



# EMC ViPR Controller

Version 2.3.0.0

## ViPR Controller REST API Virtual Data Center Configuration Guide

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# CHAPTER 1

## Virtual Data Center Configuration Overview

After EMC ViPR Controller installation, ViPR Controller System Administrators, and Tenant Administrators can use the ViPR Controller UI, or ViPR Controller REST API to configure the ViPR Controller Virtual Data Center (VDC).

This document provides the steps to configure the ViPR Controller VDC using the ViPR Controller REST API. Before you begin to configure your VDC:

- Review the information, and requirements in the *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- For steps to configure the VDC using the ViPR Controller UI, see the *ViPR Controller User Interface Virtual Data Center Configuration Guide* on the [ViPR Controller Product Documentation Index](#).

You can add any of the physical or virtual assets to ViPR Controller at anytime. However, if you are setting up the VDC for the first time, you should follow these steps:

### Procedure

1. Authenticate with the ViPR Controller REST API with credentials that match the roles required for the REST requests used to setup the virtual data center. The root user for your ViPR Controller has all of the role assignments you need. See [Authenticating with the REST API on page 9](#).
2. Add physical assets to ViPR.
  - [Adding storage systems on page 17](#)
  - [Adding a data protection system on page 29](#)
  - [Adding network systems \(fabric managers\) and SAN networks on page 33](#)
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3. Create ViPR virtual assets
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# CHAPTER 2

## Authenticating with the REST API

This chapter contains the following topics:

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- [Authenticate with cookies](#)..... 10
- [Authenticate without cookies](#)..... 11
- [How to handle an HTTP 302 authentication redirect](#)..... 12
- [Logout](#)..... 14
- [A ViPR Controller user can view their own name, tenant associate, and roles using the whoami API call](#)..... 15

## Overview

ViPR Controller uses a token-based authentication system for all its REST API calls. Examples are provided for authentication with the ViPR Controller REST API, with cookies and without cookies.

Once a user is authenticated against ViPR Controller, an authentication token is returned and can be used to authenticate the user in subsequent calls.

Authentication tokens expire after eight hours or after two hours of idle time. Once expired, the token is internally destroyed. If a client makes a request with the expired token:

- An HTTP 401 code is returned if the client is automatically following redirects, indicating that you need to login and authenticate to obtain a new token.
- An HTTP 302 code is returned if the client is not automatically following redirects. The 302 code directs the client to where to get re-authenticated.

---

### Note

If running a REST API script, you can get a proxy token to run the script. A proxy token does not expire. See [Use a proxyuser to run a ViPR Controller REST API script](#).

---

You can retrieve and use authentication tokens by:

- Saving the X-SDS-AUTH-TOKEN cookie from a successful authentication request and sending that cookie along in subsequent requests.
- Reading the X-SDS-AUTH-TOKEN HTTP header from a successful authentication request and copying that header into any subsequent request.

The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in the following examples.

## Authenticate with cookies

This example shows how to use authentication tokens by saving the cookie from a successful authentication request, then passing the cookie in a subsequent request. The examples here are written in `curl` and formatted for readability.

In this example, you specify the `?using-cookies=true` parameter to indicate that you want to receive cookies in addition to the normal HTTP header. This `curl` command saves the authentication token to a file named `cookiefile` in the current directory.

```
curl -L --location-trusted
-k https://<ViPR_Controller_VIP>:4443/login?using-cookies=true
-u "root:Password"
-c cookiefile
-v
```

The next command passes the cookie with the authentication token through the `-b` switch, and returns the user's tenant information.

```
curl -k https://10.247.100.247:4443/tenant -b cookiefile -v

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<tenant_info><name>Provider Tenant</name>
```

```

    <link href="/tenants/
urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:"
rel="self"/>
    <id>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:</
id>
</tenant_info>

```

## Authenticate without cookies

This example shows how to use authentication tokens by reading the X-SDS-AUTH-TOKEN http header from a successful authentication request and copying that header into a subsequent request. This example does not use cookies. The examples here are written in `curl` and formatted for readability.

This command executes a GET on the `/login` resource. The `-u` option indicates the user of basic authentication header. The user designation must be included in the request. Upon successful authentication, a HTTP 200 code is returned as well as the X-SDS-AUTH-TOKEN header containing the encoded token.

```

curl -L --location-trusted -k https://10.247.100.247:4443/login -u
"root:ChangeMe" -v

> GET /login HTTP/1.1
> Authorization: Basic cm9vdDpDaGFuZ2VNZQ==
> User-Agent: curl/7.24.0 (i386-pc-win32) libcurl/7.24.0 OpenSSL/
0.9.8t zlib/1.2.5
> Host: 10.247.100.247:4443
> Accept: */*
>
< HTTP/1.1 200 OK
< Date: Tue, 26 Nov 2013 22:18:25 GMT
< Content-Type: application/xml
< Content-Length: 93
< Connection: keep-alive
< X-SDS-AUTH-TOKEN:
BAAcQ0xOd3g0MjRCUG4zT3NjdnNum1AvQTFyblNrPQMAUAQADTEzODU0OTQ4NzYzNTICAA
EABQA5dXJu

OnN0b3JhZ2VvczpbUb2t1bjo2MjIxOTcyZS01NGUyLTRmNWQtYWZjOC1kMGE3ZDZmZDU3Mm
U6AgAC0A8=
<
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<loggedIn>
  <user>root</user>
</loggedIn>
* Connection #0 to host 10.247.100.247 left intact
* Closing connection #0
* SSLv3, TLS alert, Client hello (1):

```

The token can then be passed back in the next API call. You can copy the X-SDS-AUTH-TOKEN contents and pass it to the next request through `curl`'s `-H` switch.

```

curl https://10.247.100.247:4443/tenant
-k
-H "X-SDS-AUTH-TOKEN:
BAAcOHZLaGF4MTl3eFhpY0czZ0tWUGhJV2xreUE4PQMAUAQADTEzODU0OTQ4NzYzNTICAA
EABQA5dXJu

```

```
OnN0b3JhZ2VvczpwU2t1bjpkYzc3ODU3Mi04NWRmLTQ2YjMtYjgwZi05YTdlNDFkY2QwZDg6AgAC0A8="
```

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<tenant_info>
  <name>Provider Tenant</name>\
  <link href="/tenants/
urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:"
rel="self"/>
  <id>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:</
id>
</tenant_info>
```

## How to handle an HTTP 302 authentication redirect

If you try to access a ViPR Controller REST resource without a valid token, ViPR Controller will issue an HTTP 302 redirect code.

An HTTP 302 redirect code includes the URL of the authentication resource, appended with a `service=` parameter that indicates where to be redirected after successful authentication.

## Handle authentication redirects using cookies

Using cookies, you can automatically follow redirects.

The following curl example allows access to the API resource by passing credentials to it, and passing curl's `-L` option which instructs curl to automatically follow the redirects. The final HTTP response code is 200 OK, although in the full verbose output you can see how curl received the HTTP 302 Found and automatically followed the redirect.

### Request

```
curl -k "<ViPR_Controller_VIP>:4443/tenant?using-cookies=true" -u
"root:ChangeMe" -c cookie1 -b cookie1 -L -v
```

### Response

```
HTTP 200 OK
```

### Response Body

```
GET /tenant?using-cookies=true HTTP/1.1
Authorization: Basic cm9vdDpDaGFuZ2VNZQ==
User-Agent: curl/7.24.0 (i386-pc-win32) libcurl/7.24.0 OpenSSL/0.9.8t
zlib/1.2.5
Host: 10.247.100.247:4443
Accept: */*
Cookie: X-SDS-AUTH-
TOKEN=BAAcV1M5TkkwdnRvUFBJbXJkbzVqSzB3azZBQ0VnPQMAUAQADTEzODU0OTQ4NzYz
NTICAAEABQA5dXJuOnN0b3JhZ2VvczpwU2t1bjpkYzc3ODU3Mi04NWRmLTQ2YjMtYjgwZi05YTdlNDFkY2QwZDg6AgAC0A8=
xNwVmOTU6AgAC0A8=

HTTP/1.1 200 OK
Date: Wed, 27 Nov 2013 18:57:12 GMT
Content-Type: application/xml
Content-Length: 276
```

```

Connection: keep-alive

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<tenant_info>
<name>Provider Tenant</name>
<link href="/tenants/urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-
c40b6de2c72f:" rel="self"/>
<id>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:</id>
</tenant_info>

```

## Handle authentication redirects without using cookies

This example shows what to do when you authenticate with an invalid security token or no token. This example does not use cookies. The examples in this section are written in curl.

In this example, the initial request for the current user's tenant returns an HTTP 302 error. Note the following:

- The X-SDS-AUTH-TOKEN header has to be copied into each request.
- The X-SDS-AUTH-TOKEN header is a custom HTTP header.
- If you are not using cookies, HTTP clients that use the **automatically follow redirects** option need to disable it. Automatically following redirects would mean the client follows all HTTP 302 responses without copying the custom header. This results in an authentication failure.

### Procedure

1. Request the current user's tenant.

#### Request

```
curl -k "<ViPR_Controller_VIP>:4443/tenant" -v
```

#### Response

```

GET /tenants HTTP/1.1
User-Agent: curl/7.24.0 (i386-pc-win32) libcurl/7.24.0 OpenSSL/
0.9.8t zlib/1.2.5
Host: 10.247.100.247:4443
Accept: */*

HTTP/1.1 302 Found
Date: Wed, 27 Nov 2013 15:30:13 GMT
Content-Length: 0
Connection: keep-alive
Location: <ViPR_Controller_VIP>/login?service={LocationString}

```

2. Perform a GET against the location in the response body.

#### Request

```
curl -k "<ViPR_Controller_VIP>:4443/login?service={LocationString}" -v
```

#### Response

```

HTTP/1.1 401 Unauthorized
WWW-Authenticate: basic realm="ViPR"

```

## 3. Present basic authentication credentials to the URL returned in step 1.

## Request

```
curl -k "<ViPR_Controller_VIP>:4443/login?service={LocationString}"
-v -u "root:ChangeMe"
```

## Response

```
GET /login?service={LocationString} HTTP/1.1
> Authorization: Basic cm9vdDpDaGFuZ2VNZQ==
> User-Agent: curl/7.24.0 (i386-pc-win32) libcurl/7.24.0 OpenSSL/
0.9.8t zlib/1.2.5
> Host: 10.247.100.247:4443
> Accept: */*
>
< HTTP/1.1 302 Found
< Date: Wed, 27 Nov 2013 16:53:28 GMT
< Content-Type: application/xml
< Content-Length: 0
< Connection: keep-alive
< Location: https://10.247.100.247:4443/tenant?auth-redirected
< X-SDS-AUTH-TOKEN: {Token_String}
```

On successful authentication, you see another 302 code, this time redirecting you to the original service. The authentication token is also in the HTTP header.

## 4. Access the location, making sure to supply the X-SDS-AUTH-TOKEN HTTP header.

## Request

```
curl -k <ViPR_Controller_VIP>:4443/tenant?auth-redirected -H
"X-SDS-AUTH-TOKEN:{token_text}"
```

## Response

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<tenant_info>
<name>Provider Tenant</name>
<link href="/tenants/
urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:"
rel="self"/>
<id>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-c40b6de2c72f:</
id>
</tenant_info>
```

## Logout

The logout API ends a session.

A given user is allowed a maximum of 100 concurrent authentication tokens. Past this limit, the system refuses any new connection for this user until tokens free up. They can free up by expiring naturally, or by explicitly calling this URI:

```
https://<ViPR_Controller_VIP>:4443/logout
```

If you have multiple sessions running simultaneously, this URI forces the termination of all tokens related to the current user.

```
GET <ViPR_Controller_VIP>:4443/logout?force=true
```

An example logout request follows.

#### Request

```
GET: <ViPR_Controller_VIP>:4443/logout
X-SDS-AUTH-TOKEN: {Auth_Token}
```

Pass in the header or cookie with the authentication token to logout.

#### Response

```
HTTP 200
```

## A ViPR Controller user can view their own name, tenant associate, and roles using the `whoami` API call.

#### Request

```
GET <ViPR_Controller_VIP>:4443/user/whoami
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

#### Response

```
HTTP 200
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<user>
  <common_name>root</common_name>
  <distinguished_name>root</distinguished_name>
  <home_tenant_roles>
    <home_tenant_role>TENANT_ADMIN</home_tenant_role>
  </home_tenant_roles>
  <subtenant_roles/>
  <tenant>urn:storageos:TenantOrg:6c7dde31-
ec48-4028-8672-5e74f5754656:global</tenant>
  <vdc_roles>
    <vdc_role>SYSTEM_AUDITOR</vdc_role>
    <vdc_role>SECURITY_ADMIN</vdc_role>
    <vdc_role>SYSTEM_ADMIN</vdc_role>
    <vdc_role>SYSTEM_MONITOR</vdc_role>
  </vdc_roles>
</user>
```

This example shows the `whoami` output for the Root user. Root is associated with the tenant indicated in the `<tenant>` field. Root has the tenant roles listed in the `<home_tenant_roles>` and `<subtenant_roles>` fields. It also has the virtual data center roles listed in the `<vdc_role>` field.





# CHAPTER 3

## Adding storage systems

This chapter contains the following topics:

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- [Hitachi Data Systems prerequisites and sample REST API request](#)..... 18
- [IBM XIV prerequisites and sample REST API request](#)..... 19
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## Data Domain prerequisites and sample REST API request

Data Domain storage is added to ViPR Controller by adding the Data Domain Management Center as a storage provider.

Prerequisites:

- Data Domain storage is added to ViPR Controller by adding the Data Domain Management Center as a storage provider.
- Interface Type - ddmc.
- IP Address of the Data Domain Management Center (DDMC).
- Port Number - The port used to SSH into the DDMC host. The default is 3009.
- user\_name - user name for the DDMC. Storage system administrator privileges are required.
- password - password associated with the user\_name.

A sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>DD_File_West2</name>
  <ip_address>192.168.0.0</ip_address>
  <port_number>3009</port_number>
  <user_name>sysadmin</user_name>
  <password>Password1</password>
  <interface_type>ddmc</interface_type>
</storage_provider_create>
```

## Hitachi Data Systems prerequisites and sample REST API request

Hitachi Data Systems storage is added to ViPR Controller by adding the Hitachi HiCommand Device Manager storage provider to the ViPR Controller Physical Assets, using POST /vdc/storage-providers.

Prerequisites:

- When the Hitachi HiCommand Device Manager storage provider is added, all the storage systems managed by the storage provider will be added to ViPR Controller. If you do not want all the storage systems on an storage provider to be managed by ViPR Controller :
  - Before adding the storage provider to ViPR Controller, configure it to only manage the storage systems that will be added to ViPR Controller. Move the storage systems that will not be managed to ViPR Controller onto a different storage provider.
  - Or, after adding the storage provider to ViPR Controller de-register or delete the storage systems that will not be used as a ViPR Controller resource.
- IP Address of the Hitachi HiCommand Device Manager.
- Port Number - The port number used to communicate with the Hitachi HiCommand Device Manager. The default is 2001 .
- interface\_type - hicommand.

- `use_ssl` - false
- `user_name` - user name with the HiCommand storage provider. Storage system administrator privileges are required.
- `password` - password associated with the user name.

A sample REST API request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>hdsdevicemgr</name>
  <interface_type>hicommand</interface_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>2001</port_number>
  <user_name>user1</user_name>
  <password>Password1</password>
  <use_ssl>>false</use_ssl>
</storage_provider_create>
```

## IBM XIV prerequisites and sample REST API request

IBM XIV storage is added to ViPR Controller using POST `/vdc/storage-providers`.

Prerequisites:

- `interface_type` - `ibmxiv`
- `ip_address` - IP address of the host.
- `port_number` - The port used to SSH into the host. The default is 5989.
- `use_ssl` - `true`.
- `user_name` - Name of the user used to SSH into the host. Storage system administrator privileges are required.
- `password` - Password associated with the user name.

A sample REST API request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>ibmxiv_block_1</name>
  <interface_type>ibmxiv</interface_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>5989</port_number>
  <use_ssl>>true</use_ssl>
  <user_name>admin</user_name>
  <password>Password1</password>
</storage_provider_create>
```

## EMC Isilon prerequisites and sample REST API request

When you add an Isilon to ViPR Controller, the array is automatically added to the ViPR Controller discovery queue. If the credentials are correct, the array is automatically discovered and registered. Storage system discovery adds the storage pools and storage ports to ViPR Controller. Storage systems that are registered are available to be used and managed by ViPR Controller.

**Prerequisites:**

- `system_type` - isilon.
- `ip_address` - The SmartConnect IP address. Directs the discovery request to the Isilon SmartConnect host IP.
- `port_number` - 8080.
- User credentials with Isilon storage system administrator privileges. The Isilon user is independent of the currently authenticated ViPR Controller user. All ViPR Controller operations, which you perform on an Isilon storage system, are executed as this Isilon user.

**A sample request:**

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_system_create>
  <name>isilon1</name>
  <system_type>isilon</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>8080</port_number>
  <user_name>rootid</user_name>
  <password>password</password>
</storage_system_create>
```

## NetApp prerequisites and sample REST API request

NetApp storage is added to ViPR Controller using `POST /vdc/storage-systems`. The array is automatically discovered and registered.

**Prerequisites:**

- `system_type` - netapp
- `ip_address` - Direct the discovery request to the NetApp OnTap IP.
- `port_number` - The default is 443.
- `user_name` - Name of the root account on the NetApp array.
- `password` - Password of the root account on the NetApp array.

**Sample request:**

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_system_create>
  <name>NetApp4</name>
  <system_type>netapp</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>443</port_number>
  <user_name>root</user_name>
  <password>dangerous1</password>
</storage_system_create>
```

## Standalone ScaleIO prerequisites and sample REST API request

A stand-alone ScaleIO is added to ViPR Controller as a storage provider, using POST `/vdc/storage-providers`.

ViPR Controller creates storage systems from discovered protection domains in the ScaleIO. ViPR Controller also automatically creates storage ports, hosts, host initiators, and a network for the ScaleIO. These can not be edited. For additional information on how ViPR Controller uses the ScaleIO components to create the required ViPR Controller objects see *ViPR Controller Integration of ScaleIO* on the [ViPR Controller Product Documentation Index](#).

Prerequisites:

- `interface_type` - scaleio.
- `ip_address` - IP address of the primary MDM.
- `port_number` - The port used to SSH into the primary MDM host. The default is 22.
- `user_name` - name of the user used to SSH into the MDM host. Storage system administrator privileges are required.
- `secondary_username` - name of the user used for issuing the ScaleIO CLI login.
- `secondary_password` - password of the user used for issuing the ScaleIO CLI login
- `element_manager_url` - the URL of the element manager system that is associated with the storage provider. The syntax is:

```
https://<element_manager_FQDN>/resources/dashboard.jnlp?
host=<ip_address>&username=<admin_username>
```

Sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>scaleio_block_1</name>
  <interface_type>scaleio</interface_type>
  <ip_address>lg45.mycomp.com</ip_address>
  <port_number>22</port_number>
  <user_name>root</user_name>
  <password>Password1</password>
  <secondary_username>admin</secondary_username>
  <secondary_password>Password2</secondary_password>
  <element_manager_url>https://lg45.mycomp.com/resources/
  dashboard.jnlp?host=192.168.0.45&username=admin</element_manager_url>
</storage_provider_create>
```

## Best practices for ScaleIO to work with discoverable hosts

When you add ScaleIO storage, ViPR Controller automatically creates a host of type Other for each of the SDCs, and creates the host initiators. But these hosts are not discoverable. There are two methods that allow you to associate these ViPR Controller-created hosts with their discoverable hosts.

**First method**

1. Add the discoverable host, such as Windows or Linux, to ViPR Controller.

2. Add the ScaleIO storage provider to ViPR Controller.

The ScaleIO discovery adds the ScaleIO initiators to the correct discoverable host.

#### Second method

1. Add the ScaleIO storage provider to ViPR Controller. This creates hosts of type `Other` for each of the SDCs.
2. Edit the `Other` host. Change its type to match its operating system, such as Windows, and provide login credentials, and enable **Discoverable**.

When the host is discovered it is now associated with the ScaleIO initiators that were created when the ScaleIO storage provider was added to ViPR Controller.

## Third-party block storage prerequisites and sample REST API request

Third-party block storage is added to ViPR Controller using `POST /vdc/storage-providers`.

#### Prerequisites:

- `interface_type`- `cinder`.
- `ip_address` - The IP address of the Third-party block storage provider.
- `user_name` - The username for connecting to the storage provider. System administrator privileges are required.
- `password` - Password of the account provided with `user_name`.
- `port_number` - The port number used to connect to the storage provider. The default port number for a Third-party block storage provider is 22.

#### Sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>TP_east_1</name>
  <interface_type>cinder</interface_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>22</port_number>
  <user_name>admin</user_name>
  <password>Password1</password>
  <use_ssl>>false</use_ssl>
</storage_provider_create>
```

## VNX for Block and VMAX prerequisites and sample REST API request

For VNX for Block and VMAX, adding an SMI-S provider provides access to the storage systems. Once the SMI-S providers are added to {Conref} ViPR , then the underlying storage systems, storage pools, and storage ports are discovered automatically without any further user input.

#### Prerequisites:

- `ip_address` - IP address of the SMI-S provider.
- `port_number` - The port number used to connect to the SMI-S provider. The default is 5989.
- `user_name` - The username used for connecting to the SMI-S provider.
- `password` - The password for the username used for connecting to the SMI-S provider.

Sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>vnx_block_west3</name>
  <interface_type>smis</interface_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>5989</port_number>
  <user_name>admin1</user_name>
  <password>Password1</password>
  <use_ssl>true</use_ssl>
</storage_provider_create>
```

## VNX for File prerequisites and sample REST API request

Prerequisites:

- For the VNX File Control Station:
  - The IP address of the Control Station.
  - The port number used to connect to the Control Station. The default is 443.
  - VNX File user credentials with storage system administrator privileges.
- For the Onboard Storage Provider:
  - The storage provider host.
  - The port number used to connect to the VNX File Onboard Storage Provider. The default is 5988.
  - User credentials to access the Onboard Storage Provider.
  - Whether SSL is used to communicate with the Onboard Storage Provider.
- The system type is `vnxfile`.

Sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_system_create>
  <name>file_west_1</name>
  <system_type>vnxfile</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>443</port_number>
  <user_name>administrator</user_name>
  <password>password</password>
  <smis_provider_ip>192.160.100.0</smis_provider_ip>
  <smis_port_number>5988</smis_port_number>
  <smis_user_name>sp_admin</smis_user_name>
  <smis_password>Password1</smis_password>
```

```
<smis_use_ssl>>false</smis_use_ssl>
</storage_system_create>
```

## VNXe prerequisites and sample REST API request

VNXe storage is added to ViPR Controller as a storage system., using `POST /vdc/storage-systems`. Once you add the storage system to ViPR Controller, then the underlying storage pools and storage ports are discovered automatically without any further user input.

### Prerequisites:

- `system_type` - vnx.
- `ip_address` - The IP address of the host.
- `port_number` - The port used to SSH into the host. The default is 443.
- `user_name` - The name of the user used to SSH into the host. Storage system administrator privileges are required.
- `password` - Password associated with the `user_name`.

### Sample request:

```
https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_system_create>
  <name>vnx_west_1</name>
  <system_type>vnx</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>443</port_number>
  <user_name>admin</user_name>
  <password>Password1</password>
</storage_system_create>
```

## VPLEX prerequisites and sample REST API request

EMC VPLEX storage systems are added ViPR Controller as a storage provider, using `POST /vdc/storage-providers`.

### Prerequisites:

- The IP address of the VPLEX management server.
- The username and password for connecting to the storage system. System administrator privileges are required.
- The port number used to connect to the storage system. The default port number for a VPLEX management server is 443.

