

# IBM System Storage

## DS4000 Fibre Channel and Serial ATA Intermix Premium Feature Installation Overview



**Note:** For the most current information on the DS4000 Fibre Channel and Serial ATA (FC/SATA) Intermix premium feature, see the IBM® System Storage® Support Web site:

[www.ibm.com/servers/storage/support/disk/](http://www.ibm.com/servers/storage/support/disk/)

The DS4000 FC/SATA Intermix premium feature supports the concurrent attachment of Fibre Channel and SATA storage expansion enclosures to a single DS4000 controller configuration.

With this premium feature, you can create and manage distinct arrays or logical drives that are built from either Fibre Channel disks or SATA disks in a DS4000 Storage Subsystem, and allocate the drives to the appropriate applications in the attached host servers.

**Note:** You must purchase the DS4000 FC/SATA Enclosure Intermix premium feature for each DS4000 Storage Subsystem that will have drive channels/loops intermixing SATA and Fibre Channel technology drives.

This DS4000 FC/SATA Intermix premium feature supports the following combinations of DS4000 storage subsystems and storage expansion enclosures:

1. DS4500, DS4400, and DS4300 storage subsystems with Standard/Base or Turbo options support the concurrent attachment of EXP700 and EXP710 Fibre Channel expansion enclosures and EXP100 SATA expansion enclosures.
2. DS4300 storage subsystems with Standard/Base or Turbo options that have Fibre Channel drives installed in the DS4300 drive slots support the concurrent attachment of EXP100 SATA expansion enclosures.
3. DS4800 storage subsystems support the concurrent attachment of EXP710 Fibre Channel and EXP100 SATA expansion enclosures.
4. DS4700 and DS4800 storage subsystems support the concurrent attachment of EXP710 Fibre Channel expansion enclosures and EXP810 expansion enclosures that have Fibre Channel drives installed with other EXP810 enclosures that have SATA drives installed.
5. DS4700 storage subsystems that have Fibre Channel drives installed in the DS4700 drive slots support the concurrent attachment of EXP810 enclosures that have SATA drives installed.
6. DS4700 storage subsystems that have SATA drives installed in the DS4700 drive slots support the concurrent attachment of EXP710 Fibre Channel expansion enclosures and EXP810 enclosures that have Fibre Channel drives installed.

For information regarding future support for other Fibre Channel/SATA intermix combinations of DS4000 storage subsystems and storage expansion enclosures, contact your IBM reseller or representative or check the DS4000 Interoperability Matrix at the following Web site:

[www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html](http://www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html)

## Firmware requirements

The FC/SATA Intermix premium feature requires that you upgrade the DS4000 Storage Manager and controller firmware. See Table 1 on page 2 for the versions that are applicable to your DS4000 storage subsystem model.

**Important:** Before you begin the upgrade, see the readme files that are packaged with the DS4000 Storage Manager host software or controller firmware for any prerequisites and for any required updating sequences. You can also refer to the DS4000 Installation, User's, and Maintenance Guides for your specific storage subsystem and disk expansion enclosures for more information.

Table 1. Required DS4000 Storage Manager and subsystem controller firmware levels, by DS4000 subsystem model type

DS4000 Subsystem Model	DS4000 Storage Manager version	DS4000 controller firmware version
DS4300	9.16 or later	6.12.23.xx or later
DS4400	9.16 or later	6.12.23.xx or later
DS4500	9.16 or later	6.12.23.xx or later
DS4700	9.16 or later	6.16.86.xx or later.
DS4800	9.16 or later	<p>6.15.xx.xx when intermixing EXP710s and EXP100s only. (DS4800 controller firmware version 6.15.xx.xx does not currently support EXP810s.)</p> <p><b>Note:</b> Even though controller firmware version 6.14.xx.xx supports the intermixing of EXP100 and EXP710 expansion enclosures together, IBM strongly recommends using version 6.15.xx.xx.</p> <hr/> <p>6.16.86.xx or later when intermixing EXP810s with SATA E-DDMs and EXP710s, or EXP810s with Fibre Channel E-DDMs.</p> <p><b>Note:</b> DS4800 controller firmware version 6.16.xx.xx does not support EXP100s.</p>

**Note:** For the most current version of the DS4000 Storage Manager and storage subsystem controller firmware, see the IBM System Storage Support Web site:

[www.ibm.com/servers/storage/support/disk/](http://www.ibm.com/servers/storage/support/disk/)

## FC/SATA Intermix Option installation kit

The FC/SATA Intermix Option installation kit includes the following items:

- This publication, *IBM System Storage DS4000 Fibre Channel and Serial ATA Intermix Premium Feature Installation Overview*
- The DS4000 FC/SATA Intermix premium feature entitlement document
- The DS4000 FC/SATA Intermix premium feature activation document, which includes the feature activation code and the instructions about how to generate the key file

## Installing the FC/SATA Intermix premium feature

Complete the following steps to install the FC/SATA Intermix premium feature upgrade:

1. Purchase an IBM System Storage DS4000 Fibre Channel/SATA Intermix entitlement. Contact your IBM reseller or representative for additional information.

