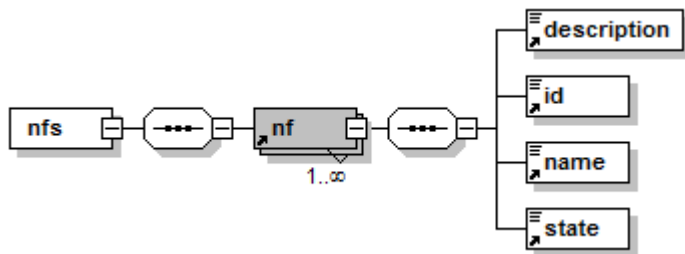
### URL

URI	Request Method	Description
/ocao/nfResources/nfs	GET	<p>Retrieves all existing deployed NFs.</p> <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

Response Schema



Parameter	Description
description	The description of the NF.
id	The NF ID in Oracle Communications Application Orchestrator.
name	The NF name.
state	<p>The current deployment state of the NF:</p> <ul style="list-style-type: none"> <li>NotConfigured—One or more child NF groups or DUs require user inputs.</li> <li>NotDeployed—All required user inputs have been specified. The NF is ready to be deployed.</li> <li>Deploying—The NF is in the process of being deployed.</li> <li>Undeploying—The NF and its DUs are in the process of undeploying.</li> <li>OperationalReady—The CNF has one or more DUs that are ready to be set to an operational state.</li> <li>Running—The NF and all of its DUs are in an operational state.</li> <li>Resizing—The NF is in the process of resizing. Resizing allows the minimum and maximum number of DUs to change over the lifecycle of the NF to meet future capacity requirements.</li> <li>DeploymentError—An error was encountered while deploying the NF and its DUs.</li> <li>UndeploymentError—An error was encountered while undeploying the NF.</li> <li>Deleting—The NF is in the process of being permanently deleted from Oracle Communications Application Orchestrator. The NF must be in an Undeploying state before deletion.</li> </ul>

Retrieve an NF


The following REST API resource URI can be used to retrieve the current status and configuration for an existing deployed network function (NF).

URL


URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}	GET	<p>Retrieves the current status and configuration for an existing deployed NF.</p> <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> </ul>

URI	Request Method	Description
		<ul style="list-style-type: none"> <li>Error response code: 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema

 **Note:** See the *Deploy an NF* section for the response schema information.


## Retrieve the Resource Usage Requirement for a Deployed NF

The following REST API resource URI can be used to retrieve the current deployed NF resource usage requirement for scaling purposes.

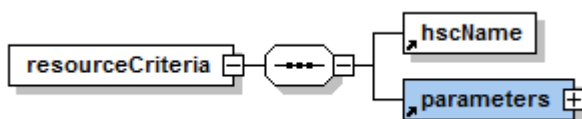
### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}/resourceUsageRequirement	GET	Get the current NF resource usage requirement. <ul style="list-style-type: none"> <li>Normal response code: 200 (Accepted)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema



Parameter	Description
hscName	The HSC name used when the resource criteria retrieves usage requirements.
parameters	The resource criteria output parameters.

## Retrieve Resource Usage and Configuration of an NF

The following REST API resource URI can be used to retrieve the current network function (NF) resource usage and configuration.


## NF Resources

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### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nflId}/resourceUsage	GET	Retrieve the current NF resource usage and configuration. <ul style="list-style-type: none"><li>• Normal response code: 200 (Accepted)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li></ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.


### Response Schema

 **Note:** See the *Deploy an NF* section for the response schema information.

## Retrieve NF Status Information

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The following REST API resource URI can be used to retrieve detailed NF deployment, capacity, health, and scalability group status information.

 **Note:** For more specific information about NF state information, see the Oracle Communications Application Orchestrator User Guide.

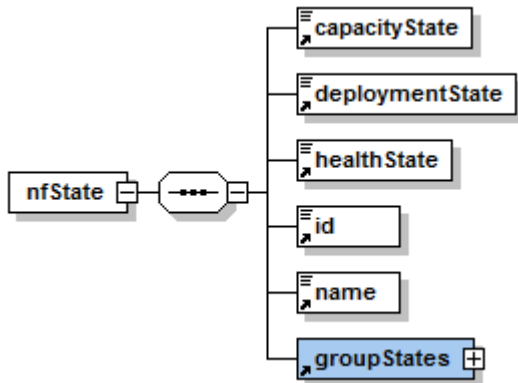
### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nflId}/state	GET	Retrieve detailed state information for an NF. <ul style="list-style-type: none"><li>• Normal response code: 200 (Accepted)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li></ul>

### Request Schema

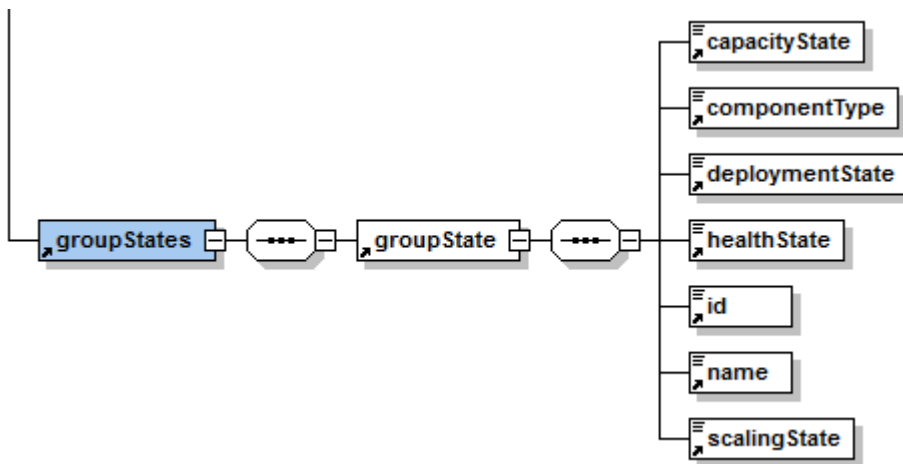
 **Note:** There are no request parameters for this API resource.

Response Schema



Parameter	Description
capacityState	The overall reported NF capacity: <ul style="list-style-type: none"> <li>• Reducible</li> <li>• Good</li> </ul>
deploymentState	The NF deployment state: <ul style="list-style-type: none"> <li>• Not Configured</li> <li>• Not Deployed</li> <li>• Deploying</li> <li>• Operational Ready</li> <li>• Setting Operational</li> <li>• Set Operational Error</li> <li>• Running</li> <li>• Undeploying</li> <li>• Deployment Error</li> <li>• Deleting</li> <li>• Delete Error</li> <li>• Undeployment Error</li> <li>• Resizing Completing Resize</li> <li>• Resize Error</li> </ul>
healthState	The overall reported health of the NF: <ul style="list-style-type: none"> <li>• Initializing</li> <li>• Healthy</li> <li>• Impaired</li> </ul>
Id	The NF ID.
Name	The NF name.

**nfState > groupStates > groupState**



**Figure 24: groupState Node**

Parameter	Type	Description
capacityState	String	The scalability group name in the NF.
componentType	String	The scalability group ID in the NF.
deploymentState	String	The scalability group component type.
healthState	String	The scalability group capacity state.
id	String	The scalability group deployment state.
name	String	The scalability group health state.
scalingState	String	The scalability group scaling state.

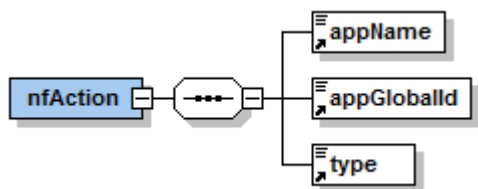
## Submit an Action Request on a Deployed NF

The following REST API resource URI can be used to submit an action request on deployed NF. This API is asynchronous. Once the server accepts this request, the northbound client application can either poll the NF status or wait for an NF state change event.

### URL


URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}/action	POST	Submit an action request to be performed on an NF. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK), 204 (No Content) for a Delete action.</li> <li>• 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

## Request Schema



Parameter	Description
appName	The name of the application that deployed the NF. For example, Oracle Network Service Orchestrator.
appGlobalId	The global ID of the application that deployed the NF. For example, NSO_Boston.
type	The action type taken: <ul style="list-style-type: none"> <li>SetOperational—Select to begin the process of setting a CNF and its DUs to an operational state.</li> <li>Undeploy—Select to begin the CNF undeployment process.</li> <li>Redeploy—Select after a CNF deployment fails to try a subsequent attempt to deploy this NF. This attempt to regain a successful status starts from the point at which the previous deployment failed.</li> <li>Delete—Select to begin the process of deploying a NF.</li> </ul>

## Response Schema

 **Note:** There are no response parameters for this API resource.

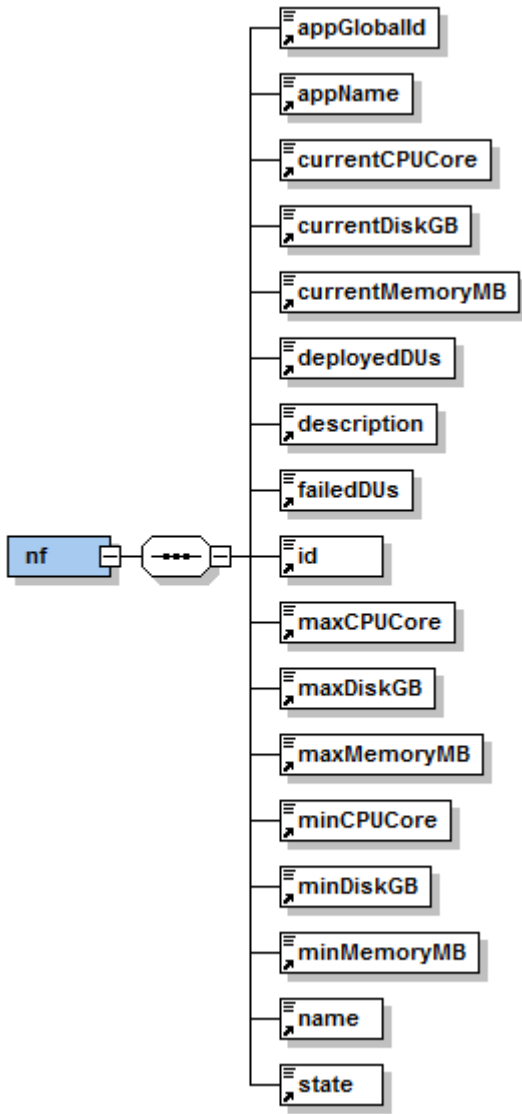
## Retrieve the Deployed NF Resource Usage Requirement

The following REST API resource URI can be used to calculate the resource usage requirement with the new resource criteria for resizing an existing NF.

### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}/resourceUsageRequirement	POST	This resource calculates the resource usage requirement with the new resource criteria for resizing an existing NF. <ul style="list-style-type: none"> <li>Normal response code: 200 (Accepted)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li> </ul>

Request Schema




Parameter	Description
appGlobalId	The global ID of the application that deployed the NF. For example, NSOBoston.
appName	The application name of the application that deployed the NF. For example, NSO.
currentCPUCore	The current number of CPUs that are used in the NF.
currentDiskGB	The current disk resource that is used by the NF.
currentMemMB	The current memory resource that is used by the NF.
deployedDUs	The number of Deployed Units (DUs) in the NF.
description	The description of the NF.
failedDUs	The number of failed DUs in the NF.
id	The NF ID Oracle Communications Application Orchestrator.



