Multitenant networking API methods

Element Software

NetApp
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Table of Contents

Multitenant networking API methods

Multitenant networking in Element storage clusters allows traffic between multiple clients that are on separate logical networks to be connected to one Element storage cluster without layer 3 routing.

Connections to the storage cluster are segregated in the networking stack through the use of VLAN tagging.

Prerequisites for setting up a multitenant virtual network

- You must have identified the block of client network IP addresses to be assigned to the virtual networks on the storage nodes.
- You must have identified a client storage network IP (SVIP) address to be used as an endpoint for all storage traffic.

Virtual networking order of operations

1. Use the AddVirtualNetwork method to bulk provision the IP addresses you enter.

   After you add a virtual network, the cluster automatically performs the following steps:

   - Each storage node creates a virtual network interface.
   - Each storage node is assigned a VLAN address that can be routed to using the virtual SVIP.
   - VLAN IP addresses persist on each node in the event of a node reboot.
2. When the virtual network interface and VLAN addresses have been assigned, you can assign client network traffic to the virtual SVIP.

Find more information

- Virtual network naming conventions
- AddVirtualNetwork
- ModifyVirtualNetwork
- ListVirtualNetworks
- RemoveVirtualNetwork
- SolidFire and Element Software Documentation
- Documentation for earlier versions of NetApp SolidFire and Element products

Virtual network naming conventions

NetApp Element storage systems use monotonically increasing numbers as unique identifiers for all objects in the system.

When you create a new volume, the new volumeID is an increment of exactly 1. This convention holds true with virtual networks in storage clusters running Element software. The first virtual network you create in an Element cluster has a VirtualNetworkID of 1. This ID is not the same thing as a VLAN tag number.

You can use VirtualNetworkID and the VirtualNetworkTag (VLAN tag) interchangeably where noted in the API methods.

Find more information

- SolidFire and Element Software Documentation
- Documentation for earlier versions of NetApp SolidFire and Element products

AddVirtualNetwork

You can use the `AddVirtualNetwork` method to add a new virtual network to a cluster configuration.

When you add a virtual network, an interface for each node is created and each interface requires a virtual network IP address. The number of IP addresses you specify as a parameter for this API method must be equal to or greater than the number of nodes in the cluster. The system bulk provisions virtual network addresses and assigns them to individual nodes automatically. You do not need to assign virtual network addresses to nodes manually.

The AddVirtualNetwork method is used only to create a new virtual network. If you want to make changes to an existing virtual network, use the ModifyVirtualNetwork method.

Parameters

This method has the following input parameters:

Name	Description	Type	Default value	Required
addressBlocks	Unique range of IP addresses to include in the virtual network. Required members for the object: • start: The start of the IP address range. (string) • size: The number of IP addresses to include in the block. (integer)	JSON object array	None	Yes
attributes	List of name-value pairs in JSON object format.	JSON object	None	No

Name	Description	Type	Default value	Required
gateway	The IP address of a gateway of the virtual network. This parameter is valid only if the namespace parameter is set to true.	string	None	No
name	A user-defined name for the new virtual network.	string	None	Yes
namespace	When set to true, enables the Routable Storage VLANs functionality by creating and configuring a namespace and the virtual network contained by it.	boolean	None	No
netmask	Unique network mask for the virtual network being created.	string	None	Yes
svip	Unique storage IP address for the virtual network being created.	string	None	Yes
virtualNetworkTag	A unique virtual network (VLAN) tag. Supported values are 1 through 4094.	integer	None	Yes

Note: Virtual network parameters must be unique to each virtual network when you set namespace to false.

Return value

This method has the following return value:

Name	Description	Type
virtualNetworkID	The virtual network ID of the new virtual network.	integer

Request example

Requests for this method are similar to the following example:

```
{
  "method": "AddVirtualNetwork",
  "params": {
    "virtualNetworkTag": 2010,
    "name": "network1",
    "addressBlocks" : [
        { "start": "192.86.5.1", "size": 10 },
        { "start": "192.86.5.50", "size": 20 }
    ],
    "netmask" : "255.255.192.0",
    "gateway" : "10.0.1.254",
    "svip" : "192.86.5.200",
    "attributes" : {}
    "namespace" : true
  },
"id": 1
}
```

Response example

This method returns a response similar to the following example:

```
{
   "id": 1,
   "result":
      {
        "virtualNetworkID": 5
   }
}
```

New since version

9.6

ModifyVirtualNetwork

You can use the `ModifyVirtualNetwork` method to change the attributes of an existing virtual network.

This method enables you to add or remove address blocks, change the netmask, or modify the name or description of the virtual network. You can also use it to enable or disable namespaces, as well as add or

remove a gateway if namespaces are enabled on the virtual network.

This method requires either the virtualNetworkID or the virtualNetworkTag as a parameter, but not both.

CAUTION:

Enabling or disabling the Routable Storage VLANs functionality for an existing virtual network by changing the namespace parameter disrupts any traffic handled by the virtual network. It is best if you change the namespace parameter during a scheduled maintenance window.

