Manage iSCSI protocol

ONTAP 9

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Table of Contents

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Configure your network for best performance

Ethernet networks vary greatly in performance. You can maximize the performance of the network used for iSCSI by selecting specific configuration values.

Steps

1. Connect the host and storage ports to the same network.

   It is best to connect to the same switches. Routing should never be used.

2. Select the highest speed ports available, and dedicate them to iSCSI.

   10 GbE ports are best. 1 GbE ports are the minimum.

3. Disable Ethernet flow control for all ports.

   You should see Network management for using the CLI to configure Ethernet port flow control.

4. Enable jumbo frames (typically MTU of 9000).

   All devices in the data path, including initiators, targets, and switches, must support jumbo frames. Otherwise, enabling jumbo frames actually reduces network performance substantially.

Configure an SVM for iSCSI

To configure a storage virtual machine (SVM) for iSCSI, you must create LIFs for the SVM and assign the iSCSI protocol to those LIFs.

About this task

You need a minimum of one iSCSI LIF per node for each SVM serving data with the iSCSI protocol. For redundancy, you should create at least two LIFs per node.

Example 1. Steps

System Manager

Configure an storage VM for iSCSI with ONTAP System Manager (9.7 and later).

To configure iSCSI on a new storage VM	To configure iSCSI on an existing storage VM
1. In System Manager, click **Storage > Storage VMs** and then click **Add**. 2. Enter a name for the storage VM. 3. Select **iSCSI** for the **Access Protocol**. 4. Click **Enable iSCSI** and enter the IP address and subnet mask for the network interface. + Each node should have at least two network interfaces. 5. Click **Save**.	1. In System Manager, click **Storage > Storage VMs**. 2. Click on the storage VM you want to configure. 3. Click on the **Settings** tab, and then click ⚙ next to the iSCSI protocol. 4. Click **Enable iSCSI** and enter the IP address and subnet mask for the network interface. + Each node should have at least two network interfaces. 5. Click **Save**.

CLI

Configure an storage VM for iSCSI with the ONTAP CLI.

1. Enable the SVMs to listen for iSCSI traffic:

   ```
   vserver iscsi create -vserver vserver_name -target-alias vserver_name
   ```

2. Create a LIF for the SVMs on each node to use for iSCSI:

   ```
   network interface create -vserver vserver_name -lif lif_name -role data
   -data-protocol iscsi -home-node node_name -home-port port_name -address
   ip_address -netmask netmask
   ```

3. Verify that you set up your LIFs correctly:

   ```
   network interface show -vserver vserver_name
   ```

4. Verify that iSCSI is up and running and the target IQN for that SVM:

   ```
   vserver iscsi show -vserver vserver_name
   ```

5. From your host, create iSCSI sessions to your LIFs.

Related information

NetApp Technical Report 4080: Best practices for modern SAN

Define a security policy method for an initiator

You can define a list of initiators and their authentication methods. You can also modify the default authentication method that applies to initiators that do not have a user-defined

authentication method.

About this task

You can generate unique passwords using security policy algorithms in the product or you can manually specify the passwords that you want to use.

Not all initiators support hexadecimal CHAP secret passwords.

Steps

1. Use the `vserver iscsi security create` command to create a security policy method for an initiator.

   ```
   vserver iscsi security create -vserver vs2 -initiator iqn.1991-
   05.com.microsoft:host1 -auth-type CHAP -user-name bob1 -outbound-user-name
   bob2
   ```

2. Follow the screen commands to add the passwords.

   Creates a security policy method for initiator iqn.1991-05.com.microsoft:host1 with inbound and outbound CHAP user names and passwords.

Related information

- How iSCSI authentication works
- Guidelines for using CHAP authentication
- What CHAP authentication is

Delete an iSCSI service for an SVM

You can delete an iSCSI service for a storage virtual machine (SVM) if it is no longer required.

What you'll need

The administration status of the iSCSI service must be in the "down" state before you can delete an iSCSI service. You can move the administration status to down with the `vserver iscsi modify` command.