Parameter	Description
maxCPUCore	The maximum number of CPUs that can be used in the NF.
maxDiskGB	The maximum disk resources that can be used by the NF.
maxMemMB	The maximum memory resources that can be used by the NF.
minCPUCore	The minimum number of CPUs that is required for the NF.
minDiskGB	The minimum disk resources that are required by the NF.
minMemMB	The minimum memory resources that are required by the NF.
name	The NF name.
state	<p>The current deployment state of the NF:</p> <ul style="list-style-type: none"> <li>• NotConfigured—One or more child NF groups or DUs require user inputs.</li> <li>• NotDeployed—All required user inputs have been specified. The NF is ready to be deployed.</li> <li>• Deploying—The NF is in the process of being deployed.</li> <li>• Undeploying—The NF and its DUs are in the process of undeploying.</li> <li>• OperationalReady—The CNF has one or more DUs that are ready to be set to an operational state.</li> <li>• Running—The NF and all of its DUs are in an operational state.</li> <li>• Resizing—The NF is in the process of resizing. Resizing allows the minimum and maximum number of DUs to change over the lifecycle of the NF to meet future capacity requirements.</li> <li>• DeploymentError—An error was encountered while deploying the NF and its DUs.</li> <li>• UndeploymentError—An error was encountered while undeploying the NF.</li> <li>• Deleting—The NF is in the process of being permanently deleted from Oracle Communications Application Orchestrator. The NF must be in an Undeploying state before deletion.</li> </ul>


### Response Schema

 **Note:** There are no response parameters for this API resource.

## Resize an NF


The following REST API resource URI can be used to resize an NF.

### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}/resizing	POST	<p>This resource resizes an NF.</p> <p> <b>Note:</b> Before the northbound service orchestrator resizes an NF, it needs to get the resource usage and configuration with a new resource criteria.</p>

## NF Resources


URI	Request Method	Description
		<ul style="list-style-type: none"><li>• Normal response code: 202 (Accepted)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li></ul>


 **Note:** See the *Deploy an NF* section for the request and response schema information.

## Scale an NF

The following REST API resource URI can be used to scale an NF.

### URL

URI	Request Method	Description
/ocao/nfResources/nfs/{nfId}/scaling	POST	<p>This resource scales an NF.</p> <p> <b>Note:</b> Before the northbound service orchestrator calls this API, it gets the NF scaling resource usage and configuration requirement, then the northbound client reserves necessary resource and configuration based on the resource and configuration requirement and uses this API to scale the NF.</p> <ul style="list-style-type: none"><li>• Normal response code: 202 (Accepted)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 500 (Internal Server Error)</li></ul>

 **Note:** See the *Deploy an NF* section for the request and response schema information.

## NF REST API Call Flow Examples

The following REST API call flow best-practice examples are used to operationalize an NF, and scale or resize a deployed NF.

### Deploy a Network Function: Example

The following call flow of API methods are entered in the main method of the Oracle Communications Application Orchestrator REST interface to configure the login and NF parameters needed to make a NF operational. The individual API methods identified below must also be configured. The configuration of these individual methods are discussed in greater detail in subsequent chapters. If you are looking for more call flow examples, see appendix A for more information.

1. Login to a valid user account session:

```
/rest/v1.0/admin/login
```

2. List the catalog of NFDs:

```
ocao/nfResources/nfds:get
```

3. Get the resource criteria for the NFD:

```
ocao/nfResources/nfds/{nfId} resourceCriteria:get
```

The output provides the resource criteria with default values.

4. Calculate to create resource usage requirement object in Oracle Communications Application Orchestrator.

```
ocao/nfResources/nfds/{nfId}/resourceUsageRequirement:post
```

The input is the resource criteria, and the output is the resource usage requirement and configuration requirement.

5. Create (and deploy) a new NF from the NFD:

```
ocao/nfResources/nfs:post
```

The input is the resource usage requirements and configuration input. The output contains the created NF ID for the following API calls.

6. After creating the API call return to caller, the caller application can either poll the NF status or wait for the NF status event.

7. Get the current deployed NF info:

```
ocao/nfResources/nfs/{nfId}/resourceCriteria:get
```

8. Set the deployed NF to operational:

```
ocao/nfResources/nfs/{nfId}/action setCNFOperational()
```

## Scale an Operational NF: Example

The following call flow steps are used to scale in or out an operational NF when a scale in or out request occurs on a NF that is managed by the northbound service orchestrator client application.

1. Login to a valid user account session:

```
/rest/v1.0/admin/login
```

2. A ScalingRequest event topic is registered and the northbound client receives a ScalingOut or ScaleIn request event.

3. Get the scaling resource usage and configuration requirement.

```
ocao/nfResources/nfs/{nfId}/resourceUsageRequirement:get
```

The output is the scaling NF resource usage requirement and configuration requirement.

4. The northbound service orchestrator client reserves the required resources and configurations.

5. Scale the operational NF:

```
ocao/nfResources/nfs/{nfId}/scaling:post
```

The input is the resource usage requirements and configuration input. The output is the NF. After the resizing the API call return to caller, the caller application can either poll the NF status or wait for the NF status event.

6. Get the operational NF info:

```
ocao/nfResources/nfs/{nfId}:get
```

The output is the operational configuration and status information.

## Resize an Operational NF: Example

1. Login to a valid user account session:

```
/rest/v1.0/admin/login
```

2. Get the resource criteria of an operational NF:

```
ocao/nfResources/nfs/{nfId}/resourceCriteria:get
```

The output shows the resource criteria of an operational NF.

3. Calculate additional new resource usage requirements and required configurations:

```
ocao/nfResources/nfs/{nfId}/resourceUsageRequirement:post
```

## NF Resources

---

The input is the new resource criteria. The output is the new resource usage requirement and configuration requirement.

4. The northbound service orchestrator application reserves the new required resources and configurations.
5. The operational NF is resized:

```
ocao/nfResources/nfs/{nfId}/resizing:post
```

The input is the resource usage requirements and configuration input. The output is the NF. After the resizing the API call return to caller, the caller application can either poll the NF status or wait for the NF status event.

6. Get the operational NF info:

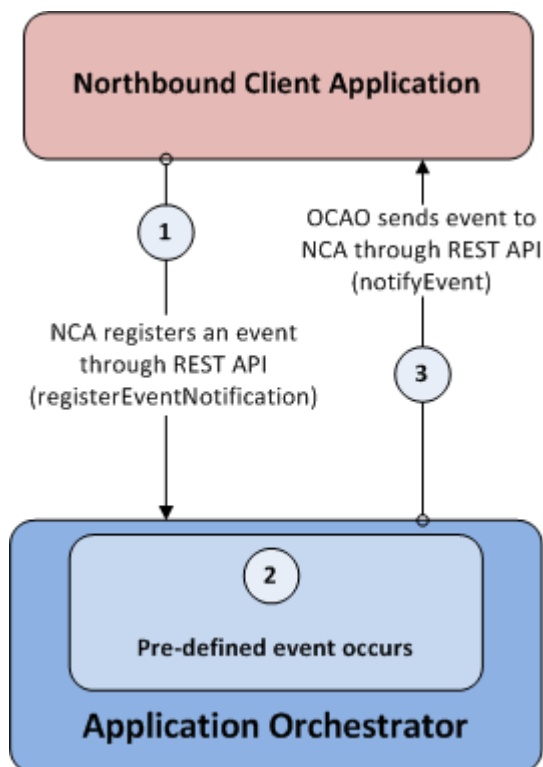
```
ocao/nfResources/nfs/{nfId}:get
```

The output is the operational configuration and status information.

## Event Resources

Oracle Communications Application Orchestrator supports Scaling, ScalingRequest, and StateChange event notifications, which are sent to a registered northbound client applications by way of its event registration callback URI.

An Oracle Communications Application Orchestrator event has an event type and an event topic. A northbound client application that can receive events from Oracle Communications Application Orchestrator, must register for specific event topics. A callback REST API is implemented by the northbound client application so that it receives event notifications from Oracle Communications Application Orchestrator when they occur. A northbound client application may use event notifications to respond with actions. For example, a northbound client application can scale in or out an NF when a ScalingRequest event notification message is received from Oracle Communications Application Orchestrator.



**Figure 25: Event registration and notification**

## Event Resources

The following table describes the scalingRequest events that are supported by Oracle Communications Application Orchestrator:

Event Type	Description
ScaleOut	<p>A new deployment unit (DU) is created. Once this process is complete, the event is sent to the northbound client application.</p> <p>The standard scaling policy requests a DU scale-out process immediately when any cumulative NF group KPI reaches a critical capacity state, and when any cumulative NF group KPI reaches the warning capacity state and remains there longer than the growth duration.</p>
ScaleIn	<p>Before a DU is undeployed from a NF, the event is sent to the northbound client application.</p> <p>The standard scaling policy only starts the scale-in process when all cumulative NF group KPIs have reached a reducible capacity state, and any cumulative NF group KPI has remained in the reducible capacity state longer than the decline duration.</p>
ScaleInComplete	<p>After a DU is undeployed from a NF, the event is sent to the northbound client application.</p>

The following table describes the scaling events that are supported by Oracle Communications Application Orchestrator:

Event Type	Description
ScaleOutRequest	<p>When the capacity planner is about to create a new DU, the event is sent to the northbound client application.</p>
ScaleInRequest	<p>A DU is undeployed from a NF. Before a DU is undeployed from a NF, the event is sent to the northbound client application before the ScaleInEvent.</p>

The following table describes the stateChange events that are supported by Oracle Communications Application Orchestrator:

Event Type	Description
Health	<p>Once the NF health state is changed, the event is sent to the northbound client application.</p> <p>The following health states are shown below:</p> <ul style="list-style-type: none"> <li>• Two dashes (- -) indicate that health data continues to be collected for one or more DUs.</li> <li>• Healthy—All DUs are in a healthy state and are reachable on the network.</li> <li>• Impaired—One or more DUs are unreachable on the network or have otherwise encountered an error which impacts the total DU capacity, or resiliency.</li> </ul>
Capacity	<p>Once the NF capacity state is changed, the event is sent to the northbound client application. The following capacity states are shown below:</p>

Event Type	Description
	<ul style="list-style-type: none"> <li>• Reducible—The capacity of the NF group can be satisfied by fewer DUs than are currently deployed (all NF group KPIs are in a reducible state).</li> <li>• Good—The capacity of the NF group is satisfied by the number of DUs that are currently deployed (one or more NF group KPIs are in the Good state, and no KPIs are in Warning or Critical states).</li> <li>• Warning—The capacity of the NF group is satisfied by the number of DUs that are currently deployed, but one or more KPIs have exceeded a warning capacity limit. Additional DUs may be required in the near future in order to bring total NF group capacity back into a Good state range.</li> <li>• Critical—The capacity of the NF group may no longer be satisfied by the number of DUs that are currently deployed. One or more KPIs have crossed a critical threshold boundary indicating that additional DUs are required immediately.</li> </ul>
Deployment	Once the NF deployment state is changed, the event is sent to the northbound client application.


