Host port protocol conversion

E-Series Systems

NetApp
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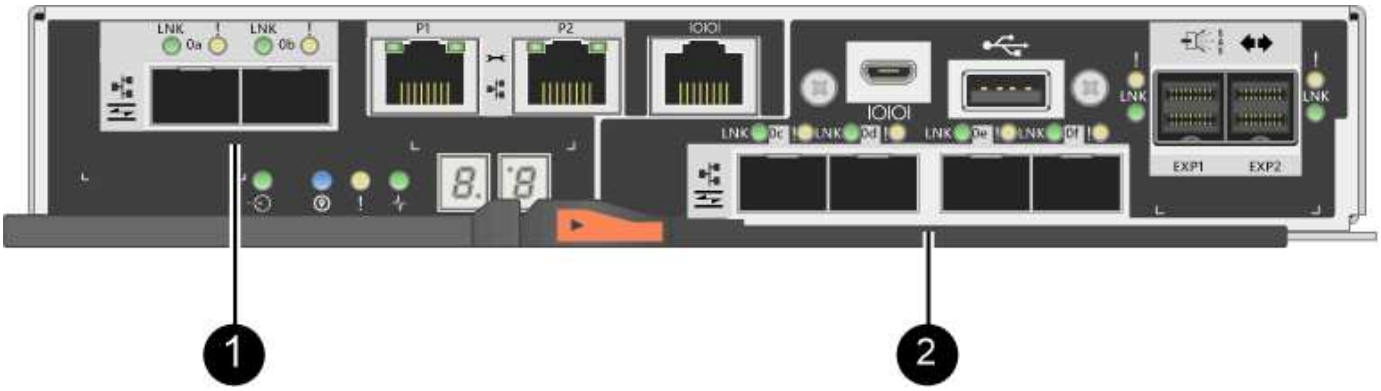
Host port protocol conversion

Requirements for changing E2800 host port protocol

Before converting the host protocol for an E2800 array, review the requirements.

Host ports you can change

The following figure shows the back of an E2800 controller that has two SFP+ (optical) baseboard host ports **(1)** and four SFP+ (optical) HIC ports **(2)**.



A two-port HIC is also available.

The E2800 controller or controllers in your storage array might have different types of baseboard host ports and different types of HIC ports. The table shows which host ports can be changed with a feature pack.

If you have these baseboard host ports…	And you have these HIC ports…	You can change…
Two SFP+ (optical) ports	None	Only the baseboard host ports
Two SFP+ (optical) ports	Four SFP+ (optical) ports	All of the ports
Two SFP+ (optical) ports	Two SFP+ (optical) ports	All of the ports
Two SFP+ (optical) ports	Two or four SAS ports	Only the baseboard host ports
Two SFP+ (optical) ports	Two RJ-45 (base-T) ports	Only the baseboard host ports
Two RJ-45 (base-T) ports	None	None of the ports
Two RJ-45 (base-T) ports	Two RJ-45 (base-T) ports	None of the ports

The baseboard host ports and the HIC ports can use the same host protocol or different host protocols.

Requirements for changing the host protocol

- You must schedule 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 must use out-of-band management. (You cannot use in-band management to complete this procedure.)
- You have obtained the necessary hardware for the conversion. Your NetApp Sales Representative can help you determine what hardware you need and help you order the correct parts.
- 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.
- Make sure that the dual-protocol SFP transceivers support both FC (at 4 Gbps, 16 Gbps,) and iSCSI (at 10 Gbps), but they do not support 1 Gbps iSCSI. See Step 1: Determine whether you have dual-protocol SFPs to determine what type of SFP transceivers are installed.

Considerations for changing the host protocol

The considerations for changing the host protocol depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

If you use a Mirroring feature or the Data Assurance (DA) feature, you must understand what happens to these features when you change the host port protocol as described below.

> The following 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.

Converting from FC to iSCSI

- 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 DA feature is not supported for iSCSI.
  - If you are currently using DA and you want to convert FC host ports to iSCSI, you must disable DA on all volumes.
  - If you do not deactivate DA before converting to iSCSI, the storage array will be out of compliance after the conversion.
- The Synchronous Mirroring feature is not supported for iSCSI.
  - If you are currently using Synchronous Mirroring relationships and you want to convert FC host ports to iSCSI, you must deactivate Synchronous Mirroring.
  - Refer to the online help for SANtricity System Manager to remove all synchronous mirrored pairs, which removes mirror relationships on the local storage array and on the remote storage array. In addition, follow the instructions in the online help to deactivate Synchronous Mirroring.

    > 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 and you want to convert all host ports from FC to iSCSI, you must deactivate Asynchronous Mirroring before applying the feature pack.
  - Refer to the online help for SANtricity System Manager to delete all mirror consistency groups and remove all mirrored pairs from the local and remote storage arrays. In addition, follow the instructions in the online help to deactivate Asynchronous Mirroring.