### A sample REST API request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-providers
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_provider_create>
  <name>VPLEX_West2</name>
  <interface_type>vplex</interface_type>
  <ip_address>192.168.0.0</ip_address>
```



```
<port_number>443</port_number>
<user_name>admin</user_name>
<password>Password1</password>
<use_ssl>true</use_ssl>
</storage_provider_create>
```

## EMC XtremIO prerequisites and sample REST API request

Add the XtremIO storage system by sending a POST `/vdc/storage-systems` request. The array is automatically discovered. Storage system discovery adds the storage pools and storage ports to ViPR Controller.

### Prerequisites:

- `system_type` - xtremio
- `ip_address` - Direct the discovery request to the XtremIO IP.
- `port_number` - The port used to connect to the XtremIO storage system host. The default is 443.
- `user_name` - Name of the root account on the XtremIO array.
- `password` - Password of the root account on the XtremIO array.

### Sample request:

```
POST https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_system_create>
  <name>xtremio_west1</name>
  <system_type>xtremio</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>443</port_number>
  <user_name>root</user_name>
  <password>password1</password>
</storage_system_create>
```

## Network configuration for block storage systems

After the storage system is added to ViPR Controller, configure the SAN switches, using POST `/vdc/network-systems`, before adding the storage systems to a virtual array.

- When a SAN switch is added to ViPR Controller, the Fibre Channel networks (Brocade Fabrics or Cisco VSANs), are automatically discovered and registered in ViPR Controller. Additionally, through discovery of the SAN switch topology, ViPR Controller discovers, and registers the host initiators for hosts on the network, and identifies which storage systems are associated with the SAN switch.

See [Adding network systems \(fabric managers\) and SAN networks on page 33](#) for more information.

- For Storage Systems that use ViPR Controller services with the iSCSI protocol, the iSCSI host ports must be logged into the correct target array ports before they can be used in the service.

## IP network configuration requirements for storage

After the storage system is added to ViPR Controller, create the IP networks to include in the virtual array, and be sure to add the necessary storage and host ports to use to provision the storage to the hosts.

ViPR Controller can discover the ports of IP connected storage systems and hosts, but it cannot discover the paths between them, so it is necessary to create IP networks, and then add the host, and storage system ports, which will be provisioned together, to the same IP network. See [Creating and configuring a virtual array on page 85](#)

## Important REST API calls to manage and configure storage systems and storage providers

The table shows some important APIs that are used to manage and configure storage systems and storage providers.

**Table 1** REST API Calls to Manage and Configure Storage Systems and Storage Providers

ViPR REST API Call	Description
POST /vdc/storage-pools/{id}/deregister	By default, all discovered storage pools are available to use for provisioning in ViPR Controller. Deregister storage pools to make them unavailable to ViPR Controller for provisioning. Sets the registration_status attribute of the storage pool to UNREGISTERED.
POST /vdc/storage-systems/{id}/storage-pools/{poolId}/register	Manually register the discovered storage pool on the storage system.
PUT /vdc/storage-systems/{id}	By default, storage systems are configured with an unlimited amount of resources that can be used by ViPR. This API call allows you to set resource limits, which defines the amount of storage that is available for use by ViPR Controller. In addition, you can also update the storage system credentials.
POST /vdc/storage-ports/{id}/deregister	By default, all storage ports are available to use for provisioning in ViPR Controller when the storage system is discovered by ViPR Controller. Deregister storage ports to make them unavailable to ViPR Controller for provisioning.
POST /vdc/storage-systems/{id}/storage-ports/{portId}/register	Manually register the discovered storage port on the storage system.
POST /vdc/storage-systems/{id}/deactivate	Remove a storage system. This method removes the storage system from ViPR Controller control and removes all resources associated with the storage system from the database. Resources (pools, ports, volumes, etc.) are not removed from the storage system physically, but become unavailable for use by ViPR Controller.
GET /vdc/storage-systems	List all storage systems.
GET /vdc/storage-systems/{id}/storage-pools	List all storage pools for the storage system.

**Table 1** REST API Calls to Manage and Configure Storage Systems and Storage Providers (continued)

ViPR REST API Call	Description
GET /vdc/storage-systems/{id}/storage-ports	List all storage ports for the storage system.
POST /vdc/storage-systems/{id}/discover	Rediscover a storage system on demand.
POST /vdc/storage-providers/scan	<p>Scan and rediscover all storage systems on demand.</p> <hr/> <p><b>Note</b></p> <p>Rediscovery of a standalone ScaleIO storage provider discovers new SDC hosts or removes deleted SDC hosts, but it does not update the ScaleIO initiators. To rediscover the ScaleIO initiators, rediscover the individual storage systems associated with the ScaleIO storage provider. See <code>POST /vdc/storage-systems/{id}/discover</code>.</p> <hr/>
GET /vdc/storage-providers/{id}	Show the details of a storage provider.
GET /vdc/storage-providers/{id}/storage-systems	Lists the ID, name, and link for all storage systems visible to the storage provider.



# CHAPTER 4

## Adding a data protection system

This chapter contains the following topics:

- [Adding a RecoverPoint data protection system](#)..... 30

## Adding a RecoverPoint data protection system

You add a RecoverPoint data protection system to ViPR Controller using `POST /vdc/protection-systems`.

### Before you begin

- Authenticate with the ViPR REST API as a System Administrator
- For pre-configuration and support requirements, see *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- You need the port used to communicate with EMC RecoverPoint. The default port is 7225.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

ViPR Controller also supports data protection using Symmetrix Remote Data Facility (SRDF). See *ViPR Controller Integration with VMAX and VNX Storage Systems User and Administration Guide* on the [ViPR Controller Product Documentation Index](#).

After you add a data protection system to ViPR Controller, you can select data protection when you create your block virtual pools. Any block volumes created from those block virtual pools will have their data protected by the selected data protection system.

### Procedure

1. Add the RecoverPoint protection system by sending a `POST <ViPR_Controller_VIP>:4443/vdc/protection-systems` request with a `system_type` of `rp`.

The request returns a task whose URI can be queried to determine the status of the task.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/protection-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<protection_system_create>
  <name>rp_west1</name>
  <system_type>rp</system_type>
  <ip_address>192.168.0.0</ip_address>
  <port_number>7225</port_number>
  <user_name>admin</user_name>
  <password>admin</password>
</protection_system_create>
```

### Response

```
HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423583101338</creation_time>
  <global>>false</global>
  <id>urn:storageos:Task:
5f7d64c9-28e8-4fef-87f3-15eb173bb5ad:vdc1</id>
  <inactive>>false</inactive>
```

```

    <internal>false</internal>
    <link rel="self" href="/vdc/tasks/urn:storageos:Task:
5f7d64c9-28e8-4fef-87f3-15eb173bb5ad:vdc1"/>
    <name>DISCOVER STORAGESYSTEM</name>
    <remote>false</remote>
    <tags/>
    <vdc>
      <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
      <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <associated_resources/>
    <description>discover a storage systems</description>
    <op_id>e95b27ef-ec82-4002-aae0-af046820af54</op_id>
    <progress>0</progress>
    <resource>
      <id>urn:storageos:ProtectionSystem:
11865a28-5953-4d7a-84fa-2cceb1038d97:vdc1</id>
      <link rel="self" href="/vdc/protection-systems/
urn:storageos:ProtectionSystem:
11865a28-5953-4d7a-84fa-2cceb1038d97:vdc1"/>
      <name>rp_west1</name>
    </resource>
    <start_time>1423583101336</start_time>
    <state>pending</state>
</task>

```

- Repeat the query of the add protection system task, using the task URI from the response body of the POST request, until the message attribute of the task is Operation completed successfully.

### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:5f7d64c9-28e8-4fef-87f3-15eb173bb5ad:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423583101338</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
5f7d64c9-28e8-4fef-87f3-15eb173bb5ad:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
5f7d64c9-28e8-4fef-87f3-15eb173bb5ad:vdc1"/>
  <name>DISCOVER STORAGESYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>

```

```
<description>discover a storage systems</description>
<end_time>1423583873389</end_time>
<message>Operation completed successfully</message>
<op_id>e95b27ef-ec82-4002-aae0-af046820af54</op_id>
<progress>100</progress>
<resource>
  <id>urn:storageos:ProtectionSystem:
11865a28-5953-4d7a-84fa-2cceb1038d97:vdc1</id>
  <link rel="self" href="/vdc/protection-systems/
urn:storageos:ProtectionSystem:
11865a28-5953-4d7a-84fa-2cceb1038d97:vdc1"/>
  <name>rp_west1</name>
</resource>
<start_time>1423583101336</start_time>
<state>ready</state>
</task>
```



# CHAPTER 5

## Adding network systems (fabric managers) and SAN networks

This chapter contains the following topics:

- [Overview](#)..... 34
- [Add a network system \(fabric manager\)](#) ..... 34
- [Manually creating and updating networks in ViPR Controller](#).....36
- [Important REST API calls for managing network systems \(fabric managers\)](#).....38

## Overview

This chapter describes the ViPR Controller support requirements, and prerequisite information to prepare SAN (Brocade and Cisco) switches for ViPR Controller integration using the ViPR Controller REST API. It also includes the steps to add and configure the Fibre Channel (FC) networks in ViPR Controller.

You can create a network system for the following SAN switches:

- Cisco = MDS switch
- Brocade = CMCNE

When you add a SAN switch to ViPR Controller, ViPR Controller discovers and registers the Fibre Channel networks (Brocade Fabrics or Cisco VSANs). Through discovery of the SAN topology, ViPR Controller can identify which hosts and storage systems that were added to ViPR Controller, are connected through the same fibre channel network. This allows ViPR Controller to automatically build the connectivity between the hosts and storage systems when you provision a service, such as creating a block volume for a host.

After the network system is added and discovered, it is re-discovered periodically. ViPR Controller continues to update its networks as host and storage system ports are added and removed. Once a network system is discovered, ViPR Controller creates and removes SAN zones when block volumes are exported or un-exported. If that is not the intended behavior, then set the auto-zoning flag false in the virtual array associated with this network.

## Add a network system (fabric manager)

### Before you begin

Authenticate with the REST API as a system administrator. See [Authenticate with the REST API](#).

Depending on the type of switch you are adding, you will need the following information:

Type	Required Information
Brocade	<ul style="list-style-type: none"> <li>• Pre-configuration and support requirements are described in the <i>ViPR Controller Virtual Data Center Requirements and Information Guide</i> on the <a href="#">ViPR Controller Product Documentation Index</a> .</li> <li>• SMI-S Host address</li> <li>• Enable/disable SSL</li> <li>• SMI-S Port</li> <li>• Credentials for an account that has administrator privileges to the SMI-S host</li> </ul>
Cisco	<ul style="list-style-type: none"> <li>• Pre-configuration and support requirements are described in the <i>ViPR Controller Virtual Data Center Requirements and Information Guide</i> on the <a href="#">ViPR Controller Product Documentation Index</a></li> <li>• Host address for the switch</li> <li>• Port</li> <li>• Credentials for an account that has administrator privileges to the switch</li> </ul>

The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this example.

### Procedure

1. Add a network system (fabric manager) using POST `/vdc/network-systems`.

The request returns a task.

In this example, a Brocade switch is being added to ViPR.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/network-systems

Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_system_create>
  <name>brocade_west1</name>
  <system_type>brocade</system_type>
  <smis_provider_ip>192.168.0.0</smis_provider_ip>
  <smis_port_number>5989</smis_port_number>
  <smis_user_name>administrator</smis_user_name>
  <smis_password>password</smis_password>
  <smis_use_ssl>>false</smis_use_ssl>
</network_system_create>
```

### Response

```
HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423588035002</creation_time>
  <global>>false</global>
  <id>urn:storageos:Task:
56a98fa7-10b9-48f0-8075-94e66a25e4ce:vdc1</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
56a98fa7-10b9-48f0-8075-94e66a25e4ce:vdc1"/>
  <name>DISCOVER NETWORKSYSTEM</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover one network system</description>
  <op_id>b1d7e95c-730c-4658-971f-49e1893ddf41</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</id>
    <link rel="self" href="/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1"/>
    <name>brocade_west1</name>
  </resource>
  <start_time>1423588035000</start_time>
```

```
<state>pending</state>
</task>
```

ViPR Controller discovers, and registers the fabric manager and the associated networks.

2. Query the discover network system task URI until the message attribute of the task is Operation completed successfully.

#### Request

```
GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:56a98fa7-10b9-48f0-8075-94e66a25e4ce:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423588035002</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
56a98fa7-10b9-48f0-8075-94e66a25e4ce:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
56a98fa7-10b9-48f0-8075-94e66a25e4ce:vdc1"/>
  <name>DISCOVER NETWORKSYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover one network system</description>
  <end_time>1423588035135</end_time>
  <message>Operation completed successfully</message>
  <op_id>b1d7e95c-730c-4658-971f-49e1893ddf41</op_id>
  <progress>100</progress>
  <resource>
    <id>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</id>
    <link rel="self" href="/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1"/>
    <name>brocade_west1</name>
  </resource>
  <start_time>1423588035000</start_time>
  <state>ready</state>
</task>
```

## Manually creating and updating networks in ViPR Controller

Manually add storage ports, and host ports to the Fibre Channel network (Brocade Fabrics and Cisco VSANs) to define the connectivity ViPR Controller will use when storage is provisioned to the hosts. When ports are not assigned to the Fibre Channel network, ViPR

Controller will automatically assign the ports when the storage is provisioned to the hosts.

- Only system administrators can assign storage and host ports to Fibre Channel networks.
- Fibre Channel networks are automatically added, discovered, and registered in ViPR Controller when the associated Brocade or Cisco switch is added to ViPR Controller using the `POST /vdc/network-systems` REST API call.
- Storage ports, host ports, or both can be defined for the Fibre Channel network by adding or removing network endpoints, using `PUT /vdc/networks/{Network_URN}`.

The table list some of the important REST API calls for managing the storage and host ports, and the Fibre Channel network.

**Table 2** Important REST API calls for managing networks

ViPR REST API Call	Description
<code>POST /vdc/networks/{id}/deregister</code>	Deregister a network to make it unavailable to ViPR Controller for provisioning. Sets the <code>registration_status</code> attribute of the network to UNREGISTERED.
<code>GET /vdc/networks/{id}/storage-ports</code>	List all storage ports associated with the network end points.
<code>PUT /vdc/networks/{id}</code>	Update a network's name, endpoints or varrays.  When endpoints are changed, added or removed, and the endpoints match some storage ports, the storage ports associations to the network are updated accordingly. If the endpoints added exist is another network, they are first removed from their current network. Discovered endpoints cannot be removed from their current networks or added to another one.  When the storage ports networks are changed, their corresponding storage pools are also update to reflect any change in varray connectivity that may have resulted from the change.
<code>GET /vdc/networks/{id}/initiators</code>	List all initiators associated with the network end points.
<code>GET /vdc/networks/{id}/ip-interfaces</code>	List all IP interfaces associated with the network end points.
<code>POST /vdc/networks</code>	Create a network of type FC, IP or Ethernet. The network can optionally be added to virtual arrays and populated with endpoints.  When the network has endpoints and the endpoints are matched to storage ports, the storage ports become assigned to the network. When the network is also added to virtual arrays, the storage ports' array pools are updated to show they are connected to the networks' virtual arrays.

## Important REST API calls for managing network systems (fabric managers)

The table lists some of the important REST API calls for managing network systems (fabric managers).

**Table 3** Important ViPR Controller REST API calls for managing network systems

ViPR REST API Call	Description
POST /vdc/network-systems/{id}/deregister	Deregister a network system (fabric manager) to make it unavailable to ViPR Controller for provisioning. Sets the registration_status attribute of the network-systems to UNREGISTERED.
PUT /vdc/network-systems/{id}	Change the IP address, port, credentials, or name of a network system. A discovery is asynchronously initiated as a result of this call.  <pre>&lt;network_system_update&gt;   &lt;name&gt;mds-a&lt;/name&gt;   &lt;ip_address&gt;192.168.0.2&lt;/ip_address&gt;   &lt;port_number&gt;22&lt;/port_number&gt;   &lt;user_name&gt;no-user&lt;/user_name&gt;   &lt;password&gt;nopass&lt;/password&gt; &lt;/network_system_update&gt;</pre>
GET /vdc/network-systems/{id}/fc-endpoints	List the cached fiber channel connectivity information between the network system and external systems, such as host initiators or storage array ports. The connectivity information is periodically updated, or can be refreshed on demand using a POST /vdc/network-systems/{id}/refresh.
GET /vdc/network-systems/{id}/san-fabrics	List all VSAN or fabric names configured on this network system.
GET /vdc/network-systems/{id}/san-fabrics/{fabricId}	List all of the active zones (and their zone members) for the specified fabric or VSAN in a network system.
POST /vdc/network-systems	Create a new network system. This can either represent an SSH connection to a Cisco MDS or Nexus switch, or an SMI-S connection to the Brocade Network Advisor. The call will return before communication has been established, but discovery of the device will be initiated.
GET /vdc/network-systems/{id}/san-aliases	Returns a list of aliases for the specified network device. For Brocade, aliases are retrieved per fabric. For MDS, the full list of aliases for the network system is returned. This is a synchronous call to the device.
POST /vdc/network-systems/{id}/san-aliases	Adds one or more aliases to the specified network system.
POST /vdc/network-systems/{id}/san-aliases/remove	Removes one or more aliases from the specified network system.

**Table 3** Important ViPR Controller REST API calls for managing network systems (continued)

ViPR REST API Call	Description
PUT /vdc/network-systems/{id}/san-aliases	Changes the WWN member of or more aliases of the specified network system. This is an asynchronous call.

Adding network systems (fabric managers) and SAN networks



# CHAPTER 6

## Adding hosts and clusters

This chapter contains the following topics:

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## Overview

You can add Linux, Windows, AIX, AIX VIO, HP-UX, and other types of hosts using the ViPR Controller REST API. You can also add host initiators and add the host to a ViPR Controller cluster.

Hosts are computers that use software including Windows, Linux, and VMware for their operating system. In ViPR Controller, hosts are tenant resources like volumes and file systems. Unlike those resources, however, hosts are imported and discovered rather than provisioned by ViPR Controller.

Hosts must be imported into ViPR Controller by a Tenant Administrator before storage may be exported and attached to them. By default, hosts are not assigned to a project which means only the Tenant Administrator may see them and export/attach storage to them. If further delegation is required, the Tenant Administrator may assign a host to a project. Anyone who has privileges to manage resources in that project may then see and export/attach storage to that host.

Hosts are not explicitly associated with virtual arrays. The host-to-virtual array association is implied based on network connectivity.

## Add and discover a LINUX host

To manage a LINUX host in ViPR Controller, use `POST /compute/hosts` to add the host to ViPR Controller and discover the host, and its initiator ports.

### Before you begin

- Preconfiguration and support requirements are described in *ViPR Controller Virtual Data Center Requirements and Information Guide*.
- The LINUX host must be running the correct version of LINUX, and be properly configured.
- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticate with the REST API on page 9](#).
- `type - Linux`
- `discoverable`
  - `true` = Allow ViPR Controller to automatically discover and register the host. This is the default setting if you do not include it in your request payload.
  - `false` = Do not allow ViPR Controller to automatically discover the host. You must manually register the host initiators in ViPR Controller using `POST /compute/hosts/{Host_URN}/initiators`.
- `port_number` - The SSH connection port. The default is 22.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.

### Procedure

1. Get the URN of your tenant.

```
GET https://<ViPR_Controller_VIP>:4443/tenant
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

2. Use the tenant URN in the request payload to create a host. The `POST /compute/hosts` method also initiates discovery of the host and its initiator ports.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/hosts
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<host_create>
  <type>Linux</type>
  <host_name>lg1w7151.example.com</host_name>
  <name>lg1w7151</name>
  <port_number>22</port_number>
  <user_name>root</user_name>
  <password>Password1</password>
  <use_ssl>>false</use_ssl>
  <tenant>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</tenant>
</host_create>
```

### Response

```
HTTP 202 Accepted
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423511829227</creation_time>
  <global>>false</global>
  <id>urn:storageos:Task:5cbe14c7-5540-4d98-abea-
fcf5ba3896a0:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
5cbe14c7-5540-4d98-abea-fcf5ba3896a0:vdcl"/>
  <name>DISCOVER HOST</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
  </vdc>
  <associated_resources/>
  <description>discover a compute host</description>
  <op_id>f9b296b2-ad28-4074-9b23-0e5766530f27</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:Host:a9a4a18d-df40-443c-9ab0-
e83823d156fa:vdcl</id>
    <link rel="self" href="/compute/hosts/
urn:storageos:Host:a9a4a18d-df40-443c-9ab0-
e83823d156fa:vdcl"/>
    <name>lg1w7151</name>
  </resource>
  <start_time>1423511829226</start_time>
  <state>pending</state>
</task>
```

You will not be able to fully manage the host until you discover it.

3. Check the user interface to see if the host has completed discovery, or check the host resource. Use the resource URI included in the task returned from the create a host request. It should contain the information shown in the following example.

## Request

```
GET https://<ViPR_Controller_VIP>:4443/compute/hosts/
urn:storageos:Host:ead39b5a-07f4-4cb4-8124-35aa864fe760:
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

## Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<host>
  <creation_time>1423511829212</creation_time>
  <global>>false</global>
  <id>urn:storageos:Host:a9a4a18d-df40-443c-9ab0-
e83823d156fa:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/compute/hosts/
urn:storageos:Host:a9a4a18d-df40-443c-9ab0-e83823d156fa:vdcl"/>
  <name>lglw7151</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
    </vdc>
    <native_guid>6C:41:6A:1E:71:68</native_guid>
    <compatibility_status>COMPATIBLE</compatibility_status>
    <job_discovery_status>COMPLETE</job_discovery_status>
    <last_discovery_run_time>1423511839761</
last_discovery_run_time>
    <last_discovery_status_message></
last_discovery_status_message>
    <last_metering_run_time>0</last_metering_run_time>
    <job_metering_status>CREATED</job_metering_status>
    <next_discovery_run_time>1423598229542</
next_discovery_run_time>
    <next_metering_run_time>0</next_metering_run_time>
    <registration_status>REGISTERED</registration_status>
    <success_discovery_time>1423511839761</success_discovery_time>
    <success_metering_time>0</success_metering_time>
    <tenant>
      <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
      <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
    </tenant>
    <discoverable>>true</discoverable>
    <host_name>lglw7151.example.com</host_name>
    <os_version>RHEL 6.3.0.3.el6</os_version>
    <port_number>22</port_number>
    <type>Linux</type>
    <use_ssl>>false</use_ssl>
    <user_name>root</user_name>
  </vdc>
</host>
```

## Add and discover a Windows host

To manage a Windows host in ViPR Controller, use `POST /compute/hosts` to add the host to ViPR Controller and discover the host, and its initiator ports.

### Before you begin

- Your Windows host must be running the correct version of Windows, and be properly configured. In particular, your ViPR Controller installation, the Windows host, and the user name you use to authenticate must all be in the same Windows domain. See the *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticate with the ViPR REST API on page 9](#).
- `type` - Windows
- `discoverable`
  - `true` = Allow ViPR Controller to automatically discover and register the host. This is the default setting if you do not include it in your request payload.
  - `false` = Do not allow ViPR Controller to automatically discover the host. You must manually register the host initiators in ViPR Controller using `POST /compute/hosts/{Host_URN}/initiators`.
- `port_number` - The SSH connection port. The default is 5986.
- `host_name` - When using domain credentials, this must be the hostname (not IP address) and resolvable through DNS.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.

### Procedure

1. Get the URN of your tenant.

```
GET https://<ViPR_Controller_VIP>:4443/tenant
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

2. Use the tenant URN as one of the parameters to create a host. The `POST /compute/hosts` method creates a host and initiates discovery of the host and its initiator ports.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/hosts
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<host_create>
  <type>Windows</type>
  <host_name>192.168.0.0</host_name>
  <name>host1win</name>
  <port_number>5986</port_number>
  <user_name>root</user_name>
  <password>Password123</password>
  <use_ssl>>false</use_ssl>
```

```
<tenant>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</tenant>
</host_create>
```

## Response

```
HTTP 202 Accepted
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1415198092146</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:b9366da9-31ed-4809-
ad46-74364f83e637:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/
urn:storageos:Task:b9366da9-31ed-4809-ad46-74364f83e637:vdc1"/>
  <name>DISCOVER HOST</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:d649923c-3d28-4195-
bd6e-d7139c0df033:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:d649923c-3d28-4195-bd6e-
d7139c0df033:vdc1"/>
  </vdc>
  <associated_resources/>
  <op_id>9e150aa2-d92e-47ee-8fab-d86733d852d0</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:Host:4582fc0e-ff38-462a-9a18-
f7488d4dd940:vdc1</id>
    <link rel="self" href="/compute/hosts/urn:storageos:Host:
4582fc0e-ff38-462a-9a18-f7488d4dd940:vdc1"/>
    <name>host1win</name>
  </resource>
  <start_time>1415198092145</start_time>
  <state>pending</state>
  <tenant>
    <id>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</id>
    <link rel="self" href="/tenants/urn:storageos:TenantOrg:
167d6c87-209e-4f9a-a688-c1c73a2c9de8:global"/>
  </tenant>
</task>
```

You will not be able to fully manage the host until discovery of the host, and its initiator ports has completed.

