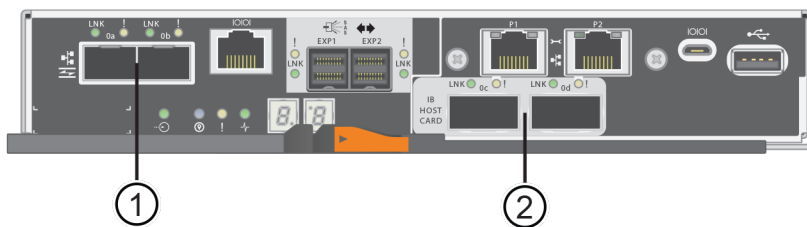


Converting the Protocol of E5700 Host Ports

On an E5700 storage array, you can change the feature pack in SANtricity System Manager to convert the host port protocol of the baseboard host ports from Fibre Channel (FC) to iSCSI or from iSCSI to FC. If you have an Infiniband (IB) HIC on an E5700, you can also convert the protocol of the IB HIC from iSER to SRP or from SRP to iSER.

The following figure shows the back of an E5700 controller with its SFP+ (optical) baseboard host ports and the optional two IB HIC ports.



Callout	Type of host ports
1	Two-port SFP+ (optical) baseboard
2	Two-port IB HIC

Before you begin

- You have obtained the necessary hardware for the conversion. For example, you might need new cables and SFP transceivers. Your NetApp Sales Representative can help you determine what hardware you need and help you order the correct parts.

Note: If you are attempting to change the baseboard host ports of your storage array, and it currently uses dual-protocol (also referred to as *unified*) SFP transceivers that you purchased from NetApp, you do not need to change your SFP transceivers. Dual-protocol SFP transceivers support both FC (at 4 Gbps, 8 Gbps, or 16 Gbps) and iSCSI (at 10 Gbps), but they do not support 1 Gbps iSCSI. See [Determining if you have dual-protocol SFPs](#) on page 2 to determine what type of SFP transceivers are installed.

- You have scheduled a downtime maintenance window for this procedure. You must stop host I/O operations when you perform the conversion, and you will not be able to access data on the storage array until you have successfully completed the conversion.
- You are using out-of-band management.

Attention: You cannot use in-band management to complete this procedure.

Steps

- [Determining if you have dual-protocol SFPs](#) on page 2
- [Before converting the protocol of the host ports](#) on page 3

3. [Obtaining the feature pack](#) on page 5
4. [Stopping host I/O](#) on page 9
5. [Changing the feature pack](#) on page 10
6. [After converting the protocol of the host ports](#) on page 11
7. [After converting IB-iSER HIC Ports to/from IB-SRP](#) on page 13

Related information

[NetApp E-Series Systems Documentation Center](#)
[NetApp Support](#)

Determining if you have dual-protocol SFPs

You can use SANtricity System Manager to determine what type of SFP transceivers you have. If your current SFPs support data rates of 16 Gbps and 10 Gbps, you can continue to use them after converting the host port protocol. Because these SFPs can be used with both FC and iSCSI protocols, they are referred to as *dual-protocol* or *unified* SFPs.

Steps

1. From SANtricity System Manager, select **Support**.
2. Select the **Support Center** tile.
3. On the **Support Resources** tab, locate and select the **Storage Array Profile** link.
4. Type **SFP** in the text box, and click **Find**.
5. For each SFP listed in the Storage Array Profile, locate the entry for **Supported data rate(s)**.

```

SFP status:           Optimal
Attached to:          Host-side of controller B
Location:             Unknown
Supported data rate(s): 16 Gbps, 10 Gbps, 8 Gbps, 4 Gbps
Link length:         Short
Connector:           LC
Transmitter type:     Shortwave Laser w/o OFC
Transmission media:  TM Multi-mode 62.5m(M6)
IEEE company ID:     00 17 6a
Revision:             Not Available
Part number:          AFBR-57F5UM2
Serial number:        AA1317J14X7
Vendor:              AVAGO
Date of manufacture: 4/28/13
  
```

6. Refer to the table to determine whether you can reuse the SFPs, as follows:

Supported data rate(s)	SFP type	Supported protocol
16 Gbps, 10 Gbps, 8 Gbps, 4 Gbps	Dual-protocol	<ul style="list-style-type: none"> • FC: 16 Gbps, 8 Gbps, 4 Gbps • iSCSI: 10 Gbps
10 Gbps	10 Gbps	iSCSI only
16 Gbps, 8 Gbps, 4 Gbps	16 Gbps	FC only

- If you have dual-protocol SFPs, you can continue using them after you convert the protocol.