- Upgrade your DS4000 ESM firmware to the level that is compatible with each particular enclosure type.

**Attention:** You should perform any required ESM code upgrades before you perform any other code upgrades. See Table 2 to find the ESM firmware levels that are compatible with each enclosure type.

Table 2. ESM firmware levels by storage expansion enclosure type

Storage expansion enclosure type	ESM firmware level
DS4000 EXP100	9563 or later (9565 is current). See note a, below
DS4000 EXP700	9326 or later (9330 is current). See notes b and c, below
DS4000 EXP710	9629 or later (9639 is current).
DS4000 EXP810	9865 or later

**Notes:**

- If a DS4000 storage subsystem has an EXP100 ESM firmware version earlier than 9554 installed, you must upgrade the firmware to version 9554 before upgrading to version 9563 or 9565. (Please note that the controller firmware version must be version 5.41.1x.xx in order to upgrade the earlier version of ESM firmware to version 9554.)
- You must upgrade the EXP700 ESM firmware to version 9326 before you upgrade the DS4000 storage subsystem controller firmware to version 06.1x.xx.xx.
- DS4700 and DS4800 storage subsystems do not support DS4000 EXP700 expansion enclosures. If you have an EXP700, you can upgrade it to an EXP710 by purchasing the *DS4000 EXP700 Models 1RU/1RX Switched-ESM Option Upgrade Kit*.

- If necessary, upgrade your host software to DS4000 Storage Manager version 9.16 or later. You can download Storage Manager software from the IBM DS4000 Storage Manager Support Web site: [www.ibm.com/servers/storage/support/disk/](http://www.ibm.com/servers/storage/support/disk/)  
Refer to the Storage Manager Installation and Support Guide for the appropriate host operating system.
- Upgrade your DS4000 Storage Subsystem controller firmware to the appropriate version for your storage subsystem model, as indicated in Table 1 on page 2. For more information, see the IBM DS4000 Storage Manager Installation and Support Guide for the appropriate host operating system. You can download the latest versions of the DS4000 Storage Subsystem controller firmware and Storage Manager host software from the DS4000 System Storage Support Web page: [www.ibm.com/servers/storage/support/disk/](http://www.ibm.com/servers/storage/support/disk/)
- The DS4000 FC/SATA Intermix premium feature is entitled, and therefore it requires the use of a feature key to enable the option. To obtain the feature key identifier, you need a feature activation code, which is printed on the IBM premium feature activation card (included with this DS4000 FC/SATA Intermix premium feature kit). You also need your controller unit IBM serial number, which is printed on the label on the back of your DS4000 storage subsystem.  
Using the instructions in the DS4000 FC/SATA Intermix premium feature activation card, generate the FC/SATA Intermix premium feature key to enable FC/SATA Intermix functionality.

**Note:** Save the premium feature enable key file in a safe place.

## Restrictions

**Important:** When you add drive expansion enclosures of different types, the grouping of the enclosure types might force the new enclosures to be cabled in the middle of the drive loop. In this case, IBM strongly recommends that you power down the configuration or schedule your installations during offpeak I/O periods. You can use the performance monitor function in the DS4000 Storage Manager Subsystem Management window to determine offpeak I/O periods.

If you cannot power down the configuration to install a new enclosure in the middle of the loop, you must use DS4000 Storage Manager to verify that the interrupted drive loop is in Optimal state before you modify the other drive loop. This minimizes the possibility that arrays might fail as a result of cabling errors.

Therefore, it is also important to plan for additions to the configuration prior to your initial installation. It is also best practice to take these same precautions when you add new enclosures to either end of the redundant drive loop.

For more information, see the *IBM System Storage DS4000 Hard Drive and Storage Expansion Enclosure Installation and Migration Guide*.

