



Controllers

SANtricity 11.6

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Controllers

Concepts

Controller terminology

Learn how the controller terms apply to your storage array.

Component	Description
Controller	A controller consists of a board, firmware, and software. It controls the drives and implements the System Manager functions.
Controller shelf	A controller shelf contains a set of drives and one or more controller canisters. A controller canister holds the controllers, host interface cards (HICs), and batteries.
DHCP	Dynamic Host Configuration Protocol (DHCP) is a protocol used on Internet Protocol (IP) networks for dynamically distributing network configuration parameters, such as IP addresses.
DNS	Domain Name System (DNS) is a naming system for devices connected to the Internet or a private network. The DNS server maintains a directory of domain names and translates them to Internet Protocol (IP) addresses.
Duplex configurations	Duplex is a two-controller module configuration within the storage array. Duplex systems are fully redundant with respect to controllers, logical volume paths, and disk paths. If one controller fails, the other controller takes over its I/O to maintain availability. Duplex systems also have redundant fans and power supplies.
Full-duplex / half-duplex connections	Full-duplex and half-duplex refer to connection modes. In full-duplex mode, two devices can communicate simultaneously in both directions. In half-duplex mode, devices can communicate in one direction at a time (one device sends a message, while the other device receives it).
HIC	A host interface card (HIC) can optionally be installed within a controller canister. Host ports that are built into the controller are called baseboard host ports. Host ports that are built into the HIC are called HIC ports.
ICMP PING response	Internet Control Message Protocol (ICMP) is a protocol used by operating systems of networked computers to send messages. ICMP messages determine whether a host is reachable and how long it takes to get packets to and from that host.
MAC address	Media access control identifiers (MAC addresses) are used by Ethernet to distinguish between separate logical channels connecting two ports on the same physical transport network interface.

Component	Description
management client	A management client is the computer where a browser is installed for accessing System Manager.
MTU	A Maximum Transmission Unit (MTU) is the largest size packet or frame that can be sent in a network.
NTP	Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems in data networks.
Simplex configurations	Simplex is a single-controller module configuration within the storage array. A simplex system does not offer controller or disk-path redundancy, but does have redundant fans and power supplies.
VLAN	A virtual local area network (VLAN) is a logical network that behaves like it is physically separate from other networks supported by the same devices (switches, routers, etc.).

Controller states

You can place a controller into three different states: online, offline, and service mode.

Online state

The online state is the normal operating state of the controller. It means that the controller is operating normally and is available for I/O operations.

When you place a controller online, its status is set to optimal.

Offline state

The offline state is typically used to prepare a controller for replacement when there are two controllers in the storage array. A controller can enter the offline state in two ways: you can issue an explicit command or the controller can fail. A controller can exit the offline state only by issuing another explicit command or by replacing the failed controller. You can place a controller offline only if there are two controllers in the storage array.

When a controller is in the offline state, the following conditions are true:

- The controller is not available for I/O.
- You cannot manage the storage array through that controller.
- Any volumes currently owned by that controller are moved to the other controller.

Service mode

Service Mode is typically used only by technical support to move all storage array volumes to one controller so that the other controller can be diagnosed. A controller must be manually placed in service mode and must be manually placed back online after the service operation is completed.

When a controller is in service mode, the following conditions are true:

- The controller is not available for I/O.
- Technical support can access the controller through the serial port or network connection to analyze potential problems.
- Any volumes currently owned by that controller are moved to the other controller.
- Cache mirroring is disabled and all volumes are changed to write through cache mode.

Considerations for assigning IP addresses

By default, controllers ship with DHCP enabled on both network ports. You can assign static IP addresses, use the default static IP addresses, or use DHCP-assigned IP addresses. You also can use IPv6 stateless auto-configuration.



IPv6 is disabled by default on new controllers, but you can configure the management port IP addresses using an alternate method, and then enable IPv6 on the management ports using SANtricity System Manager.

When the network port is in a "link down" state, that is, disconnected from a LAN, the system reports its configuration as either static, displaying an IP address of 0.0.0.0 (earlier releases), or DHCP enabled with no IP address reported (later releases). After the network port is in a "link up" state (that is, connected to a LAN), it attempts to obtain an IP address through DHCP.