Note: The dual-protocol SFPs do not support 1 Gb iSCSI. If you are converting host ports to iSCSI, be aware that the dual-protocol SFPs support only a 10 Gb link to the connected port.

- If you have 16 Gbps SFPs, and you are converting host ports to iSCSI, you must remove the SFPs and replace them with dual-protocol or 10 Gbps SFPs after converting the protocol. As needed, you can also use 10 Gbps iSCSI copper by using a special Twin-Ax cable with SFPs.
- If you have 10 Gbps SFPs, and you are converting host ports to FC, you must remove the SFPs from these ports and replace them with dual-protocol or 16 Gbps SFPs after converting the protocol.

Before converting the protocol of the host ports

If you use the Data Assurance (DA) feature or a Mirroring feature, you must understand what happens to these features when you change the host port protocol. The considerations and any steps you might need to complete depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

Before applying a feature pack, review the appropriate sections, as listed in the table, and perform the recommended steps.

Note: These considerations apply only if you are converting a storage array that has already been in use. These considerations do not apply if you are converting a new storage array that does not yet have hosts and volumes defined.

If you have this configuration...		Refer to these considerations before changing a feature pack...
From	To	
FC baseboard ports	iSCSI baseboard ports	Before converting from FC to iSCSI on page 3
iSCSI baseboard ports	FC baseboard ports	Before converting from iSCSI to FC on page 4
IB-iSER HIC ports	IB-SRP HIC ports	Before converting IB-iSER HIC Ports to/from IB-SRP on page 5
IB-SRP HIC ports	IB-iSER HIC ports	

Before converting from FC to iSCSI

You must consider how to manage any Asynchronous Mirroring relationships.

- If your configuration contains SAN Boot hosts connected to the FC baseboard ports, check the *NetApp Interoperability Matrix Tool* to ensure that the configuration is supported on iSCSI. If it is not, you cannot convert the host protocol to iSCSI.
- The Synchronous Mirroring feature is not supported for iSCSI. If you are currently using Synchronous Mirroring relationships via the baseboard ports, you must deactivate those Synchronous Mirroring relationships.

Attention: If you do not deactivate Synchronous Mirroring relationships before converting to iSCSI, your system will lose data access and data loss might occur.

- Asynchronous Mirroring requires both the local storage array and the remote storage array to use the same protocol. If you are currently using Asynchronous Mirroring through the baseboard, you must deactivate Asynchronous Mirroring relationships using those ports before applying the feature pack.

Related tasks

[Deactivating Synchronous Mirroring](#) on page 4

[Deactivating Asynchronous Mirroring](#) on page 4

Related information

[NetApp Interoperability Matrix Tool](#)

Before converting from iSCSI to FC

Asynchronous Mirroring requires both the local storage array and the remote storage array to use the same protocol. If you are currently using Asynchronous Mirroring with the baseboard ports, you must deactivate Asynchronous Mirroring before changing the protocol.

Related tasks

[Deactivating Asynchronous Mirroring](#) on page 4

Deactivating Asynchronous Mirroring

The Asynchronous Mirroring feature requires both the local storage array and the remote storage array to use the same protocol. If the host ports you plan to convert participate in mirroring relationships, you must deactivate Asynchronous Mirroring before converting the protocol.