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.
- Refer to the online help for SANtricity System Manager to delete all mirror consistency groups and remove all mirrored pairs from the local and remote storage arrays. In addition, follow the instructions in the online help to deactivate Asynchronous Mirroring.

Converting from FC to FC/iSCSI

Mirroring considerations:

- Synchronous Mirroring is not supported for iSCSI.
- If a storage array used for mirroring currently has only FC ports, and you want to convert some of them to iSCSI, you must determine which ports are used for mirroring.
- You do not need to convert the ports on the local storage array and the remote storage array to the same protocol as long as both storage arrays have at least one active FC port after the conversion.
- If you plan to convert the ports that are being used for mirrored relationships, you must deactivate any synchronous or asynchronous mirror relationships before applying the feature pack.
- If you plan to convert the ports that are *not* being used for mirroring, asynchronous mirroring operations will be unaffected.
- 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.

Data Assurance considerations:

- The Data Assurance (DA) feature is not supported for iSCSI.

  To ensure that data access remains uninterrupted, you might need to remap or remove DA volumes from host clusters before applying the feature pack.

If you have…	You must…
DA volumes in the default cluster	Remap all the DA volumes in the default cluster. • If you do not want to share DA volumes between hosts, follow these steps: a. Create a host partition for each set of FC host ports (unless this has already been done). b. Remap the DA volumes to the appropriate host ports. • If you want to share DA volumes between hosts, follow these steps: a. Create a host partition for each set of FC host ports (unless this has already been done). b. Create a host cluster that includes the appropriate host ports. c. Remap the DA volumes to the new host cluster. ⓘ This approach eliminates volume access to any volumes that remain in the default cluster.
DA volumes in a host cluster that contains FC-only hosts, and you want to add iSCSI-only hosts	Remove any DA volumes belonging to the cluster, using one of these options. ⓘ DA volumes cannot be shared in this scenario. • If you do not want to share DA volumes between hosts, remap all DA volumes to individual FC hosts within the cluster. • Segregate the iSCSI-only hosts into their own host cluster, and keep the FC host cluster as is (with shared DA volumes). • Add an FC HBA to the iSCSI-only hosts to allow for sharing of both DA and non-DA volumes.
DA volumes in a host cluster that contains FC-only hosts, or DA volumes that are mapped to an individual FC host partition	No action is needed before applying the feature pack. DA volumes will remain mapped to their respective FC host.

If you have…	You must…
No partitions defined	No action is needed before applying the feature pack because no volumes are currently mapped. After converting the host protocol, follow the proper procedure to create host partitions and, if desired, host clusters.

Converting from iSCSI to FC/iSCSI

- If you plan to convert a port that is being used for mirroring, you must move the mirroring relationships to a port that will remain iSCSI after the conversion.

  Otherwise, the communication link might be down after the conversion because of a protocol mismatch between the new FC port on the local array and the existing iSCSI port on the remote array.

- If you plan to convert the ports that are not being used for mirroring, asynchronous mirroring operations will be unaffected.

  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.

Converting from FC/iSCSI to FC

- When converting all host ports to FC, keep in mind that asynchronous mirroring over FC must occur on the highest-numbered FC port.
- If you plan to convert the ports being used for mirrored relationships, you must deactivate these relationships before applying the feature pack.

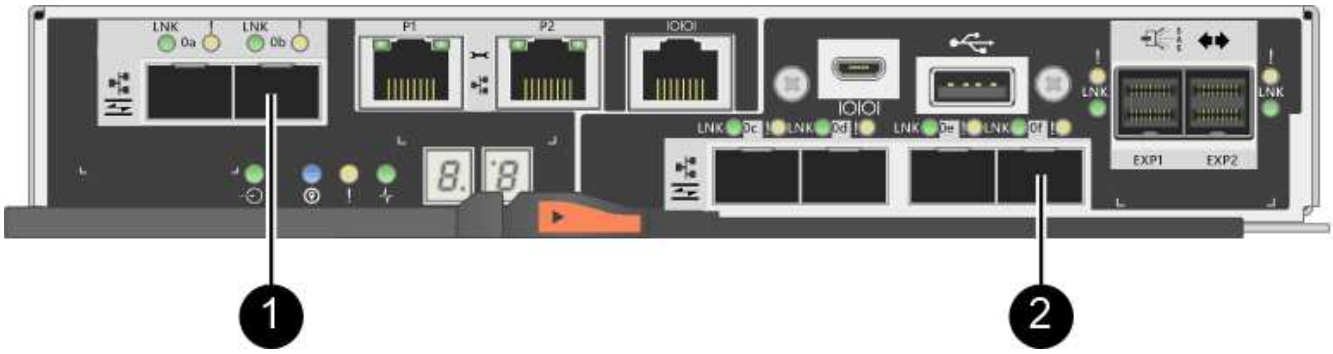
> **Possible data loss** — If you do not delete the asynchronous mirroring relationships that occurred over iSCSI before converting the ports to FC, the controllers might lock down, and you might lose data.