3. Check the user interface to see if the host has completed discovery, or use the host URN contained in the task returned from the create request to check the host resource. The host should contain the status shown in the following example.

## Request

```
GET https://<ViPR_Controller_VIP>:4443/compute/hosts/
urn:storageos:Host:4582fc0e-ff38-462a-9a18-f7488d4dd940:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

## Response

```
HTTP 200 OK
Content-Type: application/xml
```

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<host>
  <creation_time>1415198092133</creation_time>
  <global>>false</global>
  <id>urn:storageos:Host:4582fc0e-ff38-462a-9a18-
f7488d4dd940:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/compute/hosts/urn:storageos:Host:
4582fc0e-ff38-462a-9a18-f7488d4dd940:vdcl"/>
  <name>host1win</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:d649923c-3d28-4195-
bd6e-d7139c0df033:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:d649923c-3d28-4195-bd6e-
d7139c0df033:vdcl"/>
  </vdc>
  <native_guid/>
  <compatibility_status>COMPATIBLE</compatibility_status>
  <job_discovery_status>COMPLETE</job_discovery_status>
  <last_discovery_run_time>1415198092615</
last_discovery_run_time>
  <last_discovery_status_message/>
  <last_metering_run_time>0</last_metering_run_time>
  <job_metering_status>CREATED</job_metering_status>
  <next_discovery_run_time>1415284492176</
next_discovery_run_time>
  <next_metering_run_time>0</next_metering_run_time>
  <registration_status>REGISTERED</registration_status>
  <success_discovery_time>0</success_discovery_time>
  <success_metering_time>0</success_metering_time>
  <tenant>
    <id>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</id>
    <link rel="self" href="/tenants/urn:storageos:TenantOrg:
167d6c87-209e-4f9a-a688-c1c73a2c9de8:global"/>
  </tenant>
  <discoverable>>true</discoverable>
  <host_name>192.168.0.0</host_name>
  <port_number>5986</port_number>
  <type>Windows</type>
  <use_ssl>>false</use_ssl>
  <user_name>root</user_name>
</host>

```

## Add an AIX host or AIX VIO server to ViPR Controller

To manage an AIX host or AIX VIO host, use POST `/compute/hosts`.

### Before you begin

- Pre-configuration and support requirements are described in the *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticating with the REST API on page 9](#).
- type
  - AIX = Adding an AIX host.
  - AIXVIO = Adding an AIX VIO host.

- discoverable
  - true = Allow ViPR Controller to automatically discover and register the host. This is the default setting if you do not include it in your request payload.
  - false = Do not allow ViPR Controller to automatically discover the host. You must manually register the host initiators in ViPR Controller using `POST /compute/hosts/{Host_URN}/initiators`.
- port\_number - The SSH connection port. The default is 22.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.

### Procedure

1. Get the URN of your tenant.

```
GET https://<ViPR_Controller_VIP>:4443/tenant
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

2. Use the tenant URN as one of the parameters to create a host. The `POST /compute/hosts` method creates a host and initiates discovery of the host and its initiator ports.

In this example, an AIX is added to ViPR Controller.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/hosts
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<host_create>
  <type>AIX</type>
  <host_name>192.168.0.0</host_name>
  <name>host1aix</name>
  <port_number>22</port_number>
  <user_name>root</user_name>
  <password>pancake</password>
  <use_ssl>>false</use_ssl>
  <tenant>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</tenant>
</host_create>
```

### Response

```
HTTP 202 Accepted

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1415137101100</creation_time>
  <global>>false</global>
  <id>urn:storageos:Task:743ecb3f-349a-4b95-ab2a-
b7365ae13e29:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
743ecb3f-349a-4b95-ab2a-b7365ae13e29:vdcl"/>
  <name>DISCOVER HOST</name>
  <remote>>false</remote>
  <tags/>
</vdc>
```



```

        <id>urn:storageos:VirtualDataCenter:d649923c-3d28-4195-
bd6e-d7139c0df033:vdcl</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:d649923c-3d28-4195-bd6e-
d7139c0df033:vdcl"/>
    </vdc>
    <associated_resources/>
    <op_id>546f5647-4cf3-4fc9-a551-6f1ba934bc4e</op_id>
    <progress>0</progress>
    <resource>
        <id>urn:storageos:Host:d9d2312c-d172-4099-b3dd-
e17b49b01797:vdcl</id>
        <link rel="self" href="/compute/hosts/
urn:storageos:Host:d9d2312c-d172-4099-b3dd-e17b49b01797:vdcl"/>
        <name>hostlaix</name>
    </resource>
    <start_time>1415137101097</start_time>
    <state>pending</state>
    <tenant>
        <id>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</id>
        <link rel="self" href="/tenants/urn:storageos:TenantOrg:
167d6c87-209e-4f9a-a688-c1c73a2c9de8:global"/>
    </tenant>
</task>

```

You will not be able to fully manage the host until discovery of the host, and its initiator ports has completed.

3. Check the user interface to see if the host has completed discovery, or use the host URN contained in the task returned from the create request to check the host resource. It should contain the information shown in the following example.

#### Request

```

POST https://<ViPR_Controller_VIP>:4443/compute/hosts/
urn:storageos:Host:d9d2312c-d172-4099-b3dd-e17b49b01797:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<host>
    <creation_time>1415137101050</creation_time>
    <global>false</global>
    <id>urn:storageos:Host:d9d2312c-d172-4099-b3dd-
e17b49b01797:vdcl</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/compute/hosts/
urn:storageos:Host:d9d2312c-d172-4099-b3dd-e17b49b01797:vdcl"/>
    <name>hostlaix</name>
    <remote>false</remote>
    <tags/>
    <vdc>
        <id>urn:storageos:VirtualDataCenter:d649923c-3d28-4195-
bd6e-d7139c0df033:vdcl</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:d649923c-3d28-4195-bd6e-
d7139c0df033:vdcl"/>
    </vdc>
    <native_guid>BA:10:95:D0:7C:02</native_guid>
    <compatibility_status>COMPATIBLE</compatibility_status>

```

```

    <job_discovery_status>COMPLETE</job_discovery_status>
    <last_discovery_run_time>1415137121159</
last_discovery_run_time>
    <last_discovery_status_message/>
    <last_metering_run_time>0</last_metering_run_time>
    <job_metering_status>CREATED</job_metering_status>
    <next_discovery_run_time>1415223501712</
next_discovery_run_time>
    <next_metering_run_time>0</next_metering_run_time>
    <registration_status>REGISTERED</registration_status>
    <success_discovery_time>1415137121159</success_discovery_time>
    <success_metering_time>0</success_metering_time>
    <tenant>
      <id>urn:storageos:TenantOrg:167d6c87-209e-4f9a-a688-
c1c73a2c9de8:global</id>
      <link_rel="self" href="/tenants/urn:storageos:TenantOrg:
167d6c87-209e-4f9a-a688-c1c73a2c9de8:global"/>
    </tenant>
    <discoverable>true</discoverable>
    <host_name>192.168.0.0</host_name>
    <os_version>7.1.0.0
</os_version>
<port_number>22</port_number>
<type>AIX</type>
<use_ssl>>false</use_ssl>
<user_name>root</user_name>
</host>

```

## Add a host other than Windows, AIX or Linux

Adding a host other than Windows, AIX or Linux requires you to manually register the initiators with the host after adding the host. You can also manually assign host initiators and interfaces to any host you are registering with ViPR Controller .

### Before you begin

- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticating with the REST API on page 9](#).
- HP-UX hosts are not automatically discovered and registered in ViPR Controller. When you set `type` equal to `HPUX` it:
  - Sets the Volume Set Addressing (VSA) flag, which is required for exporting EMC VMAX, and VPLEX volumes to HP-UX hosts.
  - Is required to use the Host Mode Option when provisioning with HDS storage systems.

---

### Note

The Host Mode Option is set by using `PUT /config/controller/{ID}` where `{ID}` is the ID of the `HDSHostModeOption` controller type.

---

- For hosts other than HP-UX, set `type` to `Other` .
- When you add an HP-UX host to ViPR, you will still need to manually add and register the host initiators in ViPR Controller
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.
- You need the following information:

- The name of the host being registered.
- The fully qualified domain name or IP address of the host.
- The node address of an initiator
- The port address of an initiator.

In this example, a host other than Windows, AIX or Linux is added. Once the host is added, an initiator is manually registered with the host.

### Procedure

1. Get the URN of your tenant.

#### Request

```
GET https://<ViPR_Controller_VIP>:4443/tenant
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

2. Use the tenant URN as one of the parameters to add the host to ViPR Controller.

- If the host will be attached to EMC VMAX volumes, use `<type>HPUX</type>`
- Otherwise, use `<type>Other</type>`

---

#### Note

Hosts of type Other, and HPUX are not automatically discovered, therefore, set the `<discoverable>` flag to false.

---

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/hosts
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<host_create>
  <type>Other</type>
  <host_name>192.168.0.1</host_name>
  <name>myhost2</name>
  <discoverable>false</discoverable>
  <tenant>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</tenant>
</host_create>
```

#### Response

```
HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423519740612</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:7692ec89-
c388-40f1-9d5d-70029556fe9b:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:7692ec89-
c388-40f1-9d5d-70029556fe9b:vdc1"/>
  <name>DISCOVER HOST</name>
  <remote>false</remote>
```

```

    <tags/>
    <vdc>
      <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
      <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <associated_resources/>
    <description>discover a compute host</description>
    <end_time>1423519740611</end_time>
    <message>Host is not discoverable</message>
    <op_id>b738e081-e671-44be-959d-cd670ceaf75f</op_id>
    <progress>100</progress>
    <resource>
      <id>urn:storageos:Host:4f96c363-f6dd-4e5f-968e-
a4778671972b:vdc1</id>
      <link rel="self" href="/compute/hosts/urn:storageos:Host:
4f96c363-f6dd-4e5f-968e-a4778671972b:vdc1"/>
      <name>myhost2</name>
    </resource>
    <start_time>1423519740610</start_time>
    <state>ready</state>
    <tenant>
      <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
      <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
    </tenant>
  </task>

```

If the state from the returned task is `ready`, the host is now added to ViPR Controller.

3. Register an initiator associated with the host by calling the following POST . The new host initiator is returned.

#### Request

```

POST https://<ViPR_Controller_VIP>:4443/compute/hosts/{Host_URN}/
initiators
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<initiator_create>
  <protocol>FC</protocol>
  <initiator_port>10:13:27:65:60:38:68:BE</initiator_port>
</initiator_create>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<initiator>
  <creation_time>1379202603661</creation_time>
  <id>urn:storageos:Initiator:07b2e71d-
cb4c-49c9-94fe-1feab7878d35:vdc1</id>
  <inactive>false</inactive>
  <link
    href="/compute/initiators/urn:storageos:Initiator:
07b2e71d-cb4c-49c9-94fe-1feab7878d35:vdc1"
    rel="self"/>
  <tags/>
  <host>
    <id>urn:storageos:Host:c2fe902f-0de0-4a92-
a2a9-46ba87279bd2:vdc1</id>
    <link

```

```

        href="/compute/hosts/
urn:storageos:Host:c2fe902f-0de0-4a92-a2a9-46ba87279bd2:vdc1"
        rel="self"/>
    </host>
    <protocol>FC</protocol>
    <hostname>myhost</hostname>
    <initiator_port>10:13:27:65:60:38:68:BE</initiator_port>
</initiator>

```

## Add host ports to an IP network

If adding hosts to provision over an IP network, the host ports must be added to the IP network.

IP networks are created by system administrators. Tenant administrators cannot configure IP networks or add host ports to the network.

You use `POST /vdc/networks` to create a new IP network or `PUT /vdc/networks/{ID}` to add your host ports to an existing IP network.

## Add a host to a cluster

Optionally, hosts can be added to ViPR Controller clusters. Adding hosts to clusters allows service operations to be performed exclusively on a single host, or shared across all the hosts in a cluster.

### Before you begin

- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticating with the REST API on page 9](#).
- Clusters can only contain the same type of hosts.
- A host can only be used in one cluster.
- You need the following information:
  - The URN of the tenant, if you need to create the cluster before adding the host. To get the URN of the current tenant, use `GET /tenant`.
  - The URN of the host being added to the cluster. To determine the ID of the host, you can use `GET /compute/hosts/bulk` to get the list of all hosts IDs and then `GET /compute/hosts/{Host_URN}` to show the details of a specific host.
  - The URN of the cluster.

The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.

### Procedure

1. If the cluster does not already exist, create one with the following POST.

#### Request

```

POST https://<ViPR_Controller_VIP>:4443/tenants/{Tenant_URN}/
clusters
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
<cluster_create>

```

```

    <name>Win_cluster_1</name>
</cluster_create>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<cluster>
  <creation_time>1399748901762</creation_time>
  <global>false</global>
  <id>urn:storageos:Cluster:
2f6b27f2-5eb9-4b8f-8519-050a43f3c733:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/compute/clusters/urn:storageos:Cluster:
2f6b27f2-5eb9-4b8f-8519-050a43f3c733:vdc1"/>
  <name>Win_cluster_1</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:440b70de-fd36-4361-
a455-b6ca65fb8228:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:440b70de-fd36-4361-a455-
b6ca65fb8228:vdc1"/>
  </vdc>
  <tenant>
    <id>urn:storageos:TenantOrg:6c7dde31-
ec48-4028-8672-5e74f5754656:global</id>
    <link rel="self" href="/tenants/urn:storageos:TenantOrg:
6c7dde31-ec48-4028-8672-5e74f5754656:global"/>
  </tenant>
</cluster>

```

2. A host is added to a cluster by updating the `<cluster>` attribute of a host, using `PUT /compute/hosts/{Host_URN}`. This example uses the URN of the new cluster, from the cluster create call. A task is returned.

## Request

```

PUT https://<ViPR_Controller_VIP>:4443/compute/hosts/
urn:storageos:Host:24e9c36a-804d-4d05-a646-a64a47accc7e:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<host_update>
  <cluster>urn:storageos:Cluster:9a18479e-d36e-44cc-bdae-
f8d44720dbe3:vdc1</cluster>
</host_update>

```

## Response

```

HTTP/1.1 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <associated_resources/>
  <description>DISCOVER_HOST</description>
  <op_id>5e7a5c9d-2a37-4f43-9534-727dc396804f</op_id>
  <resource>
    <id>urn:storageos:Host:24e9c36a-804d-4d05-a646-

```

```

a64a47acc7e:vdc1</id>
  <link rel="self" href="/compute/hosts/urn:storageos:Host:
24e9c36a-804d-4d05-a646-a64a47acc7e:vdc1"/>
  <name>host219</name>
</resource>
<link rel="self" href="/compute/hosts/urn:storageos:Host:
24e9c36a-804d-4d05-a646-a64a47acc7e:vdc1/tasks/
5e7a5c9d-2a37-4f43-9534-727dc396804f"/>
  <start_time>1399749237037</start_time>
  <state>pending</state>
</task>

```

### Results

If the message from the returned task is `Operation completed successfully`, the host is now added to the cluster.

## Replace Host Initiators after a storage volume has been exported to a host

Once you have used ViPR Controller to export a volume to a host, you can add a host initiator to the export, remove a host initiator from the export, or perform both actions to swap out one host initiator for another in the export group.

## Update ViPR Controller after a host initiator is replaced outside of ViPR

After you use ViPR Controller to export a volume to an AIX, ESX, Linux, or Windows host, which was added to ViPR Controller as discoverable, you can, add, remove, or replace a host initiator used by ViPR Controller for an export operation directly on the host, using an application other than ViPR Controller.

### Before you begin

- The ID of the host containing the initiator that was replaced. You can use `GET /compute/hosts` to get a lists of the IDs, URIs, and names of all hosts in the system.
- Authenticate with the ViPR REST API as a System Administrator for the network-related REST API calls. See [Authenticating with the REST API on page 9](#).
- Authenticate with the ViPR REST API as a Tenant Administrator for the host-related REST API calls.

After you add, remove, or replace a host initiator that was used by ViPR Controller in an export operation, using an application other than ViPR Controller, you must rediscover the network-system (fabric manager) which provides connectivity between the host and the storage.

### Procedure

1. Get a list of the available network-systems using `GET /vdc/network-systems`. The list includes the name, ID, and URI of each of network systems (fabric managers).

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/network-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

**Response**

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network_systems>
  <network_system>
    <id>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</id>
    <link rel="self" href="/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1"/>
    <name>brocade_west1</name>
  </network_system>
</network_systems>

```

2. Select the network system on which the network between the host and the storage is configured and rediscover the network system using POST /vdc/network-systems/{id}/discover. A task is returned whose URI can be queried to determine the status of the task.

**Request**

```

POST https://<ViPR_Controller_VIP>:4443/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1/discover
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

**Response**

```

HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423664227579</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:e2fdf765-0086-4a1c-8645-
c58fa66f8cc0:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/
urn:storageos:Task:e2fdf765-0086-4a1c-8645-
c58fa66f8cc0:vdc1"/>
  <name>DISCOVER NETWORKSYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover one network system</description>
  <op_id>553dba5e-509b-48be-b586-370cbe243438</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</id>
    <link rel="self" href="/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1"/>

```



```

        <name>brocade_west1</name>
      </resource>
    <start_time>1423664227577</start_time>
    <state>pending</state>
  </task>

```

3. Query the network system discover task, using the task ID from the response body of the POST request. When the message attribute of the task is `Operation completed successfully`, the operation has completed and the network system has been rediscovered.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:e2fdf765-0086-4a1c-8645-c58fa66f8cc0:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423664227579</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:e2fdf765-0086-4a1c-8645-
c58fa66f8cc0:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/
urn:storageos:Task:e2fdf765-0086-4a1c-8645-c58fa66f8cc0:vdc1"/>
  <name>DISCOVER NETWORKSYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover one network system</description>
  <end_time>1423664228010</end_time>
  <message>Operation completed successfully</message>
  <op_id>553dba5e-509b-48be-b586-370cbe243438</op_id>
  <progress>100</progress>
  <resource>
    <id>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</id>
    <link rel="self" href="/vdc/network-systems/
urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1"/>
    <name>brocade_west1</name>
  </resource>
  <start_time>1423664227577</start_time>
  <state>ready</state></task>

```

4. Rediscover the host that is associated with the replaced initiator so that ViPR Controller can rediscover all of the initiators on the host. During host discovery, if any new or removed initiators are discovered on the host, existing exports will be automatically updated. Use `POST /compute/hosts/{id}/discover`. A task is returned whose URI can be queried to determine the status of the task.

## Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/hosts/{host_ID}/
discover
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

## Response

```
HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1424181597255</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
933b8a8e-8223-49f6-8d52-8ddfb03cfed9:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
933b8a8e-8223-49f6-8d52-8ddfb03cfed9:vdc1"/>
  <name>DISCOVER HOST</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover a compute host</description>
  <op_id>82b9ca2f-a30a-475f-b7cd-f374b1995e32</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:Host:a9a4a18d-df40-443c-9ab0-
e83823d156fa:vdc1</id>
    <link rel="self" href="/compute/hosts/
urn:storageos:Host:a9a4a18d-df40-443c-9ab0-e83823d156fa:vdc1"/>
    <name>lglw7151</name>
  </resource>
  <start_time>1424181597253</start_time>
  <state>pending</state>
  <tenant>
    <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
    <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
  </tenant>
</task>
```

5. Query the host discover task, using the task ID from the response body of the POST request. When the message attribute of the task is Operation completed successfully, the operation has completed and the host has been rediscovered.

## Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:933b8a8e-8223-49f6-8d52-8ddfb03cfed9:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

**Response**

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1424181597255</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
933b8a8e-8223-49f6-8d52-8ddfb03cfed9:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
933b8a8e-8223-49f6-8d52-8ddfb03cfed9:vdc1"/>
  <name>DISCOVER HOST</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <associated_resources/>
    <description>discover a compute host</description>
    <end_time>1424181602095</end_time>
    <message>Operation completed successfully</message>
    <op_id>82b9ca2f-a30a-475f-b7cd-f374b1995e32</op_id>
    <progress>100</progress>
    <resource>
      <id>urn:storageos:Host:a9a4a18d-df40-443c-9ab0-
e83823d156fa:vdc1</id>
      <link rel="self" href="/compute/hosts/
urn:storageos:Host:a9a4a18d-df40-443c-9ab0-e83823d156fa:vdc1"/>
      <name>lg1w7151</name>
    </resource>
    <start_time>1424181597253</start_time>
    <state>ready</state>
    <tenant>
      <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
      <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
    </tenant>
  </vdc>
</task>

```

**Replace a host initiator of an undiscovered host after a ViPR Controller export operation.**

If ViPR Controller was used to export a volume to a host, which was added to ViPR Controller as “Other,” or if the host was added as undiscoverable, use the following procedures to replace a host initiator with a different host initiator after the export operation.

**Before you begin**

- The name of the initiator being added and the name of the initiator being removed.
- The ID of the initiator being removed.
- The ID of the host containing the initiators being added and replaced.
- Authenticate with the ViPR REST API as a System Administrator for the network-related REST API calls. See [Authenticating with the REST API on page 9](#).

- Authenticate with the ViPR REST API as a Tenant Administrator for the host-related and initiator-related REST API calls.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

In ViPR Controller, add the new host initiator to the same network from which the host initiator is being replaced, so that ViPR Controller will see the connectivity between the host and the storage after the swap is complete. ViPR Controller automatically updates the host initiators in the export group after the add, and remove operations are detected in ViPR Controller

### Procedure

1. Get the list of networks using GET /vdc/networks.

#### Request

```
GET https://<ViPR_Controller_VIP>:4443/vdc/networks
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<networks>
  <network>
    <id>urn:storageos:Network:57351790-d19b-4a5b-
b77b-7cbea6f3b0fe:vdc1</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:57351790-d19b-4a5b-b77b-7cbea6f3b0fe:vdc1"/>
    <name>FABRIC_fake array fabric</name>
  </network>
  <network>
    <id>urn:storageos:Network:3a42b101-d309-4a92-
b29f-16215aa09c0f:vdc1</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:3a42b101-d309-4a92-b29f-16215aa09c0f:vdc1"/>
    <name>FABRIC_Vplex_LGL6220_FID_30-10:00:00:27:f8:58:f6:c1</name>
  </network>
  <network>
    <id>urn:storageos:Network:79596cc5-e8b2-4033-
b576-8282222b7eb0:vdc1</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:79596cc5-e8b2-4033-b576-8282222b7eb0:vdc1"/>
    <name>FABRIC_Vplex_Meta_Fid_20-10:00:00:27:f8:58:f6:c3</
name>
  </network>
  <network>
    <id>urn:storageos:Network:80d3e51d-7181-4b31-
baad-9f7d66bbd55e:vdc1</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:80d3e51d-7181-4b31-baad-9f7d66bbd55e:vdc1"/>
    <name>FABRIC_Vplex_WAN-10:00:00:27:f8:58:f6:bc</name>
  </network>
  <network>
    <id>urn:storageos:Network:1da5b653-dce0-4f1c-8ac6-
c0ad4faa176a:vdc1</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:1da5b653-dce0-4f1c-8ac6-c0ad4faa176a:vdc1"/>
    <name>FABRIC_vplex154nbr2</name>
  </network>
</networks>
```

```

        <id>urn:storageos:Network:454b5f84-403d-4d1b-bce7-
c920b93fc9d4:vdcl</id>
        <link rel="self" href="/vdc/networks/
urn:storageos:Network:454b5f84-403d-4d1b-bce7-c920b93fc9d4:vdcl"/>
        <name>FABRIC_VPlex_LGL6221_FID_40</name>
    </network>
    <network>
        <id>urn:storageos:Network:b53c8e06-0e80-457d-9764-
c2bb82437de9:vdcl</id>
        <link rel="self" href="/vdc/networks/
urn:storageos:Network:b53c8e06-0e80-457d-9764-c2bb82437de9:vdcl"/>
        <name>FABRIC_losam082-fabric</name>
    </network>
    <network>
        <id>urn:storageos:Network:3a5e76fe-2541-48ca-a293-
bdc6ead8fa84:vdcl</id>
        <link rel="self" href="/vdc/networks/
urn:storageos:Network:3a5e76fe-2541-48ca-a293-bdc6ead8fa84:vdcl"/>
        <name>FABRIC_VPLEX_WAN_lglw6208/lglw6209</name>
    </network>
</networks>

```

2. Select the network in which you want to swap the initiator. You can also use GET /vdc/networks/{id} if you want to view more details about a particular network.
3. Add the new initiator to the network using PUT /vdc/networks/{id}. The updated network representation is returned with the new endpoint.