Steps

1. From SANtricity System Manager, access the online help.
2. From the online help, select **Storage > Asynchronous Mirroring**.
3. Follow the guidelines and instructions in the online help to delete all mirror consistency groups and remove all mirrored pairs from the local and remote storage arrays.
4. Follow the guidelines and instructions in the online help to deactivate Asynchronous Mirroring.

Deactivating Synchronous Mirroring

The Synchronous Mirroring feature is not supported for iSCSI. If you are using this feature and you plan to convert all FC host ports to iSCSI, you must deactivate Synchronous Mirroring before changing the feature pack.

Steps

1. From SANtricity System Manager, access the online help.
2. From the online help, select **Storage > Synchronous Mirroring > How tos**.
3. Follow the guidelines and instructions in the online help to remove all synchronous mirrored pairs, which removes mirror relationships on the local storage array and on the remote storage array.
4. Follow the guidelines and instructions in the online help to deactivate Synchronous Mirroring.

Synchronizing mirrors and testing communications

Mirroring operations are not affected if the host ports being used for mirroring keep the same protocol after you apply the feature pack. Even so, before applying the feature pack, you should confirm that all mirror consistency groups are synchronized. After applying the feature pack, you should test the communication between the local storage array and the remote storage array.

Steps

1. Confirm that all mirror consistency groups or mirrored pairs are synchronized.
Refer to the online help for SANtricity System Manager if you have questions on how to do this.
2. Follow the instructions in this document to apply the feature pack.

3. Test the communication between the local storage array and the remote storage array.
Refer to the online help for SANtricity System Manager if you have questions on how to do this.
4. Review the information displayed in the **Results** window, and, if necessary, follow the corrective action indicated.

Before converting IB-iSER HIC Ports to/from IB-SRP

Before performing an InfiniBand iSER HIC port conversion to/from SRP, consider the following:

- You do not have to make any changes to your hardware when you convert from/to iSER to SRP.
- The Data Assurance (DA) feature is not supported for SRP.

Confirm the following:

- SANtricity System Manager is installed.
- The storage system is running SANtricity OS (controller firmware) version 08.40.11.00 or later.

Disabling Data Assurance

The DA feature is not supported for IB-SRP. If you are currently using this feature via the IB-HIC and you want to convert those ports from iSER to SRP, you must permanently disable DA on all volumes.

Steps

1. From SANtricity System Manager, access the online help.
2. From the online help, select **Storage > Volumes > How tos**.
3. Under **Manage Volumes**, follow the guidelines and instructions for changing the settings for a volume to permanently disable the data assurance setting.

Note: After it has been disabled, DA cannot be re-enabled on the volume.

Obtaining the feature pack

To obtain the feature pack, you need the serial number from the controller shelf, a Feature Activation Code, and the Feature Enable Identifier for the storage array.

Steps

1. Locate the serial number.
 - a. From SANtricity System Manager, select **Support > Support Center**.
 - b. With the **Support Resources** tab selected, scroll to the **View top storage array properties** section.
 - c. Locate the **Chassis Serial Number**, and copy this value to a text file.

View top storage array properties

Storage array world-wide identifier (ID):	600A0980006CEF9B00000000574DB18C
Chassis serial number:	1142FG00061
Number of shelves:	2
Number of drives:	41
Drive media types:	HDD
Number of controllers:	2
Controller board ID:	2806
Controller submodel ID:	318

2. Locate the **feature pack submodel ID**.
 - a. From the SANtricity System Manager, select **Support**.
 - b. Select the **Support Center** tile.
 - c. On the Support Resources tab, locate and select the **Storage Array Profile** link.
 - d. Type **feature pack submodel ID** in the text box, and click **Find**.
 - e. Locate the feature pack submodel ID for the starting configuration.

