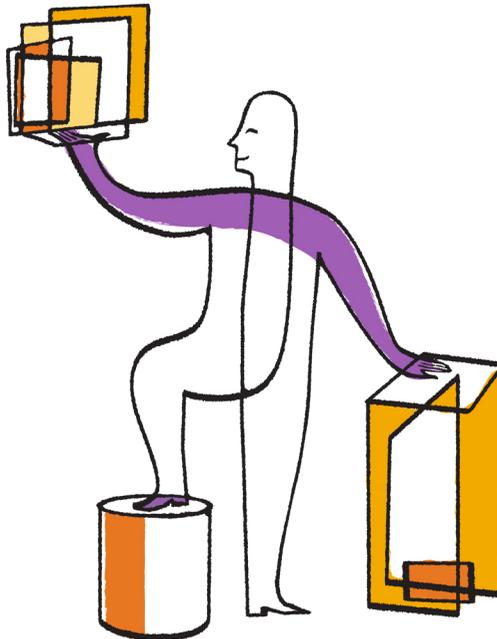




## Configuration Examples for FAS2240 Systems



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## FAS2240 configuration options

The FAS2240 systems can be used in a variety of physical configurations and with different storage protocols.

Configuration	Possible variations
Storage protocol	<ul style="list-style-type: none"> <li>NFS, CIFS, and/or iSCSI</li> <li>FC SAN, using the FC mezzanine card</li> </ul>
Mezzanine card	<ul style="list-style-type: none"> <li>None This system can be configured without a mezzanine card. In this case, a blank with no ports takes the place of the mezzanine card in the controller module.</li> <li>Dual-port 10-Gb Ethernet option</li> <li>Dual-port 8/4/2 Gb FC option The FC ports can attach to disk shelf and backup device connections, or to a SAN using the FC protocol. See the <i>SAN Configuration Guide</i> (called <i>Fibre Channel and iSCSI Configuration Guide in Data ONTAP 8.1 and earlier</i>) on the NetApp Support Site at <a href="http://support.netapp.com">support.netapp.com</a> for more information.</li> </ul>
Controller resiliency	<ul style="list-style-type: none"> <li>HA pair The system has two redundant controller modules.</li> <li>Stand-alone configuration The system has one controller module.</li> </ul>
Internal/external storage	<ul style="list-style-type: none"> <li>Internal disks Internal disks in the system chassis are used.</li> <li>External disks or tape: <ul style="list-style-type: none"> <li>SAS The onboard SAS ports can attach to disk shelves or backup devices. For SAS configuration rules, see the <i>Universal SAS and ACP Cabling Guide</i>.</li> <li>FC The optional FC mezzanine card supports FC connectivity to an FC SAN or FC storage devices.</li> </ul> </li> </ul>

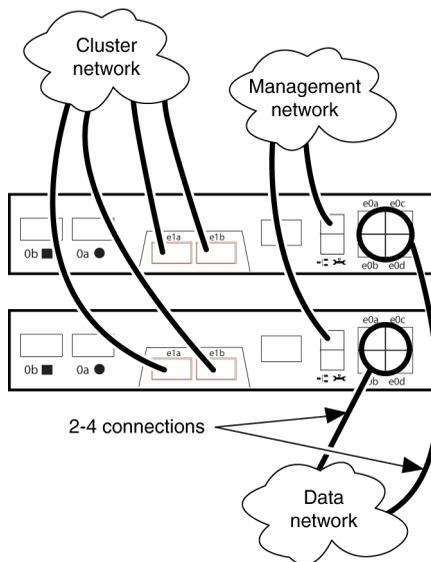
<b>Configuration</b>	<b>Possible variations</b>
Disk shelf connection redundancy	<ul style="list-style-type: none"><li data-bbox="424 244 1239 340">• Multipath configuration The controller has multiple connections to disks on the disk shelves. Multipath is the preferred configuration.</li><li data-bbox="424 348 1239 409">• Dual-path configuration The controller has two connections to disks on the disk shelves.</li><li data-bbox="424 418 1239 513">• Single-path configuration The disk shelves have a single connection to the controller. This configuration is not preferred but is supported on entry-level platforms.</li></ul>
Backup device	External backup devices The system connects to a tape backup device.