---

#### Note

The manually added endpoint is listed in the <endpoints\_discovered> section, however the value is false, whereas those endpoints that ViPR Controller discovered have a value of true.

---

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/vdc/networks/
urn:storageos:Network:454b5f84-403d-4d1b-bce7-c920b93fc9d4:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_update>
  <endpoint_changes>
    <add>
      <endpoint>50:00:14:42:90:71:23:02</endpoint>
    </add>
  </endpoint_changes>
</network_udpate>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
  <creation_time>1423688165153</creation_time>
  <global>false</global>
  <id>urn:storageos:Network:454b5f84-403d-4d1b-bce7-
c920b93fc9d4:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>

```

```

<link rel="self" href="/vdc/networks/urn:storageos:Network:
454b5f84-403d-4dlb-bce7-c920b93fc9d4:vdc1"/>
<name>FABRIC_VPlex_LGL6221_FID_40</name>
<remote>>false</remote>
<tags/>
<vdc>
  <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
  <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
</vdc>
<native_guid>FC+BROCADE+10:00:00:27:F8:58:F6:C2</native_guid>
<discovered>>true</discovered>
<endpoints>
  <endpoint>50:01:24:81:00:6A:6D:BE</endpoint>
  <endpoint>10:00:00:90:FA:66:22:E3</endpoint>
  <endpoint>50:06:01:62:39:A0:30:98</endpoint>
  <endpoint>50:01:24:81:00:71:ED:28</endpoint>
  <endpoint>50:01:24:81:00:71:ED:29</endpoint>
  <endpoint>10:00:00:90:FA:1C:A3:B8</endpoint>
  <endpoint>10:00:00:90:FA:1C:A3:B9</endpoint>
  <endpoint>50:00:14:42:90:71:23:02</endpoint>
  <endpoint>50:01:24:81:00:6A:6D:BF</endpoint>
  <endpoint>21:00:00:1B:32:8A:37:B3</endpoint>
  <endpoint>50:00:14:42:90:71:23:00</endpoint>
</endpoints>
<endpoints_discovered>
  <endpoint_discovered>
    <name>50:01:24:81:00:6A:6D:BE</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>10:00:00:90:FA:66:22:E3</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:06:01:62:39:A0:30:98</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:01:24:81:00:71:ED:28</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:01:24:81:00:71:ED:29</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>10:00:00:90:FA:1C:A3:B8</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>10:00:00:90:FA:1C:A3:B9</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:00:14:42:90:71:23:02</name>
    <value>>false</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:01:24:81:00:6A:6D:BF</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>21:00:00:1B:32:8A:37:B3</name>
    <value>>false</value>
  </endpoint_discovered>
  <endpoint_discovered>

```

```

        <name>50:00:14:42:90:71:23:00</name>
        <value>>true</value>
    </endpoint_discovered>
</endpoints_discovered>
<fabric_id>Vplex_LGL6221_FID_40</fabric_id>
<network_systems>
    <network_system>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdc1</network_system>
</network_systems>
    <registration_status>REGISTERED</registration_status>
    <transport_type>FC</transport_type>
</network>

```

4. For the initiator that you just added as an endpoint in the network, create an initiator on the required host in ViPR Controller.

#### Request

```

POST https://<ViPR_Controller_VIP>:4443/compute/hosts/{host_id}/
initiators
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<initiator_create>
    <protocol>FC</protocol>
    <initiator_port>50:00:14:42:90:71:23:02</initiator_port>
</initiator_create>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<initiator>
    <creation_time>1379202603661</creation_time>
    <id>urn:storageos:Initiator:07b2e71d-
cb4c-49c9-94fe-1feab7878d35:vdc1</id>
    <inactive>false</inactive>
    <link
        href="/compute/initiators/urn:storageos:Initiator:
07b2e71d-cb4c-49c9-94fe-1feab7878d35:vdc1"
        rel="self"/>
    </link>
    <tags/>
    <host>
        <id>urn:storageos:Host:c2fe902f-0de0-4a92-
a2a9-46ba87279bd2:vdc1</id>
        <link
            href="/compute/hosts/
urn:storageos:Host:c2fe902f-0de0-4a92-a2a9-46ba87279bd2:vdc1"
            rel="self"/>
        </link>
    </host>
    <protocol>FC</protocol>
    <hostname>myhost</hostname>
    <initiator_port>50:00:14:42:90:71:23:02</initiator_port>
</initiator>

```

The initiator is automatically registered, and any exports are updated automatically for the host.

5. Remove the host initiator, which is being replaced by the host initiator added in the previous steps, from the network in ViPR Controller.

**Note**

You can only remove those initiators which you manually added to ViPR Controller. Any initiators that ViPR Controller discovered cannot be removed.

**Request**

```
PUT https://<ViPR_Controller_VIP>:4443/vdc/networks/
urn:storageos:Network:454b5f84-403d-4d1b-bce7-c920b93fc9d4:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_update>
  <endpoint_changes>
    <remove>
      <endpoint>21:00:00:1B:32:8A:37:B3</endpoint>
    </remove>
  </endpoint_changes>
</network_update>
```

**Response**

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
  <creation_time>1423688165153</creation_time>
  <global>>false</global>
  <id>urn:storageos:Network:454b5f84-403d-4d1b-bce7-
c920b93fc9d4:vdc1</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/networks/urn:storageos:Network:
454b5f84-403d-4d1b-bce7-c920b93fc9d4:vdc1"/>
  <name>FABRIC_VPlex_LGL6221_FID_40</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <native_guid>FC+BROCADE+10:00:00:27:F8:58:F6:C2</native_guid>
  <discovered>>true</discovered>
  <endpoints>
    <endpoint>50:01:24:81:00:6A:6D:BE</endpoint>
    <endpoint>10:00:00:90:FA:66:22:E3</endpoint>
    <endpoint>50:06:01:62:39:A0:30:98</endpoint>
    <endpoint>50:01:24:81:00:71:ED:28</endpoint>
    <endpoint>50:01:24:81:00:71:ED:29</endpoint>
    <endpoint>10:00:00:90:FA:1C:A3:B8</endpoint>
    <endpoint>10:00:00:90:FA:1C:A3:B9</endpoint>
    <endpoint>50:00:14:42:90:71:23:02</endpoint>
    <endpoint>50:01:24:81:00:6A:6D:BF</endpoint>
    <endpoint>50:00:14:42:90:71:23:00</endpoint>
  </endpoints>
  <endpoints_discovered>
    <endpoint_discovered>
      <name>50:01:24:81:00:6A:6D:BE</name>
      <value>>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
      <name>10:00:00:90:FA:66:22:E3</name>
```



```

        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:06:01:62:39:A0:30:98</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:01:24:81:00:71:ED:28</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:01:24:81:00:71:ED:29</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>10:00:00:90:FA:1C:A3:B8</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>10:00:00:90:FA:1C:A3:B9</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:00:14:42:90:71:23:02</name>
        <value>false</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:01:24:81:00:6A:6D:BF</name>
        <value>true</value>
    </endpoint_discovered>
    <endpoint_discovered>
        <name>50:00:14:42:90:71:23:00</name>
        <value>true</value>
    </endpoint_discovered>
</endpoints_discovered>
<fabric_id>VPLex_LGL6221_FID_40</fabric_id>
<network_systems>
    <network_system>urn:storageos:NetworkSystem:
7875ed0e-1d2a-430d-94d0-20fcd7e38bb4:vdcl</network_system>
</network_systems>
<registration_status>REGISTERED</registration_status>
<transport_type>FC</transport_type>
</network>

```

6. Delete the initiator from ViPR Controller using POST `/compute/initiators/{id}/deactivate`. This will automatically remove the initiator from any existing exports. A task is returned whose URI can be queried to determine the status of the task.

#### Request

```

POST https://<ViPR_Controller_VIP>:4443/compute/initiators/
urn:storageos:Initiator:b90c23cf-8152-4dcc-b3e0-a1d882f9a79e:vdcl/
deactivate
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 202 Accepted
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
    <creation_time>1424203404060</creation_time>
    <global>false</global>
    <id>urn:storageos:Task:864cfa1b-8a51-4175-

```

```

b3d3-7d4a5131c33d:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
864cfalb-8a51-4175-b3d3-7d4a5131c33d:vdcl"/>
  <name>DELETE INITIATOR</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:fd8f9b83-69c4-4826-
b83b-49944710bd28:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:fd8f9b83-69c4-4826-
b83b-49944710bd28:vdcl"/>
  </vdc>
  <associated_resources/>
  <description>delete initiator</description>
  <op_id>928dd2ed-3db4-4e91-98fc-91b34e78237a</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:Initiator:b90c23cf-8152-4dcc-b3e0-
ald882f9a79e:vdcl</id>
    <link rel="self" href="/compute/initiators/
urn:storageos:Initiator:b90c23cf-8152-4dcc-b3e0-
ald882f9a79e:vdcl"/>
    <name/>
  </resource>
  <start_time>1424203404059</start_time>
  <state>pending</state>
</task>

```

7. Query the initiator deletion task, using the task ID from the response body of the POST request. When the message attribute of the task is Operation completed successfully, the operation has completed and the initiator has been deleted. In addition, if the initiator is in use by exports, those exports are updated by removing the initiator from them.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:864cfalb-8a51-4175-b3d3-7d4a5131c33d:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1424203404060</creation_time>
  <global>>false</global>
  <id>urn:storageos:Task:864cfalb-8a51-4175-
b3d3-7d4a5131c33d:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
864cfalb-8a51-4175-b3d3-7d4a5131c33d:vdcl"/>
  <name>DELETE INITIATOR</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:fd8f9b83-69c4-4826-
b83b-49944710bd28:vdcl</id>
    <link rel="self" href="/vdc/

```

```

urn:storageos:VirtualDataCenter:fd8f9b83-69c4-4826-
b83b-49944710bd28:vdcl"/>
  </vdc>
  <associated_resources/>
  <description>delete initiator</description>
  <end_time>1424203467146</end_time>
  <message>Operation completed successfully</message>
  <op_id>928dd2ed-3db4-4e91-98fc-91b34e78237a</op_id>
  <progress>100</progress>
  <resource>
    <id>urn:storageos:Initiator:b90c23cf-8152-4dcc-b3e0-
ald882f9a79e:vdcl</id>
    <link rel="self" href="/compute/initiators/
urn:storageos:Initiator:b90c23cf-8152-4dcc-b3e0-
ald882f9a79e:vdcl"/>
    <name/>
  </resource>
  <start_time>1424203404059</start_time>
  <state>ready</state>
  <workflow>
    <id>urn:storageos:Workflow:cd0a4b0f-2adb-458f-a34e-
a4331790f7ba:vdcl</id>
    <link rel="self" href="/vdc/workflows/
urn:storageos:Workflow:cd0a4b0f-2adb-458f-a34e-a4331790f7ba:vdcl"/>
  </workflow>
</task>

```

## Important REST API calls to manage hosts and clusters

The table shows some important APIs that are used to manage hosts, vCenters and Windows clusters.

**Table 4** ViPR Controller REST API Calls to Manage Hosts and Clusters

ViPR REST API Call	Description
POST /tenant/ {tenant_urn}/hosts	Create a host resource in ViPR Controller.
PUT /compute/hosts/ {Host_URN}	Modify parameters for a host. In addition, it updates any exports affected by adding or removing the host to or from a cluster. Discovery is then run for the host.
POST /compute/hosts/ {Host_URN}/discover	Add a host to the discovery queue. Host discovery is performed asynchronously.
POST /compute/hosts/ (Host_URN)/detach- storage	Detaches storage from the host. Updates export groups and fileshare exports by removing references to the given host, the host's initiators, and the host's IP interfaces. Volumes and fileshares are left intact.
GET /compute/ clusters/ {Cluster_URN}/hosts	Lists the hosts in a cluster.
GET /tenants/ {Tenant_URN}/clusters	List all clusters that belong to the specified tenant. Clusters, like hosts and vCenters, are tenant-level resources.
GET /compute/ clusters/{Cluster_URN}	Retrieve a cluster resource.
POST /tenants/{id}/ clusters	Build a ViPR Controller cluster.

**Table 4** ViPR Controller REST API Calls to Manage Hosts and Clusters (continued)

ViPR REST API Call	Description
PUT /compute/hosts/ {Host_URN}	Add a host to a cluster or remove a host from a cluster. The payload for this call allows you to specify the URN of a cluster. When removing a host from a cluster, the cluster would be specified without any value, such as <cluster></cluster>. <pre data-bbox="727 489 1465 678"> &lt;host_update&gt;   &lt;type&gt;Windows&lt;/type&gt;   &lt;host_name&gt;myhost.corp.com&lt;/host_name&gt;   &lt;name&gt;myHost&lt;/name&gt;   &lt;user_name&gt;admin&lt;/user_name&gt;   &lt;password&gt;password&lt;/password&gt;   &lt;cluster&gt;{Cluster_URN}&lt;/cluster&gt; &lt;/host_update&gt;                     </pre>
POST /compute/ clusters/ {Cluster_URN}/detach- storage	Detaches storage from the cluster. Updates export groups that are referenced by the given cluster by removing the cluster reference and initiators belonging to hosts in this cluster. Volumes are left intact.
POST /compute/hosts/ {Host_URN}/initiators	Register an initiator for the host and update the host export groups by adding the initiator to them. The payload for this call allows you to specify the initiator. <pre data-bbox="727 982 1465 1098"> &lt;initiator_create&gt;   &lt;protocol&gt;iSCSI&lt;/protocol&gt;   &lt;initiator_port&gt;iqn.2001-10.com.emc.lss.host1&lt;/initiator_port&gt; &lt;/initiator_create&gt;                     </pre>

# CHAPTER 7

## Adding vCenters and ESX/ESXi clusters

This chapter contains the following topics:

- [Overview](#)..... 70
- [Add and discover a vCenter Server](#)..... 70
- [Network configuration requirements for vCenters](#)..... 72
- [Important REST API calls to manage vCenters and clusters](#)..... 73

## Overview

This chapter provides ViPR Controller System and Tenant Administrators the ViPR Controller support requirements, and prerequisite information to prepare vCenters for ViPR Controller integration, the steps to add the host to ViPR Controller, and the important REST API calls used to manage vCenter and ESX/ESXi clusters.

## Add and discover a vCenter Server

You add a vCenter Server to ViPR Controller using `POST /tenants/{tenant_id}/vcenters`. ViPR Controller automatically discovers the host, clusters and other resources managed by that server.

### Before you begin

To complete this procedure:

- For pre-configuration and support requirements, see *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- Authenticate with the ViPR REST API as a Tenant Administrator. See [Authenticating with the REST API on page 9](#).
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

### Procedure

1. Get the URN of your tenant.

```
GET https://<ViPR_Controller_VIP>:4443/tenant
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

2. Use the tenant URN to create a vCenter.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/tenants/{Tenant_URN}/
vcenters
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<vcenter_create>
  <ip_address>192.168.0.0</ip_address>
  <name>vcenter_west</name>
  <port_number>443</port_number>
  <user_name>admin_user</user_name>
  <password>Password1</password>
</vcenter_create>
```

#### Response

```
HTTP 202 Accepted
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1423595062584</creation_time>
```

```

    <global>false</global>
    <id>urn:storageos:Task:e2a06ffe-1a96-4f54-9463-
f426fc4083d8:vdcl</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/vdc/tasks/
urn:storageos:Task:e2a06ffe-1a96-4f54-9463-
f426fc4083d8:vdcl"/>
    <name>DISCOVER VCENTER</name>
    <remote>false</remote>
    <tags/>
    <vdc>
        <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
    </vdc>
    <associated_resources/>
    <description>discover a vcenter</description>
    <op_id>c3eefcb2-5a13-4446-b31f-76a172dc7701</op_id>
    <progress>0</progress>
    <resource>
        <id>urn:storageos:Vcenter:316465e4-8661-4d73-a60d-
c2132f0ff868:vdcl</id>
        <link rel="self" href="/compute/vcenters/
urn:storageos:Vcenter:316465e4-8661-4d73-a60d-c2132f0ff868:vdcl"/>
        <name>vcenter_west</name>
    </resource>
    <start_time>1423595062583</start_time>
    <state>pending</state>
    <tenant>
        <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
        <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
    </tenant>
</task>

```

3. Query the vCenter create task, using the task URL from the response body of the POST request, until the message attribute of the task is `Operation completed successfully` which indicates that the operation has completed and the vCenter has been added to ViPR Controller and successfully discovered.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:e2a06ffe-1a96-4f54-9463-f426fc4083d8:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
    <creation_time>1423595062584</creation_time>
    <global>false</global>
    <id>urn:storageos:Task:e2a06ffe-1a96-4f54-9463-
f426fc4083d8:vdcl</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/vdc/tasks/
urn:storageos:Task:e2a06ffe-1a96-4f54-9463-f426fc4083d8:vdcl"/>

```

```

    <name>DISCOVER VCENTER</name>
    <remote>false</remote>
    <tags/>
    <vdc>
      <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
      <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <associated_resources/>
    <description>discover a vcenter</description>
    <end_time>1423595086871</end_time>
    <message>Operation completed successfully</message>
    <op_id>c3eefcb2-5a13-4446-b31f-76a172dc7701</op_id>
    <progress>100</progress>
    <resource>
      <id>urn:storageos:Vcenter:316465e4-8661-4d73-a60d-
c2132f0ff868:vdc1</id>
      <link rel="self" href="/compute/vcenters/
urn:storageos:Vcenter:316465e4-8661-4d73-a60d-c2132f0ff868:vdc1"/>
      <name>vcenter_west</name>
    </resource>
    <start_time>1423595062583</start_time>
    <state>ready</state>
    <tenant>
      <id>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</id>
      <link rel="self" href="/tenants/
urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global"/>
    </tenant>
  </task>

```

## Network configuration requirements for vCenters

After a host is added to ViPR, configure the networks if required before using the host in a service.

- Fibre Channel
  - No action is required when a vCenter is added on a Fibre Channel network. The host initiators for ESX/ESXi hosts on Fibre Channel networks are automatically discovered and registered in ViPR when vCenter is added to ViPR. At the time the fabric switch is added to the ViPR, using `POST /vdc/network-systems`, ViPR also discovers the storage systems on the same network. During provisioning ViPR selects the storage and host ports that will be used to connect the hosts and storage.
  - Optionally, the resources used for provisioning can be customized by deregistering the host initiators that can be used for provisioning, or specifying which host and storage ports can be used when provisioning storage to the ESX/ESXi hosts.
- IP
 

Add the ESX/ESXi ports to an IP network.

ViPR can discover the ports of IP connected storage systems and hosts, but it cannot discover the paths between them, so it is necessary to create IP networks, and then add the host, and storage system ports, which will be provisioned together, to the same IP network.

If creating a network for a virtual array that will be used for file system exports to an ESXi cluster, add all ESXi server IP interface addresses (Management IP, vMotion IPs, and any other IP VMNIC visible in vCenter) per cluster.



- iSCSI  
Hosts that use ViPR Controller services with the iSCSI protocol must have their iSCSI ports logged into the correct target array ports before they can be used in the service.

## Important REST API calls to manage vCenters and clusters

The table shows some important APIs that are used to manage vCenters and clusters.

**Table 5** ViPR Controller REST API Calls to Manage vCenters and Clusters

ViPR REST API Call	Description
POST /tenants/{Tenant_URN}/vcenters	Add a vCenter resource to the tenant organization.
GET /compute/vcenters/{Vcenter_URN}/clusters	List the clusters in a vCenter.
GET /compute/vcenters/{Vcenter_URN}/hosts	List the hosts in a vCenter.
PUT /compute/vcenters/{Vcenter_URN}	Update a vCenter. The vCenter attributes to be updated are included in the request payload.
POST /compute/vcenters/{vcenter_URN}/discover	Discover a vCenter.
GET /tenants/{Tenant_URN}/vCenters	List all vCenters that belong to the specified tenant.
POST /tenants/{Tenant_URN}/clusters	Build a ViPR Controller cluster.



# CHAPTER 8

## Configuring and adding Vblock Compute Systems

This chapter contains the following topics:

- [Overview](#)..... 76
- [Add a Vblock compute system to ViPR Controller](#)..... 76
- [ViPR Controller discovery of Vblock compute systems](#)..... 78
- [Vblock System configuration in ViPR Controller](#)..... 78
- [Additional REST API calls to manage your Vblock Compute Systems](#)..... 79

## Overview

ViPR Controller System Administrators can learn about ViPR Controller support requirements, prerequisite information to prepare Vblock Compute Systems (Cisco Unified Computing System™ (UCS)) and the steps to add a compute system to ViPR Controller.

For additional information, see *ViPR Controller Support for Vblock Systems*.

## Add a Vblock compute system to ViPR Controller

You add a Vblock compute system to ViPR Controller using `POST /vdc/compute-systems`.

### Before you begin

- For pre-configuration and support requirements, see *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#).
- `system_type` - `ucs` is one example
- `port_number` - The port for ViPR Controller to connect with the compute system. The default is 443.
- `ip_address` - IP address of the compute system.
- `os_install_network` - The OS Install Network is a private VLAN for operating system (OS) installation. The OS Install Network is used by ViPR Controller during provisioning for communication between the hosts and the ViPR Controller compute image server. Since ViPR Controller utilizes a PXE boot process, a DHCP server is used and must be isolated from the customer network. During provisioning, the compute blades communicate with the image server and the operating system installation is performed over the OS Install Network. Once the OS installation is complete for a given host, the OS Install Network is no longer used to communicate to that host.
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

### Procedure

1. Add a Vblock compute system to ViPR Controller by sending a `POST /vdc/compute-systems` request. The request returns a task whose URI can be queried to determine the status of the task.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/compute-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<compute_system_create>
  <name>compute_west_1</name>
  <ip_address>192.168.0.0</ip_address>
  <port_number>443</port_number>
  <use_ssl>true</use_ssl>
  <user_name>admin</user_name>
```

```

    <password>Password1</password>
    <system_type>ucs</system_type>
    <os_install_network>630</os_install_network>
</compute_system_create>

```

## Response

```

HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1421861349322</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
4434fb76-4f6f-4525-996c-2659ffb2624b:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:
4434fb76-4f6f-4525-996c-2659ffb2624b:vdc1"/>
  <name>DISCOVER COMPUTE SYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover a compute system.</description>
  <op_id>4b661145-702d-417e-951d-cec23e062d26</op_id>
  <progress>0</progress>
  <resource>
    <id>urn:storageos:ComputeSystem:a9e3a23e-1020-40ca-b3d6-
e5dc9b80c906:vdc1</id>
    <link rel="self" href="/vdc/compute-systems/
urn:storageos:ComputeSystem:a9e3a23e-1020-40ca-b3d6-
e5dc9b80c906:vdc1"/>
    <name>compute_west_1</name>
  </resource>
  <start_time>1421861349321</start_time>
  <state>pending</state>
</task>

```

2. Query the Vblock compute system create task, using the task URL from the response body of the POST request. When the message attribute of the task is `Operation completed successfully`, the operation has completed and the Vblock compute system has been successfully discovered.

## Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/tasks/
urn:storageos:Task:4434fb76-4f6f-4525-996c-2659ffb2624b:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>

```

```

<task>
  <creation_time>1421861349322</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:
4434fb76-4f6f-4525-996c-2659ffb2624b:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link_rel="self" href="/vdc/tasks/urn:storageos:Task:
4434fb76-4f6f-4525-996c-2659ffb2624b:vdc1"/>
  <name>DISCOVER COMPUTE SYSTEM</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link_rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <associated_resources/>
  <description>discover a compute system.</description>
  <end_time>1421861354723</end_time>
  <message>Operation completed successfully</message>
  <op_id>4b661145-702d-417e-951d-cec23e062d26</op_id>
  <progress>100</progress>
  <resource>
    <id>urn:storageos:ComputeSystem:a9e3a23e-1020-40ca-b3d6-
e5dc9b80c906:vdc1</id>
    <link_rel="self" href="/vdc/compute-systems/
urn:storageos:ComputeSystem:a9e3a23e-1020-40ca-b3d6-
e5dc9b80c906:vdc1"/>
    <name>compute_west_1</name>
  </resource>
  <start_time>1421861349321</start_time>
  <state>ready</state>
</task>

```

## ViPR Controller discovery of Vblock compute systems

Once the Vblock compute system is added to ViPR Controller, ViPR Controller automatically discovers the compute system and the compute system resources as follows:

- Compute System (Cisco Unified Computing System (UCS))
- Compute elements (blades for the UCS)
- Service Profile Templates (for UCS)

## Vblock System configuration in ViPR Controller

You must add each Vblock system component to ViPR Controller as an individual physical asset: Compute (UCS), Storage System, and Networks. Once all of the physical assets of the Vblock system have been added to ViPR Controller, you can set up storage visibility using the ViPR Controller virtual arrays. After configuring virtual arrays, you can configure ViPR Controller compute virtual pools.

