Cluster and SVM Peering Express Guide
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Deciding whether to use the Cluster and SVM Peering Express Guide

This guide describes how cluster administrators create authenticated peer relationships between clusters and SVMs to enable the clusters to communicate with each other so that you can replicate data between volumes in different clusters.

OnCommand System Manager in ONTAP 9.3 simplifies the way that you configure peer relationships between clusters and between SVMs. This guide describes the cluster peering procedure and SVM peering procedure for all ONTAP 9 versions. You should use the appropriate procedure for your version of ONTAP.

You should use this guide if you want to create cluster peer relationships and SVM peer relationships in the following way:

• You are working with clusters running ONTAP 9.
• You want cluster peering relationships that are authenticated.
• You want to use best practices, not explore every available option.
• You do not want to read a lot of conceptual background.
• You want to use OnCommand System Manager, not the ONTAP command-line interface or an automated scripting tool.

If these assumptions are not correct for your situation, you should see the following resources:

• **Cluster and SVM peering**
  Describes how to use the command-line interface to set up cluster peering relationships and SVM peering relationships.

• **Network and LIF management**
  Describes how to use the command-line interface to configure subnets, intercluster LIFs, routes, firewall policies, and other networking components.

• **NetApp Documentation: OnCommand Workflow Automation (current releases)**
  OnCommand Workflow Automation enables you to run prepackaged workflows that automate management tasks such as the workflows described in Express Guides.

**Related information**

*Cluster management using System Manager*
Prerequisites for cluster peering

Before you set up cluster peering, you should confirm that the connectivity, port, IP address, subnet, firewall, and cluster-naming requirements are met.

Connectivity requirements

Intercluster LIFs must have *pair-wise full-mesh connectivity*: Every intercluster LIF on the local cluster must be able to communicate with every intercluster LIF on the remote cluster. Although it is not required, it is typically simpler to configure the IP addresses used for intercluster LIFs in the same subnet. The IP addresses can reside in the same subnet as data LIFs, or in a different subnet. The subnet used in each cluster must meet the following requirements:

- The subnet must have enough IP addresses available to allocate to one intercluster LIF per node. For example, in a six-node cluster, the subnet used for intercluster communication must have six available IP addresses.

Each node must have an intercluster LIF with an IP address on the intercluster network.

Intercluster LIFs can have an IPv4 address or an IPv6 address.

Port requirements

You can use dedicated ports for intercluster communication, or share ports used by the data network. Ports must meet the following requirements:

- All ports that are used to communicate with a given remote cluster must be in the same IPspace. You can use multiple IPspaces to peer with multiple clusters. Pair-wise full-mesh connectivity is required only within an IPspace.
- The broadcast domain that is used for intercluster communication must include at least two ports per node so that intercluster communication can fail over from one port to another port. Ports added to a broadcast domain can be physical network ports, VLANs, or interface groups (ifgrps).
- All ports must be cabled.
- All ports must be in a healthy state.
- The MTU settings of the ports must be consistent.

Firewall requirements

Firewalls and the intercluster firewall policy must allow the following protocols:

- ICMP service
- TCP to the IP addresses of all the intercluster LIFs over the ports 10000, 11104, and 11105
- HTTPS
  Although HTTPS is not required when you set up cluster peering using the CLI, HTTPS is required later if you use OnCommand System Manager to configure data protection.

The default *intercluster* firewall policy allows access through the HTTPS protocol and from all IP addresses (0.0.0.0/0). You can modify or replace the policy if necessary.

Cluster requirements

Clusters must meet the following requirements:

- The time on the clusters in a cluster peering relationship must be synchronized within 300 seconds (5 minutes). Cluster peers can be in different time zones.
Related information

Data protection
Cluster and SVM peering workflow

Setting up a peering relationship involves preparing each cluster for peering, creating intercluster logical interfaces (LIFs) on each node of each cluster, setting up a cluster peer relationship, and then setting up an SVM peering relationship.

Preparing for cluster peering

Before creating a cluster peering relationship, you must verify that the time on each cluster is synchronized with an external Network Time Protocol (NTP) server, and determine the subnets, ports, and passphrases that you want to use.

Steps

1. If you are running ONTAP 9.2 or earlier, determine the passphrase that you want to use for each cluster peer relationship.

   The passphrase must include at least eight characters and cannot contain spaces. You must use a unique passphrase for each relationship.

<table>
<thead>
<tr>
<th>For the relationship between...</th>
<th>The passphrase is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster A and Cluster B</td>
<td></td>
</tr>
</tbody>
</table>

   Starting with ONTAP 9.3, you can generate the passphrase from the remote cluster while creating the cluster peer relationship. A system-generated passphrase is more secure than a user-defined passphrase.