- If the storage array currently has iSCSI baseboard ports and FC HIC ports, asynchronous mirroring operations will be unaffected.

  Before and after the conversion, mirroring will occur on the highest-numbered FC port, which will remain the HIC port labeled **2** in the figure. 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.

- If the storage array currently has FC baseboard ports and iSCSI HIC ports, you must delete any mirroring relationships that occur over FC before applying the feature pack.

  When you apply the feature pack, mirroring support will move from the highest-numbered baseboard host port (labeled **1** in the figure) to the highest-numbered HIC port (labeled **2** in the figure).



Before the conversion			After the conversion			Required steps
Baseboard ports	HIC ports	Port used for mirroring	Baseboard ports	HIC ports	Port used for mirroring	
iSCSI	FC	**(2)**	FC	FC	**(2)**	Synchronize mirror consistency groups before and test communications after
FC	iSCSI	**(1)**	FC	FC	**(2)**	Delete mirroring relationships before and re-establish mirroring after

Converting from FC/iSCSI to iSCSI

- Synchronous Mirroring is not supported for iSCSI.
- If you plan to convert the ports that are being used for mirrored relationships, you must deactivate mirroring relationships before applying the feature pack.

> **Possible data loss** — If you do not delete the mirroring relationships that occurred over FC before converting the ports to iSCSI, the controllers might lock down, and you might lose data.

- If you do not plan to convert the ports that are being used for mirroring, mirroring operations will be unaffected.
- 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.

Same host protocol and mirroring operations

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. Refer to the online help for SANtricity System Manager if you have questions on how to do this.

Change host protocol for E2800

If you have an E2800 storage array with SFP+ (optical) host ports, you can change the host port protocol from Fibre Channel (FC) to iSCSI or from iSCSI to FC.

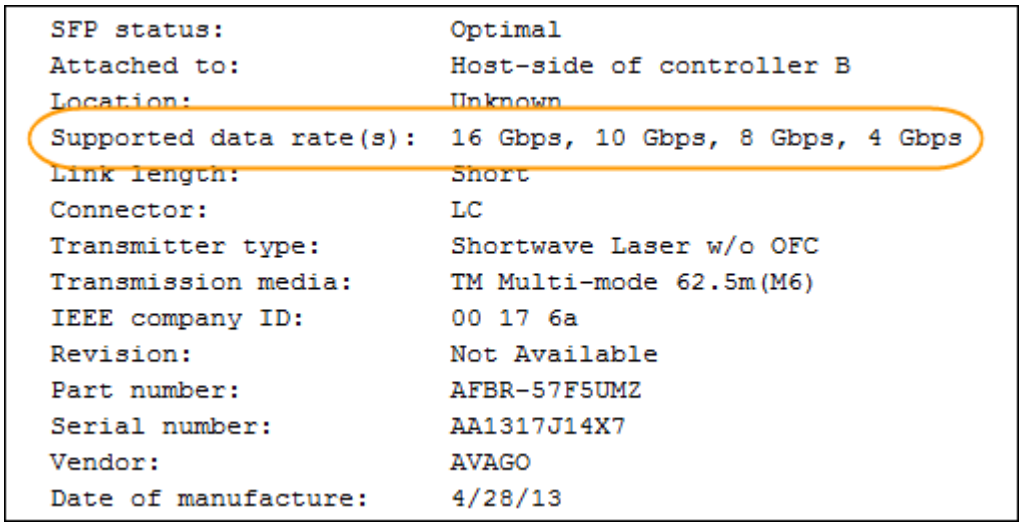
You can change the protocol used by the host ports built into the controller (*baseboard host ports*), the protocol used by the host ports on the host interface card (*HIC ports*), or the protocol of all host ports.

Step 1: Determine whether you have dual-protocol SFPs

Use SANtricity System Manager to determine what type of SFP transceivers you have. 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)**.



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, 4 Gbps	Dual-protocol	• **FC:** 16 Gbps, 4 Gbps • **iSCSI:**10 Gbps
25 Gbps, 10 Gbps	25 Gbps. 10 Gbps,	iSCSI only
32 Gbps, 16 Gbps, 8 Gbps, 4 Gbps	32 Gbps, 16 Gbps	FC only

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

  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.

  8Gbps FC SFPs are NOT supported in the E28xx or E57xx controllers. ONLY 16Gbps and 32 Gbps FC SFPs are supported.

- 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.

Step 2: Obtain 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.