## Register an Event Topic

The following REST API resource URI can be used to register event topics from Oracle Communications Application Orchestrator.

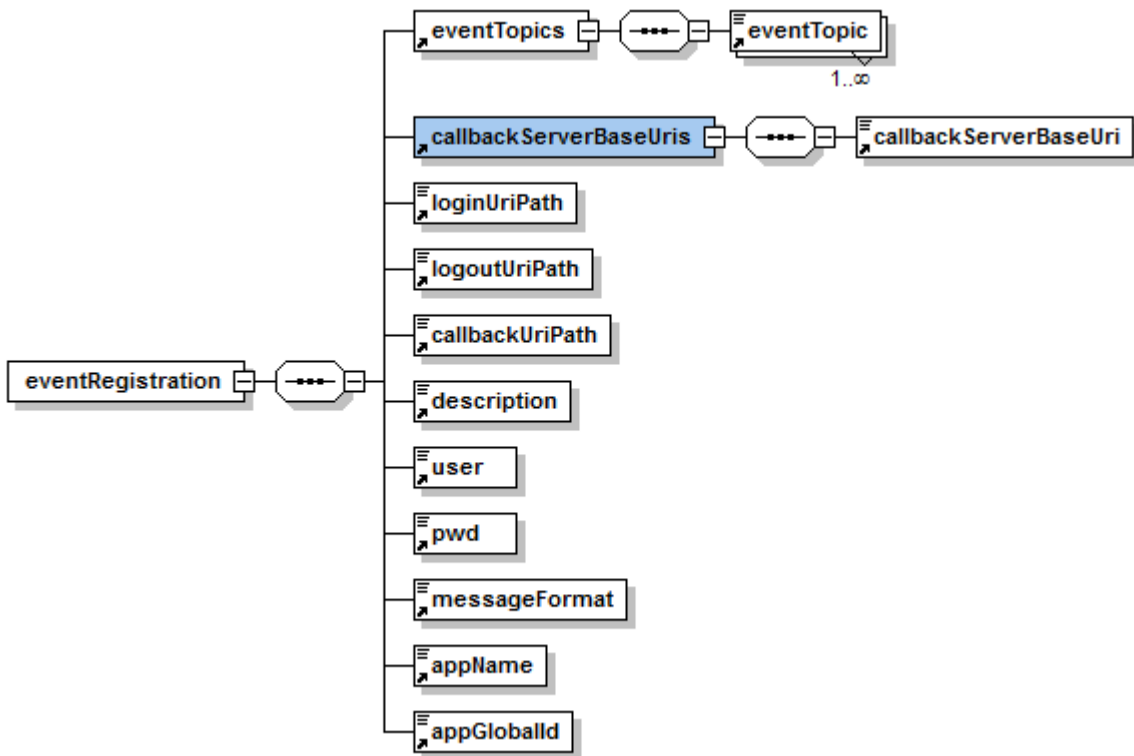
### URL

URI	Request Method	Description
/ocao/events/registrations	POST	Registers event topics. <ul style="list-style-type: none"> <li>• Normal response code: 200 (OK)</li> <li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

### Request and Response Schema

 **Note:** The request and response message body are the same for this URI.

## Event Resources



Parameter	Description
eventTopic	The event topic for which the northbound client needs to register all the application-interested event topics at once.
callbackServerBaseUri	The northbound client application uses this URI to implement the callback REST API on Oracle Communications Application Orchestrator that allows Oracle Communications Application Orchestrator to send an event to the northbound client application. This URI identifies the northbound client application server. For example: <code>http://localhost:8080&lt;/callbackServerBaseUri&gt;</code> .
eventTopics	Select this option to access eventTopic parameters.
id	There is no registration entry object ID.
loginUriPath	The login URI path that initiates a client/server session and returns a valid session ID. For example: <code>/v1.0/admin/login</code> .
logoutUriPath	The login URI path that tears down a session with a valid session ID. For example: <code>/v1.0/admin/logout</code>
pwd	The password that is used by Oracle Communications Application Orchestrator to log into the NSO before it can send the event notification.
user	The user name that is used by Oracle Communications Application Orchestrator to log into the NSO before it can send the event notification.
messageFormat	The way in which the message contents are formatted. For example, XML.
appName	The northbound client application name that registers the event topic. For example, the northbound service orchestrator, Oracle Communications Session Element Manager, etc.
appGlobalId	The unique ID or name that the northbound client application uses to register with Oracle Communications Application Orchestrator. If this northbound client



Parameter	Description
	application runs as a cluster, the unique ID or name can be the cluster ID or name. Oracle Communications Application Orchestrator uses this ID or name to ensure that only one client in the cluster is notified when an event occurs.

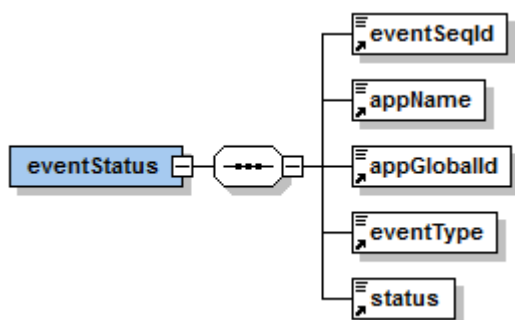
## Confirm an Event

The following REST API resource URI can be used to submit data to the northbound client application to confirm that it received an event message from Oracle Communications Application Orchestrator.

### URL

URI	Request Method	Description
/ocao/events/confirmations	POST	Submits data to a northbound client application to confirm an event. <ul style="list-style-type: none"> <li>Normal response code: 200 (OK)</li> <li>Error response code: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

### Request Schema



Parameter	Description
eventSeqId	The original event sequence ID for when the northbound client application received this event from Oracle Communications Application Orchestrator.
appName	The northbound client application name that registers the event topic. For example, the northbound service orchestrator, Oracle Communications Session Element Manager, etc.
appGlobalId	The unique ID or name that the northbound client application uses to register with Oracle Communications Application Orchestrator. If this northbound client application runs as a cluster, the unique ID or name can be the cluster ID or name. Oracle Communications Application Orchestrator uses this ID or name to ensure that only one client in the cluster is notified when an event occurs.
eventType	The original event type for when the northbound client application received this event from Oracle Communications Application Orchestrator.
status	The event processing status ( <b>success</b> or <b>failed</b> ) on the northbound client application.

## Event Resources

---

### Response Schema

There are no response parameters for this REST API resource.

## Retrieve All Event Registrations


---

The following REST API resource URI can be used to list all event registrations from Oracle Communications Application Orchestrator.


### URL

URI	Request Method	Description
/ocao/events/registrations	GET	Lists all event registrations. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li></ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema

 **Note:** See the *Register an Event Topic* section for the response schema information.

## Retrieve an Event Registration


---

The following REST API resource URI can be used to retrieve information for a specified registered event from Oracle Communications Application Orchestrator.


### URL

URI	Request Method	Description
/ocao/events/registrations/{registrationId}	GET	Retrieves a registered event type. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li></ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema

 **Note:** See the *Register an Event Topic* section for the response schema information.


## Unregister an Event

The following REST API resource URI can be used to unregister an event from Oracle Communications Application Orchestrator.


### URL

URI	Request Method	Description
/ocao/events/registrations/ {registrationId}	DELETE	Unregisters a registered event. <ul style="list-style-type: none"><li>• Normal response code: 200 (OK)</li><li>• Error response code: 400 (Bad Request), 401 (Unauthorized)</li></ul>

### Request Schema

 **Note:** There are no request parameters for this API resource.

### Response Schema

 **Note:** There are no response parameters for this API resource.



## Fault Retrieval

Use the information in this chapter to retrieve fault resources through the Oracle Communications Application Orchestrator REST API.

### Retrieve Application Orchestrator Alarms

The following REST API resource URI can be used to retrieve Oracle Communications Application Orchestrator alarms that are generated when an alarm occurs on a node for the northbound client application.



**Note:** To receive notifications, ensure that SNMP communities and the MIB contact and trap receiver information is configured on your OSS/BSS system in order to receive fault notifications.

#### URL

URI	Request Method	Description
/fault/alarms? type={OCAO}&offset={100}&limitation={50}&startTime={MM-dd-yy}&endTime={MM-dd-yy}&source={acmeXX}&sourceIp={x.x.x.x}&severity={Major}	GET	Gets alarms. All alarms are retrieved by default. You can use the following filter criteria parameters with this URI: <ul style="list-style-type: none"> <li>type—Retrieves different types of alarms for Application Orchestrator and supports pagination through the offset parameter. If the offset parameter is not specified, the default result always returns the first 50 alarms.</li> <li>limitation—Specifies the number of alarms to retrieve in a request.</li> <li>startTime—Start time for retrieving alarms in month, day and year format (mm-dd-yy). For example, March 15, 2015 is: 03-15-15.</li> <li>endTime—End time for retrieving alarms in month, day and year format (mm-dd-yy). For example, October 21, 2015 is: 10-21-15.</li> <li>source—The exact descriptive source of the alarm.</li> <li>sourceIp—The source IP address from which this alarm was generated.</li> <li>severity—The severity name of the alarm. See below for alarm names.</li> </ul>

## Fault Retrieval

URI	Request Method	Description
		URI response codes: <ul style="list-style-type: none"> <li>• Normal: 200 (OK)</li> <li>• Error: 400 (Bad Request), 401 (Unauthorized)</li> </ul>

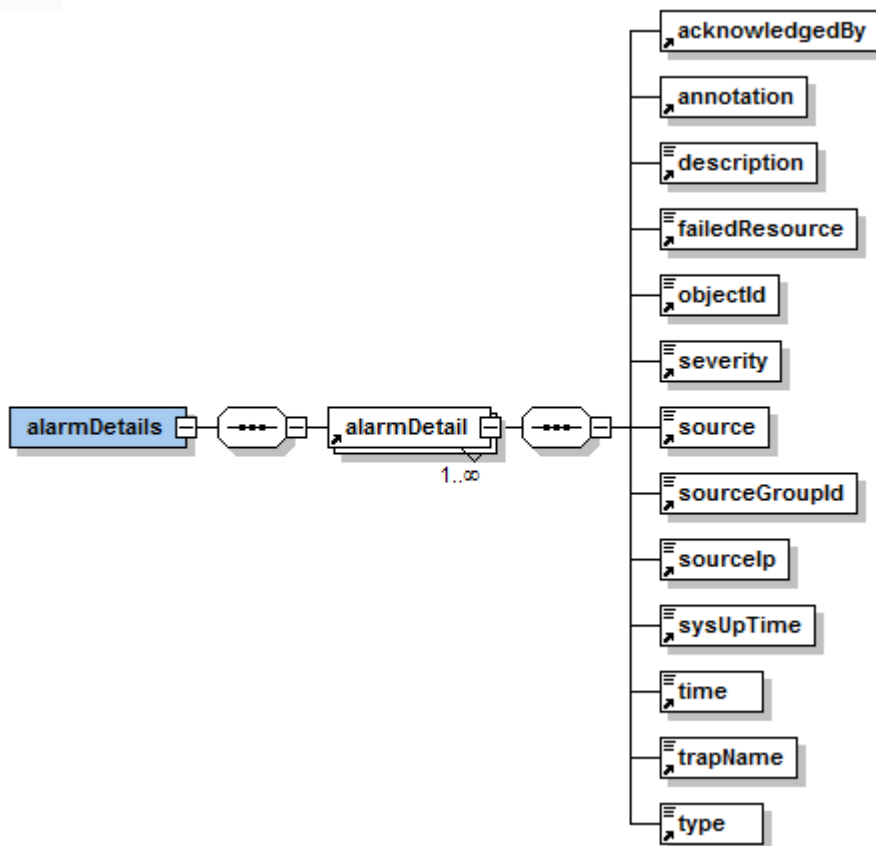
## Request Schema




### Note:

There are no request parameters for this REST API.