If the controller is unable to obtain a DHCP address on a given network port, it reverts to a default IP address, which might take up to three minutes. The default IP addresses are as follows:

```
Controller 1 (port 1): IP Address: 169.254.128.101
```

```
Controller 1 (port 2): IP Address: 169.254.129.101
```

```
Controller 2 (port 1): IP Address: 169.254.128.102
```

```
Controller 2 (port 2): IP Address: 169.254.129.102
```

When assigning IP addresses:

- Reserve Port 2 on the controllers for technical support usage. Do not change the default network settings (DHCP enabled).
- To set static IP addresses for E2800 and E5700 controllers, use SANtricity System Manager. After a static IP address is configured, it remains set through all link down/up events.
- To set static IP addresses for E2700 and E5600 controllers, use SANtricity Storage Manager. After a static IP address is configured, it remains set through all link down/up events.
- To use DHCP to assign the IP address of the controller, connect the controller to a network that can process DHCP requests. Use a permanent DHCP lease.



The default addresses are not persisted across link down events. When a network port on a controller is set to use DHCP, the controller attempts to obtain a DHCP address on every link up event, including cable insertions, reboots, and power cycles. Any time a DHCP attempt fails, the default static IP address for that port is used.

How tos

Configure management port

The controller includes an Ethernet port used for system management. If necessary, you can change its transmission parameters and IP addresses.

About this task

During this procedure, you select port 1 and then determine the speed and port addressing method. Port 1 connects to the network where the management client can access the controller and System Manager.



Do not use port 2 on either controller. Port 2 is reserved for use by technical support.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller with the management port you want to configure.

The controller's context menu appears.

4. Select **Configure management ports**.

The Configure Management Ports dialog box opens.

5. Make sure port 1 is displayed, and then click **Next**.
6. Select the configuration port settings, and then click **Next**.


Field Details

Field	Description
Speed and duplex mode	Keep the Auto-negotiate setting if you want System Manager to determine the transmission parameters between the storage array and the network; or if you know the speed and mode of your network, select the parameters from the drop-down list. Only the valid speed and duplex combinations appear in the list.
Enable IPv4 / Enable IPv6	Select one or both options to enable support for IPv4 and IPv6 networks.

If you select **Enable IPv4**, a dialog box opens for selecting IPv4 settings after you click **Next**. If you select **Enable IPv6**, a dialog box opens for selecting IPv6 settings after you click **Next**. If you select both options, the dialog box for IPv4 settings opens first, and then after you click **Next**, the dialog box for IPv6 settings opens.

- Configure the IPv4 and/or IPv6 settings, either automatically or manually.

Field Details

Field	Description
Automatically obtain configuration from DHCP server	Select this option to obtain the configuration automatically.
Manually specify static configuration	<div> <div>Select this option, and then enter the controller's IP address. (If desired, you can cut and paste addresses into the fields.) For IPv4, include the network subnet mask and gateway. For IPv6, include the routable IP address and router IP address.</div> <div> <div></div> <div>If you change the IP address configuration, you lose the management path to the storage array. If you use SANtricity Unified Manager to globally manage arrays in your network, open the user interface and go to Manage > Discover. If you use SANtricity Storage Manager, you must remove the device from the Enterprise Management Window (EMW), add it back to the EMW by selecting Edit > Add Storage Array, and then enter the new IP address.</div> </div> </div>

- Click **Finish**.

Results


The management port configuration is displayed in the controller settings, Management Ports tab.

Configure iSCSI ports

If your controller includes an iSCSI host connection, you can configure the iSCSI port settings from the Hardware page.

Before you begin

- Your controller must include iSCSI ports; otherwise, the iSCSI settings are not available.
- You must know the network speed (the data transfer rate between the ports and the host).



The iSCSI settings and functions only appear if your storage array supports iSCSI.

Steps

- Select **Hardware**.
- If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller with the iSCSI ports you want to configure.

The controller's context menu appears.

4. Select **Configure iSCSI ports**.




The **Configure iSCSI ports** option appears only if System Manager detects iSCSI ports on the controller.

The Configure iSCSI Ports dialog box opens.