## Additional REST API calls to manage your Vblock Compute Systems

The table shows some additional APIs that are used to manage your Vblock Compute Systems

**Table 6** REST API calls to manage your Vblock Compute Systems

REST API Call	Description
GET /vdc/compute-systems/{ID}	Get the details of a Vblock compute system.
GET /vdc/compute-systems	Get a list of the names, IDs, and links of all Vblock Compute Systems.
PUT /vdc/compute-systems/{ID}	Update a Vblock compute system and rediscover it.
POST /vdc/compute-systems/{ID}/deactivate	Delete a Vblock compute system.
GET /vdc/compute-systems/{ID}/compute-elements	Gets all of the compute elements belonging to a Vblock compute system in ViPR Controller.
GET /vdc/compute-systems/search?parameter={search_parameter}	Search for a Vblock compute system. For example:  <pre>GET /vdc/compute-systems/search?name=vblock_east</pre>
POST /vdc/compute-systems/{ID}/register	Registers a previously de-registered Vblock compute system.  <b>Note</b> When you use <code>POST /vdc/compute-systems</code> to create a Vblock compute system, it is automatically registered by ViPR Controller.
POST /vdc/compute-systems/{ID}/deregister	De-register a Vblock compute system so it is not used.
POST /vdc/compute-elements/{ID}/deregister	De-register an individual compute element in the Vblock compute system.





# CHAPTER 9

## Adding compute images

This chapter contains the following topics:

- [Overview](#)..... 82
- [Add Compute Images](#)..... 82
- [Additional REST API calls to manage your Compute Images](#)..... 84

## Overview

ViPR Controller system administrators can add compute images to ViPR Controller.

Compute Images are operating system (OS) installation files (ISO images) that ViPR Controller uses to deploy operating systems on Vblock compute elements that have been registered to ViPR Controller. If ViPR Controller is used to provision ESX clusters, ViPR Controller can also be used to add the cluster to a vCenter datacenter that has been registered to ViPR Controller.

For information on registering a Vblock Compute Systems to ViPR Controller, see [Configuring and adding Vblock Compute Systems on page 75](#).

## Add Compute Images

Add a compute image to ViPR Controller using `POST /compute/images`.

### Before you begin

#### **name**

The installation file name that will be seen by ViPR Controller users when selecting the OS installation file to use for a service operation.

#### **image\_url**

The URL location where the image file was added. If a user name and password are required to access the site, specify them in the URL.

- The ViPR Controller compute image server must have been deployed prior to adding the compute images to the ViPR Controller physical assets. For compute image deployment details see the: *ViPR Controller Installation, Upgrade, and Maintenance Guide*, which is available from the [ViPR Controller Product Documentation Index](#).
- Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#)
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

### Procedure

1. Add the compute image to ViPR Controller using `POST /compute/images`.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/compute/images
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<compute_image_create>
  <name>MyImage</name>
  <image_url>ftp://MyServer/myimage</image_url>
</compute_image_create>
```

#### Response

```
HTTP 202 Accepted
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
```

```

<task>
  <creation_time>1421941720408</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:2e97d85b-
e160-45d7-99cf-0b57386a7974:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:2e97d85b-
e160-45d7-99cf-0b57386a7974:vdcl"/>
  <name>IMPORT IMAGE</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:a2c45423-20a4-4d50-
a8cc-f81175a4ee75:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:a2c45423-20a4-4d50-a8cc-
f81175a4ee75:vdcl"/></vdc>
    <associated_resources/>
    <description>import an image.</description>
    <op_id>1e9e4280-d40f-44cd-94c6-b6114169fd59</op_id>
    <progress>0</progress>
    <resource>
      <id>urn:storageos:ComputeImage:c3c45b49-20ad-4b19-
a4a0-5f72694cbbcfe:vdcl</id>
      <link rel="self" href="/compute/images/
urn:storageos:ComputeImage:c3c45b49-20ad-4b19-
a4a0-5f72694cbbcfe:vdcl"/>
      <name>MyImage</name>
    </resource>
    <start_time>1421941720407</start_time>
    <state>pending</state>
</task>

```

A task is returned whose URI can be queried to determine the status of the task.

2. Query the add compute image task, using the task ID from the response body of the POST request. When the message attribute of the task is Operation completed successfully, the operation has completed and the compute image has been added to ViPR Controller.

### Request

```

https://<ViPR_Controller_VIP>:4443/vdc/tasks/urn:storageos:Task:
2e97d85b-e160-45d7-99cf-0b57386a7974:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<task>
  <creation_time>1421941720408</creation_time>
  <global>false</global>
  <id>urn:storageos:Task:2e97d85b-
e160-45d7-99cf-0b57386a7974:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/tasks/urn:storageos:Task:2e97d85b-
e160-45d7-99cf-0b57386a7974:vdcl"/>
  <name>IMPORT IMAGE</name>
  <remote>false</remote>
  <tags/>

```

```

    <vdc>
      <id>urn:storageos:VirtualDataCenter:a2c45423-20a4-4d50-
a8cc-f81175a4ee75:vdc1</id>
      <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:a2c45423-20a4-4d50-a8cc-
f81175a4ee75:vdc1"/></vdc>
      <associated_resources/>
      <description>import an image.</description>
      <end_time>1421945593699</end_time>
      <message>Operation completed successfully</message>
      <op_id>1e9e4280-d40f-44cd-94c6-b6114169fd59</op_id>
      <progress>100</progress>
      <resource>
        <id>urn:storageos:ComputeImage:c3c45b49-20ad-4b19-
a4a0-5f72694cbcfе:vdc1</id>
        <link rel="self" href="/compute/images/
urn:storageos:ComputeImage:c3c45b49-20ad-4b19-
a4a0-5f72694cbcfе:vdc1"/>
        <name>MyImage</name>
      </resource>
      <start_time>1421941720407</start_time>
      <state>ready</state>
    </task>

```

## Additional REST API calls to manage your Compute Images

The table shows some additional APIs that are used to manage your Compute Images

**Table 7** REST API calls to manage your Compute Images

REST API call	Description
GET /compute/images/{ID}	Get the details of a compute image.
GET /compute/images	Get a list of the names, IDs, and links of all compute images.
PUT /compute/images/{ID}	Update a compute image.
POST /compute/images/{ID}/deactivate	Delete a compute image.
GET /compute/images/search? parameter={search_parameter}	Search for acompute image . For example:  GET /compute/images/search? name=myimage

# CHAPTER 10

## Creating and configuring a virtual array

This chapter contains the following topics:

- [Overview](#)..... 86
- [Create a virtual array and assign an ACL](#)..... 86
- [Add and configure the networks for block storage in the virtual array](#)..... 88
- [Add and configure the networks for file storage in a virtual array](#)..... 94
- [Optionally restrict access to storage pools by manually assigning them to a virtual array](#)..... 100
- [Virtual Array requirements for Vblock system services](#)..... 107

## Overview

ViPR Controller system administrators can use the ViPR Controller REST API to create a virtual array, and assign an ACL to the virtual array. The REST API is also used to configure the networks, storage ports, and storage pools assigned to the virtual array.

For information on virtual arrays, see *ViPR Controller Concepts* on the [ViPR Controller Product Documentation Index](#).

## Create a virtual array and assign an ACL

### Before you begin

- Authenticate with the ViPR REST API as a System Administrator to create or edit virtual arrays. See [Authenticating with the REST API on page 9](#).
- For virtual array configuration requirements and recommendations, see *Configuration Considerations While Virtualizing Your Storage in ViPR Controller*.
- At a minimum, a virtual array must include at least one network, and one storage system connected to the network.
  - Storage systems can be added directly to the virtual array, or can be brought into the virtual array with the networks.
  - Networks can be added directly to the virtual array, or can be brought in with the storage systems, if the networks were previously added to the ViPR Controller physical assets.
- Optionally, physical storage ports, and storage pools associated with the storage systems in the virtual array, can be assigned for use in the virtual array. When assigned, only those storage ports and storage pools will be used as resources when storage is provisioned from the virtual array.
- A description and complete list of parameters for the REST API methods used in this article are described in the *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#).

### Procedure

1. Create a virtual array by sending a POST `/vdc/varrays`.

The request returns the representation of the new virtual array.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/varrays
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<varray_create>
  <name>Phoenix</name>
  <auto_san_zoning>true</auto_san_zoning>
</varray_create>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
```

```

<varray>
  <creation_time>1399841344524</creation_time>
  <global>false</global>
  <id>urn:storageos:VirtualArray:44232490-75d6-4bec-
b637-091e14cff7ec:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link_rel="self" href="/vdc/varrays/urn:storageos:VirtualArray:
44232490-75d6-4bec-b637-091e14cff7ec:vdcl"/>
  <name>Phoenix</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:440b70de-
fd36-4361-a455-b6ca65fb8228:vdcl</id>
    <link_rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:440b70de-fd36-4361-a455-
b6ca65fb8228:vdcl"/>
    </vdc>
    <auto_san_zoning>true</auto_san_zoning>
    <block_settings>
      <auto_san_zoning>true</auto_san_zoning>
    </block_settings>
    <object_settings>
      <device_registered>false</device_registered>
      <protection_type></protection_type>
    </object_settings>
  </vdc>
</varray>

```

2. Create an ACL for the virtual array and assign the tenant user to the ACL by sending a PUT /vdc/varrays/{Varray\_URN}/acl. You can use GET /tenant to get the ID of your own tenant or GET /tenants/bulk to return a list of all tenants in ViPR.

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:44232490-75d6-4bec-
b637-091e14cff7ec:vdcl/acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:6c7dde31-
ec48-4028-8672-5e74f5754656:global</tenant>
  </add>
</acl_assignment_changes>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
  <acl_assignments>
    <acl_assignment>
      <privilege>USE</privilege>

<tenant>urn:storageos:TenantOrg:c7ba7600-1a02-4558-954d-3de642eeacc
e:global</tenant>
    </acl_assignment>
    <acl_assignment>
      <privilege>USE</privilege>
      <tenant>urn:storageos:TenantOrg:6c7dde31-
ec48-4028-8672-5e74f5754656:global</tenant>

```

```

    </acl_assignment>
  </acl_assignments>

```

## Add and configure the networks for block storage in the virtual array

Fibre Channel networks are automatically added, discovered, and registered in ViPR when the fabric switch is added to the ViPR physical assets.

- When selecting the Fibre Channel networks to add to the virtual array the storage systems and hosts to which the storage will be provisioned must be configured on the same network.
- If the hosts were added to ViPR, and not discovered, the host ports must be manually added to the networks.
- Optionally, storage ports can be added to the network to control which ports will be used when the storage is provisioned on the host.

### Add an existing fibre channel network to a virtual array

Fibre Channel networks are automatically added, discovered, and registered in ViPR when the fabric switch is added to the ViPR Controller physical assets.

#### Before you begin

#### Procedure

1. You can determine which networks are available using GET /vdc/networks.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/networks
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<networks>
  <network>
    <id>urn:storageos:Network:
079b9be1-2342-41a0-84e3-26b4d0fd108a:vdc1</id>
    <link rel="self" href="/vdc/networks/urn:storageos:Network:
079b9be1-2342-41a0-84e3-26b4d0fd108a:vdc1"/>
    <name>FABRIC_vplex154nbr2-10:00:00:27:f8:58:f6:c2</name>
  </network>
  <network>
    <id>urn:storageos:Network:922f1519-e8ee-438a-a11a-
b7f3a139e0b3:vdc1</id>
    <link rel="self" href="/vdc/networks/urn:storageos:Network:
922f1519-e8ee-438a-a11a-b7f3a139e0b3:vdc1"/>
    <name>VSAN_56</name>
  </network>
  <network>
    <id>urn:storageos:Network:c67c9728-4d89-4e57-a345-
dc88bf1213ec:vdc1</id>

```



```

        <link rel="self" href="/vdc/networks/
urn:storageos:Network:c67c9728-4d89-4e57-a345-dc88bf1213ec:vdc1"/>
        <name>FABRIC_Brocade B FE</name>
    </network>
    <network>
        <id>urn:storageos:Network:a0fe52d9-9683-46d8-
b52d-12c6e73b7b98:vdc1</id>
        <link rel="self" href="/vdc/networks/
urn:storageos:Network:a0fe52d9-9683-46d8-b52d-12c6e73b7b98:vdc1"/>
        <name>VSAN_57</name>
    </network>
</networks>

```

2. Use GET /vdc/networks/{Network\_URN} to obtain further details about specific networks.

### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/networks/
urn:storageos:Network:a0fe52d9-9683-46d8-b52d-12c6e73b7b98:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
    <creation_time>1398806587983</creation_time>
    <global>false</global>
    <id>urn:storageos:Network:a0fe52d9-9683-46d8-
b52d-12c6e73b7b98:vdc1</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:a0fe52d9-9683-46d8-b52d-12c6e73b7b98:vdc1"/>
    <name>VSAN_57</name>
    <remote>false</remote>
    <tags/>
    <vdc>
        <id>urn:storageos:VirtualDataCenter:440b70de-fd36-4361-
a455-b6ca65fb8228:vdc1</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:440b70de-fd36-4361-a455-
b6ca65fb8228:vdc1"/>
    </vdc>
    <native_guid>FC+MDS+20:39:00:2A:6A:3E:3D:41</native_guid>
    <assigned_varrays>
        <assigned_varray>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdc1</assigned_varray>
    </assigned_varrays>
    <connected_varrays>
        <connected_varray>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdc1</connected_varray>
    </connected_varrays>
    <discovered>true</discovered>
    <endpoints>
        <endpoint>50:00:14:42:80:60:0B:13</endpoint>
        <endpoint>50:00:14:42:90:60:0B:13</endpoint>
        <endpoint>50:06:01:6B:46:E0:66:37</endpoint>
        <endpoint>50:00:09:73:F0:06:71:40</endpoint>
        <endpoint>50:06:01:63:46:E0:66:37</endpoint>
        <endpoint>50:00:09:73:F0:06:71:44</endpoint>
    </endpoints>

```

```

<endpoints_discovered>
  <endpoint_discovered>
    <name>50:00:14:42:80:60:0B:13</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:06:01:6B:46:E0:66:37</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:00:14:42:90:60:0B:13</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:00:09:73:F0:06:71:40</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:06:01:63:46:E0:66:37</name>
    <value>>true</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>50:00:09:73:F0:06:71:44</name>
    <value>>true</value>
  </endpoint_discovered>
</endpoints_discovered>
<fabric_id>57</fabric_id>
<network_systems>
  <network_system>urn:storageos:NetworkSystem:74a20311-
cd89-4ce7-90b3-54a3a8bc814a:vdcl</network_system>
</network_systems>
<registration_status>REGISTERED</registration_status>
<transport_type>FC</transport_type>
<varray>
  <id>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdcl</id>
  <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdcl"/>
</varray>
</network>

```

3. Select the appropriate fiber channel network (<transport\_type>FC</transport\_type>), and assign the network to the virtual array by sending a PUT /vdc/networks/{Network\_URN} request, including the URN of the virtual array to which the network is to be assigned in the request payload.

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/vdc/networks/
urn:storageos:Network:a0fe52d9-9683-46d8-b52d-12c6e73b7b98:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_update>
  <varrays>
    <varray>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdcl</varray>
  </varrays>
</network_update>

```

#### Response

```
HTTP 200 OK
```

```

Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
  <creation_time>1398806587983</creation_time>
  <global>>false</global>
  <id>urn:storageos:Network:a0fe52d9-9683-46d8-
b52d-12c6e73b7b98:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:a0fe52d9-9683-46d8-b52d-12c6e73b7b98:vdcl"/>
  <name>VSAN_57</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:440b70de-fd36-4361-
a455-b6ca65fb8228:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:440b70de-fd36-4361-a455-
b6ca65fb8228:vdcl"/>
    </vdc>
    <native_guid>FC+MDS+20:39:00:2A:6A:3E:3D:41</native_guid>
    <assigned_varrays>
      <assigned_varray>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdcl</assigned_varray>
    </assigned_varrays>
    <connected_varrays>
      <connected_varray>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdcl</connected_varray>
    </connected_varrays>
    <discovered>>true</discovered>
    <endpoints>
      <endpoint>50:00:14:42:80:60:0B:13</endpoint>
      <endpoint>50:00:14:42:90:60:0B:13</endpoint>
      <endpoint>50:06:01:6B:46:E0:66:37</endpoint>
      <endpoint>50:00:09:73:F0:06:71:40</endpoint>
      <endpoint>50:06:01:63:46:E0:66:37</endpoint>
      <endpoint>50:00:09:73:F0:06:71:44</endpoint>
    </endpoints>
    <endpoints_discovered>
      <endpoint_discovered>
        <name>50:00:14:42:80:60:0B:13</name>
        <value>>true</value>
      </endpoint_discovered>
      <endpoint_discovered>
        <name>50:06:01:6B:46:E0:66:37</name>
        <value>>true</value>
      </endpoint_discovered>
      <endpoint_discovered>
        <name>50:00:14:42:90:60:0B:13</name>
        <value>>true</value>
      </endpoint_discovered>
      <endpoint_discovered>
        <name>50:00:09:73:F0:06:71:40</name>
        <value>>true</value>
      </endpoint_discovered>
      <endpoint_discovered>
        <name>50:06:01:63:46:E0:66:37</name>
        <value>>true</value>
      </endpoint_discovered>
      <endpoint_discovered>
        <name>50:00:09:73:F0:06:71:44</name>
        <value>>true</value>
      </endpoint_discovered>
    </endpoints_discovered>
    <fabric_id>57</fabric_id>
    <network_systems>
      <network_system>urn:storageos:NetworkSystem:74a20311-
cd89-4ce7-90b3-54a3a8bc814a:vdcl</network_system>

```

```

</network_systems>
<registration_status>REGISTERED</registration_status>
<transport_type>FC</transport_type>
<varray>
  <id>urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdc1</id>
  <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:27a6a3a8-
ead4-4e11-92af-7d4bc2e5f5af:vdc1"/>
</varray>
</network>

```

## Configure a new fibre channel network for a virtual array

### Procedure

1. Get the list of virtual arrays.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/varrays
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<varrays>
  <varray>
    <id>urn:storageos:VirtualArray:69b363c5-
f412-4fac-9f5d-0c5367628c17:vdc1</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:69b363c5-
f412-4fac-9f5d-0c5367628c17:vdc1"/>
    <name>snapshot test</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdc1</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdc1"/>
    <name>varray_west_1</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdc1</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdc1"/>
    <name>varray_east_1</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1"/>
    <name>varray2</name>
  </varray>
</varrays>

```

- Using the URN of the selected virtual array, configure a new fibre channel network for the selected virtual array by sending POST `/vdc/varrays/{id}/networks`.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdc1/networks
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_create>
  <name>FC_network_west_1</name>
  <transport_type>FC</transport_type>
  <endpoints>
    <endpoint>10:00:20:00:c9:79:f1:46 </endpoint>
    <endpoint>10:00:20:00:c9:79:f1:47 </endpoint>
  </endpoints>
</network_create>
```

### Reponse

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
  <creation_time>1400177060451</creation_time>
  <global>false</global>
  <id>urn:storageos:Network:e508d8b6-6738-4311-
ad4d-4c582cf7b0d6:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:e508d8b6-6738-4311-ad4d-4c582cf7b0d6:vdc1"/>
  <name>FC_network_west_1</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1"/>
  </vdc>
  <native_guid></native_guid>
  <assigned_varrays>

<assigned_varray>urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdc1</assigned_varray>
</assigned_varrays>
<connected_varrays>

<connected_varray>urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdc1</connected_varray>
</connected_varrays>
<discovered>false</discovered>
<endpoints>
  <endpoint>10:00:20:00:C9:79:F1:47</endpoint>
  <endpoint>10:00:20:00:C9:79:F1:46</endpoint>
</endpoints>
<endpoints_discovered>
  <endpoint_discovered>
    <name>10:00:20:00:C9:79:F1:47</name>
    <value>false</value>
  </endpoint_discovered>
  <endpoint_discovered>
    <name>10:00:20:00:C9:79:F1:46</name>
    <value>false</value>
```

```

        </endpoint_discovered>
    </endpoints_discovered>
    <registration_status>REGISTERED</registration_status>
    <transport_type>FC</transport_type>
    <varray>
        <id>urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdcl</id>
        <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdcl"/>
    </varray>
</network>

```

## Add and configure the networks for file storage in a virtual array

ViPR Controller can discover the ports of IP connected storage systems and hosts, but it cannot discover the paths between them, so it is necessary to create IP networks, and then add the host, and storage system ports, which will be provisioned together, to the same IP network.

### Add an existing IP network to a virtual array

If the IP network has already been created, and configured using POST `/vdc/networks`, you will just need to add the network to the virtual array.

#### Before you begin

URN of the virtual array to which the IP network is being added.

#### Procedure

1. You can get which networks are available using GET `/vdc/networks`.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/networks
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<networks>
  <network>
    <id>urn:storageos:Network:b10c046f-0968-4c30-91cd-
b2b34f1d7f5e:vdcl</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:b10c046f-0968-4c30-91cd-b2b34f1d7f5e:vdcl"/>
    <name>FABRIC_vplex154nbr2</name>
  </network>
  <network>
    <id>urn:storageos:Network:fc2824bd-0935-43e4-
a062-748b48f7f99e:vdcl</id>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:fc2824bd-0935-43e4-a062-748b48f7f99e:vdcl"/>
    <name>FABRIC_VPlex_Meta_Fid_20</name>
  </network>
  <network>
    <id>urn:storageos:Network:abaf3cec-cdd1-4751-b9bf-

```

```

ba02dafa7603:vdcl</id>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:abaf3cec-cdd1-4751-b9bf-ba02dafa7603:vdcl"/>
  <name>FABRIC_VPLEX_WAN_lglw6208/lglw6209</name>
</network>
<network>
  <id>urn:storageos:Network:6c5cbf7f-d0eb-40f8-9e35-
e35e2c8d5f77:vdcl</id>
  <link rel="self" href="/vdc/networks/urn:storageos:Network:
6c5cbf7f-d0eb-40f8-9e35-e35e2c8d5f77:vdcl"/>
  <name>FABRIC_VPlex_LGL6221_FID_40</name>
</network>
<network>
  <id>urn:storageos:Network:beb93fc4-d696-4be3-
a4c9-80fab40d34b4:vdcl</id>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdcl"/>
  <name>IP_network_west1</name>
</network>
<network>
  <id>urn:storageos:Network:602444e4-
b338-4620-9e07-84247de5406d:vdcl</id>
  <link rel="self" href="/vdc/networks/urn:storageos:Network:
602444e4-b338-4620-9e07-84247de5406d:vdcl"/>
  <name>FABRIC_Vplex_WAN-10:00:00:27:f8:58:f6:bc</name>
</network>
<network>
  <id>urn:storageos:Network:eff96c90-
d67a-400e-9b07-2c308ba5ee51:vdcl</id>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:eff96c90-d67a-400e-9b07-2c308ba5ee51:vdcl"/>
  <name>FABRIC_fake array fabric</name>
</network>
<network>
  <id>urn:storageos:Network:0776alc7-97d6-498d-ad01-
d03c9cc10925:vdcl</id>
  <link rel="self" href="/vdc/networks/urn:storageos:Network:
0776alc7-97d6-498d-ad01-d03c9cc10925:vdcl"/>
  <name>FABRIC_VPlex_LGL6220_FID_30-10:00:00:27:f8:58:f6:c1</
name>
</network>
<network>
  <id>urn:storageos:Network:cb3a82dd-0202-4d6a-8f3f-3966fd817e82:vdcl
</id>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:cb3a82dd-0202-4d6a-8f3f-3966fd817e82:vdcl"/>
  <name>FABRIC_losam082-fabric</name>
</network>
</networks>