The following restrictions apply to the use of the DS4000 FC/SATA Intermix premium feature:

#### **Compatible storage subsystems**

Only the following DS4000 Storage Subsystems support the FC/SATA Intermix premium feature:

- DS4300 Standard/Base or Turbo
- DS4400
- DS4500
- DS4700
- DS4800

#### **Limitations:**

- DS4300 Standard/Base and Turbo, DS4400, and DS4500 storage subsystems do not currently support EXP810 expansion enclosures.
- DS4700 storage subsystems do not support EXP100 expansion enclosures.
- EXP810 FC/SATA Intermix is supported at the enclosure level only. You cannot intermix Fibre Channel and SATA drives within the same enclosure.
- You cannot intermix EXP810 expansion enclosures, with either Fibre Channel or SATA drives, with EXP100 expansion enclosures.
- You cannot attach more than four EXP810s to one drive port.

For information regarding future DS4000 FC/SATA Intermix interoperability, contact your IBM reseller or representative or check the DS4000 Interoperability Matrix at the following Web site:

[www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html](http://www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html)

#### **Grouping DS4000 storage expansion enclosures in a redundant drive loop**

##### **Attention:**

Configurations that do not follow this DS4000 storage expansion enclosures grouping restriction are not supported.

When mixing enclosures with Fibre Channel and SATA drives in a drive loop (DS4300/DS4400/DS4500) or behind a drive channel port (DS4700/DS4800), always group the enclosures with the same drive interface technology together. Figure 1 on page 5 shows a correct way and an incorrect way to group expansion enclosures that are attached to a DS4300, DS4400 or DS4500 storage subsystem:

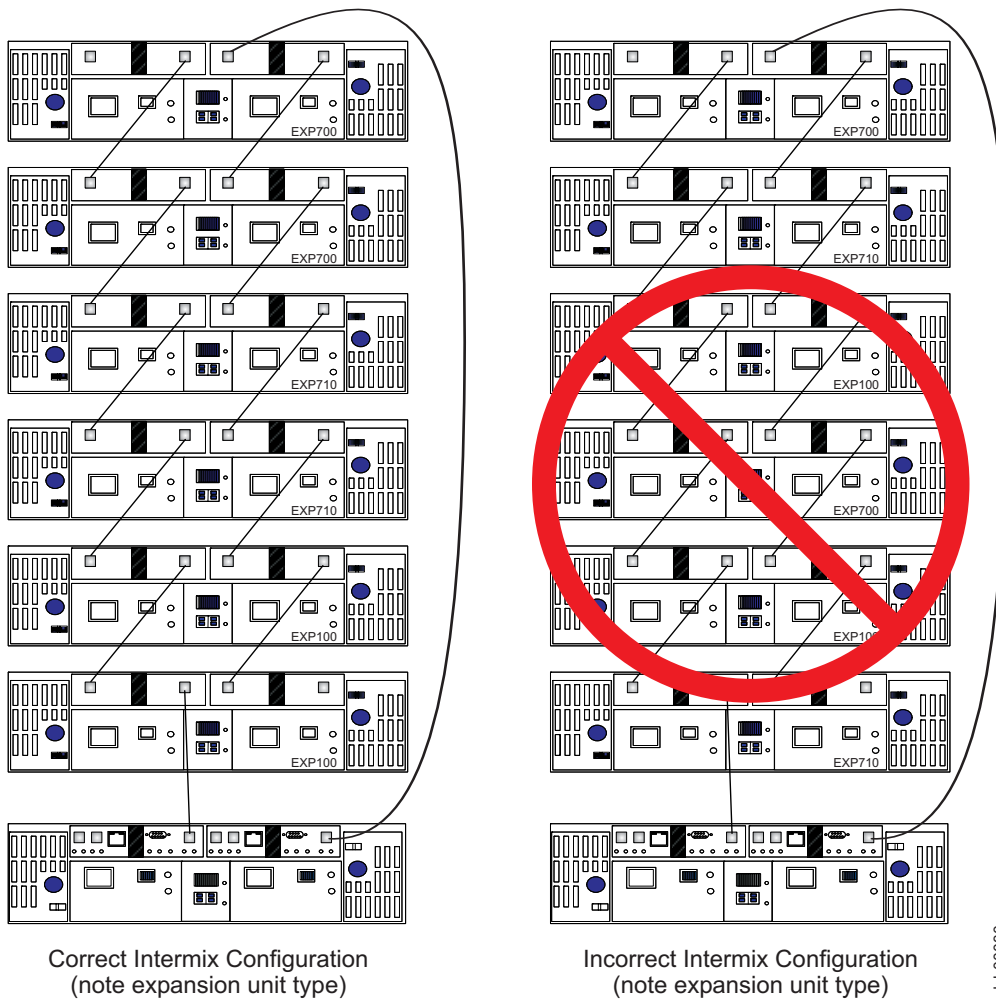


Figure 1. Correct and incorrect ways to group expansion enclosures in a redundant drive loop (DS4300 and DS4500 storage subsystems)

You must group enclosure model types together, as the configuration on the left shows. In the configuration on the left, the EXP700s are grouped together at the top of the loop, followed by the EXP710s, which are grouped together at the middle of the loop, followed by the EXP100s, which are grouped together closest to the controller.