5. In the drop-down list, select the port you want to configure, and then click **Next**.
6. Select the configuration port settings, and then click **Next**.

To see all port settings, click the **Show more port settings** link on the right of the dialog box.

Field Details

Port Setting	Description
Enable IPv4 / Enable IPv6	<p>Select one or both options to enable support for IPv4 and IPv6 networks.</p> <div> If you want to disable port access, deselect both check boxes.</div>
TCP listening port (Available by clicking Show more port settings .)	<p>If necessary, enter a new port number.</p> <p>The listening port is the TCP port number that the controller uses to listen for iSCSI logins from host iSCSI initiators. The default listening port is 3260. You must enter 3260 or a value between 49152 and 65535.</p>
MTU size (Available by clicking Show more port settings .)	<p>If necessary, enter a new size in bytes for the Maximum Transmission Unit (MTU).</p> <p>The default Maximum Transmission Unit (MTU) size is 1500 bytes per frame. You must enter a value between 1500 and 9000.</p>
Enable ICMP PING responses	<p>Select this option to enable the Internet Control Message Protocol (ICMP). The operating systems of networked computers use this protocol to send messages. These ICMP messages determine whether a host is reachable and how long it takes to get packets to and from that host.</p>

If you selected **Enable IPv4**, a dialog box opens for selecting IPv4 settings after you click **Next**. If you selected **Enable IPv6**, a dialog box opens for selecting IPv6 settings after you click **Next**. If you selected both options, the dialog box for IPv4 settings opens first, and then after you click **Next**, the dialog box for

IPv6 settings opens.

7. Configure the IPv4 and/or IPv6 settings, either automatically or manually. To see all port settings, click the **Show more settings** link on the right of the dialog box.

Field Details

Port setting	Description
Automatically obtain configuration	Select this option to obtain the configuration automatically.
Manually specify static configuration	Select this option, and then enter a static address in the fields. (If desired, you can cut and paste addresses into the fields.) For IPv4, include the network subnet mask and gateway. For IPv6, include the routable IP address and router IP address.
Enable VLAN support (Available by clicking Show more settings .)	Select this option to enable a VLAN and enter its ID. A VLAN is a logical network that behaves like it is physically separate from other physical and virtual local area networks (LANs) supported by the same switches, the same routers, or both.
Enable ethernet priority (Available by clicking Show more settings .)	<p>Select this option to enable the parameter that determines the priority of accessing the network. Use the slider to select a priority between 1 (lowest) and 7 (highest).</p> <p>In a shared local area network (LAN) environment, such as Ethernet, many stations might contend for access to the network. Access is on a first-come, first-served basis. Two stations might try to access the network at the same time, which causes both stations to back off and wait before trying again. This process is minimized for switched Ethernet, where only one station is connected to a switch port.</p>

8. Click **Finish**.

Configure iSER over InfiniBand ports

If your controller includes an iSER over InfiniBand port, you can configure the network connection to the host.

Before you begin

- Your controller must include an iSER over InfiniBand port; otherwise, the iSER over InfiniBand settings are not available in System Manager.
- You must know the IP address of the host connection.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller with the iSER over InfiniBand port you want to configure.

The controller's context menu appears.

4. Select **Configure iSER over InfiniBand ports**.

The Configure iSER over InfiniBand Ports dialog box opens.

5. In the drop-down list, select the HIC port you want to configure, and then enter the IP address of the host.
6. Click **Configure**.
7. Complete the configuration, and then reset the iSER over InfiniBand port by clicking **Yes**.

Configure NVMe over InfiniBand ports

If your controller includes an NVMe over InfiniBand connection, you can configure the NVMe port settings from the Hardware page.

Before you begin

- Your controller must include an NVMe over InfiniBand host port; otherwise, the NVMe over InfiniBand settings are not available in System Manager.
- You must know the IP address of the host connection.



The NVMe over InfiniBand settings and functions appear only if your storage array's controller includes an NVMe over InfiniBand port.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller with the NVMe over InfiniBand port you want to configure.

The controller's context menu appears.

4. Select **Configure NVMe over InfiniBand ports**.

The Configure NVMe over InfiniBand Ports dialog box opens.