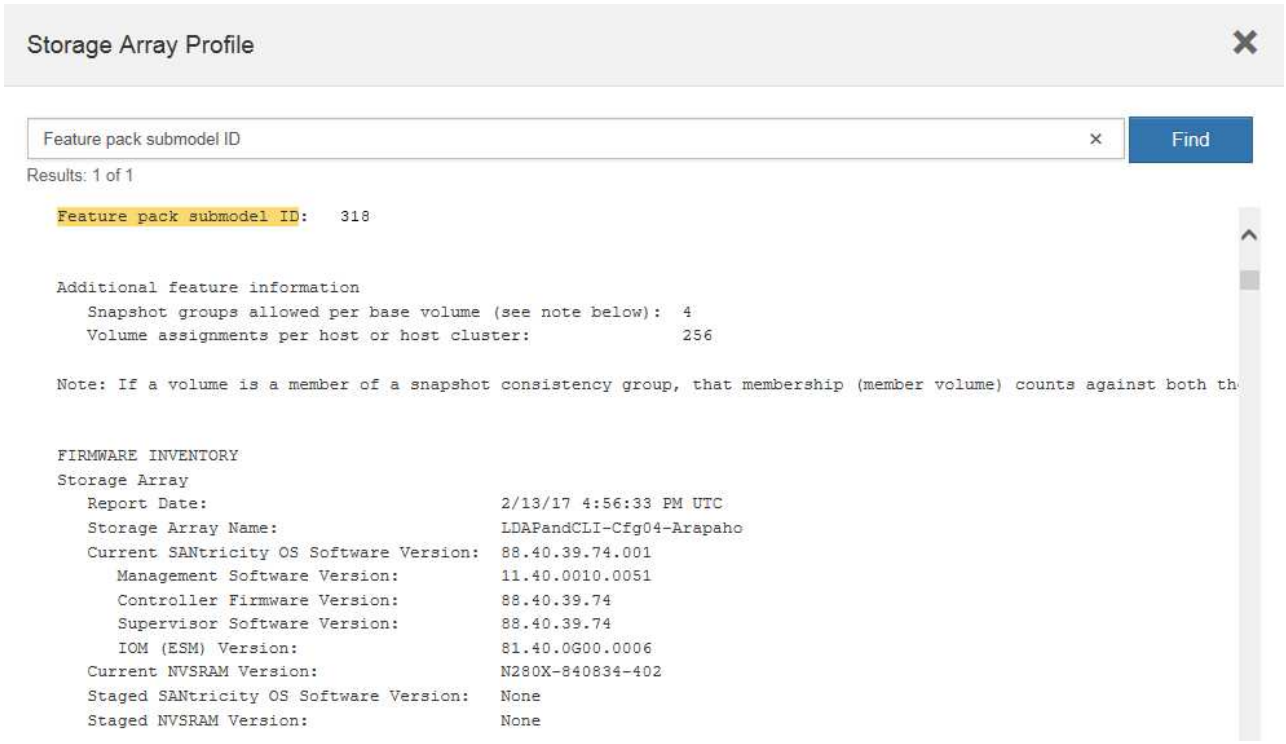
Steps

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

2. Locate the **feature pack submodel ID**.
   a. On the Support Resources tab, locate and select the **Storage Array Profile** link.
   b. Type **feature pack submodel ID** in the text box, and click **Find**.
   c. Locate the feature pack submodel ID for the starting configuration.