**Note:** The storage expansion enclosure model type is indicated in the lower right corner of each enclosure.

In the configuration on the right, the enclosures are cabled in a random order and are not grouped by type. IBM does not support DS4000 Storage Subsystem Fibre Channel/SATA intermix configurations when they are cabled in this way.

Figure 2 on page 6 shows the correct way to group expansion enclosures that are attached to a DS4700 or DS4800 storage subsystem:

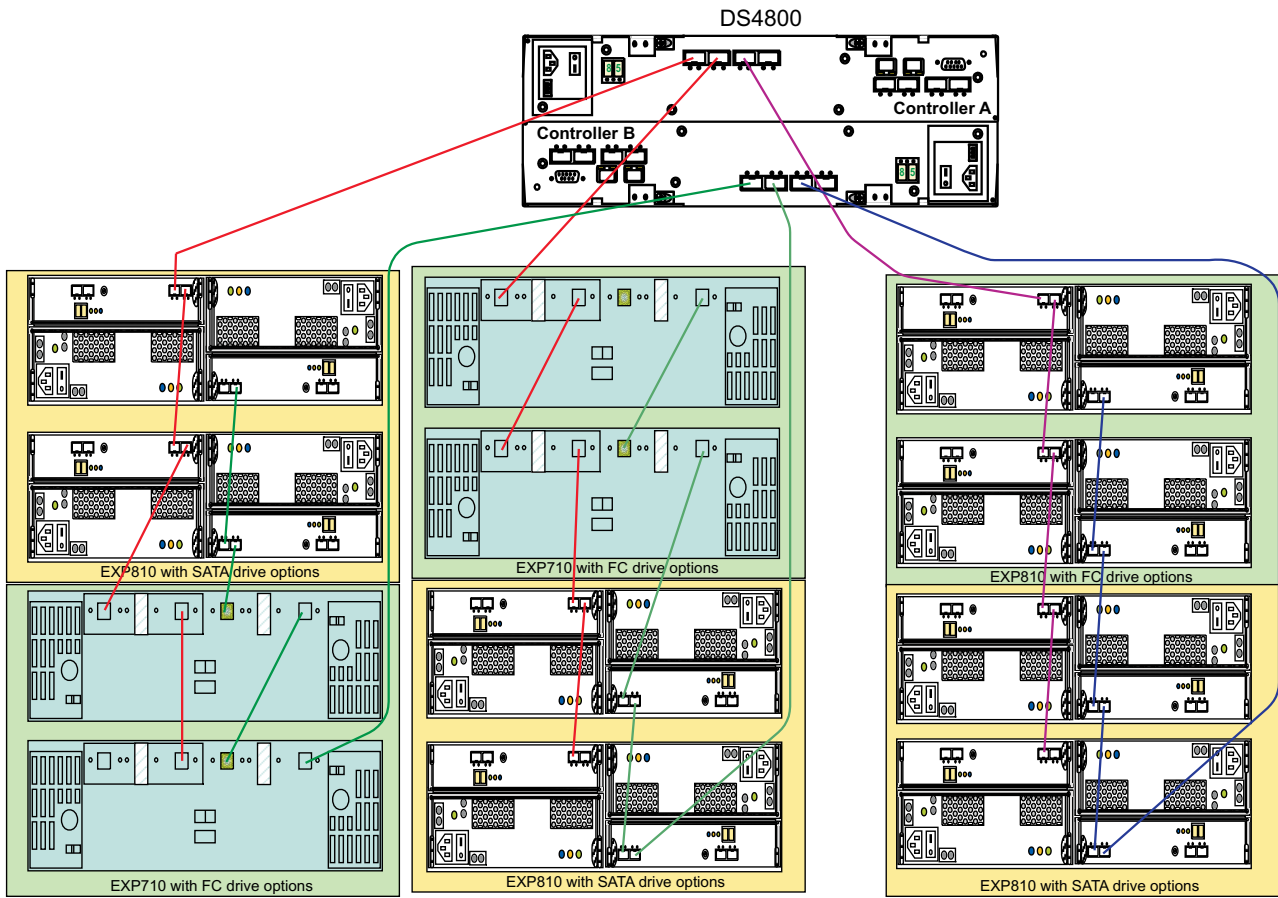


Figure 2. Grouping expansion enclosures by type behind a drive channel port (DS4700 and DS4800 storage subsystems)

**Note:** These figures are for illustrative purpose only. The representations of the DS4000 storage subsystems and expansion enclosures might not accurately reflect the rear view of the DS4000 products. (The cabling diagrams are correct).