## Response Schema



Parameter	Type	Description
acknowledgedBy	String	The user that acknowledged the alarm.
annotation	String	The user-defined note pertaining to this alarm.
description	String	A short description of the alarm.
failedResource	String	The resource responsible for this alarm.
objectId	String	The object identifier (OID) associated with this alarm.
severity	String	One of the following user-defined severity levels can display for a system alarm:

Parameter	Type	Description
		<p> <b>Note:</b> The number indicates the severity level.</p> <ul style="list-style-type: none"> <li>• (0)Emergency—The system is unusable.</li> <li>• (1) Critical—The alert indicates that action must be taken immediately. If no actions are taken, there may be physical, permanent, and irreparable damage to your system.</li> <li>• (2) Major—Critical conditions exist. The functionality has been seriously compromised and a loss of functionality, hanging applications, and dropped packets may occur. If no actions are taken, your system will suffer no physical harm, but it will cease to function.</li> <li>• (3) Minor—Error conditions exist. Functionality has been impaired to a certain degree and you might experience compromised functionality. There will be no physical harm to your system, but you need to take actions to keep your system operating properly.</li> <li>• (4) Warning—Warning conditions exist. Some irregularities in performance. These conditions are noteworthy and you should take actions to keep your system operating properly.</li> <li>• (5) Notice—Normal, but a significant condition exists.</li> <li>• (6) Info—Informational messages are appearing.</li> <li>• (7)Trace—Trace messages appear.</li> <li>• (8) Debug—Debugging messages appear.</li> <li>• (9) Detail—Detailed messages appear.</li> </ul>
source	String	The exact descriptive source of the alarm.
sourceGroupId	String	The identity of the source group associated with this alarm.
sourceIp	String	The source IP address from which this alarm was generated.
sysUpTime	String	Length of time the system has been operational in hours, minutes, and seconds.
trapName	String	The exact name of the trap associated with this alarm. For example, apNNCTrapRelayAliveNotification.
type	String	The type of trap associated with this alarm. For example, apOCAONFcDUAvailabilityFailure.





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## Application Orchestrator REST API Examples

The Oracle Communications Application Orchestrator REST API resource examples in this chapter can be used to help you specify request and response parameters. The message body for each example is represented in XML format.

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### VIM Resource Examples

#### Retrieve Initial VIM Configuration Parameters: Example

The following example retrieves the initial VIM configuration parameters before creating a VIM:

##### Response XML

```
<?xml version="1.0" encoding="UTF-8"?>
<vim>
  <type>vCloud Director 5.5.x</type>
  <parameters>
    <parameter>
      <description>The base URL to the cloud. Example: https://mycloud.com:
443</description>
      <name>vimURL</name>
      <readOnly>>false</readOnly>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The username to use for authentication</description>
      <name>vimUsername</name>
      <readOnly>>false</readOnly>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The password to use for authentication</description>
      <name>vimPassword</name>
      <readOnly>>false</readOnly>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The VCloud organization to which this user belongs.</
description>
      <name>vimOrganization</name>
      <readOnly>>false</readOnly>

```

```
<valueType>String</valueType>
</parameter>
<parameter>
  <description>The catalog to use for vAppTemplate storage.</description>
  <name>vimCatalog</name>
  <readOnly>false</readOnly>
  <valueType>SingleSelection</valueType>
</parameter>
<parameter>
  <description>Cloud identifier for Catalog.</description>
  <name>vimCatalogRef</name>
  <readOnly>true</readOnly>
  <valueType>String</valueType>
</parameter>
</parameters>
</vim>
```

### Retrieve Dynamic VIM Configuration Parameters and Required User Credentials: Example

The following example retrieves any of the dynamic VIM configuration parameters that cannot be returned after retrieving the initial VIM configuration parameters:

#### Response XML

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<vim>
  <parameters>
    <parameter>
      <name>vimURL</name>
      <value>https://10.196.120.51</value>
    </parameter>
    <parameter>
      <name>vimUsername</name>
      <valueType>String</valueType>
      <value>nnc</value>
    </parameter>
    <parameter>
      <description>The password to use for authentication</description>
      <name>vimPassword</name>
      <value>abc123</value>
    </parameter>
    <parameter>
      <name>vimOrganization</name>
      <valueType>String</valueType>
      <value>oracle</value>
    </parameter>
  </parameters>
</vim>
```

### Create a VIM: Example

The following example creates a new VIM .

#### Request XML

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<vim>
  <name>tegeRestVim-20</name>
  <type>vCloud Director 5.5.x</type>
  <parameters>
    <parameter>
```

```

    <name>vimURL</name>
    <value>https://10.196.120.51</value>
  </parameter>
  <parameter>
    <name>vimUsername</name>
    <value>nnc</value>
  </parameter>
  <parameter>
    <name>vimPassword</name>
    <value>abcccceddd</value>
  </parameter>
  <parameter>
    <name>vimOrganization</name>
    <value>oracle</value>
  </parameter>
  <parameter>
    <name>vimCatalog</name>
    <value>test</value>
  </parameter>
</parameters>
</vim>

```

### Response XML

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<vim>
  <id>76</id>
  <name>tegeRestVim-20</name>
  <parameters>
    <parameter>
      <description>The base URL to the cloud. Example: https://mycloud.com:
443</description>
      <name>vimURL</name>
      <readOnly>>true</readOnly>
      <value>https://10.196.120.51</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The username to use for authentication</description>
      <name>vimUsername</name>
      <readOnly>>true</readOnly>
      <value>nnc</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The password to use for authentication</description>
      <name>vimPassword</name>
      <readOnly>>false</readOnly>
      <value>abc123</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The VCloud organization to which this user belongs.</
description>
      <name>vimOrganization</name>
      <readOnly>>true</readOnly>
      <value>oracle</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>The catalog to use for vAppTemplate storage.</description>
      <name>vimCatalog</name>
      <readOnly>>false</readOnly>

```

```
<validValues>
  <validValue>test</validValue>
</validValues>
  <value>test</value>
  <valueType>SingleSelection</valueType>
</parameter>
<parameter>
  <description>Cloud identifier for Catalog.</description>
  <name>vimCatalogRef</name>
  <readOnly>true</readOnly>
  <value>https://10.196.120.51/api/catalog/501f5e5d-ae70-4d54-
be14-6917d436e125</value>
  <valueType>String</valueType>
</parameter>
</parameters>
<type>vCloud Director 5.5.x</type>
</vim>
```

### Retrieve the Available DCs for a VIM: Example

The following example retrieves the available data centers (DCs) for a specified VIM.

#### Response XML for OpenStack

```
<?xml version="1.0" encoding="UTF-8"?>
<vimDcs>
  <vimType>OracleOpenStackForOracleLinux</vimType>
  <vimName>Vim-2</vimName>
  <vimId>1</vimId>
  <dcs>
    <dc>
      <name>nova</name>
    </dc>
    <dc>
      <name> nova-second </name>
    </dc>
  </dcs>
</vimDcs>
```

#### Response XML for vCloud

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<vimDcs>
  <vimId>12</vimId>
  <vimName>VIM-1</vimName>
  <vimType>vCloud Director 5.5.x</vimType>
  <dcs>
    <dc>
      <name>MainVDC</name>
    </dc>
    <dc>
      <name>SmallVDC</name>
    </dc>
  </dcs>
</vimDcs>
```

## VDC Resource Examples

---

### Retrieve All VDCs that are Associated with VIMs: Example

The following example retrieves all VDCs that are associated with VIMs.

**Response XML**

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<vdc>
  <pageInfo>
    <limitation>10</limitation>
    <numberOfElements>2</numberOfElements>
    <offset>1</offset>
  </pageInfo>
  <vdc>
    <id>44</id>
    <name>tgeVdcTest</name>
    <reference>MainVDC</reference>
    <vimId>12</vimId>
    <vimName>tgeTest</vimName>
  </vdc>
  <vdc>
    <id>68</id>
    <name>tgeVdcTest-10</name>
    <reference>MainVDC</reference>
    <vimId>12</vimId>
    <vimName>tgeTest</vimName>
  </vdc>
</vdc>
</vdc>
```

**Retrieve a VDC Configuration: Example**

The following example retrieves configuration parameters for a specific VDC in the VIM:

**Request XML**

```
<?xml version="1.0" encoding="UTF-8"?>
<vdc>
  <vimName>tgeVim-1</vimName>
</vdc>
```

**Response XML for vCloud VIM**

```
<?xml version="1.0" encoding="UTF-8"?>
<vdc>
  <reference>MainVDC</reference>
  <vimId>52</vimId>
  <vimName>TgeTest-4</vimName>
  <hypervisors/>
  <parameters>
    <parameter>
      <description>'Fast Provisioning' must be disabled for VCloud
Datacenters</description>
      <name>dcWarning</name>
      <readOnly>true</readOnly>
      <value>Please ensure that the 'Fast Provisioning' feature is disabled
for this Datacenter!</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
      <description>Datacenter identifier in the cloud</description>
      <name>dcCloudId</name>
      <readOnly>true</readOnly>
      <value>https://10.196.120.51/api/vdc/3c9cd2e2-
f65b-4f32-91de-5525b58d3a1f</value>
      <valueType>String</valueType>
    </parameter>
    <parameter>
```

## Application Orchestrator REST API Examples

```
<description>The Storage Profile which will be used to allocate VM
storage for this Datacenter.</description>
<name>dcStorageProfile</name>
<readOnly>>false</readOnly>
<validValues>
<validValue>SharedStorage</validValue>
<validValue>Local Storage</validValue>
<validValue>*</validValue>
</validValues>
<valueType>SingleSelection</valueType>
</parameter>
<parameter>
<description>Storage Profile identifier in the cloud.</description>
<name>dcStorageProfileRef</name>
<readOnly>>true</readOnly>
<valueType>String</valueType>
</parameter>
<parameter>
<description>Enable Anti-Affinity rules for HA-paired VMs. Anti-
Affinity rules prevent VMs from running on the same physical host.</
description>
<name>dcEnableAA</name>
<readOnly>>false</readOnly>
<value>>false</value>
<valueType>BooleanString</valueType>
</parameter>
</parameters>
</vdc>
```

### Create and Associate a VDC with a VIM: Example

The following example creates and associates a virtual data center (VDC) with a supported VIM.

#### Request XML

```
<?xml version="1.0" encoding="UTF-8"?>
<vdc>
  <hypervisors/>
  <name>tgeVdcTest-100</name>
  <parameters>
    <parameter>
      <name>dcStorageProfile</name>
      <value>SharedStorage</value>
    </parameter>
    <parameter>
      <name>dcEnableAA</name>
      <value>>false</value>
    </parameter>
  </parameters>
  <reference>MainVDC</reference>
  <vimName>TgeRestVim-4</vimName>
</vdc>
```

#### Response XML