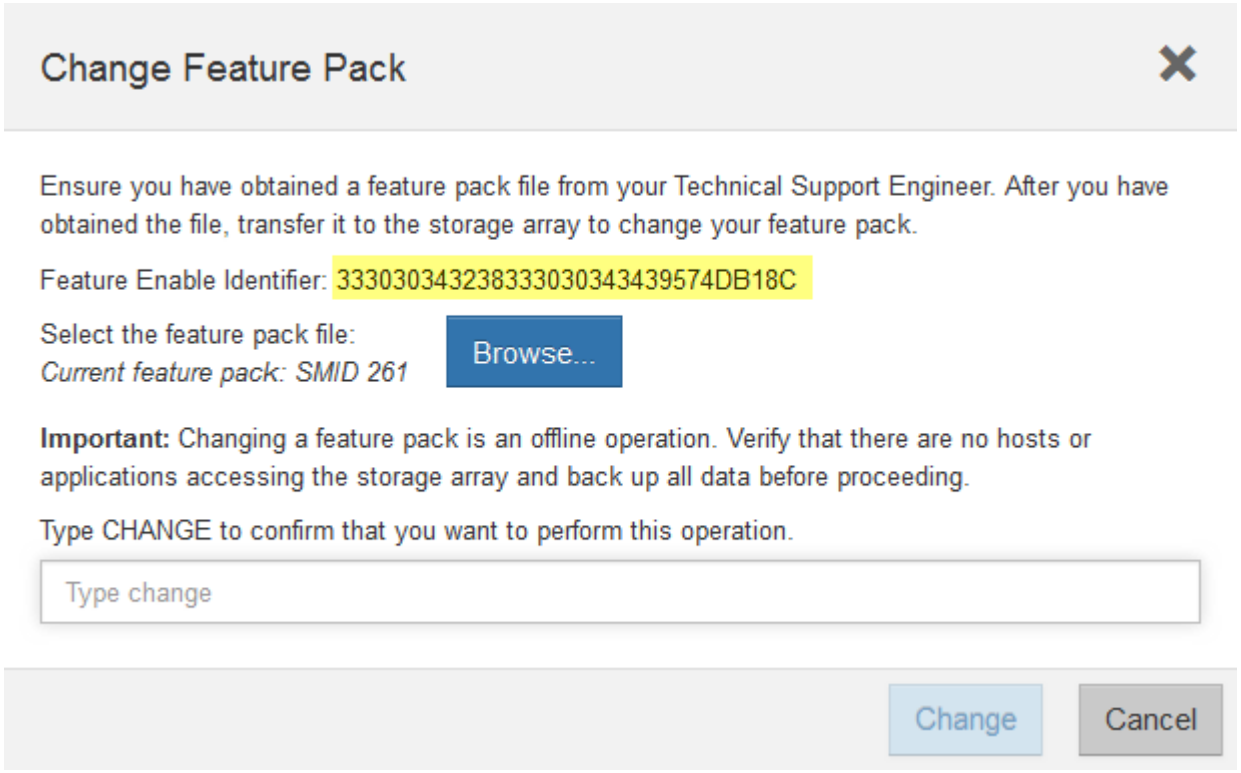
3. Using the feature pack submodel ID, locate the corresponding Controller submodel ID for the starting configuration and find the Feature Activation Code for the desired ending configuration within the table below. Then, copy that Feature Activation Code to a text file.

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	Baseboard ports	HIC ports	Controller submodel ID	Baseboard ports	HIC ports	
318	FC	FC	319	FC	iSCSI	ZGW-4L2-Z36IJ
			320	iSCSI	FC	4GZ-NL2-Z4NRP
			321	iSCSI	iSCSI	TG2-7L2-Z5485
			no HIC or not an optical HIC	321	iSCSI	TG2-7L2-Z5485
319	FC	iSCSI	318	FC	FC	1G5-QL2-Z7LFC
			320	iSCSI	FC	FG7-AL2-Z82RW
			321	iSCSI	iSCSI	5G7-0K2-Z0G8X
320	iSCSI	FC	318	FC	FC	4GP-HL2-ZYRKP
			319	FC	iSCSI	PGU-KL2-Z1P7I
			321	iSCSI	iSCSI	BGA-8K2-ZQWM5
321	iSCSI	iSCSI	318	FC	FC	SGH-UK2-ZUCJG
			319	FC	iSCSI	1GK-EK2-ZVSW1
			320	iSCSI	FC	AGM-XL2-ZWA8A

Starting configuration			Ending configuration			Feature Activation Code
Controller submodel ID	Baseboard ports	HIC ports	Controller submodel ID	Baseboard ports	HIC ports	
338	FC	FC	339	FC	iSCSI	PGC-RK2-ZREUT
			340	iSCSI	FC	MGF-BK2-ZSU3Z
			341	iSCSI	iSCSI	NGR-1L2-ZZ8QC
			no HIC or not an optical HIC	341	iSCSI	NGR-1L2-ZZ8QC
339	FC	iSCSI	338	FC	FC	DGT-7M2-ZKBMD
			340	iSCSI	FC	GGA-TL2-Z9J50
			341	iSCSI	iSCSI	WGC-DL2-ZBZIB
340	iSCSI	FC	338	FC	FC	4GM-KM2-ZGWS1
			339	FC	iSCSI	PG0-4M2-ZHDZ6
			341	iSCSI	iSCSI	XGR-NM2-ZJUGR
341	iSCSI	iSCSI	338	FC	FC	3GE-WL2-ZCHNY
			339	FC	iSCSI	FGH-HL2-ZDY3R
			340	iSCSI	FC	VGJ-1L2-ZFFEW

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.



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

> 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.

Step 3: Stop 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.

