



# **How to use layer 3 wide-area networks**

## **ONTAP MetroCluster**

NetApp  
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# Considerations for layer 3 wide-area networks

Beginning with ONTAP 9.9.1, MetroCluster IP configurations can be implemented with IP-routed (layer 3) backend connections.

The MetroCluster backend switches are connected to the routed IP network, either directly to routers (as shown in the following simplified example) or through other intervening switches.



NetApp supports only NetApp-validated switches. These switches are tested and sold by NetApp. They are listed in the [NetApp Interoperability Matrix Tool \(IMT\)](#) and in [Cabling the IP switches](#).

The MetroCluster environment is configured and cabled as a standard MetroCluster IP configuration as described in [Configure the MetroCluster hardware components](#). When you perform the installation and cabling procedure, you must perform the steps specific to the layer 3 configuration:

- The MetroCluster switches can be connected directly to the router or to one or more intervening switches. The VLAN must be extended to the gateway device.
- You use the `-gateway` parameter to configure the MetroCluster IP (MCC-IP) interface address with an IP gateway address.

When you configure routers and gateway IP addresses, ensure the following requirements are met:

- On each node, two interfaces cannot have the same gateway IP address.
- The corresponding interfaces on the HA pairs on each site must have the same gateway IP address.
- The corresponding interfaces on a node and its DR and AUX partners cannot have the same gateway IP address.
- The corresponding interfaces on a node and its DR and AUX partners must have the same VLAN ID.

The MetroCluster VLANs must extend from the edge MetroCluster switch to the gateway router so that MetroCluster traffic reaches the gateway (refer to the diagram shown above). The VLAN IDs for the MetroCluster VLANs must be the same at each site. However, the subnets can be different.

You use the RCF files that are created by the RcfFileGenerator tool. The network between the MetroCluster

nodes and the gateway router must provide the same VLAN IDs as set in the RCF file.

## IP-routed network requirements

The IP-routed network must meet the following requirements:

- [Basic MetroCluster ISL requirements](#)
- [ISL requirements in shared layer 2 networks](#)
- [Required settings on intermediate switches](#)
- Dynamic routing is not supported for the MetroCluster traffic.
- Only four-node MetroCluster configurations are supported (two nodes at each site).
- Two subnets are required on each MetroCluster site—one in each network.
- Auto-IP assignment is not supported.

## Modifying address, netmask, and gateway in a MetroCluster IP

Starting from ONTAP 9.10.1, you can change the following properties of a MetroCluster IP interface: IP address and mask, and gateway. You can use any combination of parameters to update.

You might need to update these properties, for example, if a duplicate IP address is detected or if a gateway needs to change in the case of a layer 3 network due to router configuration changes.

You can only change one interface at a time. There will be traffic disruption on that interface until the other interfaces are updated and connections are reestablished.

Use the `metrocluster configuration-settings interface modify` command to change any MetroCluster IP interface property.



These commands change the configuration on a particular node for a particular port. To restore complete network connectivity, similar commands are needed on other ports. Similarly, network switches also need to update their configuration. For example, if the gateway is updated, ideally it is changed on both nodes of an HA pair, since they are same. Plus the switch connected to those nodes also needs to update its gateway.

Use the `metrocluster configuration-settings interface show`, `metrocluster connection check` and `metrocluster connection show` commands to verify that all connectivity is working in all interfaces.

### Modify the IP address, netmask, and gateway

1. Update the IP address, netmask, and gateway for a single node and interface: `metrocluster configuration-settings interface modify`

The following command shows how to update the IP address, netmask and gateway:

```
cluster_A::* metrocluster configuration-settings interface modify -cluster
-name cluster_A -home-node node_A_1 -home-port e0a-10 -address
192.168.12.101 -gateway 192.168.12.1 -netmask 255.255.254.0
(metrocluster configuration-settings interface modify)
```

Warning: This operation will disconnect and reconnect iSCSI and RDMA connections used for DR protection through port "e0a-10". Partner nodes may need modifications for port "e0a-10" in order to completely establish network connectivity.