```
<?xml version="1.0" encoding="UTF-8"?>
<vdc>
  <hypervisors>
    <hypervisor>ESXI</hypervisor>
  </hypervisors>
  <id>112</id>
  <name>tgeVdcTest-100</name>
  <reference>MainVDC</reference>
```

```

<vimId>60</vimId>
<vimName>tegeRestVim-10</vimName>
<parameters>
  <parameter>
    <description>'Fast Provisioning' must be disabled for VCloud
Datacenters</description>
    <name>dcWarning</name>
    <readOnly>>true</readOnly>
    <value>Please ensure that the 'Fast Provisioning' feature is disabled
for this Datacenter!</value>
    <valueType>String</valueType>
  </parameter>
  <parameter>
    <description>Datacenter identifier in the cloud</description>
    <name>dcCloudId</name>
    <readOnly>>true</readOnly>
    <value>https://10.196.120.51/api/vdc/3c9cd2e2-
f65b-4f32-91de-5525b58d3a1f</value>
    <valueType>String</valueType>
  </parameter>
  <parameter>
    <description>The Storage Profile which will be used to allocate VM
storage for this Datacenter.</description>
    <name>dcStorageProfile</name>
    <readOnly>>false</readOnly>
    <validValues>
      <validValue>SharedStorage</validValue>
    </validValues>
    <value>SharedStorage</value>
    <valueType>SingleSelection</valueType>
  </parameter>
  <parameter>
    <description>Storage Profile identifier in the cloud.</description>
    <name>dcStorageProfileRef</name>
    <readOnly>>true</readOnly>
    <value>https://10.196.120.51/api/vdcStorageProfile/
374055b7-70a1-4482-85f9-510b865e750b</value>
    <valueType>String</valueType>
  </parameter>
  <parameter>
    <description>Enable Anti-Affinity rules for HA-paired VMs. Anti-
Affinity rules prevent VMs from running on the same physical host.</
description>
    <name>dcEnableAA</name>
    <readOnly>>false</readOnly>
    <value>>false</value>
    <valueType>BooleanString</valueType>
  </parameter>
</parameters>
<cloudNetworks>
  <cloudNetwork>
    <name>Access</name>
    <ref>https://10.196.120.51/api/network/7c439cef-165b-4dfc-923a-
c8662cea43c4</ref>
  </cloudNetwork>
  <cloudNetwork>
    <name>Wancom1</name>
    <ref>https://10.196.120.51/api/network/e9b96827-
e601-4669-8337-587420d9a6e5</ref>
  </cloudNetwork>
  <cloudNetwork>
    <name>Wancom2</name>
    <ref>https://10.196.120.51/api/network/4f2dad94-5aea-414e-b74d-
ce0cdc54f9e7</ref>
  </cloudNetwork>
</cloudNetworks>

```

## Application Orchestrator REST API Examples

---

```
</cloudNetwork>
<cloudNetwork>
  <name>Private Mgmt</name>
  <ref>https://10.196.120.51/api/network/222c33ea-75cc-4af3-9162-
ea3c4f410f41</ref>
</cloudNetwork>
<cloudNetwork>
  <name>Management</name>
  <ref>https://10.196.120.51/api/network/40d90f7e-4b62-4c79-9fb4-
c8a0de812928</ref>
</cloudNetwork>
<cloudNetwork>
  <name>Core External</name>
  <ref>https://10.196.120.51/api/network/
fbf77107-7f53-4aeb-9613-8ddc82edf498</ref>
</cloudNetwork>
</cloudNetworks>
</vdc>
```

## Retrieve All VM Images: Example

---

The following example retrieves all VM images from the Oracle Communications Application Orchestrator image archive.

### Response XML

```
<?xml version="1.0" encoding="UTF-8"?>
<vmImages>
  <vmImage>
    <name>vmImageSCZ715</name>
    <filename>nnSCZ715.64-img-bin.ova</filename>
    <description>this is Oracle CSM and SLRM software image </description>
    <softwareVersion>SCZ715</softwareVersion>
    <size>8635164 bytes</size>
    <cpuCapacity>2</cpuCapacity>
    <memoryCapacity>2GB</memoryCapacity>
    <diskCapacity>43GB</diskCapacity >
    <NICs>8</NICs >
    <componentTypes>
      <componentType>CSM</componentType>
      <componentType>SLRM</componentType>
    </componentTypes>
    <hypervisors>
      <hypervisor> ESXI</hypervisor>
      <hypervisor> KVM</hypervisor>
      <hypervisor> OVM_PV</hypervisor>
      <hypervisor> OVM_HVM</hypervisor>
    </hypervisors>
  </vmImage>
</vmImages>
```

## NF Resource Examples

---

### Retrieve an NF Descriptor: Example

The following example retrieves an NF descriptor (NFD).



**Response XML**

```
<?xml version="1.0" encoding="UTF-8"?>
<nfd>
  <name>IMS-core</name>
  <id>12</id>
  <version>1.0</version>
  <vendor>ORACLE</vendor>
  <vendorId>ACME</vendorId>
  <cnfPluginName>Acme CNF Adaptor</cnfPluginName >
</nfd>
```

**Retrieve the Resource Criteria for an NF: Example**

The following example retrieves the resource criteria for an NF, which is calculated and resized by default criteria values.

**Request XML**

```
<?xml version="1.0" encoding="UTF-8"?>
<resourceCriteria>
  <hscName/>
  <parameters>
    <parameter>
      <description>Minimum Number of Subscribers.</description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MinimumNumberOfSubscribers</name>
      <readOnly>>false</readOnly>
      <value>450000</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Maximum Number Of Subscribers</description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MaximumNumberOfSubscribers</name>
      <readOnly>>false</readOnly>
      <value>850000</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Minimum Messages per Second for Busy Hour Call Attempts</
description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MinimumMessagesPerSecond</name>
      <readOnly>>false</readOnly>
      <value>7360</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Maximum Messages per Second for Busy Hour Call Attempts</
description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MaximumMessagesPerSecond</name>
      <readOnly>>false</readOnly>
      <value>13650</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Sizing Model</description>
```

```
<name>SizingModel</name>
<readOnly>>false</readOnly>
<validValues>
  <validValue>Small</validValue>
  <validValue>Medium</validValue>
  <validValue>Large</validValue>
</validValues>
<value>Small</value>
<valueType>SingleSelection</valueType>
</parameter>
</parameters>
</resourceCriteria>
```

### Retrieve Resource Usage Requirements for a Deployed NF: Example

The following example retrieve the current deployed NF resource usage requirement for scaling purposes.

#### Request XML

```
<?xml version="1.0" encoding="UTF-8"?>
<resourceCriteria>
  <hscName>hscForCsmStandaloneBoston</hscName>
  <parameters>
    <parameter>
      <description>Minimum Number of Subscribers.</description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MinimumNumberOfSubscribers</name>
      <readOnly>>false</readOnly>
      <value>450000</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Maximum Number Of Subscribers</description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MaximumNumberOfSubscribers</name>
      <readOnly>>false</readOnly>
      <value>850000</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Minimum Messages per Second for Busy Hour Call Attempts</
description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MinimumMessagesPerSecond</name>
      <readOnly>>false</readOnly>
      <value>7360</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Maximum Messages per Second for Busy Hour Call Attempts</
description>
      <maxValue>9223372036854775807</maxValue>
      <minValue>-9223372036854775808</minValue>
      <name>MaximumMessagesPerSecond</name>
      <readOnly>>false</readOnly>
      <value>13650</value>
      <valueType>NumberString</valueType>
    </parameter>
    <parameter>
      <description>Sizing Model</description>
```

```

<name>SizingModel</name>
<readOnly>>false</readOnly>
<validValues>
  <validValue>Small</validValue>
  <validValue>Medium</validValue>
  <validValue>Large</validValue>
</validValues>
<value>Small</value>
<valueType>SingleSelection</valueType>
</parameter>
</parameters>
</resourceCriteria>

```

## Response XML

```

<?xml version="1.0" encoding="UTF-8"?>
<!--assuming 3 csm, 1 slrm, 2 Asbc, 1 SLB -->
<nfRequirement>
  <nfdName>IMS-Access-Hybrid</nfdName>
  <nfdId>12</nfdId>
  <nfdVendor>ORACLE</nfdVendor>
  <nfdVendorId>ACME</nfdVendorId>
  <nfdVersion>ORACLE</nfdVersion>
  <hscName>HSCForIMS-Access-Hybrid-EastCoast</hscName>
  <name/>
  <id/>
  <resourceCriteria/>
  <vLinks>
    <vLink>
      <id>11</id>
      <scope>public</scope>
      <name>Access</name>
      <description>This is media network for Access</description>
      <type>Media</type>
      <qos>
        <latency>10ms</latency>
        <jitter>50ms</jitter>
        <pktLoss>0%</pktLoss>
        <bandwidth>10G</bandwidth>
      </qos>
      <connectedNICs/>
      <subnets>
        <subnet>
          <id>2101</id>
          <name>Access_11</name>
          <vlanId>11</vlanId>
          <epPools/>
          <externalEps/>
          <sharedExternalEps/>
        </subnet>
        <subnet>
          <id>2102</id>
          <name>Access:0</name>
          <vlanId>0</vlanId>
          <epPools/>
          <externalEps/>
          <sharedExternalEps/>
        </subnet>
      </subnets>
    </vLink>
    <vLink>
      <id>12</id>
      <scope>public</scope>

```

```
<name>Core</name>
<description>This is media network for Core</description>
<type>Media</type>
<qos>
  <latency>10ms</latency>
  <jitter>50ms</jitter>
  <pktLoss>0%</pktLoss>
  <bandwidth>10G</bandwidth>
</qos>
<connectedNICs/>
<subnets>
  <subnet>
    <id>2201</id>
    <name>CoreSubnet</name>
    <vlanId>0</vlanId>
    <epPools/>
    <externalEps/>
    <sharedExternalEps/>
  </subnet>
</subnets>
</vLink>
</vLinks>
<virtualResource>
  <virtualTotal>
    <currentCpuCore>0</currentCpuCore>
    <currentMemoryMB>0</currentMemoryMB>
    <currentDiskGB>0</currentDiskGB>
    <minCpuCore>14</minCpuCore>
    <minMemoryMB>14</minMemoryMB>
    <minDiskGB>301</minDiskGB>
    <maxCpuCore>128</maxCpuCore>
    <maxMemoryMB>128</maxMemoryMB>
    <maxDiskGB>2748</maxDiskGB>
    <supportedAccelerators>
      <softwareBased>
        <type>DPDK</type>
      </softwareBased>
      <hardwareBased>
        <epa>PCI-passthrough</epa>
        <epa>transcoding</epa>
        <epa>encryption</epa>
        <epa>IntelAVX</epa>
      </hardwareBased>
    </supportedAccelerators>
  </virtualTotal>
  <virtualGroups>
    <vScalabilityGroup>
      <name>CSM-Core</name>
      <componentType>CSM</componentType>
      <version>SCZ715</version>
      <deviceInfo>
        <parameters>
          <parameter>
            <name>deviceGroup</name>
            <value/>
            <type>String</type>
            <description>this is the device group that the device belongs
to</description>
          </parameter>
          <parameter>
            <name>snmpCommunity</name>
            <value/>
            <type>String</type>
            <description>the device snmp community</description>
          </parameter>
        </parameters>
      </deviceInfo>
    </vScalabilityGroup>
  </virtualGroups>
</virtualResource>
```