5. Select the HIC port you want to configure from the drop-down list, and then enter the IP address.

If you are configuring an EF600 storage array with a 200Gb-capable HIC, this dialog box displays two IP Address fields, one for a physical port (external) and one for a virtual port (internal). You should assign a unique IP address for both ports. These settings allow the host to establish a path between each port, and for the HIC to achieve maximum performance. If you do not assign an IP address to the virtual port, the HIC will run at approximately half its capable speed.

6. Click **Configure**.
7. Complete the configuration, and then reset the NVMe over InfiniBand port by clicking **Yes**.

Configure NVMe over RoCE ports

If your controller includes a connection for NVMe over RoCE (RDMA over Converged Ethernet), you can configure the NVMe port settings from the Hardware page.

Before you begin

- Your controller must include an NVMe over RoCE host port; otherwise, the NVMe over RoCE settings are not available in System Manager.
- You must know the IP address of the host connection.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller with the NVMe over RoCE port you want to configure.

The controller's context menu appears.


4. Select **Configure NVMe over RoCE ports**.

The Configure NVMe over RoCE Ports dialog box opens.

5. In the drop-down list, select the HIC port you want to configure.
6. Click **Next**.

To see all port settings, click the **Show more port settings** link on the right of the dialog box.

Field Details

Port Setting	Description
Configured ethernet port speed	Select the speed that matches the speed capability of the SFP on the port.
Enable IPv4 / Enable IPv6	<div>Select one or both options to enable support for IPv4 and IPv6 networks.</div> <div> If you want to disable port access, deselect both check boxes.</div>
MTU size (Available by clicking Show more port settings .)	<div>If necessary, enter a new size in bytes for the Maximum Transmission Unit (MTU).</div> <div>The default Maximum Transmission Unit (MTU) size is 1500 bytes per frame. You must enter a value between 1500 and 9000.</div>

If you selected **Enable IPv4**, a dialog box opens for selecting IPv4 settings after you click **Next**. If you

selected **Enable IPv6**, a dialog box opens for selecting IPv6 settings after you click **Next**. If you selected both options, the dialog box for IPv4 settings opens first, and then after you click **Next**, the dialog box for IPv6 settings opens.

7. Configure the IPv4 and/or IPv6 settings, either automatically or manually.

Field Details

Port setting	Description
Automatically obtain configuration	Select this option to obtain the configuration automatically.
Manually specify static configuration	<p>Select this option, and then enter a static address in the fields. (If desired, you can cut and paste addresses into the fields.) For IPv4, include the network subnet mask and gateway. For IPv6, include the routable IP address and router IP address.</p> <p>If you are configuring an EF600 storage array with a 200Gb-capable HIC, this dialog box displays two sets of fields for network parameters, one for a physical port (external) and one for a virtual port (internal). You should assign unique parameters for both ports. These settings allow the host to establish a path between each port, and for the HIC to achieve maximum performance. If you do not assign an IP address to the virtual port, the HIC will run at approximately half its capable speed.</p>

8. Click **Finish**.

Configure NTP server addresses

You can configure a connection to the Network Time Protocol (NTP) server so that the controller periodically queries the NTP server to update its internal time-of-day clock.

Before you begin

- An NTP server must be installed and configured in your network.
- You must know the address of the primary NTP server and an optional backup NTP server. These addresses can be fully qualified domain names, IPv4 addresses, or IPv6 addresses.



If you enter one or more domain names for the NTP servers, you must also configure a DNS server to resolve the NTP server address. You need to configure the DNS server only on those controllers where you configured NTP and provided a domain name.

About this task

NTP enables the storage array to automatically synchronize the controller's clocks with an external host using Simple Network Time Protocol (SNTP). The controller periodically queries the configured NTP server, and then uses the results to update its internal time-of-day clock. If only one controller has NTP enabled, the alternate controller periodically synchronizes its clock with the controller that has NTP enabled. If neither controller has NTP enabled, the controllers periodically synchronize their clocks with each other.



You do not need to configure NTP on both controllers; however, doing so improves the storage array's ability to stay synchronized during hardware or communication failures.

Steps

1. Select **Hardware**.

2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller you want to configure.

The controller's context menu appears.

4. Select **Configure NTP server**.

The Configure Network Time Protocol (NTP) Server dialog box opens.