Steps

1. Use the `vserver iscsi modify` command to stop the I/O to the LUN.

   ```
   vserver iscsi modify -vserver vs1 -status-admin down
   ```

2. Use the `vserver iscsi delete` command to remove the iscsi service from the SVM.

   ```
   vserver iscsi delete -vserver vs_1
   ```

3. Use the `vserver iscsi show command` to verify that you deleted the iSCSI service from the SVM.

   ```
   vserver iscsi show -vserver vs1
   ```

Get more details in iSCSI session error recoveries

Increasing the iSCSI session error recovery level enables you to receive more detailed information about iSCSI error recoveries. Using a higher error recovery level might cause a minor reduction in iSCSI session performance.

About this task

By default, ONTAP is configured to use error recovery level 0 for iSCSI sessions. If you are using an initiator that has been qualified for error recovery level 1 or 2, you can choose to increase the error recovery level. The modified session error recovery level affects only the newly created sessions and does not affect existing sessions.

Beginning with ONTAP 9.4, the `max-error-recovery-level` option is not supported in the `iscsi show` and `iscsi modify` commands.

Steps

1. Enter advanced mode:

   ```
   set -privilege advanced
   ```

2. Verify the current setting by using the `iscsi show` command.

   ```
   iscsi show -vserver vs3 -fields max-error-recovery-level
   ```

   ```
   vserver max-error-recovery-level
   ------- ------------------------
   vs3     0
   ```

3. Change the error recovery level by using the `iscsi modify` command.

   ```
   iscsi modify -vserver vs3 -max-error-recovery-level 2
   ```

Register the SVM with an iSNS server

You can use the `vserver iscsi isns` command to configure the storage virtual machine (SVM) to register with an iSNS server.

About this task

The `vserver iscsi isns create` command configures the SVM to register with the iSNS server. The SVM does not provide commands that enable you to configure or manage the iSNS server. To manage the iSNS server, you can use the server administration tools or the interface provided by the vendor for the iSNS server.

Steps

1. On your iSNS server, ensure that your iSNS service is up and available for service.
2. Create the SVM management LIF on a data port:

```
network interface create -vserver SVM_name -lif lif_name -role data -data
-protocol none -home-node home_node_name -home-port home_port -address
IP_address -netmask network_mask
```

3. Create an iSCSI service on your SVM if one does not already exist:

   ```
   vserver iscsi create -vserver SVM_name
   ```

4. Verify that the iSCSI service was created successfully:

   ```
   iscsi show -vserver SVM_name
   ```

5. Verify that a default route exists for the SVM:

   ```
   network route show -vserver SVM_name
   ```

6. If a default route does not exist for the SVM, create a default route:

   ```
   network route create -vserver SVM_name -destination destination -gateway
   gateway
   ```

7. Configure the SVM to register with the iSNS service:

   ```
   vserver iscsi isns create -vserver SVM_name -address IP_address
   ```

   Both IPv4 and IPv6 address families are supported. The address family of the iSNS server must be the same as that of the SVM management LIF.

   For example, you cannot connect anSVM management LIF with an IPv4 address to an iSNS server with an IPv6 address.

8. Verify that the iSNS service is running:

   ```
   vserver iscsi isns show -vserver SVM_name
   ```

9. If the iSNS service is not running, start it:

   ```
   vserver iscsi isns start -vserver SVM_name
   ```

Resolve iSCSI error messages on the storage system

There are a number of common iSCSI-related error messages that you can view with the `event log show` command. You need to know what these messages mean and what you can do to resolve the issues they identify.

The following table contains the most common error messages, and instructions for resolving them:

Message	Explanation	What to do
`ISCSI: network interface identifier disabled for use; incoming connection discarded`	The iSCSI service is not enabled on the interface.	You can use the `iscsi interface enable` command to enable the iSCSI service on the interface. For example: `iscsi interface enable -vserver vs1 -lif lif1`
`ISCSI: Authentication failed for initiator nodename`	CHAP is not configured correctly for the specified initiator.	You should check the CHAP settings; you cannot use the same user name and password for inbound and outbound settings on the storage system: • Inbound credentials on the storage system must match outbound credentials on the initiator. • Outbound credentials on the storage system must match inbound credentials on the initiator.

iSCSI LIF failover for ASA platforms

Beginning with ONTAP 9.11.1 on All SAN Array (ASA) platforms, the iSCSI LIF failover feature supports automatic and manual migration of iSCSI LIFs in an SFO partner failover (when an iSCSI LIF moves from its home node/port to its HA partner node/port and back again) and in a local failover (when an iSCSI LIF moves from its unhealthy port to a healthy port on its current home node and back again). This feature provides faster I/O resumption for SAN workloads running on ISCSI.