```

        </parameter>
        <parameter>
          <name>autoScaling</name>
          <value>>false</value>
          <type>String</type>
          <description>this is the scaling mode</description>
        </parameter>
        <parameter>
          <name>deviceUserPassword</name>
          <value/>
          <type>String</type>
          <description>the user password on device customer wish to use</
description>
        </parameter>
        <parameter>
          <name>deviceAdminPassword</name>
          <value/>
          <type>String</type>
          <description>the admin user password on device customer wish to
use</description>
        </parameter>
        <parameter>
          <name>deviceConfigPassword</name>
          <value/>
          <type>String</type>
          <description>this is the configuration password on device
customer wish to use</description>
        </parameter>
      </parameters>
    </deviceInfo>
    <dcParameters>
      <parameter>
        <name>transcodingCoreUsage</name>
        <value/>
        <type>String</type>
        <description>the CPU cores that dedicate for transcoding</
description>
      </parameter>
      <parameter>
        <name>dosCoreUsage</name>
        <value/>
        <type>String</type>
        <description>the CPU cores that dedicate for DOS</description>
      </parameter>
      <parameter>
        <name>forwardingCoreUsage</name>
        <value/>
        <type>String</type>
        <description>the CPU cores that dedicate for forwarding</
description>
      </parameter>
      <parameter>
        <name>signalingCoreUsage</name>
        <value/>
        <type>String</type>
        <description>the CPU cores that dedicate for signaling</
description>
      </parameter>
      <parameter>
        <name>pageSizeInMB</name>
        <value/>
        <type>String</type>
        <description>memory page size either in 2 for 2MB or 1024 for
1GB</description>

```

```
</parameter>
<parameter>
  <name>memorySize</name>
  <value/>
  <type>String</type>
  <description>memory size either 1024 for page size 2MB or 1 for
page size 1GB </description>
</parameter>
</dcParameters>
<geoRedundancyGroups>
  <geoRedundancyGroup>
    <type>primary</type>
    <currentSegmentCount>0</currentSegmentCount>
    <requiredSegmentCount>3</requiredSegmentCount>
    <removedSegmentCount>0</removedSegmentCount>
    <maximumSegmentCount>5</maximumSegmentCount>
    <groupSegment>
      <cpuCore>2</cpuCore>
      <memoryMB>4096</memoryMB>
      <diskGB>8</diskGB>
      <supportedAccelerators>
        <hardwareBased>
          <epa>encryption</epa>
          <epa>IntelAVX</epa>
        </hardwareBased>
      </supportedAccelerators>
      <vLinks>
        <vLink>
          <id/>
          <scope/>
          <name>Core</name>
          <description/>
          <type/>
          <qos/>
          <connectedNICs/>
          <subnets>
            <subnet>
              <id>2201</id>
              <name>CoreSubnet</name>
              <vlanId/>
              <epPools>
                <epPool>
                  <type>IPv4</type>
                  <size>1</size>
                </epPool>
                <epPool>
                  <type>IPv6</type>
                  <size>0</size>
                </epPool>
                <epPool>
                  <type>Mac</type>
                  <size>0</size>
                </epPool>
              </epPools>
              <externalEps>
                <endpoint>
                  <name>CxInterfacel</name>
                  <id>23232</id>
                  <type>Cx</type>
                  <description>Cx</description>
                  <parameters>
                    <parameter>
                      <name>protocol</name>
                      <value/>
                    </parameter>
                  </parameters>
                </endpoint>
              </externalEps>
            </subnet>
          </subnets>
        </vLink>
      </vLinks>
    </groupSegment>
  </geoRedundancyGroup>
</geoRedundancyGroups>
```

```

        <type>String</type>
        <description>network protocol for this
endpoint</description>
    </parameter>
    <parameter>
        <name>port</name>
        <value/>
        <type>String</type>
        <description>port number for this endpoint</
description>
    </parameter>
    <parameter>
        <name>ip</name>
        <value/>
        <type>IPv4</type>
        <description>ip address for this endpoint</
description>
    </parameter>
</parameters>
</endpoint>
<endpoint>
    <name>CxInterface2</name>
    <id>23233</id>
    <type>Cx</type>
    <description>Cx</description>
    <parameters>
        <parameter>
            <name>protocol</name>
            <value/>
            <type>String</type>
            <description>network protocol for this
endpoint</description>
        </parameter>
        <parameter>
            <name>port</name>
            <value/>
            <type>String</type>
            <description>port number for this endpoint</
description>
        </parameter>
        <parameter>
            <name>ip</name>
            <value/>
            <type>IPv4</type>
            <description>ip address for this endpoint</
description>
        </parameter>
    </parameters>
</endpoint>
</externalEps>
<sharedExternalEps/>
</subnet>
</subnets>
</vLink>
<vLink>
    <id/>
    <scope/>
    <name>Management</name>
    <description/>
    <type/>
    <qos/>
    <connectedNICs/>
    <subnets>
        <subnet>

```

```
<id>2301</id>
<name>MgmtSubnet</name>
<vlanId/>
<epPools>
  <epPool>
    <type>IPv4</type>
    <size>2</size>
  </epPool>
  <epPool>
    <type>IPv6</type>
    <size>0</size>
  </epPool>
  <epPool>
    <type>Mac</type>
    <size>0</size>
  </epPool>
</epPools>
<externalEps/>
<sharedExternalEps/>
</subnet>
</subnets>
</vLink>
<vLink>
  <id/>
  <scope/>
  <name>HARedundancy1</name>
  <description/>
  <type/>
  <qos/>
  <connectedNICs/>
  <subnets>
    <subnet>
      <id>2401</id>
      <name>HAUtil_1_Subnet</name>
      <vlanId/>
      <epPools>
        <epPool>
          <type>IPv4</type>
          <size>2</size>
        </epPool>
        <epPool>
          <type>IPv6</type>
          <size>0</size>
        </epPool>
        <epPool>
          <type>Mac</type>
          <size>0</size>
        </epPool>
      </epPools>
      <externalEps/>
      <sharedExternalEps/>
    </subnet>
  </subnets>
</vLink>
<vLink>
  <id/>
  <scope/>
  <name>HARedundancy2</name>
  <description/>
  <type/>
  <qos/>
  <connectedNICs/>
  <subnets>
    <subnet>
```



```

        <id>2501</id>
        <name>HAUtil_2_Subnet</name>
        <vlanId/>
        <epPools>
          <epPool>
            <type>IPv4</type>
            <size>2</size>
          </epPool>
          <epPool>
            <type>IPv6</type>
            <size>0</size>
          </epPool>
          <epPool>
            <type>Mac</type>
            <size>0</size>
          </epPool>
        </epPools>
        <externalEps/>
        <sharedExternalEps/>
      </subnet>
    </subnets>
  </vLink>
</vLinks>
</groupSegment>
</geoRedundancyGroup>
<geoRedundancyGroup>
  <type>Disaster Recovery</type>
  <currentSegmentCount>0</currentSegmentCount>
  <requiredSegmentCount>3</requiredSegmentCount>
  <removedSegmentCount>0</removedSegmentCount>
  <maximumSegmentCount>5</maximumSegmentCount>
  <groupSegment>
    <cpuCore>2</cpuCore>
    <memoryMB>4096</memoryMB>
    <diskGB>8</diskGB>
    <supportedAccelerators>
      <hardwareBased>
        <epa>encryption</epa>
        <epa>IntelAVX</epa>
      </hardwareBased>
    </supportedAccelerators>
    <vLinks>
    </vLinks>
  </groupSegment>
</geoRedundancyGroup>
</geoRedundancyGroups>
</vScalabilityGroup>
<vScalabilityGroup>
  <name>SLRM-Core</name>
  <componentType>SLRM</componentType>
  <version>SCZ715</version>
  <deviceInfo>
  </deviceInfo>
  <dcParameters>
  </dcParameters>
  <geoRedundancyGroups>
    <geoRedundancyGroup>
      <type>primary</type>
      <currentSegmentCount>0</currentSegmentCount>
      <requiredSegmentCount>1</requiredSegmentCount>
      <removedSegmentCount>0</removedSegmentCount>
      <maximumSegmentCount>2</maximumSegmentCount>
      <groupSegment>
        <cpuCore>2</cpuCore>

```



```

    <scope/>
    <name/>
    <description/>
    <type/>
    <qos/>
    <connectedNICs>
      <connectedNIC>s0p0</connectedNIC>
      <connectedNIC>s0p1</connectedNIC>
    </connectedNICs>
    <subnets>
      <subnet>
        <id>2101</id>
        <name/>
        <vlanId/>
        <epPools>
          <epPool>
            <type>IPv4</type>
            <size>2</size>
          </epPool>
        </epPools>
        <externalEps>
          <endpoint>
            <name>physcalMgmt</name>
            <id>23232</id>
            <type>Cx</type>
            <description>Cx</description>
            <parameters>
              <parameter>
                <name>protocol</name>
                <value/>
                <type>String</type>
                <description>network protocol for this
endpoint</description>
              </parameter>
              <parameter>
                <name>port</name>
                <value/>
                <type>String</type>
                <description>port number for this endpoint</
description>
              </parameter>
              <parameter>
                <name>ip</name>
                <value/>
                <type>IPv4</type>
                <description>ip address for this endpoint</
description>
              </parameter>
            </parameters>
          </endpoint>
        </externalEps>
        <sharedExternalEps/>
      </subnet>
    </subnets>
  </vLink>
</vLinks>
</groupSegment>
</geoRedundancyGroup>
</geoRedundancyGroups>
</pScalabilityGroup>
</physicalGroups>
</physicalResource>
</nfRequirement>

```

### Deploy an NF: Example

The following example deploys a new NF.

#### Request XML

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?> <nfResourceConfig>
  <name>hong-ims-hybrid-nf</name>
  <description>Hong IMS hybrid on vCloud test</description>
  <appName>myApp</appName>
  <appGlobalId>ACME</appGlobalId>
  <hscName>hong-ims-hybrid-hsc</hscName>
  <resourceCriteria>
    <parameters>
      <parameter>
        <name>SizingModel</name>
        <value>Small</value>
      </parameter>
      <parameter>
        <name>MinimumNumberOfSubscribers</name>
        <value>250000</value>
      </parameter>
      <parameter>
        <name>MaximumNumberOfSubscribers</name>
        <value>850000</value>
      </parameter>
      <parameter>
        <name>MinimumMessagesPerSecond</name>
        <value>7360</value>
      </parameter>
      <parameter>
        <name>MaximumMessagesPerSecond</name>
        <value>13650</value>
      </parameter>
      <parameter>
        <name>MinimumCPS</name>
        <value>32</value>
      </parameter>
      <parameter>
        <name>MaximumCPS</name>
        <value>43</value>
      </parameter>
      <parameter>
        <name>MinimumNumberOfSessions</name>
        <value>2870</value>
      </parameter>
      <parameter>
        <name>MaximumNumberOfSessions</name>
        <value>3870</value>
      </parameter>
      <parameter>
        <name>AverageCallTime</name>
        <value>90</value>
      </parameter>
    </parameters>
  </resourceCriteria>
  <computeStorageGroups>
    <dc>
      <vDC>
        <vdcName>qa-vdc</vdcName>
        <vLinks>
          <vLink>
            <name>wancom1Link</name>
          </vLink>
        </vLinks>
      </vDC>
    </dc>
  </computeStorageGroups>
</nfResourceConfig>
```

```

<cloudNetworkName>wancom1</cloudNetworkName>
<cloudNetworkId>https://10.196.149.45/api/network/0964f6a8-
b2e6-4272-8652-26bd51a5d8a4</cloudNetworkId>
  <subnets>
    <subnet>
      <name>wancom1Link:0</name>
      <vlanId>0</vlanId>
      <epPools>
        <epPool>
          <type>IPv4</type>
          <size>4</size> <range>168.254.1.121-168.254.1.124</
range>
          </epPool>
        </epPools>
      </subnet>
    </subnets>
  </vLink>
<vLink>
  <name>wancom2Link</name>
<cloudNetworkName>wancom2</cloudNetworkName>
<cloudNetworkId>https://10.196.149.45/api/network/abd36a47-
c086-43dd-95c6-16ae7e092aae</cloudNetworkId>
  <subnets>
    <subnet>
      <name>wancom2Link:0</name>
      <vlanId>0</vlanId>
      <epPools>
        <epPool>
          <type>IPv4</type>
          <size>4</size> <range>168.254.2.121-168.254.2.124</
range>
          </epPool>
        </epPools>
      </subnet>
    </subnets>
  </vLink>
<vLink>
  <name>wancom0Link</name>
<cloudNetworkName>MgmtNet</cloudNetworkName>
<cloudNetworkId>https://10.196.149.45/api/network/ac77f469-9e80-42ea-837a-
a295effc7c2e</cloudNetworkId>
  <subnets>
    <subnet>
      <name>wancom0Link:0</name> <vlanId>0</vlanId>
      <externalEpSegments>
        <externalEpSegment> <scalabilityGroup>CSM-core</
scalabilityGroup>
        <externalEps>
          <externalEp>
            <name>CSM-core/bootparams</name>
            <parameters>
              <parameter>
                <name>mgmtIP</name>
                <value>10.196.149.121</value>
              </parameter>
              <parameter> <name>mgmtHost</name>
                <value>csm121</value>
              </parameter>
              <parameter>
                <name>mgmtIP2</name>
                <value>10.196.149.122</value>
              </parameter>
              <parameter> <name>mgmtHost2</name>
                <value>csm122</value>
            </parameters>
          </externalEp>
        </externalEps>
      </externalEpSegments>
    </subnet>
  </subnets>