```

2. Use GET /vdc/networks/{Network\_URN} to get further details about a specific network.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/networks/
urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>

```

```

<network>
  <creation_time>1400172861659</creation_time>
  <global>false</global>
  <id>urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link_rel="self" href="/vdc/networks/urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdc1"/>
  <name>IP_network_west1</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-a105-6b669983f58f:vdc1</id>
    <link_rel="self" href="/vdc/urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-a105-6b669983f58f:vdc1"/>
  </vdc>
  <native_guid></native_guid>
  <discovered>false</discovered>
  <endpoints>
    <endpoint>192.168.0.10</endpoint>
    <endpoint>192.168.0.20</endpoint>
  </endpoints>
  <endpoints_discovered>
    <endpoint_discovered>
      <name>192.168.0.10</name>
      <value>false</value>
    </endpoint_discovered>
    <endpoint_discovered>
      <name>192.168.0.20</name>
      <value>false</value>
    </endpoint_discovered>
  </endpoints_discovered>
  <registration_status>REGISTERED</registration_status>
  <transport_type>IP</transport_type>
</network>

```

3. Select the appropriate network, and assign the IP network to the virtual array by sending a PUT /vdc/networks/{Network\_URN} request, including the URN of the virtual array to which the network is to be assigned in the request payload. The updated network representation, with the varray added, is returned.

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/vdc/networks/urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_update>
  <varrays>
    <varray>urn:storageos:VirtualArray:bd15ab0c-fc25-4256-9ccb-73dea570d65c:vdc1</varray>
  </varrays>
</network_update>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<network>
  <creation_time>1400172861659</creation_time>

```



```

    <global>false</global>
    <id>urn:storageos:Network:beb93fc4-d696-4be3-
a4c9-80fab40d34b4:vdc1</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/vdc/networks/
urn:storageos:Network:beb93fc4-d696-4be3-a4c9-80fab40d34b4:vdc1"/>
    <name>IP_network_west1</name>
    <remote>false</remote>
    <tags/>
    <vdc>
        <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1"/>
    </vdc>
    <native_guid></native_guid>
    <assigned_varrays>
        <assigned_varray>urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1</assigned_varray>
    </assigned_varrays>
    <connected_varrays>
        <connected_varray>urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1</connected_varray>
    </connected_varrays>
    <discovered>false</discovered>
    <endpoints>
        <endpoint>192.168.0.10</endpoint>
        <endpoint>192.168.0.20</endpoint>
    </endpoints>
    <endpoints_discovered>
        <endpoint_discovered>
            <name>192.168.0.10</name>
            <value>false</value>
        </endpoint_discovered>
        <endpoint_discovered>
            <name>192.168.0.20</name>
            <value>false</value>
        </endpoint_discovered>
    </endpoints_discovered>
    <registration_status>REGISTERED</registration_status>
    <transport_type>IP</transport_type>
    <varray>
        <id>urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1</id>
        <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdc1"/>
    </varray>
</network>

```

## Configure a new IP network for a virtual array

### Procedure

1. Get the list of virtual arrays.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/varrays
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<varrays>
  <varray>
    <id>urn:storageos:VirtualArray:69b363c5-
f412-4fac-9f5d-0c5367628c17:vdcl</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:69b363c5-
f412-4fac-9f5d-0c5367628c17:vdcl"/>
    <name>snapshot test</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdcl</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:eed33299-3fa4-4de1-
be44-73949a7a42ea:vdcl"/>
    <name>varray_west_1</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdcl</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdcl"/>
    <name>varray_east_1</name>
  </varray>
  <varray>
    <id>urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdcl</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:bd15ab0c-
fc25-4256-9ccb-73dea570d65c:vdcl"/>
    <name>varray2</name>
  </varray>
</varrays>

```

- Using the URN of the selected virtual array, configure a new IP network for the selected virtual array by sending POST /vdc/varrays/{id}/networks.

## Request

```

POST https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdcl/networks
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<network_create>
  <name>IP_network_east_1</name>
  <transport_type>IP</transport_type>
  <endpoints>
    <endpoint>192.169.100.10</endpoint>
    <endpoint>192.168.100.40</endpoint>
  </endpoints>
</network_create>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>

```

```

<network>
  <creation_time>1400181561583</creation_time>
  <global>false</global>
  <id>urn:storageos:Network:f6e2d237-
a770-4085-924a-0d11afdb8e6a:vdc1</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/networks/
urn:storageos:Network:f6e2d237-a770-4085-924a-0d11afdb8e6a:vdc1"/>
  <name>IP_network_east_1</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1"/>
    </vdc>
    <native_guid></native_guid>
    <assigned_varrays>

<assigned_varray>urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdc1</assigned_varray>
  </assigned_varrays>
  <connected_varrays>

<connected_varray>urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990
d-c346125b4141:vdc1</connected_varray>
  </connected_varrays>
  <discovered>false</discovered>
  <endpoints>
    <endpoint>192.168.100.40</endpoint>
    <endpoint>192.169.100.10</endpoint>
  </endpoints>
  <endpoints_discovered>
    <endpoint_discovered>
      <name>192.168.100.40</name>
      <value>false</value>
    </endpoint_discovered>
    <endpoint_discovered>
      <name>192.169.100.10</name>
      <value>false</value>
    </endpoint_discovered>
  </endpoints_discovered>
  <registration_status>REGISTERED</registration_status>
  <transport_type>IP</transport_type>
  <varray>
    <id>urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdc1</id>
    <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:e6f1d340-9a32-4c4a-990d-
c346125b4141:vdc1"/>
    </varray>
  </network>

```

## Optionally restrict access to storage pools by manually assigning them to a virtual array

When no specific storage pools are manually assigned to a virtual array, then all available pools from the storage arrays are available to the virtual array. Optionally, you can restrict access to certain pools by manually assigning them to a specific virtual array.

### Before you begin

Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#).

### Procedure

1. Get the URN of the storage system, on which the storage pools were created, by sending GET /vdc/storage-systems

This request returns a list of all of the physical storage arrays.

#### Request

```
GET https://<ViPR_Controller_VIP>:4443/vdc/storage-systems
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_systems>
  <storage_system>
    <id>urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1"/>
    <name>VNXE+FNM00135000061</name>
  </storage_system>
  <storage_system>
    <id>urn:storageos:StorageSystem:acc7c01a-0d1d-48b8-
afce-93636e0cb748:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:acc7c01a-0d1d-48b8-
afce-93636e0cb748:vdc1"/>
    <name>CLARIION+APM00112800557</name>
  </storage_system>
  <storage_system>
    <id>urn:storageos:StorageSystem:a27276b9-
b2ae-4bba-8741-08be646efc92:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:a27276b9-
b2ae-4bba-8741-08be646efc92:vdc1"/>
    <name>losat018.lss.emc.com</name>
  </storage_system>
  <storage_system>
    <id>urn:storageos:StorageSystem:848eedd3-f5a8-4c14-bde8-
c11a82b93dce:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:848eedd3-f5a8-4c14-bde8-
c11a82b93dce:vdc1"/>
    <name>IBMXIV+IBM.2810-7825363</name>
  </storage_system>
```

```

    <storage_system>
      <id>urn:storageos:StorageSystem:d8012fac-4237-4953-8857-
adc217a7c5dd:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:d8012fac-4237-4953-8857-
adc217a7c5dd:vdcl"/>
      <name>isilon1</name>
    </storage_system>
    <storage_system>
      <id>urn:storageos:StorageSystem:2b576fd1-c40a-4bbf-
bdb6-73c529b13487:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:2b576fd1-c40a-4bbf-
bdb6-73c529b13487:vdcl"/>
      <name>SYMMETRIX+000198700406</name>
    </storage_system>
  </storage_systems>

```

2. Use the storage system URN to get detailed information about the storage array by sending a GET /vdc/storage-systems/{Storage\_URN} request.

The request returns the representation of the storage system.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_system>
  <creation_time>1421364124360</creation_time>
  <global>false</global>
  <id>urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl"/>
  <name>VNXE+FNM00135000061</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
  </vdc>
  <native_guid>VNXE+FNM00135000061</native_guid>
  <compatibility_status>COMPATIBLE</compatibility_status>
  <job_discovery_status>COMPLETE</job_discovery_status>
  <last_discovery_run_time>1423607690987</
last_discovery_run_time>
  <last_discovery_status_message>Discovery completed
successfully for Storage System: urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl</
last_discovery_status_message>

```

```

        <last_metering_run_time>1423607644158</last_metering_run_time>
        <job_metering_status>COMPLETE</job_metering_status>
        <next_discovery_run_time>1423611274176</
next_discovery_run_time>
        <next_metering_run_time>1423611244106</next_metering_run_time>
        <registration_status>REGISTERED</registration_status>
        <success_discovery_time>1423607690987</success_discovery_time>
        <success_metering_time>1423607644158</success_metering_time>
        <system_type>vnx</system_type>
        <associated_systems/>
        <export_masks/>
        <firmware_version>3.0.1</firmware_version>
        <ip_address>10.247.40.221</ip_address>
        <max_resources>-1</max_resources>
        <num_resources>0</num_resources>
        <port_number>443</port_number>
        <protocols/>
        <smis_providers/>
        <reachable>true</reachable>
        <connected_systems/>
        <secondary_ips/>
        <serial_number>FNM00135000061</serial_number>
        <smis_use_ssl>false</smis_use_ssl>
        <async_actions>
            <async_action>CreateGroupReplica</async_action>
            <async_action>CreateElementReplica</async_action>
        </async_actions>
        <supported_replication_types>
            <supported_replication_type>LOCAL</
supported_replication_type>
supported_replication_type>
        </supported_replication_types>
        <user_name>bourne</user_name>
    </storage_system>

```

### 3. Get the list of virtual arrays by sending GET /vdc/varrays.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/varrays
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<varrays>
    <varray>
        <id>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:
vdc1</id>
        <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:vdc
1"/>
        <name>vblock_varray1</name>
    </varray>
    <varray>
        <id>urn:storageos:VirtualArray:0d3276fc-a65b-45c5-
bc41-527251476738:vdc1</id>
        <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:0d3276fc-a65b-45c5-
bc41-527251476738:vdc1"/>
        <name>Phoenix</name>
    </varray>
</varrays>

```

#### 4. Use the virtual array URN to get detailed information about the virtual array.

##### Request

```
GET https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:vdc
1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

##### Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<varray>
  <creation_time>1422289959135</creation_time>
  <global>>false</global>

  <id>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:
vdc1</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:vdc
1"/>
  <name>vblock_varray1</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <auto_san_zoning>>true</auto_san_zoning>
    <block_settings>
      <auto_san_zoning>>true</auto_san_zoning>
    </block_settings>
    <object_settings>
      <device_registered>>false</device_registered>
      <protection_type/>
    </object_settings>
  </vdc>
</varray>
```

#### 5. Get the list of storage pools on the storage system by sending GET /vdc/storage-systems/{Storage\_URN}/storage-pools.

##### Request

```
GET https://<ViPR_Controller_VIP>:4443/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1/storage-pools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

##### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_pools>
```

```

    <storage_pool>
      <id>urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl/storage-pools/
urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdcl"/>
      <name>VNXE+FNM00135000061+POOL+pool_1</name>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:4ba86c2b-19c1-4714-aff4-
d8ebc5fc808a:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl/storage-pools/
urn:storageos:StoragePool:4ba86c2b-19c1-4714-aff4-
d8ebc5fc808a:vdcl"/>
      <name>VNXE+FNM00135000061+POOL+pool_8</name>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:b401f7ce-
fe40-4be0-8eea-02bd332329fd:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl/storage-pools/
urn:storageos:StoragePool:b401f7ce-
fe40-4be0-8eea-02bd332329fd:vdcl"/>
      <name>VNXE+FNM00135000061+POOL+pool_2</name>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:f42a22a4-398c-4d4d-
a9f2-49a38010272b:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl/storage-pools/
urn:storageos:StoragePool:f42a22a4-398c-4d4d-
a9f2-49a38010272b:vdcl"/>
      <name>VNXE+FNM00135000061+POOL+pool_4</name>
    </storage_pool>
  </storage_pools>

```

6. Get the detailed information of the storage pool to add to the virtual array by sending GET /vdc/storage-systems/{Storage\_URN}/storage-pools/{Pool\_URN}.

#### Request

```

GET https://<ViPR_Controller_VIP>:4443/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdcl/storage-pools/
urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-c3bc7d36bc78:vdcl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

#### Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_pool>
  <creation_time>1421364142991</creation_time>
  <global>false</global>
  <id>urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdcl</id>

```



```

    <inactive>>false</inactive>
    <internal>>false</internal>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1/storage-pools/
urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdc1"/>
    <name>VNXE+FNM00135000061+POOL+pool_1</name>
    <remote>>false</remote>
    <tags/>
    <vdc>
      <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
      <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
    </vdc>
    <native_guid>VNXE+FNM00135000061+POOL+pool_1</native_guid>
    <auto_tiering_supported>>false</auto_tiering_supported>
    <compatibility_status>COMPATIBLE</compatibility_status>
    <controller_params/>
    <copy_types7/>
    <discovery_status>VISIBLE</discovery_status>
    <drive_types>
      <drive_type>SAS</drive_type>
    </drive_types>
    <free_gb>590</free_gb>
    <long_term_retention>>false</long_term_retention>
    <max_pool_utilization_percentage>75</
max_pool_utilization_percentage>
    <max_resources>-1</max_resources>
    <max_thin_pool_subscription_percentage>300</
max_thin_pool_subscription_percentage>
    <maximum_thick_volume_size_gb>590</
maximum_thick_volume_size_gb>
    <maximum_thin_volume_size_gb>590</maximum_thin_volume_size_gb>
    <minimum_thick_volume_size_gb>0</minimum_thick_volume_size_gb>
    <minimum_thin_volume_size_gb>0</minimum_thin_volume_size_gb>
    <operational_status>READY</operational_status>
    <percent_subscribed>89</percent_subscribed>
    <percent_used>45</percent_used>
    <pool_name>StoragePool100</pool_name>
    <pool_service_type>block_file</pool_service_type>
    <protocols>
      <protocol>iSCSI</protocol>
      <protocol>CIFS</protocol>
      <protocol>FC</protocol>
      <protocol>NFS</protocol>
    </protocols>
    <raid_levels>
      <raid_level>RAID5</raid_level>
    </raid_levels>
    <registration_status>REGISTERED</registration_status>
    <storage_system>
      <id>urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1"/>
    </storage_system>
    <subscribed_gb>945</subscribed_gb>
    <supported_resource_types>THIN_AND_THICK</
supported_resource_types>
    <thin_volume_preallocation_supported>>false</
thin_volume_preallocation_supported>
    <tier_utilization_percentages/>
    <usable_gb>1072</usable_gb>
    <used_gb>482</used_gb>
  </storage_pool>

```

7. Assign a storage pool to the virtual array by sending PUT /vdc/storage-pools/{Pool\_URN}. The URN of the virtual array to which the storage pool is being assigned is included in the request payload.

The updated representation of the virtual array is returned.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/vdc/storage-pools/
urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-c3bc7d36bc78:vdc1
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<storage_pool_update>
  <varray_assignment_changes>
    <add>

<varray>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f001
2f86:vdc1</varray>
    </add>
  </varray_assignment_changes>
</storage_pool_update>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_pool>
  <creation_time>1421364142991</creation_time>
  <global>>false</global>
  <id>urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdc1</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1/storage-pools/
urn:storageos:StoragePool:33e228e5-9547-4f69-a7c3-
c3bc7d36bc78:vdc1"/>
  <name>VNXE+FNM00135000061+POOL+pool_1</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdc1"/>
  </vdc>
  <native_guid>VNXE+FNM00135000061+POOL+pool_1</native_guid>

<assigned_varrays>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f5
4-4980f0012f86:vdc1</assigned_varrays>

<tagged_varrays>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-
4980f0012f86:vdc1</tagged_varrays>
  <auto_tiering_supported>>false</auto_tiering_supported>
  <compatibility_status>COMPATIBLE</compatibility_status>
  <controller_params/>
  <copy_types/>
  <discovery_status>VISIBLE</discovery_status>
  <drive_types>
    <drive_type>SAS</drive_type>
  </drive_types>
  <free_gb>590</free_gb>
  <long_term_retention>>false</long_term_retention>
```

```

    <max_pool_utilization_percentage>75</
max_pool_utilization_percentage>
    <max_resources>-1</max_resources>
    <max_thin_pool_subscription_percentage>300</
max_thin_pool_subscription_percentage>
    <maximum_thick_volume_size_gb>590</
maximum_thick_volume_size_gb>
    <maximum_thin_volume_size_gb>590</maximum_thin_volume_size_gb>
    <minimum_thick_volume_size_gb>0</minimum_thick_volume_size_gb>
    <minimum_thin_volume_size_gb>0</minimum_thin_volume_size_gb>
    <operational_status>READY</operational_status>
    <percent_subscribed>89</percent_subscribed>
    <percent_used>45</percent_used>
    <pool_name>StoragePool100</pool_name>
    <pool_service_type>block_file</pool_service_type>
    <protocols>
      <protocol>iSCSI</protocol>
      <protocol>CIFS</protocol>
      <protocol>FC</protocol>
      <protocol>NFS</protocol>
    </protocols>
    <raid_levels>
      <raid_level>RAID5</raid_level>
    </raid_levels>
    <registration_status>REGISTERED</registration_status>
    <storage_system>
      <id>urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1</id>
      <link_rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:
2370c474-4d8d-44a9-8ebf-58aa87b5b3ea:vdc1"/>
    </storage_system>
    <subscribed_gb>945</subscribed_gb>
    <supported_resource_types>THIN_AND_THICK</
supported_resource_types>
    <thin_volume_preallocation_supported>false</
thin_volume_preallocation_supported>
    <tier_utilization_percentages/>
    <usable_gb>1072</usable_gb>
    <used_gb>482</used_gb>
</storage_pool>

```

## Virtual Array requirements for Vblock system services

For Vblock systems, storage must be accessible to compute systems through the virtual array. Vblock systems configured using the VCE logical build guide will have networks configured that connect the Cisco Unified Computing System™ (UCS) compute system to the storage via the SAN switches.

In ViPR Controller, virtual arrays should be created just as you would for any non-Vblock system. The networks that are defined in the virtual arrays will then determine whether the UCS systems have visibility to ViPR Controller storage.

The most effective thing is to do is discover all the Vblock system physical assets before defining virtual arrays. After discovering all components, consult with the UCS administrator to determine which networks (VSANs) will be used on a given Vblock system. Use those networks to define the ViPR Controller virtual arrays. On less complicated Vblock system configurations, for example, a single Vblock system, simply adding the storage system to the virtual array may be enough. Once the virtual arrays are defined, they will be used by ViPR Controller for the following:

- ViPR Controller will automatically determine which UCS compute systems are available to compute virtual pools based on the selection of virtual arrays.

- ViPR Controller will automatically determine which blades to use to provision hosts based on the virtual arrays and compute virtual pools.

ViPR Controller makes these determinations by calculating which UCS compute systems have visibility to storage through the networks in the virtual arrays.

**If working with updating service profile templates**

When using updating service profile templates, it is recommended to create a dedicated virtual array that:

- Includes only the specific storage arrays that are intended to be used with the updating service profile template.
- Includes only the specific storage ports that are intended to be used with the updating service profile template.

# CHAPTER 11

## Creating virtual pools for block storage

- [Create ViPR Controller Virtual Pools for Block Storage](#)..... 110
- [Important REST API calls to manage and configure block virtual pools](#)..... 118

## Create ViPR Controller Virtual Pools for Block Storage

Create a virtual pool for block storage by specifying the criteria for provisioned block storage volumes. These criteria are also used to match physical storage pools which can be used for virtual pool volumes.

### Before you begin

For information on virtual pools, see *ViPR Controller Concepts* on the [ViPR Controller Product Documentation Index](#).

- Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#).
- For block virtual pool configuration requirements and recommendations, see *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- You need the URN of the tenant to be assigned as the ACL to the virtual pool. You can determine the current tenant using `GET /tenant` or use `GET /tenants/bulk` to get a list of all of the tenants.

**Table 8** Required Parameters in Request Payload

Required Parameter	Description
provisioning_type	<p>The provisioning type for the virtual pool.</p> <p>Valid values:</p> <ul style="list-style-type: none"> <li>• Thin</li> <li>• Thick</li> </ul> <hr/> <p><b>Note</b></p> <p>For VMAX journal volumes, set <code>provisioning_type</code> to <code>Thick</code> as ViPR Controller does not pre-allocate the volumes.</p>
protocol	<p>The block protocols supported by the physical storage pools that will comprise the virtual pool.</p> <p>Valid values:</p> <ul style="list-style-type: none"> <li>• FC</li> <li>• iSCSI</li> </ul>

There are additional optional parameters that can be set for RAID levels, high availability, SAN multi-path, and so on. A complete list of parameters for `POST /block/vpools` is described in the *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#).

**Table 9** Optional Request Payload Parameters Used in this Example

Optional Parameters used in this example	Description
name	Since the virtual pool will be the target for all provisioning operations, select a name that conveys some information about the type of storage

**Table 9** Optional Request Payload Parameters Used in this Example (continued)

Optional Parameters used in this example	Description
	that it provides (its performance and protection levels) or how it should be used. For example, "gold", "tier1", or "backup", etc.
varray	The URNs of the virtual arrays to which the virtual pool is assigned.
description	Description for the virtual pool.
use_matched_pools	Determines if matched or valid assigned pools are returned from the command to retrieve the list of storage pools. Valid values: <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul>
protection	Parameters to support data protection: <ul style="list-style-type: none"> <li>• continuous_copies = Parameter settings if you are using VMAX SRDF/A</li> <li>• recoverpoint = Parameter settings if you are using RecoverPoint</li> <li>• remote_copies = Parameter settings if you are using VMAX SRDF/S</li> <li>• snapshots</li> </ul> <hr/> <p><b>Note</b></p> <p>If you are setting continuous copies for VMAX SRDF/A, you must also set:</p> <ul style="list-style-type: none"> <li>• multi-volume_consistency = true</li> <li>• remote_copy_mode = ASYNCHRONOUS</li> </ul> <p>If you are setting remote copies for VMAX SRDF/S, you must also set:</p> <ul style="list-style-type: none"> <li>• multi-volume_consistency = false</li> <li>• remote_copy_mode = SYNCHRONOUS</li> </ul>

## Procedure

1. To create a block virtual pool, use `POST /block/vpools`. The representation of the new virtual pool is returned.

### Request

```
POST https://<ViPR_Controller_VIP>:4443/block/vpools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<block_vpool_create>
  <description>Basic Virtual Pool for Block Provisioning</
description>
  <name>basic_vpool</name>
  <max_paths>4</max_paths>
  <min_paths>1</min_paths>
  <paths_per_initiator>1</paths_per_initiator>
  <protection>
```

```

        <snapshots>
            <max_native_snapshots>10</max_native_snapshots>
        </snapshots>
    </protection>
    <protocols>
        <protocol>FC</protocol>
    </protocols>
    <provisioning_type>Thin</provisioning_type>
    <use_matched_pools>true</use_matched_pools>
    <varrays>
<varray>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f001
2f86:vdcl</varray>
    </varrays>
</block_vpool_create>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<block_vpool>
    <creation_time>1423598650598</creation_time>
    <global>false</global>
    <id>urn:storageos:VirtualPool:ba745027-2385-437c-bf44-
a49fb32bb45c:vdcl</id>
    <inactive>false</inactive>
    <internal>false</internal>
    <link rel="self" href="/block/vpools/
urn:storageos:VirtualPool:ba745027-2385-437c-bf44-
a49fb32bb45c:vdcl"/>
    <name>basic_vpool</name>
    <remote>false</remote>
    <tags/>
    <vdc>
        <id>urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
        <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:99c5c185-
ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
    </vdc>
    <assigned_storage_pools/>
    <description>Basic Virtual Pool for Block Provisioning</
description>
    <invalid_matched_pools/>
    <matched_storage_pools>
        <storage_pool>
            <id>urn:storageos:StoragePool:78caaf4a-673e-4580-ae41-
a545a45e5e28:vdcl</id>
            <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdcl/storage-pools/urn:storageos:StoragePool:
78caaf4a-673e-4580-ae41-a545a45e5e28:vdcl"/>
        </storage_pool>
        <storage_pool>
            <id>urn:storageos:StoragePool:ad0dae57-d318-409c-
a859-6c9e59a28251:vdcl</id>
            <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdcl/storage-pools/urn:storageos:StoragePool:ad0dae57-
d318-409c-a859-6c9e59a28251:vdcl"/>
        </storage_pool>
        <storage_pool>
            <id>urn:storageos:StoragePool:62d2e40d-
ced0-4114-8bb7-8d333e7ef878:vdcl</id>
            <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-

```



```

fec72e9927d3:vdcl/storage-pools/urn:storageos:StoragePool:62d2e40d-
ced0-4114-8bb7-8d333e7ef878:vdcl"/>
  </storage_pool>
</matched_storage_pools>
<num_paths>4</num_paths>
<protocols>
  <protocol>FC</protocol>
</protocols>
<provisioning_type>Thin</provisioning_type>
<type>block</type>
<use_matched_pools>true</use_matched_pools>
<varrays>
  <varray>

<id>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86
:vdcl</id>
  <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:vdcl
1"/>
  </varray>
</varrays>
<expandable>>false</expandable>
<fast_expansion>>false</fast_expansion>
<max_paths>4</max_paths>
<min_paths>1</min_paths>
<multi_volume_consistency>>false</multi_volume_consistency>
<paths_per_initiator>1</paths_per_initiator>
<protection>
  <snapshots>
    <max_native_snapshots>10</max_native_snapshots>
  </snapshots>
  <continuous_copies>
    <max_native_continuous_copies>0</
max_native_continuous_copies>
  </continuous_copies>
</protection>
<raid_levels/>
<unique_auto_tier_policy_names>>false</
unique_auto_tier_policy_names>
</block_vpool>

```

2. Tenant access to each virtual pool is controlled by an Access Control List (ACL). Only tenants that are included in the virtual pool's ACL are permitted access to that virtual pool. If no ACL is set, the virtual pool can be accessed by all tenants. Apply an ACL to the virtual pool using `PUT /block/vpools/{vpool_urn}/acl`. The updated ACL is returned.

