

# IBM System Storage DS4700 Express Storage Subsystem Fibre Channel Cabling Guide



Table 1 summarizes the steps required to correctly install, cable, and power on your IBM® System Storage™ DS4700 Express Storage Subsystem. Unless otherwise stated, all the following tasks are detailed in the sections referenced in the *IBM System Storage DS4700 Express Installation, User's, and Maintenance Guide*. Review the multilingual *IBM Safety Information* document and read all safety information in the *DS4700 Express Installation, User's, and Maintenance Guide* before you begin the installation.

**Attention:** Before powering on the DS4700 Express Storage Subsystem, it must be populated with at least two Enhanced Disk Drive Modules (E-DDMs). If at least two E-DDMs are not installed in each attached storage expansion enclosure or DS4700 Storage Subsystem, when you power on the DS4700 Express and its attached storage expansion enclosures, your standard storage partition key might be lost and must be regenerated. In addition, the resulting insufficient load to the enclosure power supplies might cause them to intermittently appear as failed, falsely indicating the power supplies are bad. All E-DDMs in the DS4700 Express Storage Subsystem and the connected storage expansion enclosure or enclosures must contain no prior configuration data.

*Table 1. Installation Tasks*

	Task	Detailed Description
1	Review the DS4700 Express installation recommendations and requirements.	"Preparing for installation" in Chapter 2  "Handling static-sensitive devices" in Chapter 2
2	Fold down and open the sides of the shipping box. Without removing the DS4700 Express from box, you can remove the DS4700 Express rack mounting rails and hardware from the box. Install the support rails in the rack cabinet.	"Installing the support rails" in Chapter 2
3	Before removing the DS4700 Express from the shipping box, remove the components to lighten the unit.	"Removing the CRUs" in Chapter 2
4	Record the serial number, machine type, model number, and RAID controller MAC addresses for your DS4700 Express.	Appendix A, "Records"
5	Install and secure the DS4700 Express chassis in the rack cabinet.	"Installing the DS4700 Express into a rack on the support rails" in Chapter 2
6	Replace the components in the installed DS4700 Express chassis.	"Replacing the components" in Chapter 2
7	Install in the rack cabinet the DS4000 storage expansion enclosures that you plan to cable to the DS4700 Express.	<i>Installation, User's, and Maintenance Guide</i> for your DS4000 storage expansion enclosure
8	If there is any storage expansion enclosure to be attached to the DS4700 Express, use SFP modules and FC cables to cable the DS4700 Express to the DS4000 storage expansion enclosure.	"Connecting storage expansion enclosures to the DS4700 Express" in Chapter 3

Table 1. Installation Tasks (continued)

	Task	Detailed Description
9	<p>(If applicable) After you cable the DS4000 storage expansion enclosures, set the enclosure IDs of any storage expansion enclosures in the DS4700 Express configuration that require their enclosure IDs to be manually set. Ensure that all enclosures including the DS4700 Express Storage Subsystems have a unique drive enclosure ID, including a unique value in the singles digit (x1).</p> <p>For example, enclosure IDs for EXP710 storage expansion enclosures must be set manually while enclosure IDs for EXP810 storage expansion enclosures are automatically set by the controller.</p>	"Storage expansion enclosure settings" in Chapter 3
10	<p><b>For out-of-band management:</b></p> <ul style="list-style-type: none"> <li>• Cable the DS4700 Express Ethernet ports to either the management workstation or to the hosts.</li> <li>• Use the default IP addresses for out-of-band connection, or change the IP addresses by using Dynamic Host Configuration Protocol (DHCP) or Storage Manager client.</li> </ul>	"Connecting secondary interface cables" in Chapter 3
	<p><b>For in-band management:</b> Cable the DS4700 Express host channels to the FC HBAs in either the hosts or the FC switch that connects to the host FC HBAs.</p>	"Connecting hosts to the DS4700 Express" in Chapter 3
11	Connect the power cables for the DS4700 Express and the storage expansion enclosures if needed. For models with DC power supplies, ensure that the appropriate disconnect device is installed between the DC power supply and the DC power source.	"Cabling the power supply" in Chapter 3
12	Power on the attached storage expansion enclosures and the DS4700 Express storage subsystem.	"Turning on the storage subsystem" in Chapter 4
13	Review the controller firmware and NVSRAM, drive enclosure firmware, ESM firmware, and Storage Manager software requirements and obtain upgrades if necessary.	"Software and hardware compatibility and upgrades" in Chapter 1
14	Install the DS4000 Storage Manager 9.19 host software on the management workstation (for out-of-band management) or on the host (for in-band management). Use the DS4000 Storage Manager software to verify the configuration.	<i>IBM DS4000 Storage Manager Version 9 Installation and Support Guide</i> for your operating system
15	Review and perform the DS4000 Health Check process.	"Performing the DS4000 Health Check process" in Chapter 4

The following illustrations and instructions provide a very brief overview of the cabling tasks required after you install the DS4700 Express in a rack cabinet. Review the following sections and then follow the instructions provided in the *IBM System Storage DS4700 Express Installation, User's, and Maintenance Guide*.

