Subnets (cluster administrators only)

ONTAP 9

NetApp
January 23, 2026

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Subnets (cluster administrators only)

Learn about subnets for the ONTAP network

Subnets enable you to allocate specific blocks, or pools, of IP addresses for your ONTAP network configuration. This enables you to create LIFs more easily by specifying a subnet name instead of having to specify the IP address and network mask values.

A subnet is created within a broadcast domain, and it contains a pool of IP addresses that belong to the same layer 3 subnet. IP addresses in a subnet are allocated to ports in the broadcast domain when LIFs are created. When LIFs are removed, the IP addresses are returned to the subnet pool and are available for future LIFs.

It is recommended that you use subnets because they make the management of IP addresses much easier, and they make the creation of LIFs a simpler process. Additionally, if you specify a gateway when defining a subnet, a default route to that gateway is added automatically to the SVM when a LIF is created using that subnet.

Create subnets for the ONTAP network

You can create a subnet to allocate specific blocks of IPv4 or IPv6 addresses to be used later when you create LIFs for the SVM.

This enables you to create LIFs more easily by specifying a subnet name instead of having to specify IP address and network mask values for each LIF.

Before you begin

You must be a cluster administrator to perform this task.

The broadcast domain and IPspace where you plan to add the subnet must already exist.

About this task

- All subnet names must be unique within an IPspace.
- When adding IP address ranges to a subnet, you must ensure that there are no overlapping IP addresses in the network so that different subnets, or hosts, do not attempt to use the same IP address.
- If you specify a gateway when defining a subnet, a default route to that gateway is added automatically to the SVM when a LIF is created using that subnet. If you do not use subnets, or if you do not specify a gateway when defining a subnet, then you will need to use the `route create` command to add a route to the SVM manually.
- NetApp recommends creating subnet objects for all LIFs on data SVMs. This is especially important for MetroCluster configurations, where the subnet object enables ONTAP to determine failover targets on the destination cluster because each subnet object has an associated broadcast domain.

Steps

You can create a subnet with ONTAP System Manager or the ONTAP CLI.

System Manager

Beginning with ONTAP 9.12.0, you can use System Manager to create a subnet.

Steps

1. Select **Network > Overview > Subnets**.
2. Click + Add to create a subnet.
3. Name the subnet.
4. Specify the subnet IP address.
5. Set the subnet mask.
6. Define the range of IP addresses that comprise the subnet.
7. If useful, specify a gateway.
8. Select the broadcast domain to which the subnet belongs.
9. Save your changes.
   a. If the IP address or range entered is already used by an interface, the following message is displayed:
   `An IP address in this range is already in use by a LIF. Associate the LIF with this subnet?`
   b. When you click **OK**, the existing LIF will be associated with the subnet.

CLI

Use the CLI to create a subnet.

Steps

```
network subnet create -subnet-name subnet_name -broadcast-domain
<broadcast_domain_name> [- ipspace <ipspace_name>] -subnet
<subnet_address> [-gateway <gateway_address>] [-ip-ranges
<ip_address_list>] [-force-update-lif-associations <true>]
```

- `subnet_name` is the name of the layer 3 subnet you want to create.

  The name can be a text string like "Mgmt" or it can be a specific subnet IP value like 192.0.2.0/24.

- `broadcast_domain_name` is the name of the broadcast domain where the subnet will reside.
- `ipspace_name` is the name of the IPspace that the broadcast domain is part of.

  The "Default" IPspace is used unless you specify a value for this option.

- `subnet_address` is the IP address and mask of the subnet; for example, 192.0.2.0/24.
- `gateway_address` is the gateway for the default route of the subnet; for example, 192.0.2.1.
- `ip_address_list` is the list, or range, of IP addresses that will be allocated to the subnet.

  The IP addresses can be individual addresses, a range of IP addresses, or a combination in a comma-separated list.

- The value `true` can be set for the `-force-update-lif-associations` option.

  This command fails if any service processor or network interfaces are currently using the IP addresses in the specified range. Setting this value to true associates any manually addressed interfaces with the current subnet, and allows the command to succeed.