5. Select **I want to enable NTP on Controller (A or B)**.

Additional selections appear in the dialog box.

6. Select one of the following options:

- **Automatically obtain NTP server addresses from DHCP server** — The detected NTP server addresses are shown.



If the storage array is set to use a static NTP address, no NTP servers appear.

- **Manually specify NTP server addresses** — Enter the primary NTP server address and a backup NTP server address. The backup server is optional. (These address fields appear after you select the radio button.) The server address can be a fully qualified domain name, IPv4 address, or IPv6 address.

7. **Optional:** Enter server information and authentication credentials for a backup NTP server.

8. Click **Save**.

Results

The NTP server configuration is displayed in the controller settings, **DNS / NTP** tab.

Configure DNS server addresses

Domain Name System (DNS) is used to resolve fully qualified domain names for the controllers and a Network Time Protocol (NTP) server. The management ports on the storage array can support IPv4 or IPv6 protocols simultaneously.

Before you begin

- A DNS server must be installed and configured in your network.
- You know the address of the primary DNS server and an optional backup DNS server. These addresses can be IPv4 addresses or IPv6 addresses.

About this task

This procedure describes how to specify a primary and backup DNS server address. The backup DNS server can be optionally configured to use if a primary DNS server fails.



If you already configured the storage array's management ports with Dynamic Host Configuration Protocol (DHCP), and you have one or more DNS or NTP servers associated with the DHCP setup, then you do not need to manually configure DNS or NTP. In this case, the storage array should have already obtained the DNS/NTP server addresses automatically. However, you should still follow the instructions below to open the dialog box and make sure that the correct addresses are detected.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Select the controller to configure.

The controller's context menu appears.

4. Select **Configure DNS server**.

The **Configure Domain Name System (DNS) Server** dialog box opens.

5. Select one of the following options:

- **Automatically obtain DNS server addresses from DHCP server** — The detected DNS server addresses are shown.



If the storage array is set to use a static DNS address, no DNS servers appear.

- **Manually specify DNS server addresses** — Enter a primary DNS server address and a backup DNS server address. The backup server is optional. (These address fields appear after you select the radio button.) These addresses can be IPv4 addresses or IPv6 addresses.

6. Click **Save**.
7. Repeat these steps for the other controller.

Results

The DNS configuration is displayed in the controller settings, **DNS / NTP** tab.

View controller settings

You can view information about a controller, such as the status of the host interfaces, drive interfaces, and management ports.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.


3. Do one of the following actions to display the controller settings:
 - Click the controller to display the context menu, and then select **View settings**.

- Select the controller icon (next to the **Shelf** drop-down list). For duplex configurations, select either **Controller A** or **Controller B** from the dialog box, and then click **Next**. The Controller Settings dialog box opens.

4. Select the tabs to move between property settings.

Some tabs have a link for **Show more settings** at the top right.

Field Details

Tab	Description
Base	Shows the controller status, model name, replacement part number, current firmware version, and the non-volatile static random access memory (NVSRAM) version.
Cache	Shows the cache settings of the controller, which include the data cache, processor cache, and the cache backup device. The cache backup device is used to back up data in the cache if you lose power to the controller. Status can be Optimal, Failed, Removed, Unknown, Write Protected, or Incompatible.
Host Interfaces	<p>Shows the host interface information and the link status of each port. The host interface is the connection between the controller and the host, such as Fibre Channel or iSCSI.</p> <div>  <p>The host interface card (HIC) location is either in the baseboard or in a slot (bay). "Baseboard" indicates that the HIC ports are built into the controller. "Slot" ports are on the optional HIC.</p> </div>
Drive Interfaces	Shows the drive interface information and the link status of each port. The drive interface is the connection between the controller and the drives, such as SAS.
Management Ports	Shows the management port details, such as the host name used to access the controller and whether a remote login has been enabled. The management port connects the controller and the management client, which is where a browser is installed for accessing System Manager.
DNS / NTP	<p>Shows the addressing method and IP addresses for the DNS server and the NTP server, if these servers have been configured in System Manager. Domain Name System (DNS) is a naming system for devices connected to the Internet or a private network. The DNS server maintains a directory of domain names and translates them to Internet Protocol (IP) addresses.</p> <p>Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems in data networks.</p>

5. Click **Close**.

Allow remote login

Remote login lets users from outside of the local area network start an SSH session and change settings on the controller.