   Creating a cluster peer relationship (starting with ONTAP 9.3)

2. On each cluster, verify that the time is synchronized to an external NTP server to ensure that the time on all of the peered clusters is within five minutes of each other:

   a. Navigate to the cluster settings page, and click Date and Time.
b. Verify that the **Time servers** field contains at least one IP address of an external NTP server.

![NTP Service](image)

- **Time servers**: Enabled
- 10.56.32.32


c. If the **Time servers** field is blank, click **Edit**, and then add the IP address of an NTP server.

3. Identify the subnets, IP addresses, and ports that you will use for intercluster LIFs.

By default, the IP address is automatically selected from the subnet. If you want to specify the IP address manually, you must ensure that the IP address either is already available in the subnet or can be added to the subnet later. Information about subnets is available in the Network tab.

The following table assumes that each cluster has four nodes. If a cluster has more than four nodes, you can record the ports on another piece of paper.

<table>
<thead>
<tr>
<th>Cluster A</th>
<th>Cluster B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet (ONTAP 9.2 or earlier)</td>
<td></td>
</tr>
<tr>
<td>IP address (starting with ONTAP 9.3, optional for ONTAP 9.2 or earlier)</td>
<td></td>
</tr>
<tr>
<td>Node 1 port</td>
<td></td>
</tr>
<tr>
<td>Node 2 port</td>
<td></td>
</tr>
<tr>
<td>Node 3 port</td>
<td></td>
</tr>
<tr>
<td>Node 4 port</td>
<td></td>
</tr>
</tbody>
</table>

### Configuring peer relationships (starting with ONTAP 9.3)

A peer relationship defines the network connections that enable clusters and SVMs to exchange data securely. ONTAP 9.3 simplifies the way that you configure peer relationships between clusters and between SVMs.

#### Creating intercluster LIFs (starting with ONTAP 9.3)

Creating intercluster logical interfaces (LIFs) enables the cluster network to communicate with a node. You must create an intercluster LIF on each node in each cluster for which you want to create a peer relationship.

**About this task**

You must perform this procedure on both clusters for which you want to create a peer relationship.

**Steps**

1. Click **Configuration > Advanced Cluster Setup**.
2. In the **Setup Advanced Cluster Features** window, click **Proceed** next to the **Cluster Peering** option.
3. Select an IPspace from the **IPspace** list.
4. Enter the IP address, port, network mask, and gateway details of each node.
5. Click Submit and Continue.

After you finish
You should enter the cluster details in the Cluster Peering window to continue with cluster peering.

Creating a cluster peer relationship (starting with ONTAP 9.3)
You can create a cluster peer relationship between two clusters by providing a system-generated passphrase and the IP addresses of the intercluster LIFs of the remote cluster.

Steps
1. In the **Target Cluster Intercluster LIF IP addresses** field, enter the IP addresses of the intercluster LIFs of the remote cluster.
2. Generate a passphrase from the remote cluster.
   a. Specify the management address of the remote cluster.
   b. Click **Management URL** to launch OnCommand System Manager on the remote cluster.
   c. Log in to the remote cluster.
   d. In the **Cluster Peers** window, click **Generate Peering Passphrase**.
   e. Select the IPspace, validity of the passphrase, and SVM permissions.
      You can allow all of the SVMs or selected SVMs for peering. When a SVM peer request is generated, the permitted SVMs are automatically peered with the source SVMs without requiring you to accept the peer relationship from the remote SVMs.
   f. Click **Generate**.
      The passphrase information is displayed.
3. In the source cluster, enter the generated passphrase that you obtained in Step 2.

4. Click **Initiate Cluster Peering**.
   The cluster peer relationship is successfully created.

5. Click **Continue**.

**After you finish**
You should specify the SVM details in the SVM Peering window to continue with the peering process.

**Creating SVM peer relationship**

storage virtual machine (SVM) peering enables you to establish a peer relationship between two SVMs for data protection.

**Steps**
1. Select the initiator SVM.
2. Select the target SVM from the list of permitted SVMs.
3. Click Initiate SVM Peering.
4. Click Continue.

After you finish
You can view the intercluster LIFs, cluster peer relationship, and SVM peer relationship in the Summary window.

Configuring peer relationships (ONTAP 9.2 and earlier)
A peer relationship defines network connections that enable clusters and SVMs to exchange data securely. You must create a cluster peer relationship before you can create an SVM peer relationship.

Creating intercluster interfaces on all nodes (ONTAP 9.2 or earlier)
Clusters communicate with each other through logical interfaces (LIFs) that are dedicated to intercluster communication. You must create an intercluster LIF on each node in each cluster that you want to peer.

Before you begin
You must have identified the subnet and ports, and optionally the IP addresses, that you plan to use for the intercluster LIFs.