Storage Array Profile ✕

Feature pack submodel ID Find

Results: 1 of 1

Feature pack submodel ID: 318

Additional feature information

Snapshot groups allowed per base volume (see note below): 4
 Volume assignments per host or host cluster: 256

Note: If a volume is a member of a snapshot consistency group, that membership (member volume) counts against both th

FIRMWARE INVENTORY

Storage Array	
Report Date:	2/13/17 4:56:33 PM UTC
Storage Array Name:	LD&PandCLI-Cfg04-Araspho
Current SANtricity OS Software Version:	88.40.39.74.001
Management Software Version:	11.40.0010.0051
Controller Firmware Version:	88.40.39.74
Supervisor Software Version:	88.40.39.74
IOM (ESM) Version:	81.40.0000.0006
Current NVSRAM Version:	N280X-840834-402
Staged SANtricity OS Software Version:	None
Staged NVSRAM Version:	None

3. Using the feature pack submodel ID, locate the corresponding Controller submodel ID for the starting configuration and find the Feature Activation Code for the desired ending configuration within the table below. Then, copy that Feature Activation Code to a text file.

Note: If you are not using the IB HIC, you can ignore the *HIC Ports* column in the following tables:

Table 1: Encryption Capable Feature Activation Codes (Baseboard Port Only Conversions)

Starting configuration		Ending Configuration		Feature Activation Code
Controller submodel ID	Ports to Convert	Controller Submodel ID	Ports Converted To	
360	FC baseboard ports	362	iSCSI baseboard ports	SGL-2SB-ZEX13
362	iSCSI baseboard ports	360	FC baseboard ports	5GI-4TB-ZW3HL

Table 2: Encryption Capable Feature Activation Codes

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	Baseboard ports	HIC ports	Controller submodel ID	Baseboard ports	HIC ports	
360	FC	iSER	361	FC	SRP	UGG-XSB-ZCZKU
			362	iSCSI	iSER	SGL-2SB-ZEX13
			363	iSCSI	SRP	VGN-LTB-ZGFCT
361	FC	SRP	360	FC	iSER	JGS-0TB-ZID1V
			362	iSCSI	iSER	UGX-RTB-ZLBPV
			363	iSCSI	SRP	2G1-BTB-ZMRYN
362	iSCSI	iSER	360	FC	iSER	5GI-4TB-ZW3HL
			361	FC	SRP	EGL-NTB-ZXKQ4
			363	iSCSI	SRP	HGP-QUB-Z1ICJ
363	iSCSI	SRP	360	FC	iSER	SGU-TUB-Z3G2U
			361	FC	SRP	FGX-DUB-Z5WF7
			362	iSCSI	SRP	LG3-GUB-Z7V17

Table 3: Non-Encryption Feature Activation Codes (Baseboard Port Only Conversions)

Starting configuration		Ending Configuration		Feature Activation Code
Controller submodel ID	Ports to Convert	Controller Submodel ID	Ports Converted To	
365	FC baseboard ports	367	iSCSI baseboard ports	9GU-2WB-Z503D
367	iSCSI baseboard ports	366	FC baseboard ports	XG8-XTB-ZQ7XS

Table 4: Non-Encryption Feature Activation Codes

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	Baseboard ports	HIC ports	Controller submodel ID	Baseboard ports	HIC ports	
365	FC	iSER	366	FC	SRP	PGR-IWB-Z48PC
			367	iSCSI	iSER	9GU-2WB-Z503D
			368	iSCSI	SRP	SGJ-IWB-ZJFE4
366	FC	SRP	365	FC	iSER	YG0-LXB-ZLD26
			367	iSCSI	iSER	SGR-5XB-ZNTFB
			368	iSCSI	SRP	PGZ-5WB-Z8M0N
367	iSCSI	iSER	365	FC	iSER	QG6-ETB-ZPPPT
			366	FC	SRP	XG8-XTB-ZQ7XS
			368	iSCSI	SRP	SGB-HTB-ZS0AH
368	iSCSI	SRP	365	FC	iSER	LG8-JUB-ZATLD
			366	FC	SRP	LGA-3UB-ZBAX1
			367	iSCSI	SRP	NGF-7UB-ZE8KX

Note: If your controller submodel ID is not listed, contact [NetApp Support](#).

4. In System Manager, locate the Feature Enable Identifier.
 - a. Go to **Settings > System**.
 - b. Scroll down to **Add-ons**.
 - c. Under **Change Feature Pack**, locate the **Feature Enable Identifier**.
 - d. Copy and paste this 32-digit number to a text file.