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/block/vpools/
urn:storageos:VirtualPool:ba745027-2385-437c-bf44-
a49fb32bb45c:vdcl/acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</tenant>
  </add>
</acl_assignment_changes>

```

## Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<acl_assignments>
  <acl_assignment>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:c104b49e-4e6b-449c-b92b-
a19b247a613b:global</tenant>
  </acl_assignment>
</acl_assignments>
```

3. ViPR Controller automatically matches existing physical pools on the ViPR Controller-managed storage systems to the virtual pool characteristics. You have the option of allowing ViPR Controller to automatically associate the matching physical pools to the virtual pool you created, or you can manually select a subset of the matching physical pools to associate to the virtual pool. To manually select a subset of the matching physical pools:

- a. POST /block/vpools/matching-pools is used to get a list of storage pools that match a given set of criteria. In this example, the criterial that are sent in the request payload match the properties of the virtual pool that was just created.

## Request

```
POST https://<ViPR_Controller_VIP>:4443/block/vpools/matching-
pools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<block_vpool_create>
  <description>Basic Virtual Pool for Block Provisioning</
description>
  <name>basic_vpool</name>
  <num_paths>1</num_paths>
  <protection>
    <snapshots>
      <max_native_snapshots>10</max_native_snapshots>
    </snapshots>
  </protection>
  <protocols>
    <element>FC</element>
  </protocols>
  <provisioning_type>Thin</provisioning_type>
  <use_matched_pools>true</use_matched_pools>
  <varrays>
    <varray>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f
0012f86:vdcl</varray>
  </varrays>
</block_vpool_create>
```

## Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8"?>
<storage_pools>
  <storage_pool>>
    <id>urn:storageos:StoragePool:62d2e40d-
ced0-4114-8bb7-8d333e7ef878:vdcl</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
```

```

fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:
62d2e40d-ced0-4114-8bb7-8d333e7ef878:vdc1"/>
  <name>SYMMETRIX+000198700420+POOL+TP+3R5-A</name>
</storage_pool>
  <storage_pool>
    <id>urn:storageos:StoragePool:9e551963-d596-48ae-
b208-1b870126d195:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:
9e551963-d596-48ae-b208-1b870126d195:vdc1"/>
    <name>SYMMETRIX+000198700420+POOL+TP+M3</name>
  </storage_pool>
  <storage_pool>
    <id>urn:storageos:StoragePool:ad0dae57-d318-409c-
a859-6c9e59a28251:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdc1/storage-pools/
urn:storageos:StoragePool:ad0dae57-d318-409c-
a859-6c9e59a28251:vdc1"/>
    <name>SYMMETRIX+000198700420+POOL+TP+M2</name>
  </storage_pool>
  <storage_pool>
    <id>urn:storageos:StoragePool:78caaf4a-673e-4580-ae41-
a545a45e5e28:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:
78caaf4a-673e-4580-ae41-a545a45e5e28:vdc1"/>
    <name>SYMMETRIX+000198700420+POOL+TP+data</name>
  </storage_pool>
  <storage_pool>
    <id>urn:storageos:StoragePool:38e2a0c2-89c9-4ec7-
ad9b-29420e464012:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:
38e2a0c2-89c9-4ec7-ad9b-29420e464012:vdc1"/>
    <name>SYMMETRIX+000198700420+POOL+TP+t3</name>
  </storage_pool>
  <storage_pool>
    <id>urn:storageos:StoragePool:dbdcd42a-
b0a4-49b4-8a6e-204a09b8b1ef:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdc1/storage-pools/
urn:storageos:StoragePool:dbdcd42a-
b0a4-49b4-8a6e-204a09b8b1ef:vdc1"/>
    <name>SYMMETRIX+000198700420+POOL+TP+3R5-B</name>
  </storage_pool>
</storage_pools>

```

- b. Using the URN returned for the new virtual pool returned from the POST `/block/vpools` request, assign one or more of the storage pools that match the properties of the virtual pool by sending a PUT `/block/vpools/{identifier}/assign-matched-pools` request. The representation of the updated virtual pool is returned.

#### Request

```

PUT https://<ViPR_Controller_VIP>:4443/block/vpools/
urn:storageos:VirtualPool:ba745027-2385-437c-bf44-
a49fb32bb45c:vdc1/assign-matched-pools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

```

```
<vpool_pool_update>
  <assigned_pool_changes>
    <add>
      <storage_pool>
        <storage_pool>urn:storageos:StoragePool:62d2e40d-ced0-4114-8bb7-8d333e7ef878:vdc1</storage_pool>
        <storage_pool>urn:storageos:StoragePool:78caaf4a-673e-4580-ae41-a545a45e5e28:vdc1</storage_pool>
      </storage_pool>urn:storageos:StoragePool:ad0dae57-d318-409c-a859-6c9e59a28251:vdc1</storage_pool>
    </storage_pool>
  </add>
</assigned_pool_changes>
</vpool_pool_update>
```

## Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<block_vpool>
  <creation_time>1379202604198</creation_time>
  <global>>false</global>
  <id>urn:storageos:VirtualPool:6cd9f843-1b41-4b9f-8eb1-a26797d0a268:vdc1</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/block/vpools/urn:storageos:VirtualPool:6cd9f843-1b41-4b9f-8eb1-a26797d0a268:vdc1"/>
  <name>basic_vpool</name>
  <remote>>false</remote>
  <tags />
  <vdc>
    <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-a105-6b669983f58f:vdc1</id>
    <link rel="self" href="/vdc/urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-a105-6b669983f58f:vdc1"/>
  </vdc>
  <assigned_storage_pools>
    <storage_pool>
      <id>urn:storageos:StoragePool:78caaf4a-673e-4580-ae41-a545a45e5e28:vdc1</id>
      <link rel="self" href="/vdc/storage-systems/urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:78caaf4a-673e-4580-ae41-a545a45e5e28:vdc1"/>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:ad0dae57-d318-409c-a859-6c9e59a28251:vdc1</id>
      <link rel="self" href="/vdc/storage-systems/urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:ad0dae57-d318-409c-a859-6c9e59a28251:vdc1"/>
    </storage_pool>
    <storage_pool>>
      <id>urn:storageos:StoragePool:62d2e40d-ced0-4114-8bb7-8d333e7ef878:vdc1</id>
      <link rel="self" href="/vdc/storage-systems/urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-fec72e9927d3:vdc1/storage-pools/urn:storageos:StoragePool:62d2e40d-ced0-4114-8bb7-8d333e7ef878:vdc1"/>
```

```

    </storage_pool>
  </assigned_storage_pools>
  <description>Basic Virtual Pool for Block Provisioning</
description>
  <invalid_matched_pools />
  <matched_storage_pools>
    <storage_pool>
      <id>urn:storageos:StoragePool:78caaf4a-673e-4580-
ae41-a545a45e5e28:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdcl/storage-pools/urn:storageos:StoragePool:
78caaf4a-673e-4580-ae41-a545a45e5e28:vdcl"/>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:ad0dae57-d318-409c-
a859-6c9e59a28251:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdcl/storage-pools/
urn:storageos:StoragePool:ad0dae57-d318-409c-
a859-6c9e59a28251:vdcl"/>
    </storage_pool>
    <storage_pool>
      <id>urn:storageos:StoragePool:62d2e40d-
ced0-4114-8bb7-8d333e7ef878:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:56d8aa7e-45fe-4383-b49a-
fec72e9927d3:vdcl/storage-pools/urn:storageos:StoragePool:
62d2e40d-ced0-4114-8bb7-8d333e7ef878:vdcl"/>
    </storage_pool>
  </matched_storage_pools>
  <num_paths>1</num_paths>
  <num_resources>4</num_resources>
  <protocols>
    <protocol>FC</protocol>
  </protocols>
  <provisioning_type>Thin</provisioning_type>
  <system_type>NONE</system_type>
  <type>block</type>
  <use_matched_pools>true</use_matched_pools>
  <varrays>
    <varray>
      <id>urn:storageos:VirtualArray:dc09417d-9028-40de-8bff-74574996f
2d5:vdcl</id>
      <link rel="self" href="vdc/varrays/
urn:storageos:VirtualArray:dc09417d-9028-40de-8bff-74574996f2d5:
vdcl"/>
    </varray>
  </varrays>
  <drive_type>NONE</drive_type>
  <expandable>true</expandable>
  <fast_expansion>>false</fast_expansion>
  <high_availability/>
  <max_paths>2</max_paths>
  <min_paths>1</min_paths>
  <multi_volume_consistency>true</multi_volume_consistency>
  <paths_per_initiator>1</paths_per_initiator>
  <protection>
    <continuous_copies>
      <max_native_continuous_copies>0</
max_native_continuous_copies>
    </continuous_copies>
    <snapshots>
      <max_native_snapshots>10</max_native_snapshots>
    </snapshots>
  </protection>
  <protocols>

```

```

        <element>FC</element>
    </protocols>
    <provisioning_type>Thin</provisioning_type>
    <raid_levels />
    <thin_volume_preallocation_percentage>0</
thin_volume_preallocation_percentage>
    <unique_auto_tier_policy_names>>false</
unique_auto_tier_policy_names>
</block_vpool>
    
```

## Important REST API calls to manage and configure block virtual pools

The table shows some important APIs that are used to manage and configure block virtual pools.

**Table 10** REST API calls to manage and configure block virtual pools

REST API call	Description
POST /block/vpools/{id}/vpool-change/vpool	Returns all potential virtual pools, which supported the given virtual pool change operation for a virtual pool change of the volumes specified in the request.
POST /block/vpools/matching-pools	You provide a set of block virtual pool attributes, and the method returns block virtual pools that match the given set of attributes. You can use this API to find matching pools before creating a block virtual pool. Sample request payload:  <pre> &lt;block_vpool_create&gt;   &lt;use_matched_pools&gt;&gt;true&lt;/use_matched_pools&gt;   &lt;system_type&gt;vnxblock&lt;/system_type&gt;   &lt;provisioning_type&gt;thin&lt;/provisioning_type&gt; &lt;/block_vpool_create&gt;                 </pre>
GET /block/vpools	List all block virtual pools.
GET /block/vpools/{id}	Show the details of the specified block virtual pool.
PUT /block/vpools/{id}	Update the specified block virtual pool. <hr/> <b>Note</b> <hr/> No associated resources such as volumes or snapshots should exist. <hr/> Sample request payload:  <pre> &lt;block_vpool_update&gt;   &lt;protection&gt;     &lt;continuous_copies&gt;       &lt;max_native_continuous_copies&gt;1&lt;/ max_native_continuous_copies&gt;     &lt;/continuous_copies&gt;   &lt;/protection&gt; &lt;/block_vpool_update&gt;                 </pre>

**Table 10** REST API calls to manage and configure block virtual pools (continued)

REST API call	Description
GET /block/vpools/{id}/varrays/{varrayid}/capacity	Gets storage capacity information for the specified virtual pool and neighborhood instances. The method returns set of metrics for capacity available for block storage provisioning: <p><b>free_gb</b> free storage capacity</p> <p><b>used_gb</b> used storage capacity</p> <p><b>provisioned_gb</b> subscribed storage capacity (may be larger than usable capacity)</p> <p><b>percent_used</b> percent of usable capacity which is used - percent_subscribed</p> <p><b>percent_subscribed</b> percent of usable capacity which is subscribed (may be more than 100)</p>
GET /block/vpools/{id}/quota	Show the quota and available capacity before the quota is exhausted.
PUT /block/vpools/{id}/quota	Updates quota and available capacity before quota is exhausted. <pre>&lt;quota_update&gt;   &lt;quota_enabled&gt;true&lt;/quota_enabled&gt;   &lt;quota_gb&gt;2&lt;/quota_gb&gt; &lt;/quota_update&gt;</pre>
PUT /block/vpools/{id}/acl	Add or remove individual block store virtual pool ACL entry(s). Request body must include at least one add or remove operation. <p>Sample request payload:</p> <pre>&lt;acl_assignment_changes&gt;   &lt;add&gt;     &lt;privilege&gt;USE&lt;/privilege&gt;     &lt;tenant&gt;urn:storageos:TenantOrg:dbeb4135-e297-40d9- a5d4-9b40c73bdb4b:&lt;/tenant&gt;   &lt;/add&gt; &lt;/acl_assignment_changes&gt;</pre>





# CHAPTER 12

## Creating virtual pools for file storage

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## Create ViPR Controller virtual pools for file storage

Create a virtual pool for file storage by specifying the criteria for provisioned file storage volumes. These criteria are also used to match physical storage pools which can be used for virtual pool volumes.

### Before you begin

- Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#).
- For information on virtual pools, see *ViPR Controller Concepts* on the [ViPR Controller Product Documentation Index](#).
- For file virtual pool configuration requirements and recommendations, see *ViPR Controller Virtual Data Center Requirements and Information Guide* on the [ViPR Controller Product Documentation Index](#).
- You need the URN of the tenant to be assigned as the ACL to the virtual pool. You can determine the current tenant using `GET /tenant` or use `GET /tenants/bulk` to get a list of all of the tenants.

**Table 11** Additional Required Parameters for the Request Payload

Required Parameter	Description
provisioning_type	The provisioning type for the virtual pool. Valid values: <ul style="list-style-type: none"> <li>• Thin</li> <li>• Thick</li> </ul>
protocol	The file protocols supported by the physical storage pools that will comprise the virtual pool. Valid values: <ul style="list-style-type: none"> <li>• CIFS</li> <li>• NFS</li> </ul>
long_term_retention	Valid values: <ul style="list-style-type: none"> <li>• True</li> <li>• False</li> </ul>
name	Since the virtual pool will be the target for all provisioning operations, select a name that conveys some information about the type of storage that it provides (its performance and protection levels) or how it should be used. For example, "gold", "tier1", or "backup", etc.
varray	The URNs of the virtual arrays to which the virtual pool is assigned.
description	Description for the virtual pool.
use_matched_pools	Determines if matched or valid assigned pools are returned from the command to retrieve the list of storage pools. Valid values: <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul>

**Table 11** Additional Required Parameters for the Request Payload (continued)

Required Parameter	Description
protection	Parameters if you are using a data protection system: <ul style="list-style-type: none"> <li>• snapshots</li> </ul>

A complete list of parameters for POST /file/vpools is described in the *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#).

### Procedure

1. Create a virtual pool for file storage by sending a POST /file/vpools. The representation of the new file virtual pool is returned.

#### Request

```
POST https://<ViPR_Controller_VIP>:4443/file/vpools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<file_vpool_create>
  <name>Isilon VPool</name>
  <description>Isilon VPool</description>
  <varrays>
    <varray>urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdcl</varray>
  </varrays>
  <provisioning_type>Thick</provisioning_type>
  <protocols>
    <protocol>NFS</protocol>
  </protocols>
  <protection>
    <snapshots>
      <max_native_snapshots>0</max_native_snapshots>
    </snapshots>
  </protection>
  <use_matched_pools>true</use_matched_pools>
  <long_term_retention>>false</long_term_retention>
</file_vpool_create>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<file_vpool>
  <creation_time>1399901093414</creation_time>
  <global>>false</global>
  <id>urn:storageos:VirtualPool:07f9b2f4-baa2-4136-b0f7-
cfb6572c853c:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <link rel="self" href="/file/vpools/urn:storageos:VirtualPool:
07f9b2f4-baa2-4136-b0f7-cfb6572c853c:vdcl"/>
  <name>Isilon VPool</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:ed581473-3453-4c05-
bd61-2068ad66942a:vdcl</id>
    <link rel="self" href="/vdc/
```

```
urn:storageos:VirtualDataCenter:ed581473-3453-4c05-
bd61-2068ad66942a:vdcl"/>
</vdc>
<assigned_storage_pools/>
<description>Isilon VPool</description>
<invalid_matched_pools/>
<matched_storage_pools>
  <storage_pool>
    <id>urn:storageos:StoragePool:6a3eb06f-4670-4ee3-b812-
dc04771c5118:vdcl</id>
    <link_rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:de38e08a-8cf4-4767-8291-5765bba63091:vd
c1/storage-pools/urn:storageos:StoragePool:6a3eb06f-4670-4ee3-b812-
dc04771c5118:vdcl"/>
  </storage_pool>
</matched_storage_pools>
<num_resources>1</num_resources>
<protocols>
  <protocol>NFS</protocol>
</protocols>
<provisioning_type>Thick</provisioning_type>
<system_type>NONE</system_type>
<type>file</type>
<use_matched_pools>true</use_matched_pools>
<varrays>
  <varray>
    <id>urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdcl</id>
    <link_rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdcl"/>
  </varray>
</varrays>
<long_term_retention>>false</long_term_retention>
<protection>
  <snapshots>
    <max_native_snapshots>0</max_native_snapshots>
  </snapshots>
</protection>
</file_vpool>
```

2. Tenant access to each virtual pool is controlled by an Access Control List (ACL). Only tenants that are included in the virtual pool's ACL are permitted access to that virtual pool. If no ACL is set, the virtual pool can be accessed by all tenants. Apply an ACL to the virtual pool by sending a PUT request to `/file/vpools/{vpool_urn}/acl`. The updated ACL is returned.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/file/vpools/
urn:storageos:VirtualPool:07f9b2f4-baa2-4136-b0f7-
cfb6572c853c:vdcl/acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:757053b7-
b952-41b9-83e1-44204b67a368:vdcl</tenant>
  </add>
</acl_assignment_changes>
```

## Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<acl_assignments>
  <acl_assignment>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:757053b7-
b952-41b9-83e1-44204b67a368:vdc1</tenant>
  </acl_assignment>
</acl_assignments>

```

3. ViPR Controller automatically matches existing physical pools on the ViPR Controller-managed storage systems to the virtual pool characteristics. You have the option of allowing ViPR Controller to automatically associate the matching physical pools to the virtual pool you created, or you can manually select a subset of the matching physical pools to associate to the virtual pool. To manually select a subset of matching physical pools:

- a. POST /file/vpools/matching-pools is used to get a list of storage pools that match a given set of criteria. In this example, the criterial that are sent in the request payload match the properties of the virtual pool that was just created.

## Request

```

POST https://<ViPR_Controller_VIP>:4443/file/vpools/matching-
pools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<file_vpool_create>
  <name>Isilon VPool</name>
  <description>Isilon VPool</description>
  <varrays>

<varray>urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdc1</varray>
</varrays>
  <provisioning_type>Thick</provisioning_type>
  <protocols>
    <protocol>NFS</protocol>
  </protocols>
  <protection>
    <snapshots>
      <max_native_snapshots>0</max_native_snapshots>
    </snapshots>
  </protection>
  <use_matched_pools>true</use_matched_pools>
</file_vpool_create>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<storage_pools>
  <storage_pool>
    <id>urn:storageos:StoragePool:6a3eb06f-4670-4ee3-b812-
dc04771c5118:vdc1</id>
    <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:de38e08a-8cf4-4767-8291-5765bba63091
:vdc1/storage-pools/urn:storageos:StoragePool:

```

```
6a3eb06f-4670-4ee3-b812-dc04771c5118:vdcl"/>
  <name>ISILON+6805ca00ad44cad54252f514e871a3c03333+POOL
+x200_5.5tb_200gb-ssd_6gb</name>
</storage_pool>
</storage_pools>
```

- b. Using the URN returned for the new virtual pool returned from the POST /file/vpools request, assign one or more of the storage pools that match the properties of the virtual pool by sending a PUT/file/vpools/{identifier}/assign-matched-pools request. The representation of the updated virtual pool is returned.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/file/vpools/
urn:storageos:VirtualPool:07f9b2f4-baa2-4136-b0f7-
cfb6572c853c:vdcl/assign-matched-pools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<vpool_pool_update>
  <assigned_pool_changes>
    <add>
      <storage_pool>
        <storage_pool>urn:storageos:StoragePool:
6a3eb06f-4670-4ee3-b812-dc04771c5118:vdcl</storage_pool>
      </storage_pool>
    </add>
  </assigned_pool_changes>
</vpool_pool_update>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<file_vpool>
  <creation_time>1399901093414</creation_time>
  <global>false</global>
  <id>urn:storageos:VirtualPool:07f9b2f4-baa2-4136-b0f7-
cfb6572c853c:vdcl</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/file/vpools/
urn:storageos:VirtualPool:07f9b2f4-baa2-4136-b0f7-
cfb6572c853c:vdcl"/>
  <name>Isilon VPool</name>
  <remote>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:ed581473-3453-4c05-
bd61-2068ad66942a:vdcl</id>
    <link rel="self" href="/vdc/
urn:storageos:VirtualDataCenter:ed581473-3453-4c05-
bd61-2068ad66942a:vdcl"/>
  </vdc>
  <assigned_storage_pools>
    <storage_pool>
      <id>urn:storageos:StoragePool:6a3eb06f-4670-4ee3-
b812-dc04771c5118:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:de38e08a-8cf4-4767-8291-5765bba63091
:vdcl/storage-pools/urn:storageos:StoragePool:
6a3eb06f-4670-4ee3-b812-dc04771c5118:vdcl"/>
```