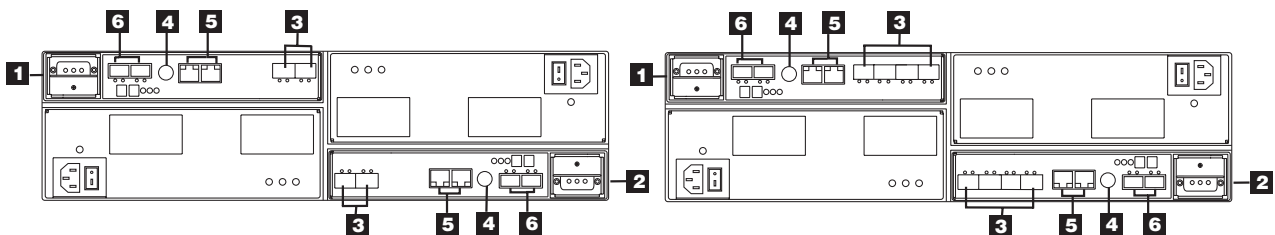


Figure 1. DS4700 Express controller ports for models 70 and 72

Table 2. DS4700 Express controller ports for models 70 and 72

Number	Description
1	Controller A
2	Controller B
3	Host ports 2 and 1 on Controller A - Model 70 Host ports 1 and 2 on Controller B - Model 70 Host ports 4, 3, 2 and 1 on Controller A - Model 72 Host ports 1, 2, 3 and 4 on Controller B - Model 72
4	Serial port
5	Ethernet ports 2 and 1 on Controller A Ethernet ports 1 and 2 on Controller B
6	Drive Channel 1 - Ports 2 and 1 on Controller A Drive Channel 2 - Ports 1 and 2 on Controller B

**Note:** A drive channel consists of two fibre channel ports. Use one drive channel from each controller to create a redundant drive channel loop. See the *System Storage DS4700 Express Installation, User's, and Maintenance Guide* for more details.

## Installing Small Form-Factor Pluggable (SFP) modules and fibre channel cables



### Statement 3:

**DANGER:** Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following: Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

All host and drive cabling connections require you to use SFP modules in the DS4700 Express host and drive channels used by the cabling connections. The SFP module housing and fibre channel cable have integrated guide keys that prevent you from inserting these devices incorrectly. Insert SFP modules into ports with minimal pressure so that you do not damage either the SFP module or the port. You can insert an SFP module into an active port without affecting the operational loop performance. You must connect the fibre channel cable to the SFP module after you insert the SFP module into the port.

**Attention:** To avoid damage to your fibre-optic cables:

- Do not route the cable along a folding cable-management arm.
- Route the cable away from places where it can be damaged by other devices in the cabinet.
- For devices on slide rails, leave enough slack in the cable so that it does not bend to a diameter of less than 76 mm (3 in.) or a radius less than 38 mm (1.5 in.) when extended or become pinched when retracted.
- Do not use plastic cable ties in place of the provided cable straps.
- Do not put excess weight on the cable at the connection point. Be sure that the cable is well supported.

To install an SFP module and fibre channel cable:

1. Remove the protective caps from the SFP module and from the fibre channel cable. Do not touch the exposed fibre-optic cable.
2. Insert the SFP module into a DS4700 Express controller port.
3. Connect the fibre channel cable to the SFP module.