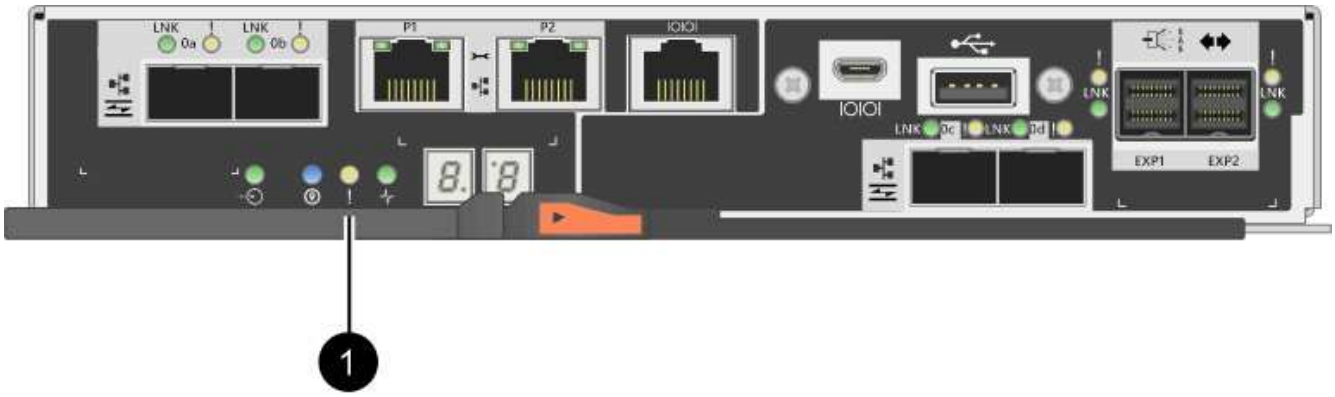
- Ensure that no applications are writing data to any LUNs mapped from the storage to the hosts.
- Unmount all file systems associated with volumes on the array.

> 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.

> **Possible data loss** — If you continue this procedure while I/O operations are occurring, the host application might lose access to the data because the storage is not 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.



Callout	Type of host ports
(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.

Step 4: Change the feature pack

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.

What’s next?

Go to Complete host protocol conversion.

Complete host protocol conversion for E2800

After converting the protocol of the host ports, you must perform additional steps before you can use the new protocol.

The steps depend on the starting and ending protocols of the baseboard host ports and the HIC ports.

Complete FC to iSCSI conversion

If you converted all host ports from FC to iSCSI, you must configure iSCSI networking.

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.

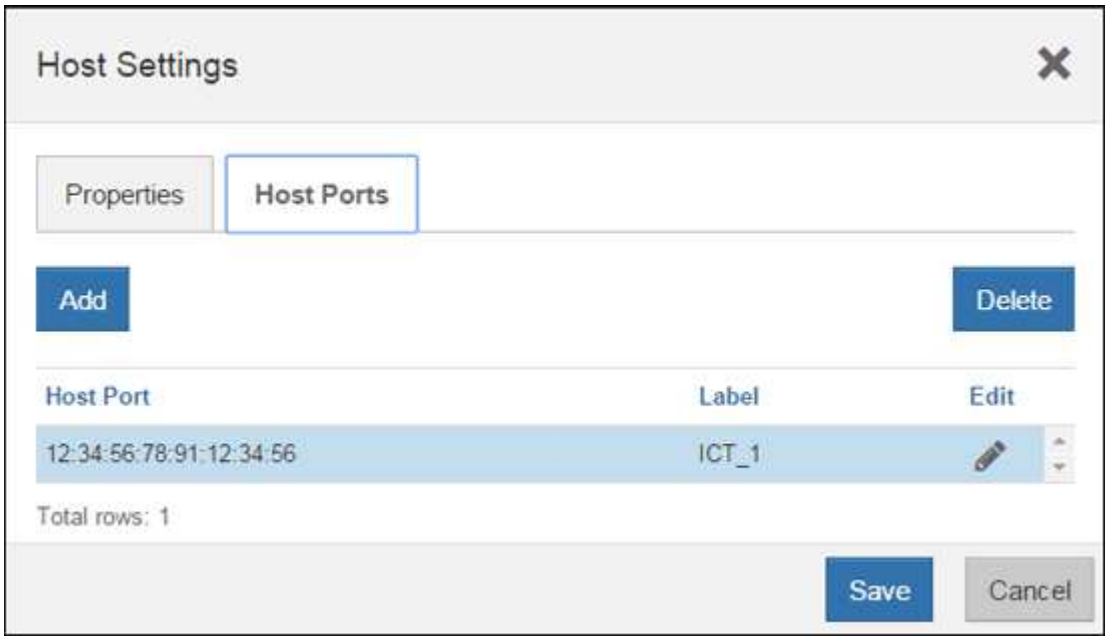
4. Update the host definitions in SANtricity System Manager.

   If you need instructions for 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.

Complete iSCSI to FC conversion

If you converted all host ports from iSCSI to FC, you must configure FC networking.