Security risk — For security reasons, enable remote login for use only by technical support.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller for which you want to enable remote login.

The controller's context menu appears.

4. Select **Change remote login**, and confirm that you want to perform the operation.

Results

After technical support is finished troubleshooting, follow this same procedure to disable remote login. Disabling remote login terminates any current SSH sessions and rejects any new login requests.

Place controller online

If a controller is in the offline state or in service mode, you can place it back online.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click a controller that is in either the offline state or service mode.

The controller's context menu appears.

4. Select **Place online**, and confirm that you want to perform the operation.

Results

Detection of a restored preferred path by the multipath driver can take up to 10 minutes.

Any volumes originally owned by this controller are automatically moved back to the controller as I/O requests are received for each volume. In some cases, you might need to manually redistribute the volumes with the **Redistribute volumes** command.

Place controller offline

If you are instructed to do so, you can place a controller offline.

Before you begin

- Your storage array must have two controllers. The controller that you are not placing offline must be online (in the optimal state).
- Make sure that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.

About this task



Do not place a controller offline unless you are instructed to do so by the Recovery Guru or technical support.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller that you want to place offline.

The controller's context menu appears.

4. Select **Place offline**, and confirm that you want to perform the operation.

Results

It might take several minutes for System Manager to update the controller's status to offline. Do not begin any other operations until after the status has been updated.

Place controller in service mode

If you are instructed to do so, you can place a controller in service mode.

Before you begin

- The storage array must have two controllers. The controller that you are not placing in service mode must be online (in the optimal state).
- Make sure that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.

About this task



Placing a controller in service mode might significantly reduce performance. Do not place a controller in service mode unless you are instructed to do so by technical support.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller that you want to place into service mode.

The controller's context menu appears.

4. Select **Place in service mode**, and confirm that you want to perform the operation.

Reset (reboot) controller

Some issues require a controller reset (reboot). You can reset the controller even if you don't have physical access to it.

Before you begin

- The storage array must have two controllers. The controller that you are not resetting must be online (in the optimal state).
- Make sure that no volumes are in use or that you have a multipath driver installed on all hosts using these volumes.

Steps

1. Select **Hardware**.
2. If the graphic shows the drives, click **Show back of shelf**.

The graphic changes to show the controllers instead of the drives.

3. Click the controller that you want to reset.

The controller's context menu appears.

4. Select **Reset**, and confirm that you want to perform the operation.

FAQs

What is auto-negotiation?

Auto-negotiation is the ability of a network interface to automatically coordinate its own connection parameters (speed and duplex) with another network interface.

Auto-negotiation is usually the preferred setting for configuring management ports; however, if the negotiation fails, mismatched network interface settings can severely impact network performance. In cases where that condition is unacceptable, you should manually set the network interface settings to a correct configuration. Auto-negotiation is performed by the controller's Ethernet management ports. Auto-negotiation is not performed by iSCSI host bus adapters.



If auto-negotiation fails, the controller attempts to establish a connection at 10BASE-T, half-duplex, which is the lowest common denominator.

What is IPv6 stateless address auto-configuration?

With stateless auto-configuration, hosts do not obtain addresses and other configuration information from a server. Stateless auto-configuration in IPv6 features link-local addresses, multicasting, and the Neighbor Discovery (ND) protocol. IPv6 can generate the interface ID of an address from the underlying data link layer address.

Stateless auto-configuration and stateful auto-configuration complement each other. For example, the host can use stateless auto-configuration to configure its own addresses, but use stateful auto-configuration to obtain other information. Stateful auto-configuration allows hosts to obtain addresses and other configuration information from a server. Internet Protocol version 6 (IPv6) also defines a method whereby all of the IP addresses on a network can be renumbered at one time. IPv6 defines a method for devices on the network to automatically configure their IP address and other parameters without the need for a server.