Change Feature Pack
✕

Ensure you have obtained a feature pack file from your Technical Support Engineer. After you have obtained the file, transfer it to the storage array to change your feature pack.

Feature Enable Identifier: 333030343238333030343439574DB18C

Select the feature pack file: Browse...

Current feature pack: SMID 261

Important: Changing a feature pack is an offline operation. Verify that there are no hosts or applications accessing the storage array and back up all data before proceeding.

Type CHANGE to confirm that you want to perform this operation.

Type change

Change
Cancel

5. Go to [NetApp License Activation: Storage Array Premium Feature Activation](#), and enter the information required to obtain the feature pack.

- Chassis serial number
- Feature Activation Code
- Feature Enable Identifier

Important: The Premium Feature Activation web site includes a link to “Premium Feature Activation Instructions.” Do not attempt to use those instructions for this procedure.

6. Choose whether to receive the key file for the feature pack in an email or download it directly from the site.

Stopping host I/O

You must stop all I/O operations from the host before converting the protocol of the host ports. You cannot access data on the storage array until you successfully complete the conversion.

Steps

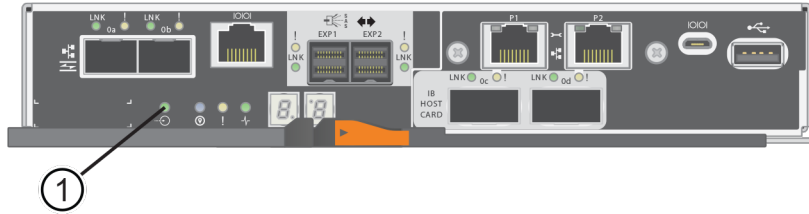
1. Ensure that no I/O operations are occurring between the storage array and all connected hosts. For example, you can perform these steps:
 - Stop all processes that involve the LUNs mapped from the storage to the hosts.
 - Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
 - Unmount all file systems associated with volumes on the array.

Note: The exact steps to stop host I/O operations depend on the host operating system and the configuration, which are beyond the scope of these instructions. If you are not sure how to stop host I/O operations in your environment, consider shutting down the host.

Attention: Possible data loss - If you continue this procedure while I/O operations are occurring, the host application might lose data because the storage array will not be accessible.

2. If the storage array participates in a mirroring relationship, stop all host I/O operations on the secondary storage array.
3. Wait for any data in cache memory to be written to the drives.

The green Cache Active LED on the back of each controller is on when cached data needs to be written to the drives. You must wait for this LED to turn off.



1	Cache Active LED
----------	------------------

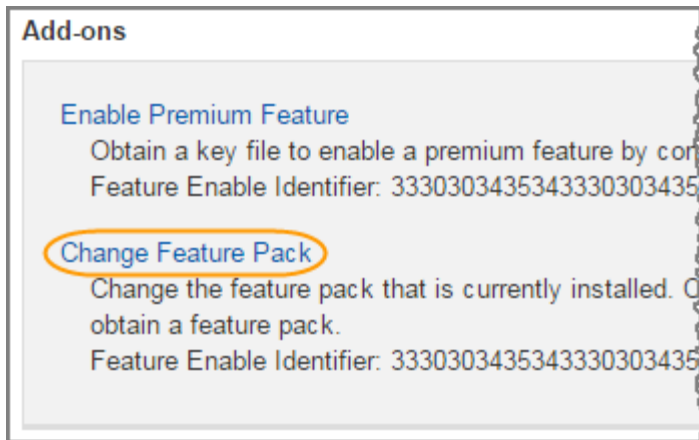
4. From the Home page of SANtricity System Manager, select **View Operations in Progress**.
5. Wait for all operations to complete before continuing with the next step.

Changing the feature pack

You can change the feature pack to convert the host protocol of the baseboard host ports, the IB HIC ports, or both types of ports.