**Attention:**

For the purposes of the storage expansion enclosure grouping restriction, note the following considerations:

- All models of the EXP100 are considered to be the same from a grouping perspective. For example, the EXP100 1710-10X, 1710-10U, and the 1724-1XP are considered like enclosure types and must be grouped together.
- All models of the EXP700 are considered to be the same from a grouping perspective. For example, the EXP700 1740-1RU, and the 1740-1RX are considered like enclosure types and must be grouped together.
- After the EXP700 has been upgraded with the *DS4000 EXP700 Models 1RU/1RX Switched-ESM Option Upgrade Kit*, it is considered an EXP710, regardless of the machine type and model (as labeled in the EXP700 chassis).

For more information, see the *IBM System Storage DS4000 Hard Drive and Storage Expansion Enclosure Installation and Migration Guide*.

### Cannot mix drive types

Arrays must consist exclusively of either Fibre Channel or SATA drives. You cannot mix drive types in an array.

### Cannot mix Fibre Channel and SATA drives in the same DS4000 storage subsystem or storage expansion enclosure

You cannot mix Fibre Channel and SATA drives in the same DS4000 storage subsystem or storage expansion enclosure. Even though the drive trays for the DS4700 and EXP810 Fibre Channel *Disk Drive Modules* (DDMs) and the 500GB SATA *Enhanced Disk Drive Modules* (E-DDMs) are the same, the trays must be filled with either SATA or Fibre Channel drives, but not both.

For example, if one drive slot in the DS4700 or EXP810 enclosure is filled with a SATA drive, the rest of the drive slots in that enclosure must be filled with SATA drives only. This statement is similarly true with Fibre Channel drives.

For information about the removal of this restriction in the future, contact your IBM reseller or representative, or check the DS4000 Interoperability Matrix at the following Web site:

[www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html](http://www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html)

Table 3 lists the drive types and their corresponding DS4000 storage subsystems and storage expansion enclosures.

*Table 3. Drive types and their corresponding DS4000 storage subsystems and storage expansion enclosures*

Drive type	Storage subsystem type	Storage expansion enclosure type
SATA	DS4100 DS4700 (see note 1)	DS4000 EXP100 DS4000 EXP810 (see note 1)
Fibre Channel	DS4300 Standard/Base or Turbo DS4400 DS4500 DS4700 (see note 1) DS4800	DS4000 EXP700 DS4000 EXP710 DS4000 EXP810 (see note 1)

#### Notes:

1. The drive trays for the DS4700/EXP810 Fibre Channel drives and SATA E-DDMs are the same. However, this is not true of the DS4100/EXP100 SATA DDMs and the DS4300/EXP710/700 Fibre Channel DDMs, which have different drive trays from each other and from the DS4700/EXP810 Fibre Channel or SATA E-DDMs.
2. IBM currently does not support intermixing EXP810 and EXP100 storage expansion enclosures within a DS4000 storage subsystem. For information about the removal of this restriction in the future, contact your IBM reseller or representative, or check the DS4000 Interoperability Matrix at the following Web site:

[www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html](http://www-1.ibm.com/servers/storage/disk/ds4000/interop-matrix.html)

### Cannot intermix drive types for hot spares

SATA drives can function as hot spares for SATA drives only.

Fibre Channel drives can function as hot spares for Fibre Channel drives only.

### DS4300 Standard/Base or Turbo Intermix configuration restrictions

In DS4300 Intermix configurations, with the FC/SATA Intermix premium feature enabled and the correct NVSRAM file installed, the maximum number of expansion enclosures in a drive loop is limited to seven. This is true whether or not there are drives in the DS4300 storage subsystem drive slots.

## Recommendations

Please note the following recommendations when you cable your configuration:

### Connect only one type of expansion enclosure behind each controller drive port

Connect only one type of expansion enclosure behind each DS4700 or DS4800 controller drive port. Figure 3 shows three EXP710s and three EXP810s, *not* mixed together, behind the same drive port of a given drive channel.