Parameters

This method has the following input parameters:

Name	Description	Type	Default value	Required
virtualNetworkID	Unique identifier of the virtual network to modify. This is the virtual network ID assigned by the cluster.	integer	None	No
virtualNetworkTag	The network tag that identifies the virtual network to modify.	integer	None	No

addressBlocks	The new address block to set for this virtual network. This might include new address blocks to add to the existing object or omit unused address blocks that need to be removed. Alternatively, you can extend or reduce the size of existing address blocks. You can only increase the size of the starting addressBlocks for a Virtual Network object; you can never decrease it. Required members for this object: • start: The start of the IP address range. (string) • size: The number of IP addresses to include in the block. (integer)	JSON object	None	No
gateway	The IP address of a gateway of the virtual network. This parameter is valid only if the namespace parameter is set to true.	string	None	No
attributes	List of name-value pairs in JSON object format.	JSON object	None	No
name	The new name for the virtual network.	string	None	No

namespace	When set to true, enables the Routable Storage VLANs functionality by recreating the virtual network and configuring a namespace to contain it. When set to false, disables the VRF functionality for the virtual network. Changing this value disrupts traffic running through this virtual network.	boolean	None	No
netmask	New network mask for this virtual network.	string	None	No
svip	The storage virtual IP address for this virtual network. The SVIP for a virtual network cannot be changed. You must create a new virtual network to use a different SVIP address.	string	None	No

Return values

This method has no return values.

Request example

Requests for this method are similar to the following example:

```
{
  "method": "ModifyVirtualNetwork",
  "params": {
    "virtualNetworkID": 2,
    "name": "ESX-VLAN-3112",
    "addressBlocks": [
     {
      "start": "10.1.112.1",
      "size": 20
     },
     {
      "start": "10.1.112.100",
      "size": 20
     }
   ],
    "netmask": "255.255.255.0",
    "gateway": "10.0.1.254",
    "svip": "10.1.112.200",
    "attributes": {}
  },
  "id":1
}
```

Response example

This method returns a response similar to the following example:

```
{
  "id": 1,
  "result": {
  }
}
```

New since version

9.6

ListVirtualNetworks

You can use the `ListVirtualNetworks` method to list all configured virtual networks for the cluster.

You can use this method to verify the virtual network settings in the cluster. There are no required parameters for this method. However, to filter the results, you can pass one or more virtualNetworkID or virtualNetworkTag values.

Parameters

This method has the following input parameters:

Name	Description	Type	Default value	Required
virtualNetworkID	Network ID to filter the list for a single virtual network.	integer	None	No
virtualNetworkTag	Network tag to filter the list for a single virtual network.	integer	None	No
virtualNetworkIDs	Network IDs to include in the list.	integer array	None	No
virtualNetworkTags	Network tag to include in the list.	integer array	None	No

Return value

This method has the following return value:

Name	Description	Type
virtualNetworks	Object containing virtual network IP addresses.	virtualNetwork

Request example

Requests for this method are similar to the following example:

```
{
  "method": "ListVirtualNetworks",
  "params": {
     "virtualNetworkIDs": [5,6]
   },
"id": 1
}
```

Response example

This method returns a response similar to the following example:

```
{
  "id": 1,
```

```
  "result": {
    "virtualNetworks": [
   {
    "addressBlocks": [
   {
    "available": "11000000",
    "size": 8,
    "start": "10.26.250.207"
   }
  ],
    "attributes": null,
    "gateway": "10.26.250.254",
    "name": "2250",
    "namespace": false,
    "netmask": "255.255.255.0",
    "svip": "10.26.250.200",
    "virtualNetworkID": 2250
   },
   {
     "addressBlocks": [
   {
     "available": "11000000",
     "size": 8,
     "start": "10.26.241.207"
   }
  ],
     "attributes": null,
     "gateway": "10.26.241.254",
     "name": "2241",
     "namespace": false,
     "netmask": "255.255.255.0",
     "svip": "10.26.241.200",
     "virtualNetworkID": 2241
   },
  {
     "addressBlocks": [
  {
     "available": "11000000",
     "size": 8,
     "start": "10.26.240.207"
   }
  ],
     "attributes": null,
     "gateway": "10.26.240.254",
     "name": "2240",
     "namespace": false,
```

```
      "netmask": "255.255.255.0",
      "svip": "10.26.240.200",
      "virtualNetworkID": 2240
     },
    {
   }
  ]
}
```

New since version

9.6

RemoveVirtualNetwork

You can use the `RemoveVirtualNetwork` method to remove a previously added virtual network.

> This method requires either the virtualNetworkID or the virtualNetworkTag as a parameter, but not both.

> You cannot remove a virtual network if there are initiators associated with it. Disassociate the initiators first, and then remove the virtual network.

Parameters

This method has the following input parameters:

Name	Description	Type	Default value	Required
virtualNetworkID	Network ID that identifies the virtual network to remove.	integer	None	Yes
virtualNetworkTag	Network tag that identifies the virtual network to remove.	integer	None	Yes

Return values

This method has no return values.

Request example

Requests for this method are similar to the following example:

```
{
  "method": "RemoveVirtualNetwork",
  "params": {
     "virtualNetworkID": 5
    }
}
```

Response example

This method returns a response similar to the following example:

```
{
   "id": 1,
   "result": {}
}
```

New since version

9.6

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