Devices perform these steps when using stateless auto-configuration:

1. **Generate a link-local address** — The device generates a link-local address, which has 10 bits, followed by 54 zeros, and followed by the 64-bit interface ID.
2. **Test the uniqueness of a link-local address** — The node tests to make sure that the link-local address that it generates is not already in use on the local network. The node sends a neighbor solicitation message by using the ND protocol. In response, the local network listens for a neighbor advertisement message, which indicates that another device is already using the link-local address. If so, either a new link-local address must be generated or auto-configuration fails, and another method must be used.
3. **Assign a link-local address** — If the device passes the uniqueness test, the device assigns the link-local address to its IP interface. The link-local address can be used for communication on the local network but not over the Internet.
4. **Contact the router** — The node tries to contact a local router for more information about continuing the configuration. This contact is performed either by listening for router advertisement messages sent periodically by the routers or by sending a specific router solicitation message to ask a router for information about what to do next.
5. **Provide direction to the node** — The router provides direction to the node about how to proceed with auto-configuration. Alternatively, the router tells the host how to determine the global Internet address.
6. **Configure the global address** — The host configures itself with its globally unique Internet address. This address is generally formed from a network prefix provided to the host by the router.

Which do I choose — DHCP or manual configuration?

The default method for network configuration is Dynamic Host Configuration Protocol (DHCP). Always use this option unless your network does not have a DHCP server.

What is a DHCP server?

Dynamic Host Configuration Protocol (DHCP) is a protocol that automates the task of assigning an Internet Protocol (IP) address.

Each device that is connected to a TCP/IP network must be assigned a unique IP address. These devices include the controllers in your storage array.

Without DHCP, a network administrator enters these IP addresses manually. With DHCP, when a client needs to start TCP/IP operations, the client broadcasts a request for address information. The DHCP server receives the request, assigns a new address for a specified amount of time called a lease period, and sends the address to the client. With DHCP, a device can have a different IP address each time it connects to the network. In some systems, the IP address for the device can change even while the device is still connected.

How do I configure my DHCP server?

You must configure a Dynamic Host Configuration Protocol (DHCP) server to use static

Internet Protocol (IP) addresses for the controllers in your storage array.

The IP addresses that your DHCP server assigns are generally dynamic and can change because they have a lease period that expires. Some devices, for example, servers and routers, need to use static addresses. The controllers in your storage array also need static IP addresses.

For information about how to assign static addresses, see the documentation for your DHCP server.

Why do I need to change the controller network configuration?

You must set the network configuration for each controller—its Internet Protocol (IP) address, subnetwork mask (subnet mask), and gateway—when you use out-of-band management.

You can set the network configuration by using a Dynamic Host Configuration Protocol (DHCP) server. If you are not using a DHCP server, you must enter the network configuration manually.

Where do I get the network configuration?

You can get the Internet Protocol (IP) address, subnetwork mask (subnet mask), and gateway information from your network administrator.

You need this information when you are configuring ports on the controllers.

What are ICMP PING responses?

Internet Control Message Protocol (ICMP) is one of the protocols of the TCP/IP suite.

The ICMP `echo request` and the ICMP `echo reply` messages are commonly known as `ping` messages. `Ping` is a troubleshooting tool used by system administrators to manually test for connectivity between network devices, and also to test for network delay and packet loss. The `ping` command sends an ICMP `echo request` to a device on the network, and the device immediately responds with an ICMP `echo reply`. Sometimes, a company's network security policy requires `ping` (ICMP `echo reply`) to be disabled on all devices to make them more difficult to be discovered by unauthorized persons.

When should I refresh the port configuration or the iSNS server from the DHCP server?

Refresh the DHCP server any time the server is modified or upgraded, and the DHCP information relevant to the current storage array and the storage array that you want to use has changed.

Specifically, refresh the port configuration or the iSNS server from the DHCP server when you know that the DHCP server will be assigning different addresses.



Refreshing a port configuration is destructive to all of the iSCSI connections on that port.

What should I do after configuring the management ports?

If you changed the IP address for the storage array, you might want to update the global

array view in SANtricity Unified Manager.

To update the global array view in Unified Manager, open the interface and go to **Manage › Discover**.

If you are still using the SANtricity Storage Manager, go to the Enterprise Management Window (EMW), where you must remove and re-add the new IP address.

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