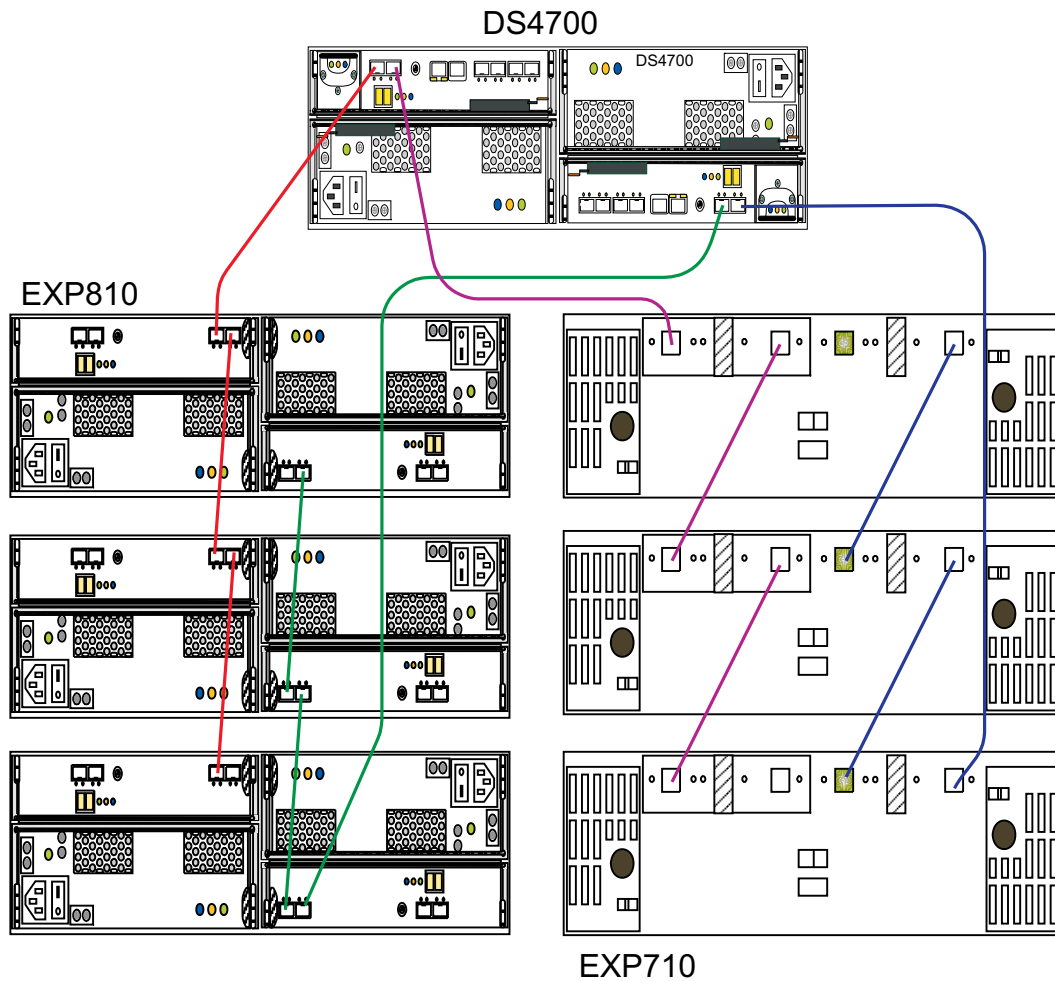


Figure 3. Example of connecting only one type of expansion enclosure (EXP710 or EXP810) behind a DS4700 controller drive port



### Group EXP810s by technology type behind each controller drive port

If you are using EXP810 expansion enclosures, connect only those that have the same type of technology (Fibre Channel or SATA) behind each DS4700 or DS4800 controller drive port. Figure 4 shows three EXP810s with SATA E-DDMs and three EXP810s with Fibre Channel, not mixed together, behind the same drive port of a given drive channel.