Steps

1. From SANtricity System Manager, select **Settings > System**.
2. Under **Add-ons**, select **Change Feature Pack**.



3. Click **Browse**, and then select the feature pack you want to apply.
4. Type **CHANGE** in the field.
5. Click **Change**.

The feature pack migration begins. Both controllers automatically reboot twice to allow the new feature pack to take effect. The storage array returns to a responsive state after the reboot is complete.

6. Confirm the host ports have the protocol you expect.
 - a. From SANtricity System Manager, select **Hardware**.
 - b. Click **Show back of shelf**.
 - c. Select the graphic for either Controller A or Controller B.
 - d. Select **View settings** from the context menu.
 - e. Select the **Host Interfaces** tab.
 - f. Click **Show more settings**.
 - g. Review the details shown for the baseboard ports and the HIC ports (labeled “slot 1”), and confirm that each type of port has the protocol you expect.

After converting the protocol of the host ports

After converting the protocol of the host ports, you need to perform additional steps before you can use the new protocol. The steps depend on the starting protocol and the host protocol.

These considerations apply only if you are converting a storage array that has already been in use. These considerations do not apply if you are converting a new storage array that does not yet have hosts and volumes defined. If you converted the host-port protocol of a new storage array, use the *Hardware Cabling Guide* to install cables and SFPs. Then, follow the instructions in the *SANtricity System Manager Express Guide* or *SANtricity Power Guide for Advanced Users* for your operating system to complete the setup for each protocol.

Related information

[E-Series Hardware Cabling Guide](#)

[SANtricity System Manager 11.40 Installing and Configuring for Linux Express Guide](#)

[SANtricity System Manager 11.40 Installing and Configuring for VMware Express Guide](#)

[SANtricity System Manager 11.40 Installing and Configuring for Windows Express Guide](#)

[SANtricity 11.40 Installing and Configuring for Linux Power Guide for Advanced Users](#)

[SANtricity 11.40 Installing and Configuring for VMware Power Guide for Advanced Users](#)

[SANtricity 11.40 Installing and Configuring for Windows Power Guide for Advanced Users](#)

[NetApp Interoperability Matrix Tool](#)

After converting from FC to iSCSI

If you previously had FC host ports and you converted to iSCSI, you might need to modify your existing configuration to support iSCSI. The following procedure is only applicable if there is no iSCSI HIC present.

Steps

1. Configure the switches.

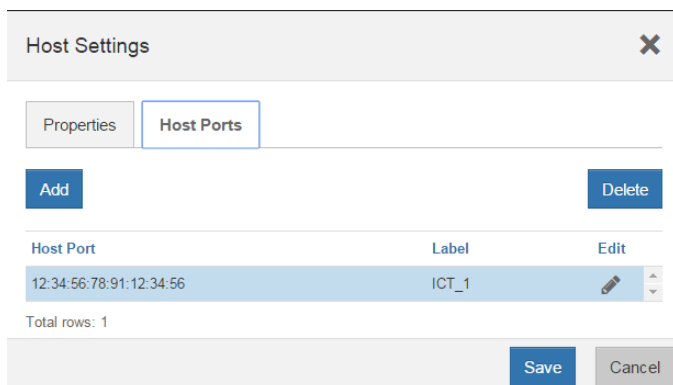
You should configure the switches used to transport iSCSI traffic according to the vendor’s recommendations for iSCSI. These recommendations might include both configuration directives as well as code updates.
2. From SANtricity System Manager, select **Hardware > Configure iSCSI ports**.
3. Select the port settings.

You can set up your iSCSI network in many ways. Consult your network administrator for tips on selecting the best configuration for your environment.

4. Update the host definitions in SANtricity System Manager.

Note: If you need instructions to add hosts or host clusters, refer to the online help for SANtricity System Manager.

- a. Select **Storage > Hosts**.
- b. Select the host to which the port will be associated, and click **View/Edit Settings**.
The Host Settings dialog box appears.
- c. Click the **Host Ports** tab.