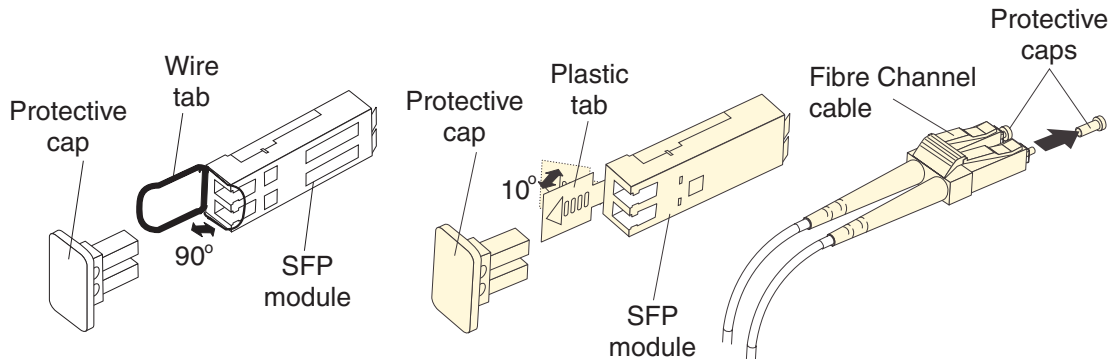


Figure 2. Connecting fibre channel cable to the SFP module

## Redundant drive-side fibre channel cabling

**Attention:** Review the cabling information in Chapter 3 of the *IBM System Storage DS4700 Express Installation, User's, and Maintenance Guide*. Pay attention to the "Connecting storage expansion enclosures to the DS4700" and "DS4700 Storage Subsystem and supported storage expansion enclosure drive cabling schemes" sections. Failure to observe the recommended storage expansion enclosure cabling topology and limitations might result in non-optimal drive channels. Ensure that each storage expansion enclosure and the DS4700 Express Storage Subsystem has a unique enclosure ID, including a unique value in the singles digit.

The *IBM System Storage DS4700 Express Installation, User's, and Maintenance Guide* describes the importance of redundant cabling and provides redundant cabling diagrams for connecting DS4000 storage expansion enclosures to your DS4700 Express. Refer to "Connecting storage expansion enclosures to the DS4700 Express", which provides diagrams of recommended topologies for enclosures.

Figure 3 on page 5 shows the recommended redundant cabling topology for attaching a single DS4000 EXP710 storage expansion enclosure to the DS4700 Express storage subsystem. The topology shown uses ports from drive channels 1 (on controller A) and 2 (on controller B) to achieve a redundant connection to the DS4000 enclosure. (In the graphic, **1** represents the IN port and **2** represents the OUT port).

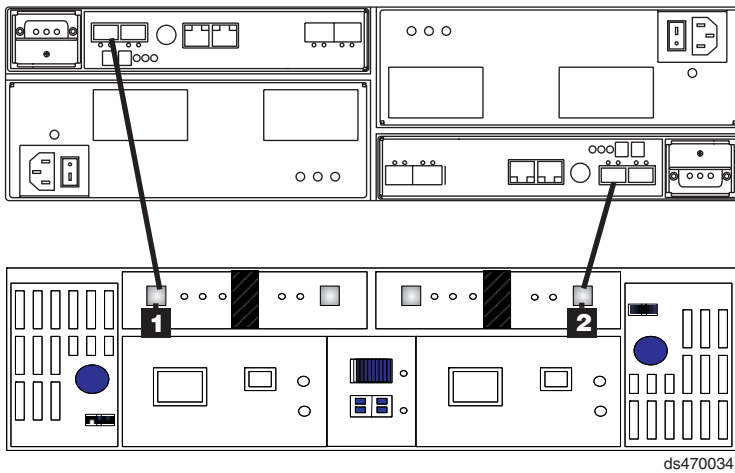


Figure 3. Redundant drive-side fibre channel cabling topology for the DS4700 and EXP710

Figure 4 shows the recommended redundant cabling topology for attaching a single DS4000 EXP810 storage expansion enclosure to the DS4700 Express storage subsystem. The topology shown uses ports from drive channels 1 (on controller A) and 2 (on controller B) to achieve a redundant connection to the DS4000 enclosure. (In the graphic, **1** represents the EXP810 port labeled 1B.)