```

## Application Orchestrator REST API Examples

```

        </parameter>
        <parameter> <name>mgmtGateway</name>
</value>10.196.128.1</value>
        </parameter>
    </parameters>
</externalEp>
</externalEps>
</externalEpSegment>
<externalEpSegment> <scalabilityGroup>SLRM-core</
scalabilityGroup>
    <externalEps>
    <externalEp> <name>SLRM-core/bootparams</name>
    <parameters>
    <parameter>
        <name>mgmtIP</name>
</value>10.196.149.124</value>
    </parameter>
    <parameter> <name>mgmtHost</name>
</value>slrm124</value>
    </parameter>
    <parameter> <name>mgmtGateway</name>
</value>10.196.128.1</value>
    </parameter>
    </parameters>
</externalEp>
</externalEps>
</externalEpSegment>
<externalEpSegment> <scalabilityGroup>SBC-core</
scalabilityGroup>
    <externalEps>
    <externalEp> <name>SBC-core/bootparams</name>
    <parameters>
    <parameter>
        <name>mgmtIP</name>
</value>10.196.149.125</value>
    </parameter>
    <parameter> <name>mgmtHost</name>
</value>sbc125</value>
    </parameter>
    <parameter>
        <name>mgmtIP2</name>
</value>10.196.149.126</value>
    </parameter>
    <parameter> <name>mgmtHost2</name>
</value>sbc126</value>
    </parameter>
    <parameter> <name>mgmtGateway</name>
</value>10.196.128.1</value>
    </parameter>
    </parameters>
</externalEp>
</externalEps>
</externalEpSegment>
</externalEpSegments>
</subnet>
</subnets>
</vLink>
<vLink>
    <name>coreLink</name>
<cloudNetworkName>CoreNet</cloudNetworkName>
<cloudNetworkId>https://10.196.149.45/api/network/7791426d-
d2b0-475d-90c4-4b02c627512d</cloudNetworkId>
    <subnets>
    <subnet>

```

```

        <name>coreLink:0</name>
        <vlanId>0</vlanId>
<netmask>255.255.0.0</netmask>
        <epPools>
            <epPool>
                <type>IPv4</type>
                <size>7</size>
<range>172.16.205.121-172.16.205.127</range>
            </epPool>
            <epPool>
                <type>Mac</type>
                <size>2</size> <addresses><address>f2:50:56:40:0a:
21</address><address>f2:50:56:40:0a:25</address></addresses>
            </epPool>
        </epPools>
        <sharedEps>
            <sharedEp>
                <name>HSS-ep</name>
                <parameters>
                    <parameter>
                        <name>hssIP</name> <value>172.16.205.21</
value>
                    </parameter>
                </parameters>
            </sharedEp>
        </sharedEps>
    </subnet>
</subnets>
</vLink>
<vLink>
    <name>accessLink</name>
<cloudNetworkName>AccessNet</cloudNetworkName>
<cloudNetworkId>https://10.196.149.45/api/network/
21f02d8a-9e46-4dc3-8489-89987b85e77d</cloudNetworkId>
    <subnets>
        <subnet>
            <name>accessLink:11</name>
            <vlanId>11</vlanId>
            <netmask>255.255.0.0</netmask>
            <epPools>
                <epPool>
                    <type>IPv4</type>
                    <size>3</size>
<range>182.16.205.125-182.16.205.127</range>
                </epPool>
                <epPool>
                    <type>Mac</type>
                    <size>1</size> <addresses><address>f2:50:56:40:0a:
26</address></addresses>
            </epPools>
        </subnet>
    </subnets>
</vLink>
</vLinks>
</vDC>
<pDC>
    <siteName>oracle</siteName>
    <vLinks>
        <vLink>
            <name>serviceLink</name>
            <subnets>
                <subnet>
                    <name>serviceLink:0</name>

```

## Application Orchestrator REST API Examples

```
        <vlanId>0</vlanId>
        <netmask>255.255.0.0</netmask>
        <epPools>
          <epPool>
            <type>IPv4</type>
            <size>1</size>
<range>192.168.205.91-192.168.205.91</range>
          </epPool>
        </epPools>
      </subnet>
    </subnets>
  </vLink>
  <vLink>
    <name>accessLink</name>
    <subnets>
      <subnet>
        <name>accessLink:11</name>
        <vlanId>11</vlanId>
        <netmask>255.255.0.0</netmask>
        <epPools>
          <epPool>
            <type>IPv4</type>
            <size>1</size> <range>182.16.205.91-182.16.205.91</
range>
          </epPool>
        </epPools>
      </subnet>
    </subnets>
  </vLink>
  <vLink>
    <name>wancom0Link</name>
    <subnets>
      <subnet>
        <name>wancom0Link:0</name> <vlanId>0</vlanId>
        <externalEpSegments>
          <externalEpSegment> <scalabilityGroup>SLB-core</
scalabilityGroup>
        <externalEps>
          <externalEp>
<name>SLB-core/bootparams</name>
            <parameters>
              <parameter>
                <name>mgmtIP</name> <value>10.196.149.8</
value>
              </parameter>
              <parameter> <name>adminPassword</name>
<value>packet</value>
              </parameter>
              <parameter> <name>mgmtHost</name>
                <value>sd110</value>
              </parameter>
              <parameter> <name>mgmtGateway</name>
<value>10.196.128.1</value>
              </parameter>
            </parameters>
          </externalEp>
        </externalEps>
      </externalEpSegment>
    </externalEpSegments>
  </subnet>
</subnets>
</vLink>
</vLinks>
</pDC>
```



```

    </dcs>
    <vScalabilityGroup>
      <name>CSM-core</name>
      <componentType>CSM</componentType>
      <deviceInfo>
        <parameter>
<name>userPassword</name>
          <value>abc12345!</value>
        </parameter>
        <parameter>
<name>adminPassword</name>
          <value>abc12345!</value>
        </parameter>
        <parameter>
<name>configPassword</name>
          <value>acmepacket</value>
        </parameter>
        <parameter>
<name>deviceGroup</name>
          <value>Home</value>
        </parameter>
        <parameter>
<name>snmpCommunity</name>
          <value>public</value>
        </parameter>
        <parameter>
<name>useDeviceCluster</name>
          <value>true</value>
        </parameter>
        <parameter>
<name>deviceClusterName</name>
          <value>hong-csm-ha-cluster</value>
        </parameter>
      </deviceInfo>
      <geoRedundancyGroups>
        <geoRedundancyGroup>
          <type>Preferred</type>
          <reservedDcs>
            <reservedDc>
              <vdcName>qa-vdc</vdcName> <reservedSegmentCount>1</
reservedSegmentCount>
            <dcParameters>
              <parameter>
                <name>bootparams.gateway</name>
                <value>10.196.128.1</value>
              </parameter>
              <parameter>
                <name>bootparams.netmask0</name>
                <value>255.255.224.0</value>
              </parameter>
              <parameter>
                <name>bootparams.vlan</name>
                <value>0</value>
              </parameter>
            </dcParameters>
          </reservedDc>
        </reservedDcs>
      </geoRedundancyGroup>
    </geoRedundancyGroups>
  </vScalabilityGroup>
  <vScalabilityGroup>
    <name>SLRM-core</name>
    <componentType>SLRM</componentType>
    <deviceInfo>