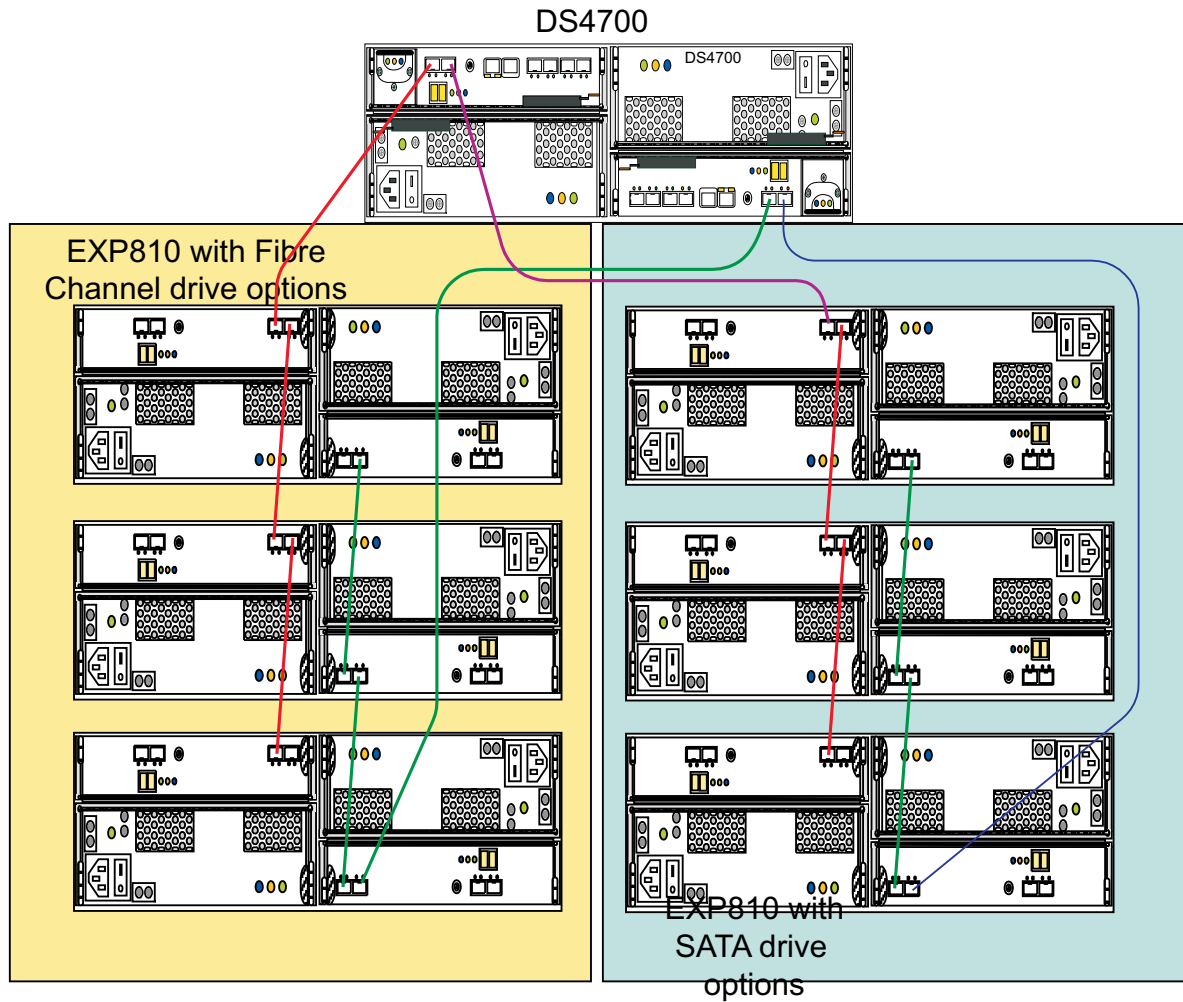


Figure 4. Example of connecting only one type of EXP810 expansion enclosure (SATA E-DDM or Fibre Channel) behind a DS4700 controller drive port

### Group EXP710 and EXP810s by model type behind each controller drive port

If it is not possible to separate EXP810 and other expansion enclosures behind different controller drive ports, group the expansion enclosures by model type behind each controller drive port. Figure 5 shows EXP710 and EXP810 enclosures that are mixed together behind a drive port, grouped together by model type. In addition, the three EXP810s with the SATA drive option are connected to a different drive channel than the EXP810 and EXP710 with the Fibre Channel drive option.