The following command creates subnet sub1 in broadcast domain Default-1 in the Default IPspace. It adds an IPv4 subnet IP address and mask, the gateway, and a range of IP addresses:

```
network subnet create -subnet-name sub1 -broadcast-domain Default-1
-subnet 192.0.2.0/24 - gateway 192.0.2.1 -ip-ranges 192.0.2.1-
192.0.2.100, 192.0.2.122
```

The following command creates subnet sub2 in broadcast domain Default in the "Default" IPspace. It adds a range of IPv6 addresses:

```
network subnet create -subnet-name sub2 -broadcast-domain Default
-subnet 3FFE::/64 - gateway 3FFE::1 -ip-ranges "3FFE::10-3FFE::20"
```

Learn more about `network subnet create` in the ONTAP command reference.

After you finish

You can assign SVMs and interfaces to an IPspace using the addresses in the subnet.

If you need to change the name of an existing subnet, use the `network subnet rename` command.

Learn more about `network subnet rename` in the ONTAP command reference.

Add or remove IP addresses from a subnet for the ONTAP network

You can add IP addresses when initially creating a subnet, or you can add IP addresses to a subnet that already exists. You can also remove IP addresses from an existing subnet. This enables you to allocate only the required IP addresses for SVMs.

The procedure you follow depends on the interface that you use—System Manager or the CLI:

System Manager

Beginning with ONTAP 9.12.0, you can use System Manager to add or remove IP addresses to or from a subnet

Steps

1. Select **Network > Overview > Subnets**.
2. Select ⋮ **> Edit** beside the subnet you want to change.
3. Add or remove IP addresses.
4. Save your changes.
   a. If the IP address or range entered is already used by an interface, the following message is displayed:
   `An IP address in this range is already in use by a LIF. Associate the LIF with this subnet?`
   b. When you click **OK**, the existing LIF will be associated with the subnet.

CLI

Use the CLI to add or remove IP addresses to or from a subnet

About this task

When adding IP addresses, you will receive an error if any service processor or network interfaces are using the IP addresses in the range being added. If you want to associate any manually addressed interfaces with the current subnet, you can set the `-force-update-lif-associations` option to `true`.

When removing IP addresses, you will receive an error if any service processor or network interfaces are using the IP addresses being removed. If you want the interfaces to continue to use the IP addresses after they are removed from the subnet, you can set the `-force-update-lif-associations` option to `true`.

Step

Add or remove IP addresses from a subnet:

If you want to…	Use this command…
Add IP addresses to a subnet	network subnet add-ranges
Remove IP addresses from a subnet	network subnet remove-ranges

The following command adds IP addresses 192.0.2.82 through 192.0.2.85 to subnet sub1:

```
network subnet add-ranges -subnet-name <sub1> -ip-ranges <192.0.2.82-
192.0.2.85>
```

The following command removes IP address 198.51.100.9 from subnet sub3:

```
network subnet remove-ranges -subnet-name <sub3> -ip-ranges
<198.51.100.9>
```

If the current range includes 1 through 10 and 20 through 40, and you want to add 11 through 19 and 41 through 50 (basically allowing 1 through 50), you can overlap the existing range of addresses by using the following command. This command adds only the new addresses and does not affect the existing addresses:

```
network subnet add-ranges -subnet-name <sub3> -ip-ranges <198.51.10.1-
198.51.10.50>
```

Learn more about `network subnet add-ranges` and `network subnet remove-ranges` in the ONTAP command reference.

Change subnet properties for the ONTAP network

You can change the subnet address and mask value, gateway address, or range of IP addresses in an existing subnet.

About this task

- When modifying IP addresses, you must ensure there are no overlapping IP addresses in the network so that different subnets, or hosts, do not attempt to use the same IP address.
- If you add or change the gateway IP address, the modified gateway is applied to new SVMs when a LIF is created in them using the subnet. A default route to the gateway is created for the SVM if the route does not already exist. You may need to manually add a new route to the SVM when you change the gateway IP address.