- d. Click **Add**, and use the **Add Host Port** dialog box to associate a new host port identifier to the host.
The length of the host port identifier name is determined by the host interface technology. FC host port identifier names must have 16 characters. iSCSI host port identifier names have a maximum of 223 characters. The port must be unique. A port number that has already been configured is not allowed.
- e. Click **Delete**, and use the **Delete Host Port** dialog box to remove (unassociate) a host port identifier.
The **Delete** option does not physically remove the host port. This option removes the association between the host port and the host. Unless you remove the host bus adapter or the iSCSI initiator, the host port is still recognized by the controller.
- f. Click **Save** to apply your changes to the host port identifier settings.
- g. Repeat these steps to add and remove any additional host port identifiers.

5. Reboot the host or perform a rescan so that the host properly discovers the LUNs.

6. Remount volumes or start using block volume.

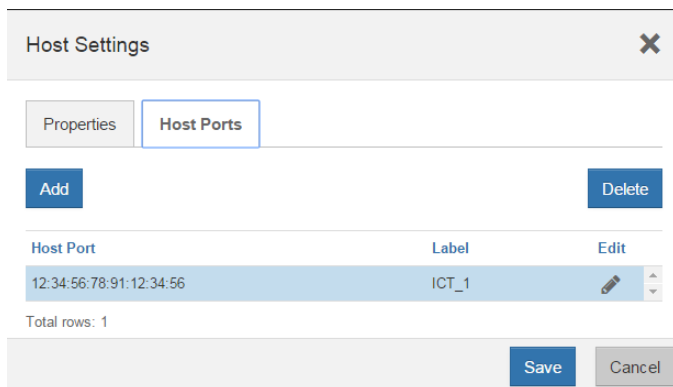
After converting from iSCSI to FC

If you previously had iSCSI host ports and you converted to FC, you might need to modify your existing configuration to support FC. The following procedure is only applicable if no FC HIC present.

Steps

1. Install the HBA utility and determine initiator WWPNs.
2. Zone the switches.
Zoning the switches enables the hosts to connect to the storage and limits the number of paths. You zone the switches using the management interface of the switches.
3. Update the host definitions in SANtricity System Manager.

- a. Select **Storage > Hosts**.
- b. Select the host to which the port will be associated, and click **View/Edit Settings**.
The Host Settings dialog box appears.
- c. Click the **Host Ports** tab.



- d. Click **Add**, and use the **Add Host Port** dialog box to associate a new host port identifier to the host.
The length of the host port identifier name is determined by the host interface technology. FC host port identifier names must have 16 characters. iSCSI host port identifier names have a maximum of 223 characters. The port must be unique. A port number that has already been configured is not allowed.
 - e. Click **Delete**, and use the **Delete Host Port** dialog box to remove (unassociate) a host port identifier.
The **Delete** option does not physically remove the host port. This option removes the association between the host port and the host. Unless you remove the host bus adapter or the iSCSI initiator, the host port is still recognized by the controller.
 - f. Click **Save** to apply your changes to the host port identifier settings.
 - g. Repeat these steps to add and remove any additional host port identifiers.
4. Reboot the host or perform a rescan so that the host properly discovers mapped storage.
 5. Remount volumes or start using block volume.

After converting IB-iSER HIC Ports to/from IB-SRP

After you apply the feature pack key to convert the protocol used by your InfiniBand iSER HIC port to/from SRP, you need to configure the host to use the appropriate protocol.

About this task

For step-by-step instructions on how to configure the host to use SRP or iSER, see the *SANtricity System Manager 11.40 Installing and Configuring for Linux Express Guide* under the *E-Series Documentation Center*. To connect the host to the storage array for an SRP configuration, you must enable the InfiniBand driver stack with the appropriate options. Specific settings might vary between Linux distributions. Check the *NetApp Interoperability Matrix* for specific instructions and additional recommended settings for your solution.

Related information

[SANtricity System Manager 11.40 Installing and Configuring for Linux Express Guide](#)
[NetApp E-Series Systems Documentation Center](#)
[NetApp Interoperability Matrix Tool](#)

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