About enabling iSCSI LIF failover

You should familiarize yourself with aspects of when iSCSI LIF failover is automatically enabled and when you must manually enable it, including how newly created iSCSI LIFs and existing iSCSI LIFs are affected.

- The automatic migration of an iSCSI LIF is a LIF failover and auto-revert, which is triggered in certain events, such as planned or unplanned failover, a physical ethernet link down, or a node dropping out of replicated database (RDB) quorum.
  - After upgrading your ASA HA pair to ONTAP 9.11.1, this feature is automatically enabled on newly created iSCSI LIFs if no iSCSI LIFs exist in the specified storage VM or if all existing iSCSI LIFs in the specified storage VM are already enabled with iSCSI LIF failover.
  - For iSCSI LIFs created prior to upgrading to ONTAP 9.11.1, to use the iSCSI LIF failover feature, you must enable it using the ONTAP CLI. (Enabling the failover feature and auto-revert capability means changing the failover policy to `sfo-partner-only` and designating the auto-revert value to `true`.)

Manage iSCSI LIFs using the ONTAP CLI

If you do not enable iSCSI LIF failover on the existing iSCSI LIFs, when there is a failover event, the iSCSI LIFs will not failover.

Additionally, if after upgrading to ONTAP 9.11.1 or later you have existing iSCSI LIFs in a storage VM that have not been enabled with the iSCSI LIF failover feature and you create new iSCSI LIFs in the same storage VM, the new iSCSI LIFs assume the same failover policy (`disabled`) of the existing iSCSI LIFs in the storage VM.

- The manual migration of an iSCSI LIF is a LIF migrate and revert, which is initiated by the cluster admin using the ONTAP CLI or System Manager.

  Migrate and revert an iSCSI LIF

  You manually migrate and revert an iSCSI LIF under the following circumstances:

  - When scheduled maintenance or replacement is needed.
  - When you have a pre-existing iSCSI LIF, meaning that the iSCSI LIF was created before you upgraded your HA pair to ONTAP 9.11.1 or later, and you have not enabled the iSCSI LIF failover feature on the LIF.

How iSCSI LIF failover works

For LIFs with iSCSI LIF failover enabled (either automatically or manually), the following applies.

- For LIFs using the `data-iscsi` service policy, the failover-policy is restricted to `sfo-partner-only`, `local-only`, and `disabled`.
- iSCSI LIFs can failover only to the HA partner when their failover policy is set to `sfo-partner-only`.
- Auto-revert of LIFs happens when the auto-revert is set to `true` and when the LIF's home port is healthy and able to host the LIF.
- On a planned or unplanned node takeover, the iSCSI LIF on the node which is taken-over fails over to the HA partner. The port on which the LIF fails over is determined by VIF Manager.
- Once the failover is complete, the iSCSI LIF operates normally.
- When a giveback is initiated, the iSCSI LIF reverts back to its home node and port, if auto-revert is set to `true`.
- When an ethernet link goes down on a port hosting one or more iSCSI LIFs, VIF Manager migrates the LIFs from the down port to a different port in the same broadcast domain. The new port could be in the same node or its HA partner. Once the link is restored and if auto-revert is set to `true`, VIF Manager reverts the iSCSI LIFs back to their home node and home port.
- When a node drops out of replicated database (RDB) quorum, VIF Manager migrates the iSCSI LIFs from the out of quorum node to its HA partner. Once the node comes back into quorum and if auto-revert is set to `true`, VIF Manager reverts the iSCSI LIFs back to their home node and home port.

Migrate and revert an iSCSI LIF

You can use System Manager or the ONTAP CLI to manually migrate an iSCSI LIF to a different port on the same node or to a different port on the HA partner, and then revert the LIF back to its home node and home port.