Steps

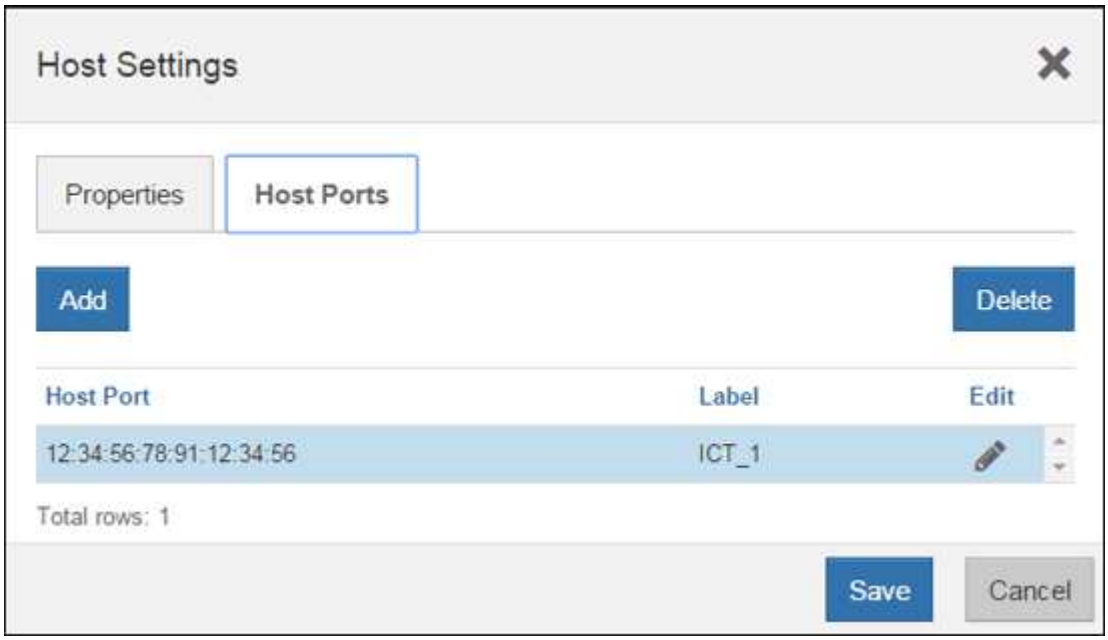
1. Install the HBA utility and determine initiator WWPNs.
2. Zone the switches.

   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.



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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.

Complete FC to FC/iSCSI conversion

If you previously had all FC host ports and you converted some of them to iSCSI, you might need to modify your existing configuration to support iSCSI.

You can use either of the following options to use the new iSCSI ports. The exact steps depend on your current and planned network topologies. Option 1 assumes that you want to attach new iSCSI hosts to the array. Option 2 assumes that you want to convert the hosts connected to the converted ports from FC to iSCSI.

Option 1: Move FC hosts and add new iSCSI hosts

1. Move any FC hosts from the new iSCSI ports to the ports that remain FC.
2. If you are not already using dual-protocol SFPs, remove any FC SFPs.
3. Attach new iSCSI hosts to these ports, either directly or by using a switch.
4. Configure iSCSI networking for the new hosts and ports. For instructions, refer to the Linux express configuration, Windows express configuration, or VMware express configuration.

Option 2: Convert FC hosts to iSCSI

1. Shut down the FC hosts connected to the converted ports.
2. Provide an iSCSI topology for the converted ports. For example, convert any switches from FC to iSCSI.
3. If you are not already using dual-protocol SFPs, remove the FC SFPs from the converted ports, and replace them with iSCSI SFPs or dual-protocol SFPs.
4. Attach cables to the SFPs in the converted ports, and confirm they are connected to the correct iSCSI switch or host.
5. Power on the hosts.
6. Use the NetApp Interoperability Matrix tool to configure the iSCSI hosts.
7. Edit the host partition to add the iSCSI host port IDs and remove the FC host port IDs.
8. After the iSCSI hosts reboot, use the applicable procedures on the hosts to register the volumes and to make them available to your operating system.
   - Depending on your operating system, two utilities are included with the storage management software (hot_add and SMdevices). These utilities help register the volumes with the hosts and also show the applicable device names for the volumes.
   - You might need to use specific tools and options that are provided with your operating system to make the volumes available (that is, assign drive letters, create mount points, and so on). Refer to your host operating system documentation for details.

Complete iSCSI to FC/iSCSI conversion

If you previously had all iSCSI host ports and you converted some of them to FC, you might need to modify

your existing configuration to support FC.

You can use either of the following options to use the new FC ports. The exact steps depend on your current and planned network topologies. Option 1 assumes that you want to attach new FC hosts to the array. Option 2 assumes that you want to convert the hosts connected to the converted ports from iSCSI to FC.

Option 1: Move iSCSI hosts and add new FC hosts

1. Move any iSCSI hosts from the new FC ports to the ports that remain iSCSI.
2. If you are not already using dual-protocol SFPs, remove any FC SFPs.
3. Attach new FC hosts to these ports, either directly or by using a switch.
4. Configure FC networking for the new hosts and ports. For instructions, refer to the Linux express configuration, Windows express configuration, or VMware express configuration.