About this task
You must perform this procedure on both clusters for which you want to create a peer relationship.

Steps
1. Create an intercluster LIF on one node of the source cluster:
   a. Navigate to the Network Interfaces window.
   b. Click Create.
      The Create Network Interface dialog box is displayed.
   c. Enter a name for the intercluster LIF.
      Example
      You can use “icl01” for the intercluster LIF on the first node, and “icl02” for the intercluster LIF on the second node.
   d. Select Intercluster Connectivity as the interface role.
   e. Select the IPspace.
   f. In the Add Details dialog box, select Using a subnet from the Assign IP Address drop-down list, and then select the subnet that you want to use for intercluster communication.
      By default, the IP address is automatically selected from the subnet after you click Create. If you do not want to use the IP address that is automatically selected, you must manually specify the IP address that the node uses for intercluster communication.
   g. Optional: If you want to manually specify the IP address that the node uses for intercluster communication, select Use this IP Address, and type the IP address.
You must ensure that the IP address that you want to use either is already available in the subnet or can be added to the subnet later.

h. In the Ports area, click the node that you are configuring, and select the port that you want to use for this node.

i. If you decided not to share ports for intercluster communication with data communication, confirm that the selected port displays “0” in the Hosted Interface Count column.

j. Click Create.

2. Repeat Step 1 for each node in the cluster.

Each node in the cluster has an intercluster LIF.

3. Make a note of the IP addresses of the intercluster LIFs so that you can use them later when you create peer relationships with other clusters:

   a. In the Network Interfaces window, in the Role column, click ☑️, clear the All check box, and then select Intercluster.

      The Network Interfaces window displays only intercluster LIFs.

   b. Note down the IP addresses that are listed in the IP Addresses/WWPN column, or leave the Network Interfaces window open so that you can retrieve the IP addresses later.

      You can click the column display icon (⋮) to hide the columns that you do not want to view.

Result

All of the nodes in each cluster have intercluster LIFs that can all communicate with each other.
Creating a cluster peer relationship (ONTAP 9.2 or earlier)

You can create a cluster peer relationship between two clusters by entering a predetermined passphrase and the IP addresses of the intercluster LIFs of the remote cluster, and then verifying that the relationship was created successfully.

Before you begin

- You must know the IP addresses of all of the intercluster LIFs of the clusters that you want to peer.
- You must know the passphrase that you will use for each peer relationship.

About this task

You must perform this procedure on each cluster.

Steps

1. From the source cluster, create a cluster peer relationship with the destination cluster.
   a. Click the Configurations tab.
   b. In the Cluster Settings pane, click Cluster Peers.
   c. Click Create.
      The Create Cluster Peer dialog box is displayed.
   d. In the Details of the remote cluster to be peered area, specify the passphrase that both peers will use to ensure an authenticated cluster peer relationship.
   e. Enter the IP addresses of all of the intercluster LIFs of the destination cluster (one per node) separated by commas.
      
      f. Click Create.
         The authentication status is pending because only one cluster has been configured.

2. Switch to the destination cluster, and then create a cluster peer relationship with the source cluster:
   a. Click the Configurations tab.
   b. In the Cluster Settings pane, click Cluster Peers.
   c. Click Create.
      The Create Cluster Peer dialog box is displayed.
d. In the **Details of the remote cluster to be peered** area, specify the same passphrase that you specified in step 1 and the IP addresses of the intercluster LIFs of the source cluster, and then click **Create**.

3. From the **Cluster Peers** window of the destination cluster, confirm that the source cluster is **available** and that the authentication status is **ok**.

   ![Cluster Peers window](image)

   You might have to click **Refresh** to view the updated information.

   The two clusters are in a peer relationship.

4. Switch to the source cluster, and confirm that the destination cluster is **available** and that the authentication status is **ok**.

   You might have to click **Refresh** to view the updated information.

**After you finish**

Create an SVM peer relationship between the source and destination SVMs while creating a data protection relationship between the source volume and the destination volume.

*Volume express backup using SnapVault*

*Volume disaster recovery express preparation*
Where to find additional information

After you successfully create a cluster peering relationship, you are ready to protect the availability of your data. There are express guides to help you configure data protection, as well as additional guides to do advanced configuration of cluster peering.

Express guides
You can protect your data by using the following express guides:

• Volume disaster recovery express preparation
  Describes how to quickly configure and monitor the SnapMirror relationships between volumes in different clusters.

• Volume express backup using SnapVault
  Describes how to quickly configure an intercluster SnapVault relationship.

Other guides
More information is available in the following guides:

• Data protection
  Describes how to prevent data loss using Snapshot copies and SnapMirror replication to a remote system

  Describes information and best practices about configuring replication, including cluster peering.

• ONTAP concepts
  Provides conceptual information about cluster peering.
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