Do you want to continue?" yes

```
[Job 28] Setting up iSCSI target configuration. (pass2:iscsil3:0:-1:0):
xpt_action_default: CCB type 0xe XPT_DEV_ADVINFO not supported
[Job 28] Establishing iSCSI initiator connections.
(pass6:iscsil4:0:-1:0): xpt_action_default: CCB type 0xe XPT_DEV_ADVINFO
not supported
(pass8:iscsil5:0:-1:0): xpt_action_default: CCB type 0xe XPT_DEV_ADVINFO
not supported
(pass9:iscsil6:0:-1:0): xpt_action_default: CCB type 0xe XPT_DEV_ADVINFO
not supported
[Job 28] Job succeeded: Interface Modify is successful.
```

```
cluster_A::~*> metrocluster configuration-settings interface modify
-cluster-name cluster_A -home-node node_A_2 -home-port e0a-10 -address
192.168.12.201 -gateway 192.168.12.1 -netmask 255.255.254.0
(metrocluster configuration-settings interface modify)
Warning: This operation will disconnect and reconnect iSCSI and RDMA
connections used for DR protection through port "e0a-10". Partner nodes
may need modifications for port "e0a-10" in order to completely establish
network connectivity.
Do you want to continue?" yes
[Job 28] Job succeeded: Interface Modify is successful
```

2. Verify that all connectivity is working for all interfaces: metrocluster configuration-settings interface show

The following command shows how to verify that all connectivity is working for all interfaces:

```

cluster_A::*> metrocluster configuration-settings interface show
(metrocluster configuration-settings interface show)
DR          Config
Group Cluster Node    Network Address Netmask          Gateway
State
-----
1      cluster_A node_A_2
      Home Port: e0a-10
      192.168.12.201  255.255.254.0  192.168.12.1
completed
      Home Port: e0b-20
      192.168.20.200  255.255.255.0  192.168.20.1
completed
      node_A_1
      Home Port: e0a-10
      192.168.12.101  255.255.254.0  192.168.12.1
completed
      Home Port: e0b-20
      192.168.20.101  255.255.255.0  192.168.20.1
completed
      cluster_B node_B_1
      Home Port: e0a-10
      192.168.11.151  255.255.255.0  192.168.11.1
completed
      Home Port: e0b-20
      192.168.21.150  255.255.255.0  192.168.21.1
completed
      node_B_2
      Home Port: e0a-10
      192.168.11.250  255.255.255.0  192.168.11.1
completed
      Home Port: e0b-20
      192.168.21.250  255.255.255.0  192.168.21.1
completed
8 entries were displayed.

```

3. Verify that all connections are working: metrocluster configuration-settings connection show

The following command shows how to verify that all connections are working:

```

cluster_A::*> metrocluster configuration-settings connection show
(metrocluster configuration-settings connection show)
DR                               Source                               Destination
Group Cluster Node   Network Address Network Address Partner Type Config
State
-----
1      cluster_A node_A_2
      Home Port: e0a-10
      192.168.10.200  192.168.10.101  HA Partner
completed
      Home Port: e0a-10
      192.168.10.200  192.168.11.250  DR Partner
completed
      Home Port: e0a-10
      192.168.10.200  192.168.11.151  DR Auxiliary
completed
      Home Port: e0b-20
      192.168.20.200  192.168.20.100  HA Partner
completed
      Home Port: e0b-20
      192.168.20.200  192.168.21.250  DR Partner
completed
      Home Port: e0b-20
      192.168.20.200  192.168.21.150  DR Auxiliary
completed
      node_A_1
      Home Port: e0a-10
      192.168.10.101  192.168.10.200  HA Partner
completed
      Home Port: e0a-10
      192.168.10.101  192.168.11.151  DR Partner
completed
      Home Port: e0a-10
      192.168.10.101  192.168.11.250  DR Auxiliary
completed
      Home Port: e0b-20
      192.168.20.100  192.168.20.200  HA Partner
completed
      Home Port: e0b-20
      192.168.20.100  192.168.21.150  DR Partner
completed
      Home Port: e0b-20
      192.168.20.100  192.168.21.250  DR Auxiliary
completed

```

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