Option 2: Convert iSCSI hosts to FC

1. Shut down the iSCSI hosts connected to the converted ports.
2. Provide an FC topology for the converted ports. For example, convert any switches from iSCSI to FC.
3. If you are not already using dual-protocol SFPs, remove the iSCSI SFPs from the converted ports, and replace them with FC SFPs or dual-protocol SFPs.
4. Attach cables to the SFPs in the converted ports, and confirm they are connected to the correct FC switch or host.
5. Power on the hosts.
6. Use the NetApp Interoperability Matrix tool to configure the FC hosts.
7. Edit the host partition to add the FC host port IDs and remove the iSCSI host port IDs.
8. After the new FC hosts reboot, use the applicable procedures on the hosts to register the volumes and to make them available to your operating system.
    - Depending on your operating system, two utilities are included with the storage management software (hot_add and SMdevices). These utilities help register the volumes with the hosts and also show the applicable device names for the volumes.
    - You might need to use specific tools and options that are provided with your operating system to make the volumes available (that is, assign drive letters, create mount points, and so on). Refer to your host operating system documentation for details.

Complete FC/iSCSI to FC conversion

If you previously had a combination of FC host ports and iSCSI host ports and you converted all ports to FC, you might need to modify your existing configuration to use the new FC ports.

You can use either of the following options to use the new FC ports. The exact steps depend on your current and planned network topologies. Option 1 assumes that you want to attach new FC hosts to the array. Option 2 assumes that you want to convert the hosts connected to ports 1 and 2 from iSCSI to FC.

Option 1: Remove iSCSI hosts and add FC hosts

1. If you are not already using dual-protocol SFPs, remove any iSCSI SFPs, and replace them with FC SFPs or dual-protocol SFPs.
2. If you are not already using dual-protocol SFPs, remove any FC SFPs.

3. Attach new FC hosts to these ports, either directly or by using a switch
4. Configure FC networking for the new hosts and ports. For instructions, refer to the Linux express configuration, Windows express configuration, or VMware express configuration.

Option 2: Convert iSCSI hosts to FC

1. Shut down the iSCSI hosts connected to the ports you converted.
2. Provide an FC topology for these ports. For example, convert any switches connected to those hosts from iSCSI to FC.
3. If you are not already using dual-protocol SFPs, remove the iSCSI SFPs from the ports, and replace them with FC SFPs or dual-protocol SFPs.
4. Attach cables to the SFPs, and confirm they are connected to the correct FC switch or host.
5. Power on the hosts.
6. Use the NetApp Interoperability Matrix tool to configure the FC hosts.
7. Edit the host partition to add the FC host port IDs and remove the iSCSI host port IDs.
8. After the new FC hosts reboot, use the applicable procedures on the hosts to register the volumes and to make them available to your operating system.
    - Depending on your operating system, two utilities are included with the storage management software (hot_add and SMdevices). These utilities help register the volumes with the hosts and also show the applicable device names for the volumes.
    - You might need to use specific tools and options that are provided with your operating system to make the volumes available (that is, assign drive letters, create mount points, and so on). Refer to your host operating system documentation for details.

Complete FC/iSCSI to iSCSI conversion

If you previously had a combination of FC host ports and iSCSI host ports and you converted all ports to iSCSI, you might need to modify your existing configuration to use the new iSCSI ports.

You can use either of the following options to use the new iSCSI ports. The exact steps depend on your current and planned network topologies. Option 1 assumes that you want to attach new iSCSI hosts to the array. Option 2 assumes that you want to convert the hosts from FC to iSCSI.

Option 1: Remove FC hosts and add iSCSI hosts

1. If you are not already using dual-protocol SFPs, remove any FC SFPs, and replace them with iSCSI SFPs or dual-protocol SFPs.
2. Attach new iSCSI hosts to these ports, either directly or by using a switch.
3. Configure iSCSI networking for the new hosts and ports. For instructions, refer to the Linux express configuration, Windows express configuration, or VMware express configuration.

Option 2: Convert FC hosts to iSCSI

1. Shut down the FC hosts connected to the ports you converted.
2. Provide an iSCSI topology for these ports. For example, convert any switches connected to those hosts from FC to iSCSI.
3. If you are not already using dual-protocol SFPs, remove the FC SFPs from the ports, and replace them with iSCSI SFPs or dual-protocol SFPs.

4. Attach cables to the SFPs, and confirm they are connected to the correct iSCSI switch or host.
5. Power on the hosts.
6. Use the NetApp Interoperability Matrix tool to configure the ISCSI hosts.
7. Edit the host partition to add the iSCSI host port IDs and remove the FC host port IDs.
8. After the new iSCSI hosts reboot, use the applicable procedures on the hosts to register the volumes and to make them available to your operating system.
    - Depending on your operating system, two utilities are included with the storage management software (hot_add and SMdevices). These utilities help register the volumes with the hosts and also show the applicable device names for the volumes.
    - You might need to use specific tools and options that are provided with your operating system to make the volumes available (that is, assign drive letters, create mount points, and so on). Refer to your host operating system documentation for details.

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