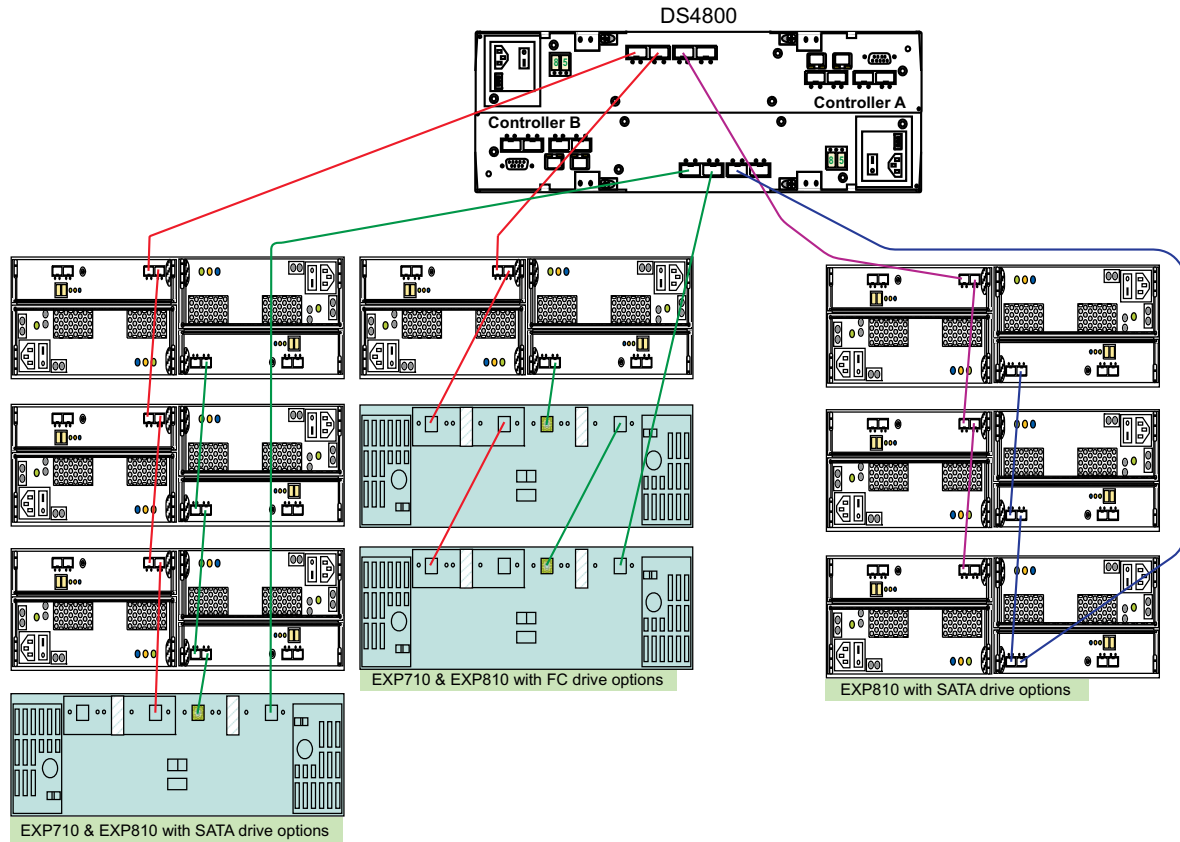


Figure 5. Example of grouping EXP810 and EXP710 model types together behind a DS4800 controller drive port

## Product updates

### Important

In order to keep your system up to date with the latest firmware and other product updates, use the information below to register and use the **My support** Web site.

Download the latest versions of the DS4000 Storage Manager host software, DS4000 storage server controller firmware, DS4000 drive expansion enclosure ESM firmware, and drive firmware at the time of the initial installation and when product updates become available.

To be notified of important product updates, you must first register at the IBM Support and Download Web site:

[www-1.ibm.com/servers/storage/support/disk/index.html](http://www-1.ibm.com/servers/storage/support/disk/index.html)

In the Additional Support section of the Web page, click **My support**. On the next page, if you have not already done so, register to use the site by clicking **Register now**.

Perform the following steps to receive product updates:

1. After you have registered, type your user ID and password to log into the site. The **My support** page opens.
2. Click **Add products**. A pull-down menu displays.
3. In the pull-down menu, select **Storage**. Another pull-down menu displays.
4. In the new pull-down menu, and in the subsequent pull-down menus that display, select the following topics:
  - **Computer Storage**
  - **Disk Storage Systems**
  - **TotalStorage DS4000 Midrange Disk Systems & FAStT Stor Svrs**

**Note:** During this process a check list displays. Do not check any of the items in the check list until you complete the selections in the pull-down menus.

5. When you finish selecting the menu topics, place a check in the box for the machine type of your DS4000 series product, as well as any other attached DS4000 series product(s) for which you would like to receive information, then click **Add products**. The My Support page opens again.
6. On the My Support page, click the **Edit profile** tab, then click **Subscribe to email**. A pull-down menu displays.
7. In the pull-down menu, select **Storage**. A check list displays.
8. Place a check in each of the following boxes:
  - a. **Please send these documents by weekly email**
  - b. **Downloads and drivers**
  - c. **Flashes**
  - d. Any other topics that you may be interested inThen, click **Update**.
9. Click **Sign out** to log out of My Support.

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