```

    </storage_pool>
  </assigned_storage_pools>
  <description>Isilon VPool</description>
  <invalid_matched_pools/>
  <matched_storage_pools>
    <storage_pool>
      <id>urn:storageos:StoragePool:6a3eb06f-4670-4ee3-
b812-dc04771c5118:vdcl</id>
      <link rel="self" href="/vdc/storage-systems/
urn:storageos:StorageSystem:de38e08a-8cf4-4767-8291-5765bba63091
:vdcl/storage-pools/urn:storageos:StoragePool:
6a3eb06f-4670-4ee3-b812-dc04771c5118:vdcl"/>
    </storage_pool>
  </matched_storage_pools>
  <protocols>
    <protocol>NFS</protocol>
  </protocols>
  <provisioning_type>Thick</provisioning_type>
  <system_type>NONE</system_type>
  <type>file</type>
  <use_matched_pools>true</use_matched_pools>
  <varrays>
    <varray>
      <id>urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdcl</id>
      <link rel="self" href="/vdc/varrays/
urn:storageos:VirtualArray:f66ee94d-12d2-4a99-8514-
f74beb4844e6:vdcl"/>
    </varray>
  </varrays>
  <long_term_retention>>false</long_term_retention>
  <protection>
    <snapshots>
      <max_native_snapshots>0</max_native_snapshots>
    </snapshots>
  </protection>
</file_vpool>

```





# CHAPTER 13

## Creating virtual pools for Vblock Compute Systems

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- [UCS blades and service profile templates](#).....132
- [Additional REST API calls to manage your Compute Virtual Pools](#)..... 133

## Create a Compute Virtual Pool using the REST API

Compute virtual pools are a pool of compute system blades. When a Vblock System Service is run, ViPR Controller pulls required compute resources from the selected compute virtual pool.

### Before you begin

- Authenticate with the ViPR REST API as a System Administrator. See [Authenticating with the REST API on page 9](#)
- For a compute virtual pool based on UCS compute systems to be used by ViPR Controller for provisioning, at least one service profile template must be selected in the compute virtual pool. Review the ViPR Controller requirements for service profile templates, and discuss with your UCS administrator which service profile template should be used by ViPR Controller to provision the Vblock system. See [ViPR Controller requirements for service profile templates on page 132](#).
- `system_type` - `Cisco_UCSM` is one example.
- `varrays` - URN of the varrays. You can find the ID of the varray using `GET /vdc/varrays`
- `service_profile_template` - the URNs of the service profile templates which you want associated with this virtual pool. You can find the URNs of the service profile templates using `GET /vdc/compute-systems/{ID}`. You can include more than one service profile template but you can only use one service profile template per compute system.
- Optional: Minimum and maximum values to eliminate blades, which do not match the criteria. The range of values is 1 - 65535. When no minimum is set, ViPR Controller defaults to zero. There is no maximum value. The maximum is unlimited when it is not set. For example:
  - If processors are set with a minimum of 6 and no maximum, then only blades with 6 or more processors will be available to use in the compute virtual pool.
  - If processors are set with no minimum, and a maximum of 16, then any blade with 16 or less processors will be available to use in the compute virtual pool.
  - If no minimum or maximum value is set for processors ViPR Controller will include available blades with any number of processors in the virtual pool.
  - `min_processors` and `max_processors`
  - `min_total_cores` and `max_total_cores`
  - `min_total_threads` and `max_total_threads`
  - `min_cpu_speed` and `max_cpu_speed`
  - `min_memory` and `max_memory`
  - `min_nics` and `max_nics`
  - `min_hbas` and `max_hbas`
- The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this article.

### Procedure

1. Create a compute virtual pool using `POST /compute/vpools`. The new compute vpool is returned.

## Request

```

POST https://<ViPR_Controller_VIP>:4443/compute/vpools
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<compute_vpool_create>
  <name>compute_vpool_west1</name>
  <description>vpool for west</description>
  <system_type>Cisco_UCSM</system_type>
  <min_processors>3</min_processors>
  <varrays>
    <varray>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f001
    2f86:vdcl</varray>
  </varrays>
  <use_matched_elements>true</use_matched_elements>
  <service_profile_templates>
    <service_profile_template>urn:storageos:UCSServiceProfileTemplate:
    6c6236dd-e98d-47da-b2e6-749c09554ccd:vdcl</
    service_profile_template>
  </service_profile_templates>
</compute_vpool_create>

```

## Response

```

HTTP 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<compute_vpool>
  <creation_time>1422389775019</creation_time>
  <global>>false</global>
  <id>urn:storageos:ComputeVirtualPool:75ec968b-8001-4889-
  abd7-80090c4010a9:vdcl</id>
  <inactive>>false</inactive>
  <internal>>false</internal>
  <name>compute_vpool_west1</name>
  <remote>>false</remote>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:99c5c185-
    ebb0-468a-8fe7-3ea6e65b7b57:vdcl</id>
    <link rel="self" href="/vdc/urn:storageos:VirtualDataCenter:
    99c5c185-ebb0-468a-8fe7-3ea6e65b7b57:vdcl"/>
  </vdc>
  <available_matched_compute_elements/>
  <description>vpool for west</description>
  <in_use>>false</in_use>
  <matched_compute_elements/>
  <min_processors>3</min_processors>
  <service_profile_templates>
    <service_profile_template>
      <id>urn:storageos:UCSServiceProfileTemplate:6c6236dd-
      e98d-47da-b2e6-749c09554ccd:vdcl</id>
      <name>ST-ServerTemplate</name>
    </service_profile_template>
  </service_profile_templates>
  <system_type>Cisco_UCSM</system_type>
  <use_matched_elements>true</use_matched_elements>
  <varrays>
    <varray>
      <id>urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86
      :vdcl</id>
      <link rel="self" href="/vdc/varrays/

```

```
urn:storageos:VirtualArray:ac294bc7-0518-48dd-9f54-4980f0012f86:vdc
1"/>
  </varray>
</varrays>
</compute_vpool>
```

## UCS blades and service profile templates

Some compute systems are blade servers with hardware virtualization. This means that many properties of the servers that were traditionally burned into the hardware are actually soft settable. The UCS uses the concept of "service profiles" as a container for all the required settings to stand up a blade.

Service profiles are associated to blades to assign the required settings. Additionally, the UCS has the concept of, "service profile templates, (SPTs)," and "updating Service Profile Templates (uSPTs)," that must be set up by UCS administrators. These service profile templates can be used by non-admin users to create the service profiles that turn a blade into a host.

ViPR Controller does not perform the functions of the UCS administrator, rather ViPR Controller utilizes service profile templates to assign the required properties to blades. A UCS administrator will need to create service profile templates that ViPR Controller can use to provision servers and hosts.

## ViPR requirements for service profile templates

The following sections explain the requirements to configure a service profile template for ViPR Controller provisioning operations.

---

### Note

If existing service profile templates do not match the following requirements, clone one of the service profile template to create a new service profile template and alter the settings as required by ViPR Controller.

---

### General properties

- The service profile template must not be associated to a server pool. Blade selection is performed by the ViPR Controller Compute Virtual Pools.
- UUID assignment must be from a valid UUID Suffix Pool set up in the UCS with available addresses.

### Storage

ViPR Controller currently supports Fibre Channel boot for UCS servers. The following lists the Fibre Channel requirements:

- World Wide Node Name (WWNN) assignment must be from a valid UUID Suffix Pool set up in the UCS with available addresses.
- The Local Disk Configuration Policy must be set to a local disk configuration policy where the **Mode** is set to **No Local Storage**.
- There must be at least one vHBA interface.
- For each vHBA, the World Wide Port Name (WWPN) assignment must be from a valid WWPN pool set up in the UCS with available addresses.
- The VSAN set on each vHBA must be a valid network discovered by ViPR Controller. The VSAN must match one of the networks in a ViPR Controller virtual array.

- Policy settings on the vHBAs are not set by ViPR Controller provisioning and are at the administrator's discretion.

#### Network

- Policy settings on the vNICs are not set by ViPR Controller provisioning and are at the administrator's discretion.
- There must be at least one vNIC interface.
- For each vNIC, the MAC Address Assignment must be from a valid MAC pool that was set up in the UCS with available addresses.
- Each vNIC must have at least one VLAN.

#### Boot Policy and Boot Order

There are no Boot Policy requirements. ViPR Controller ignores all Boot Policy settings in the service profile template and overwrites any existing parameters when it creates service profiles.

#### Policies

ViPR Controller does not set any policies. The UCS administrator is responsible for setting the policies.

#### Updating service profile templates

If provisioning with updating service profile templates,

- The boot policy of the updating service profile template must specify SAN as the first boot device.
- If the boot policy of the updating service profile template enforces vNIC and vHBA names, the names of the vNICs and vHBAs in the service profile template must match those in its boot policy.
- The compute virtual pool with which the updating service profile template is being associated, must be associated to a virtual array that has storage ports on the VSANs that the vHBAs of the template use.
- If the boot policy of the updating service profile template specifies SAN boot target WWPNs, then compute virtual pool that the template is associated with must be associated with a virtual array that includes those storage ports on the appropriate VSANs.

## Additional REST API calls to manage your Compute Virtual Pools

The table shows some additional APIs that are used to manage your Compute Virtual Pools.

**Table 12** REST API calls to manage your Compute Virtual Pools

ViPR Controller REST API Call	Description
GET /compute/vpools/{ID}	Get the details of a compute virtual pools .
GET /compute/vpools	Get a list of the names, IDs, and links of all compute virtual pools.
PUT /compute/vpools/{ID}	Update a compute virtual pool.

**Table 12** REST API calls to manage your Compute Virtual Pools (continued)

ViPR Controller REST API Call	Description
	<hr/> <p><b>Note</b></p> <p>Once a compute virtual pool has been used by ViPR Controller, only some of the attributes can be changed. You will receive an error message in the response if you try to update a field that cannot be changed.</p> <hr/>
POST /compute/vpools/{ID}/deactivate	Delete a compute virtual pools.
POST /compute/vpools/matching-compute-elements	Get compute elements that match the compute virtual pool criteria.
GET /compute/vpools/search?parameter={search_parameter}	<p>Search for a compute virtual pool . For example:</p> <pre>GET /compute/vpools/search?name=cvpool1</pre>

# CHAPTER 14

## Assigning an Access Control List (ACL) to a resource

This chapter contains the following topics:

- [ACLs](#).....136
- [Virtual array and virtual pool ACLs](#)..... 136
- [Project ACLs](#)..... 139

## ACLs

An Access Control List (ACL) is a list of permissions attached to a ViPR Controller resource that specifies which tenants are authorized to access VDC-level resources and which users or groups are authorized to access tenant-level resources. ACLs also indicate which operations are allowed on the resource.

Assigning an ACL to a resource is one means of setting up which users and groups are authorized to access ViPR Controller functionality . Assigning roles to users and groups is another method. See [Assigning roles to users and groups on page 143](#).

The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this chapter.

## Virtual array and virtual pool ACLs

At creation time, virtual arrays and virtual pools are public. They are accessible to all tenants.

A System or Security Administrator can assign an ACL to a virtual pool or virtual array to restrict them to be used by specified tenants.

The ACL permission associated with virtual arrays and pools is of the type USE. If a specific tenant has a USE ACL on a virtual pool, this means that all the users who are mapped to that tenant will be allowed to use that virtual pool in their provisioning operations.

All newly created virtual arrays and pools will have an empty ACL. The System or Security Administrator is responsible for managing the ACL. If no ACLs are set, the virtual arrays and pools remain accessible to the provider tenant and all other tenants in the ViPR system.

For virtual pools and virtual arrays, you cannot assign an ACL to a user (subject ID) or group. Only tenants can be assigned ACLs for these resources.

The following table shows the APIs that allow a system or security administrator to modify ACLs for virtual arrays and virtual pools. Note that there are separate API calls for file and block virtual pools.



**Table 13** REST APIs for Modifying ACLs for Virtual Arrays and Virtual Pools

API	Description
GET /block/vpools/{id}/acl	Show ACL assignment for block store virtual pool .
PUT /block/vpools/{id}/acl	Add or remove block store virtual pool ACL entries.
GET /file/vpools/{id}/acl	Show ACL entries for file store VirtualPool.
PUT /file/vpools/{id}/acl	Add or remove ACL entries from file store VirtualPool.
GET /compute/vpools/{id}acl	Show the ACL assignment for a compute virtual pool.
PUT /compute/vpools/{id}/acl	Add or remove compute virtual pool ACL entries.
GET /vdc/varrays/{id}/acl	Show VirtualArray ACL Virtual Array.
PUT /vdc/varrays/{id}/acl	Add or remove ACL for VirtualArray Virtual Array.

## Examples: Virtual array and virtual pool ACL APIs

The examples in this section show some commonly-used APIs for managing virtual array and virtual pool ACLs.

### Virtual array: Assigning the USE ACL to a tenant

The following example shows how to give a tenant privileges to use a virtual array. If no ACL exists on the virtual array, all tenants have access to it.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:f49f6e36-0fe5-4181-9622-49d116204d86:vdc1/
acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:7985d438-9980-41df-
bba1-29d6a873f811:global</tenant>
  </add>
</acl_assignment_changes>
```

#### Response:

```
HTTP 200 OK
Content-Type: application/xml
<acl_assignments>
  <acl_assignment>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:7985d438-9980-41df-
bba1-29d6a873f811:global</tenant>
  </acl_assignment>
</acl_assignments>
```

### Virtual array: Removing the USE ACL from a tenant Request

```
PUT https://<ViPR_Controller_VIP>:4443/vdc/varrays/
urn:storageos:VirtualArray:f49f6e36-0fe5-4181-9622-49d116204d86:vdc1/
acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <remove>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:7985d438-9980-41df-
bba1-29d6a873f811:global</tenant>
  </remove>
</acl_assignment_changes>
```

### Response:

```
HTTP 200 OK
Content-Type: application/xml
<acl_assignments/>
```

### Virtual pool: Assigning the USE ACL to a tenant

The following example shows how to give a tenant privileges to use a virtual pool. If no ACL exists on the virtual pool, all tenants have access to it.

### Request

```
PUT https://<ViPR_Controller_VIP>:4443/file/vpools/
urn:storageos:VirtualPool:4394653f-cf2e-4301-8f11-9e8d3e7e7fa9:vdc1/
acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-
c40b6de2c72f:global</tenant>
  </add>
</acl_assignment_changes>
```

### Response:

```
HTTP 200 OK
Content-Type: application/xml
<acl_assignments>
  <acl_assignment>
    <privilege>USE</privilege>
    <tenant>urn:storageos:TenantOrg:d61d9fa1-9886-40ef-85d3-
c40b6de2c72f:global</tenant>
  </acl_assignment>
</acl_assignments>
```

## Project ACLs

A Tenant Administrator can access all projects for their tenant. Project Administrators can only access projects that they own.

Newly created projects will have an empty ACL.

The project ACLs can be created or modified by a Tenant Administrator, a Security Administrator, or a project owner. Project owners are assigned the OWN ACL. The user that creates the project is the owner of that project unless they, or a tenant administrator, transfers ownership of that project to another user.

The default ACL behavior of a project is different from the default ACL behavior of a Virtual Array or Virtual Pool. Whereas, the default ACL for a Virtual Array or Virtual Pool enables anyone to use them, the default ACL for the Project prevents all but the Tenant Admin or Project owner from using it (for example, to create a volume in the project). For other users or groups to use a project, that user or group must be explicitly added to the ACL for that project.

The ACL permissions associated with projects are listed in the following table.

**Table 14** Project ACLs

Project ACL	Description
ALL	The user can manage the resources in the project (that is, perform create, read, update, and delete (CRUD) operations on file systems, volumes, snapshots, exports, and buckets).
BACKUP	The user has read-only access to the first-level resources under the project (that is, volumes, file systems, and buckets) and full access to snapshot operations (can create/delete/export snapshots).
OWN	OWN is an internal ACL permission that you use to identify the user as a project owner. The internal OWN ACL on a project is modified by editing a project's properties, not the project's ACL. (The API uses the <code>project update</code> API call is used, not the <code>update project ACL</code> call.) A user with an OWN ACL can: <ul style="list-style-type: none"> <li>• Perform create, read, update, and delete operations on project resources.</li> <li>• Set ACLs on the project. This includes the use of the <code>project update</code> API to set another user as the new owner.)</li> <li>• Delete the project.</li> <li>• Set project properties such as the project name and owner.</li> </ul>
ANY	ANY is an internal ACL that identifies users with any of the above ACLs on a project. You cannot use the project ACL assignment API to modify the internal ANY ACL.

## Examples: Project ACL APIs

The examples in this section show some commonly-used APIs for managing project ACLs.

### Get the ACLs for a project

#### Request

```
GET https://<ViPR_Controller_VIP>:4443/projects/{Project_URN}/acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<acl_assignments>
  <acl_assignment>
    <privilege>ALL</privilege>
    <subject_id>jordab@sanity.local</subject_id>
  </acl_assignment>
  <acl_assignment>
    <privilege>BACKUP</privilege>
    <subject_id>jordab2@sanity.local</subject_id>
  </acl_assignment>
</acl_assignments>
```

### Assigning the USE ACL to a user

The following example sets the project ACL using a user's subject\_id. A subject\_id or group can be assigned the ALL or BACKUP permission.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/projects/<project_urn>/acl
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<acl_assignment_changes>
  <add>
    <privilege>ALL</privilege>
    <subject_id>jordab2@sanity.local</subject_id>
  </add>
</acl_assignment_changes>
```

#### Response

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<acl_assignments>
  <acl_assignment>
    <privilege>ALL</privilege>
    <subject_id>jordab@sanity.local</subject_id>
  </acl_assignment>
  <acl_assignment>
    <privilege>ALL</privilege>
    <privilege>BACKUP</privilege>
    <subject_id>jordab2@sanity.local</subject_id>
  </acl_assignment>
</acl_assignments>
```

## Examples: Changing a project's owner

The example in this section shows how to change the owner of a project.

The OWN ACL is assigned to a project's creator, giving that user ownership rights to that project. A tenant admin, a project admin or the project's owner can reassign the ownership of the project to another user.

### Checking the owner of a project

The user that owns the project is displayed in the <owner> field of the project resource. Here, the user jordab@sanity.local is displayed as the project owner.

```
GET https://<ViPR_Controller_VIP>:4443/projects/{Project_urn}
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

```
HTTP 200 OK
Content-Type: application/xml
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<project>
  <creation_time>1400267698359</creation_time>
  <global>true</global>
  <id>urn:storageos:Project:7581d618-
e124-4c7f-9a04-624cad271ff2:global</id>
  <inactive>false</inactive>
  <internal>false</internal>
  <link rel="self" href="/projects/urn:storageos:Project:7581d618-
e124-4c7f-9a04-624cad271ff2:global"/>
  <name>Snapshot Project</name>
  <tags/>
  <vdc>
    <id>urn:storageos:VirtualDataCenter:030618c2-c6b2-40b0-
a105-6b669983f58f:vdc1</id>
    <link rel="self" href="/vdc/urn:storageos:VirtualDataCenter:
030618c2-c6b2-40b0-a105-6b669983f58f:vdc1"/>
    </vdc>
    <owner>jordab@sanity.local</owner>
  </tenant>
  <id>urn:storageos:TenantOrg:2b5f6d7c-e670-4aee-9fc1-
ddb0fc8de22:global</id>
  <link rel="self" href="/tenants/urn:storageos:TenantOrg:
2b5f6d7c-e670-4aee-9fc1-ddb0fc8de22:global"/>
  </tenant>
</project>
```

### Changing the owner of a project

This example changes the ownership of the project shown in the previous example to jordab2@sanity.local. Note that this is done by changing the owner attribute of the project, rather than through an ACL call.

#### Request

```
PUT https://<ViPR_Controller_VIP>:4443/projects/{Project_URN}
Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>
```

```
<project_update>
  <owner>jordab2@sanity.local</owner>
</project_update>
```

### Response

```
HTTP 200 OK  
Content-Type: application/xml
```

# CHAPTER 15

## Assigning roles to users and groups

This chapter contains the following topics:

- [Overview of assigning roles using the REST API](#) ..... 144
- [Assign a Virtual Data Center Role to a User or Group](#) ..... 144
- [Assign a Tenant Role to a User or Group](#) ..... 145

## Overview of assigning roles using the REST API

Learn how to assign roles to users and groups in ViPR Controller using the ViPR Controller REST API . ViPR Controller has two types of roles: virtual data center roles and tenant-level roles. When you assign a role to a user or group, you are using one of the methods to control authorization in ViPR Controller.

See *ViPR Controller Concepts* on the [ViPR Controller Product Documentation Index](#) .

The other method to control authorization is to assign an Access Control List (ACL) to a resource. See [Assigning an Access Control List \(ACL\) to a resource on page 135](#).

## Assign a Virtual Data Center Role to a User or Group

A Security Administrator can assign roles to users or groups that belong to the top-level provider tenant. These roles identify what functions the user or group can perform, such as adding physical assets or creating users, at the level of the entire virtual data center.

### Before you begin

- Authenticate with the ViPR REST API as a Security Administrator. See [Authenticating with the REST API on page 9](#).
- If you plan to assign a role to a user or group that is in LDAP or Active Directory, ensure that you meet the following conditions:
  - You have already added an authentication provider to ViPR Controller.
  - You have already mapped those users, for whom you are assigning a virtual data center role, to the provider tenant.
- The virtual data center level roles include:
  - Security Administrator (SECURITY\_ADMIN)
  - System Administrator (SYSTEM\_ADMIN)
  - System Monitor (SYSTEM\_MONITOR)
  - System Auditor (SYSTEM\_AUDITOR)

For information on ViPR Controller users, roles and ACLs, see *ViPR Controller Concepts* on the [ViPR Controller Product Documentation Index](#) .

The *EMC ViPR Controller REST API Reference* on the [ViPR Controller Product Documentation Index](#) provides a description and complete list of parameters for the REST API methods used in this section.

In the following example, a Security Administrator role is being assigned to the user, `username@mycompany.com`, using `PUT https://<ViPR_Controller_VIP>:4443/vdc/role-assignments` . The response is an updated list of role assignments for the virtual data center, including the SECURITY\_ADMIN role assigned to the user, `username@mycompany.com`.

### Procedure

1. To apply the SECURITY\_ADMIN role assignment to `username@mycompany.com`, send the following request.

Request

```
PUT https://<ViPR_Controller_VIP>:4443/vdc/role-assignments HTTP/1.1
```



```

Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<role_assignment_change>
  <add>
    <role>SECURITY_ADMIN</role>
    <subject_id>username@mycompany.com</subject_id>
  </add>
</role_assignment_change>

```

#### Response

```

HTTP/1.1 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<role_assignments_create>
  <role_assignment>
    <role>SYSTEM_ADMIN</role>
    <subject_id>username@mycompany.com</subject_id>
  </role_assignment>
  <role_assignment>
    <role>SYSTEM_AUDITOR</role>
    <role>SECURITY_ADMIN</role>
    <role>SYSTEM_MONITOR</role>
    <role>SYSTEM_ADMIN</role>
    <subject_id>username@mycompany.com</subject_id>
  </role_assignment>
  <link href="/vdc/role-assignments" rel="self"/>
</role_assignments_create>

```

## Assign a Tenant Role to a User or Group

A Security Administrator or Tenant Administrator with access to a tenant can assign roles to users or groups in that tenant by sending a PUT `https://<ViPR_Controller_VIP> : 4443/tenants/<tenant_URN>/role-assignments`. These roles identify what functions the user can do at the tenant level.

#### Before you begin

- [Authenticate with the ViPR REST API](#) with the [Security Administrator](#) or [Tenant Administrator](#) role with access to the tenant.
- Authenticate with the ViPR Controller REST API with the Security Administrator or Tenant Administrator role with access to the tenant.
- You need the URN of the tenant .
- If you plan to assign a role to a user or group that is in LDAP or Active Directory, ensure that you meet the following conditions:
  - You have already added an authentication provider to ViPR Controller.
  - You have already configured users and groups for the provider tenant.
- The tenant level roles include:
  - Tenant Administrator (TENANT\_ADMIN)
  - Tenant Approver (TENANT\_APPROVER)
  - Project Administrator (PROJECT\_ADMIN)

- The tenant level roles include:
  - Tenant Administrator (TENANT\_ADMIN)
  - Tenant Approver (TENANT\_APPROVER)
  - Project Administrator (PROJECT\_ADMIN)

See [Understanding ViPR Users, Roles, and ACLs](#).

See *Understanding ViPR Users, Roles, and ACLs*.

The provides a description and complete list of parameters for the REST API methods used in this section.

In the following example, a Tenant Administrator role is being assigned to the user, `user@mycompany.com`, using PUT `https://<ViPR_Controller_VIP>:4443/tenants/<tenant_URN>/role-assignments`. The response is an updated list of role assignments for the tenant.

### Procedure

1. To apply the TENANT\_ADMIN role assignment to `user@mycompany.com`, send the following request:

Request

```
PUT https://<ViPR_Controller_VIP>:4443/tenants/
urn:storageos:TenantOrg:dbeb4135-e297-40d9-
a5d4-9b40c73bdb4b:global/role-assignments HTTP/1.1

Content-Type: application/xml
X-SDS-AUTH-TOKEN: <AUTH_TOKEN>

<role_assignment_change>
  <add>
    <role>TENANT_ADMIN</role>
    <subject_id>user@mycompany.com</subject_id>
  </add>
</role_assignment_change>
```

Response

```
HTTP/1.1 200 OK
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
  <role_assignments_create>
    <link href="/tenants/urn:storageos:TenantOrg:dbeb4135-
e297-40d9-a5d4-9b40c73bdb4b:global/role-assignments" rel="self"/>
    <role_assignment>
      <role>TENANT_ADMIN</role>
      <subject_id>user@mycompany.com</subject_id>
    </role_assignment>
    <role_assignment>
      <role>TENANT_ADMIN</role>
      <subject_id>root</subject_id>
    </role_assignment>
  </role_assignments_create>
```