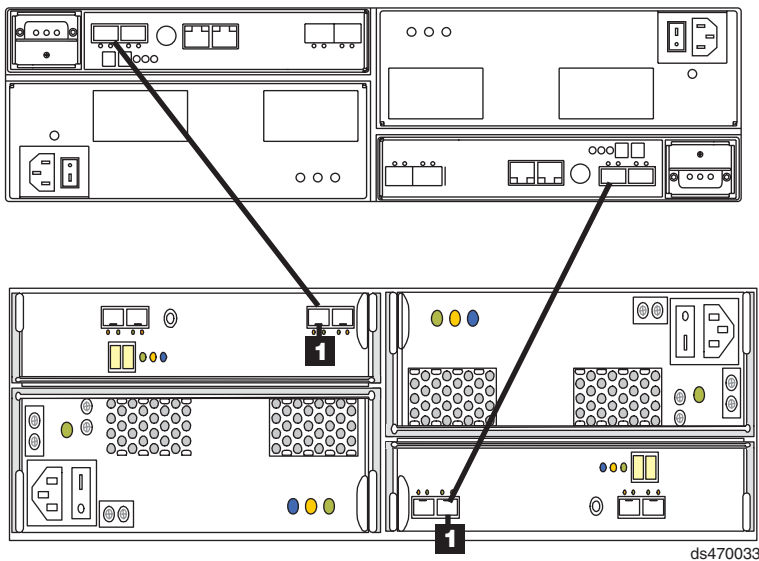


Figure 4. Redundant drive-side fibre channel cabling topology for the DS4700 and EXP810

## DS4000 storage expansion enclosure support

The DS4700 Express supports a maximum of 112 drives in one redundant drive channel pair. The DS4700 Express storage subsystem enables you to mix certain storage expansion enclosure models in the same configuration. In some cases, to intermix storage expansion enclosure models you must meet additional requirements, such as firmware updates or grouping restrictions. You might also need to purchase additional premium features. Refer to the *IBM System Storage DS4000 Hard Drive and Storage Expansion Enclosure Installation and Migration Guide* and the *IBM System Storage DS4700 Express Storage Subsystem*

*Installation, User's and Maintenance Guide* for complete information on enclosure support and intermixing requirements for the DS4700 Express storage subsystem.

## Redundant host-side fibre channel cabling

The DS4700 Express supports direct-attached redundant connections to up to four hosts. To ensure full protection against the loss of any one fibre channel path from the host servers to the DS4700 Express storage subsystem, always use redundant host connections by connecting each host to the appropriate single-ported host channels on both RAID controllers A and B.

1. To connect the first host server to the DS4700 Express storage subsystem, connect one host server FC host adapter to host channel 1 of controller A (top), and connect the other host server FC host adapter to host channel 1 of controller B (bottom).
2. To connect additional redundant hosts, connect the two host server FC host adapters to the next host channels on each controller (A and B), as shown in the following figure.

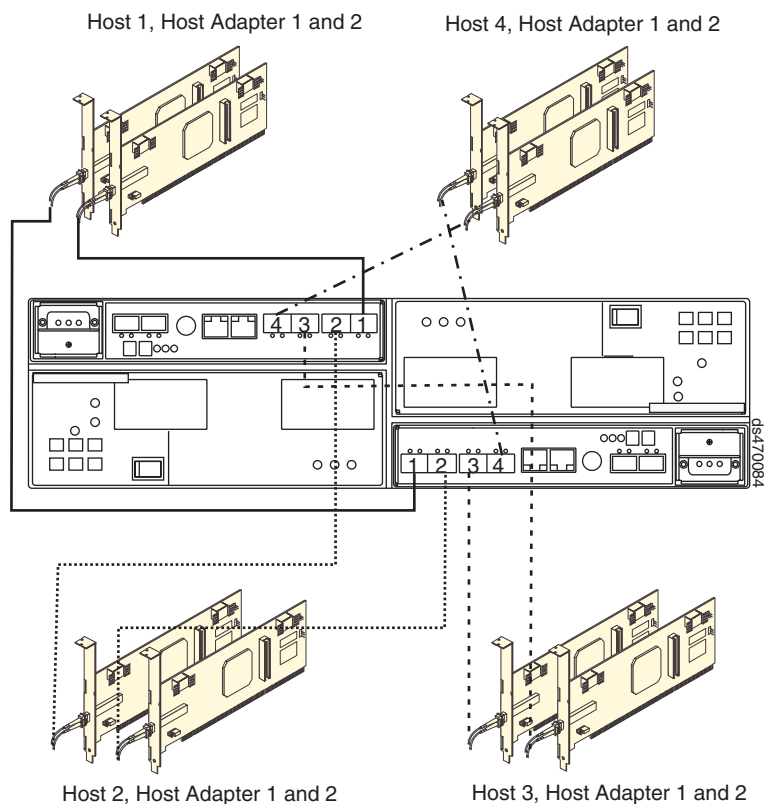


Figure 5. Redundant host-side fibre channel cabling topology

**Note:** Instead of connecting to a fibre channel host bus adapter, you can also connect to fibre channel switch ports.

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