```

## Application Orchestrator REST API Examples

```
    <parameter>
<name>userPassword</name>
    <value>abc12345!</value>
  </parameter>
  <parameter>
<name>adminPassword</name>
    <value>abc12345!</value>
  </parameter>
  <parameter>
<name>configPassword</name>
    <value>acmepacket</value>
  </parameter>
  <parameter>
<name>deviceGroup</name>
    <value>Home</value>
</parameter>
  <parameter>
<name>snmpCommunity</name>
    <value>public</value>
  </parameter>
  <parameter>
<name>useDeviceCluster</name>
    <value>true</value>
</parameter>
  <parameter>
<name>deviceClusterName</name>
    <value>hong-slrn-cluster</value>
  </parameter>
</deviceInfo>
<geoRedundancyGroups>
  <geoRedundancyGroup>
    <type>Preferred</type>
    <reservedDcs>
      <reservedDc>
        <vdcName>qa-vdc</vdcName> <reservedSegmentCount>1</
reservedSegmentCount>
        <dcParameters>
          <parameter>
            <name>bootparams.gateway</name>
            <value>10.196.128.1</value>
          </parameter>
          <parameter>
            <name>bootparams.netmask0</name>
            <value>255.255.224.0</value>
          </parameter>
          <parameter>
            <name>bootparams.vlan</name>
            <value>0</value>
          </parameter>
        </dcParameters>
      </reservedDc>
    </reservedDcs>
  </geoRedundancyGroup>
</geoRedundancyGroups>
</vScalabilityGroup>
<vScalabilityGroup>
  <name>SBC-core</name>
  <componentType>SBC</componentType>
  <deviceInfo>
    <parameter>
<name>userPassword</name>
    <value>abc12345!</value>
  </parameter>
  <parameter>
```

```

<name>adminPassword</name>
  <value>abc12345!</value>
</parameter>
<parameter>
<name>configPassword</name>
  <value>acmepacket</value>
</parameter>
<parameter>
<name>deviceGroup</name>
  <value>Home</value>
</parameter>
<parameter>
<name>snmpCommunity</name>
  <value>public</value>
</parameter>
<parameter>
<name>useDeviceCluster</name>
  <value>>true</value>
</parameter>
<parameter>
<name>deviceClusterName</name>
  <value>hong-sbc-ha-cluster</value>
</parameter>
<parameter>
<name>entitlement:capacity:capacity</name>
  <value>5000</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_ACCOUNTING</name>
  <value>>false</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_IPV6</name>
  <value>>false</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_SAG</name>
  <value>>true</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_QOS</name>
  <value>>true</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_SESSION_RECORDING</name>
  <value>>false</value>
</parameter>
<parameter>
<name>entitlement:feature:FEATURE_IWF</name>
  <value>>false</value>
</parameter>
<parameter>
<name>entitlement:feature:Routing</name>
  <value>>true</value>
</parameter>
<parameter>
  <name>entitlement:feature:Policy Server</name>
  <value>>true</value>
</parameter>
</deviceInfo>
<geoRedundancyGroups>
  <geoRedundancyGroup>
    <type>Preferred</type>
    <reservedDcs>

```

## Application Orchestrator REST API Examples

```
        <reservedDc>
          <vdcName>qa-vdc</vdcName> <reservedSegmentCount>1</
reservedSegmentCount>
          <dcParameters>
            <parameter>
              <name>bootparams.gateway</name>
              <value>10.196.128.1</value>
            </parameter>
            <parameter>
              <name>bootparams.netmask0</name>
              <value>255.255.224.0</value>
            </parameter>
            <parameter>
              <name>bootparams.vlan</name>
              <value>0</value>
            </parameter>
            <parameter>
<name>MediaPath.CoreUsageTranscoding</name>
              <value></value>
            </parameter>
            <parameter>
<name>MediaPath.CoreUsageDOS</name>
              <value>3</value>
            </parameter>
            <parameter>
<name>MediaPath.CoreUsageForwarding</name>
              <value>2</value>
            </parameter>
            <parameter>
<name>MediaPath.CoreUsageSignaling</name>
              <value>0,1</value>
            </parameter>
            <parameter>
              <name>MediaPath.PageSize</name>
              <value>2M</value>
            </parameter>
            <parameter>
              <name>MediaPath.MemorySize</name>
              <value>1024</value>
            </parameter>
            <parameter>
              <name>bootparams.other</name>
              <value>isolcpus=2,3</value>
            </parameter>
          </dcParameters>
        </reservedDc>
      </reservedDcs>
    </geoRedundancyGroup>
  </geoRedundancyGroups>
</vScalabilityGroup>
<pScalabilityGroup>
  <name>SLB-core</name>
  <componentType>SLB</componentType>
  <deviceInfo>
    <parameter>
<name>deviceGroup</name>
      <value>Home</value>
    </parameter>
    <parameter>
<name>snmpCommunity</name>
      <value>public</value>
    </parameter>
    <parameter>
<name>useDeviceCluster</name>
```

```

        <value>>true</value>
</parameter>
    <parameter>
<name>deviceClusterName</name>
        <value>hong-slb-cluster</value>
    </parameter>
</deviceInfo>
    <geoRedundancyGroups>
        <geoRedundancyGroup>
            <type>Preferred</type>
            <reservedDcs>
                <reservedDc>
                    <siteName>oracle</siteName> <reservedSegmentCount>1</
reservedSegmentCount>
                </reservedDc>
            </reservedDcs>
        </geoRedundancyGroup>
    </geoRedundancyGroups>
</pScalabilityGroup>
</computeStorageGroups>
</nfResourceConfig>

```

### Response XML

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?> <nf>
    <appGlobalId>ACME</appGlobalId>
    <appName>myApp</appName>
    <currentCPUCore>20</currentCPUCore>
    <currentDiskGB>236</currentDiskGB>
    <currentMemoryMB>81920</currentMemoryMB>
    <deployedDUs>4</deployedDUs>
    <description>Hong IMS hybrid on vCloud test</description>
    <failedDUs>0</failedDUs>
    <id>656</id>
    <maxCPUCore>52</maxCPUCore>
    <maxDiskGB>614</maxDiskGB>
    <maxMemoryMB>212992</maxMemoryMB>
    <minCPUCore>20</minCPUCore>
    <minDiskGB>236</minDiskGB>
    <minMemoryMB>81920</minMemoryMB>
    <name>hong-ims-hybrid-nf</name>
    <state>Running</state>
</nf>

```

## Retrieve NF Status Information: Example

The following example retrieves detailed NF deployment, capacity, health, and scalability group status information.

### Response XML

```

<?xml version="1.0" encoding="UTF-8"?>
<nfState>
    <capacityState>Good</capacityState>
    <deploymentState>Running</deploymentState>
    <healthState>Healthy</healthState>
    <id>513</id>
    <name>TGE_CSM_SharedEp_TEST</name>
    <groupStates>
        <groupState>
            <capacityState>Good</capacityState>
            <componentType>CSM</componentType>
            <deploymentState>Running</deploymentState>
            <healthState>Healthy</healthState>

```

## Application Orchestrator REST API Examples

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```
<id>514</id>
<name>CSM-core</name>
<scalingState>Good</scalingState>
</groupState>
</groupStates>
</nfState>
```

### Submit an Action Request on a Deployed NF: Example

The following example submits an action request on deployed NF.

#### Request XML

```
<?xml version="1.0" encoding="UTF-8"?>
<nfAction>
  <appName>NSO</appName>
  <appGlobalId>NSOBoston</appGlobalId>
  <type>SetOperational|Undeploy|Redeploy|Delete</type>
</nfAction>
```

## Application Orchestrator Scaling Event Resource Examples

---

### Retrieve All Event Registrations: Example

The following example lists all event registrations from Oracle Communications Application Orchestrator.

#### Response XML

```
<?xml version="1.0" encoding="UTF-8"?>
<eventRegistrations>
  <eventRegistration>
    <appName>OCSEM</appName>
    <appGlobalId>OCSEMBoston</appGlobalId>
    <callbackServerBaseUris>
      <callbackServerBaseUri>http://localhost:8080</callbackServerBaseUri>
    </callbackServerBaseUris>
    <callbackUriPath>/rest/v1.0/ocsem/events/callback</callbackUriPath>
    <eventTopics>
      <eventTopic>ScalingRequest</eventTopic>
      <eventTopic>Scaling</eventTopic>
      <eventTopic>StateChange</eventTopic>
    </eventTopics>
    <id>1</id>
    <loginUriPath>/rest/v1.0/admin/login</loginUriPath>
    <logoutUriPath>/rest/v1.0/admin/logout</logoutUriPath>
    <messageFormat>xml</messageFormat>
    <pwd>xxxx</pwd>
    <user>AoSystem</user>
  </eventRegistration>
  <eventRegistration>
    <appName>NSO</appName>
    <appGlobalId>NSOBoston</appGlobalId>
    <callbackServerBaseUris>
      <callbackServerBaseUri>http://localhost:9191</callbackServerBaseUri>
    </callbackServerBaseUris>
    <callbackUriPath>eventReceiver/event</callbackUriPath>
    <description>event registration test</description>
    <eventTopics>
      <eventTopic>Scaling</eventTopic>
      <eventTopic>ScalingRequest</eventTopic>
      <eventTopic>StateChange</eventTopic>
    </eventTopics>
  </eventRegistration>
</eventRegistrations>
```

```

</eventTopics>
<id>4</id>
<loginUriPath>eventReceiver/login</loginUriPath>
<logoutUriPath>eventReceiver/logout</logoutUriPath>
<messageFormat>xml</messageFormat>
<pwd>xxxx</pwd>
<user>admin</user>
</eventRegistration>
<pageInfo>
  <limitation>50</limitation>
  <numberOfElements>2</numberOfElements>
  <offset>1</offset>
</pageInfo>
</eventRegistrations>

```

## Confirm an Event: Example

The following example submits data to the northbound client application to confirm that it received an event message from Oracle Communications Application Orchestrator.

### Request XML

```

<?xml version="1.0" encoding="UTF-8"?>
<eventStatus>
  <seqId>123</seqId>
  <appName>NSO</appName>
  <appGlobalId>NSOBoston</appGlobalId>
  <eventType>ScaleOut</eventType >
  <status>Success|Failed</status></eventStatus>

```

## Retrieve Application Orchestrator Alarms: Example

The following example retrieves Oracle Communications Application Orchestrator alarms that are generated when an alarm occurs on a node for the northbound client application.

### Response XML

```

<?xml version="1.0" encoding="UTF-8"?>
<alarmDetails>
  <alarmDetail>
    <acknowledgedBy/>
    <annotation/>
    <description>String</description>
    <failedResource>10.196.0.91</failedResource>
    <objectId>1</objectId>
    <severity>Major</severity>
    <source>10.196.0.91</source>
    <sourceGroupId>45</sourceGroupId>
    <sourceIp>10.196.0.91</sourceIp>
    <sysUpTime>0 days, 0 hours, 1 minutes, 5 seconds</sysUpTime>
    <time>Thu Mar 17 11:09:54 EDT 2016</time>
    <trapName>apNNCTrapRelayNotAliveNotification</trapName>
    <type>TrapRelayMonitor</type>
  </alarmDetail>
</alarmDetails>

```





---

## Install and Configure the REST Sample Client

The following task shows how to install and configure the REST sample client on which you can view the structure and composition of the Oracle Communications Application Orchestrator REST API in order to help you construct your own REST client.

1. Download the NNC<Version>RESTClient.zip file from the [Oracle Delivery Software Cloud](#) to your server by doing the following:
  - a) Type **Oracle Communications Application Orchestrator** in the **Product** drop-down list.
  - b) Click the **Select Platform** drop-down list.
  - c) In the **Select Platform** drop-down dialog box, select **Acme Packet OS**.
  - d) Continue through the next screens and accept the Oracle license agreements and download the product installation zip file.
2. Within the product installation zip file, unzip <NNC\_VERSION>RESTClient.zip file and open the README.txt file.
3. Download the Jersey client software to the /lib directory, and unzip the file. Use the README.txt file to verify the Jersey client directory structure on the server.
4. Run `chmod +x *` within the bin folder to make bash scripts executable.
5. Run the `./build.sh` to compile source code.
6. Open and modify the <rest-client> class file to configure REST API calls under the src folder by editing the RESTClientExample, which is a container of all calls to the Oracle Communications Application Orchestrator REST API and uncomment parameters in the main () method to execute different call flows.
7. Modify XML files in the xml folder.
8. Configure the individual REST API methods, which are called from the main method.
9. Run the `./run.sh <rest-client> <server-name>:<port>` script to execute the desired REST client within the src folder.