Migrate and revert an iSCSI LIF using System Manager

You can use System Manager to manually migrate and revert one or more iSCSI LIFs (network interfaces) to another port on the same node or to a port on the HA partner.

Before you begin

You must have an ASA platform HA pair and it must be running ONTAP 9.11.1 or later.

Migrate a LIF

Steps

1. In System Manager, click **Network > Overview > Network Interfaces**
2. Select the LIF you want to migrate, click ⋮, and then click **Migrate**.
3. In the **Migrate Interface** dialog box, select the destination node and port of the HA partner.

> ⓘ You have the option of permanently migrating the iSCSI LIF by checking the checkbox. Understand that the iSCSI LIF must be offline before it is permanently migrated. Additionally, once an iSCSI LIF is permanently migrated, it cannot be undone. There is no revert option.

4. Click **Migrate**.

Revert a LIF

Steps

1. In System Manager, click **Network > Overview > Network Interfaces**.
2. Select the LIF you want to revert, click ⋮ and then click **Revert Network Interface**.
3. In the **Revert Network Interface** dialog box, click **Revert**.

Migrate and revert an iSCSI LIF using the ONTAP CLI

You can use the ONTAP CLI to manually migrate and revert one or more iSCSI LIFs to another port on the same node or to a port on the HA partner.

Before you begin

You must have an ASA platform HA pair and it must be running ONTAP 9.11.1 or later.

If you want to…	Use this command…
Migrate an iSCSI LIF to another node/port	See Migrate a LIF for the available commands.
Revert an iSCSI LIF back to its home node/port	See Revert a LIF to its home port for the available commands.

Manage iSCSI LIFs using the ONTAP CLI

You can use the ONTAP CLI to manage iSCSI LIFs, including creating new iSCSI LIFs and enabling the iSCSI LIF failover feature for pre-existing LIFs.

Before you Begin

You must have an ASA platform HA pair and it must be running ONTAP 9.11.1 or later.

About this task

See the ONTAP 9.11.1 Command Reference for a full list of `network interface` commands.

If you want to…	Use this command…
Create an iSCSI LIF	`network interface create -vserver` *`vserver_name`* `-lif` *`iscsi_lif`* `-service -policy default-data-blocks -data -protocol iscsi -home-node` *`node_name`* `-home-port` *`port_name`* `-address` *`IP_address`* `-netmask` *`netmask_value`* If needed, see Create a LIF for more information.
Verify that the LIF was created successfully	`network interface show -vserver` *`vserver_name`* `-fields failover-policy,failover-group,auto-revert,is-home`
Verify if you can override the auto-revert default on iSCSI LIFs	`network interface modify -vserver` *`vserver_name`* `-lif` *`iscsi_lif`* `-auto-revert false`
Perform a storage failover on an iSCSI LIF	`storage failover takeover -ofnode` *`node_name`* `-option normal` You receive a warning: `A takeover will be initiated. Once the partner node reboots, a giveback will be automatically initiated. Do you want to continue? {y/n}:` A `y` response displays a takeover message from its HA partner.
Enable iSCSI LIF failover feature for pre-existing LIFs	For iSCSI LIFs created before you upgraded your cluster to ONTAP 9.11.1 or later, you can enable the iSCSI LIF failover feature (by modifying the failover policy to `sfo-partner-only` and by modifying the auto-revert capability to `true`): `network interface modify -vserver` *`vserver_name`* `-lif` *`iscsi_lif`* `-failover-policy sfo-partner-only -auto-revert true` This command can be run on all the iSCSI LIFs in a Storage VM by specifying “-lif*” and keeping all other parameters the same.

Disable iSCSI LIF failover feature for pre-existing LIFs	For iSCSI LIFs created before you upgraded your cluster to ONTAP 9.11.1 or later, you can disable the iSCSI LIF failover feature and the auto-revert capability: `network interface modify -vserver` *`vserver_name`* `-lif` *`iscsi_lif`* `–failover-policy disabled -auto-revert false` This command can be run on all the iSCSI LIFs in a storage VM by specifying “-lif*” and keeping all other parameters the same.

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