The procedure you follow depends on the interface that you use—System Manager or the CLI:

System Manager

Beginning with ONTAP 9.12.0, you can use System Manager to change subnet properties

Steps

1. Select **Network > Overview > Subnets**.
2. Select **> Edit** beside the subnet you want to change.
3. Make changes.
4. Save your changes.
   a. If the IP address or range entered is already used by an interface, the following message is displayed:
   `An IP address in this range is already in use by a LIF. Associate the LIF with this subnet?`
   b. When you click **OK**, the existing LIF will be associated with the subnet.

CLI

Use the CLI to change subnet properties

Step

Modify subnet properties:

```
network subnet modify -subnet-name <subnet_name> [-ipspace
<ipspace_name>] [-subnet <subnet_address>] [-gateway <gateway_address>]
[-ip-ranges <ip_address_list>] [-force-update-lif-associations <true>]
```

- `subnet_name` is the name of the subnet you want to modify.
- `ipspace` is the name of the IPspace where the subnet resides.
- `subnet` is the new address and mask of the subnet, if applicable; for example, 192.0.2.0/24.
- `gateway` is the new gateway of the subnet, if applicable; for example, 192.0.2.1. Entering **""** removes the gateway entry.
- `ip_ranges` is the new list, or range, of IP addresses that will be allocated to the subnet, if applicable. The IP addresses can be individual addresses, a range or IP addresses, or a combination in a comma-separated list. The range specified here replaces the existing IP addresses.
- `force-update-lif-associations` is required when you change the IP address range. You can set the value to **true** for this option when modifying the range of IP addresses. This command fails if any service processor or network interfaces are using the IP addresses in the specified range. Setting this value to **true** associates any manually addressed interfaces with the current subnet and allows the command to succeed.

The following command modifies the gateway IP address of subnet sub3:

```
network subnet modify -subnet-name <sub3> -gateway <192.0.3.1>
```

Learn more about `network subnet modify` in the ONTAP command reference.

View subnets for the ONTAP network

You can display the list of IP addresses that are allocated to each subnet within an IPspace. The output also shows the total number of IP addresses that are available in each subnet, and the number of addresses that are currently being used.

The procedure you follow depends on the interface that you use—System Manager or the CLI:

System Manager

Beginning with ONTAP 9.12.0, you can use System Manager to display subnets

Steps

1. Select **Network > Overview > Subnets**.
2. View the list of subnets.

CLI

Use the CLI to display subnets

Step

Display the list of subnets and the associated IP address ranges that are used in those subnets:

```
network subnet show
```

The following command displays the subnets and the subnet properties:

```
network subnet show

IPspace: Default
Subnet                  Broadcast               Avail/
Name   Subnet           Domain    Gateway       Total   Ranges
-----  ---------------  --------- ------------ --------
-----------------------
sub1   192.0.2.0/24      bcast1   192.0.2.1     5/9     192.0.2.92-
192.0.2.100
sub3   198.51.100.0/24  bcast3   198.51.100.1   3/3
198.51.100.7,198.51.100.9
```

Learn more about `network subnet show` in the ONTAP command reference.

Delete subnets from the ONTAP network

If you no longer need a subnet and want to deallocate the IP addresses that were assigned to the subnet, you can delete it.

The procedure you follow depends on the interface that you use—System Manager or the CLI:

System Manager

Beginning with ONTAP 9.12.0, you can use System Manager to delete a subnet

Steps

1. Select **Network > Overview > Subnets**.
2. Select **> Delete** beside the subnet you want to remove.
3. Save your changes.

CLI

Use the CLI to delete a subnet

About this task

You will receive an error if any service processor or network interfaces are currently using IP addresses in the specified ranges. If you want the interfaces to continue to use the IP addresses even after the subnet is deleted, you can set the -force-update-lif-associations option to true to remove the subnet's association with the LIFs.

Step

Delete a subnet:

```
network subnet delete -subnet-name subnet_name [-ipspace ipspace_name] [-
force-update-lif- associations true]
```

The following command deletes subnet sub1 in IPspace ipspace1:

```
network subnet delete -subnet-name sub1 -ipspace ipspace1
```

Learn more about `network subnet delete` in the ONTAP command reference.

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