## Required configuration for FAS2240 systems running clustered Data ONTAP

The FAS2240 systems support clustered Data ONTAP. This requires the 10-GbE mezzanine card to provide the connections to the cluster network unless you are operating a single-node cluster.

### Switched-cluster configuration

The following example shows a FAS2240 system configured to support clustered Data ONTAP:



**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

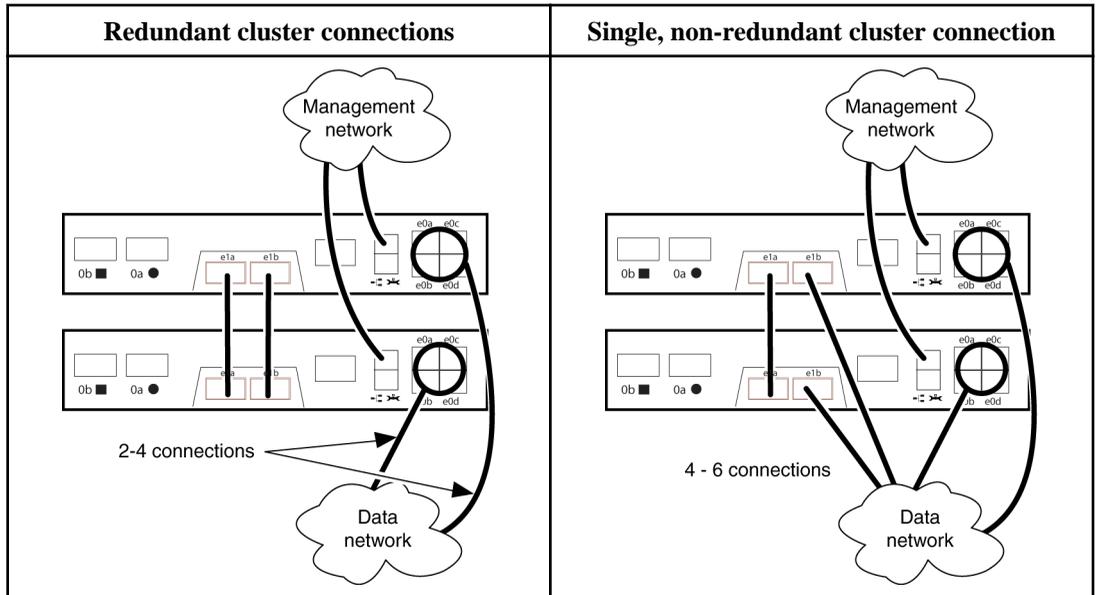
This configuration has the following requirements and options:

- The 10-GbE mezzanine card is required in each controller module. All four 10-GbE ports (the e1a and e1b ports on both controllers) are required for cluster-network connections.
- Either two or four of the onboard GbE ports are used for the data network connections.
- The Remote Management port (marked with a wrench icon) is used for the management network connections. This port also allows access to the Service Processor.

- This configuration supports NFS, CIFS, and iSCSI protocols as shown in other configuration examples.
- This configuration can be used with SAS storage only.

### Two-node switchless-cluster configuration

The following examples show a FAS2240 system configured to support clustered Data ONTAP with either redundant back-to-back cluster connections or a single-cluster connection. This configuration is referred to as a two-node switchless cluster. The redundant configuration is recommended.



**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

This configuration has the following requirements and options:

- The 10-GbE mezzanine card is required in each controller module.  
All four 10-GbE ports (the e1a and e1b ports on both controllers) are required for fully redundant cluster connections. The cluster ports are directly connected without a switch.
- **Note:** A configuration using a single 10-GbE port on each controller is supported to allow use of the e1b ports for data, but this does not provide a redundant connection in the event of a cable or port failure.
- Two or four of the onboard GbE ports are used for the data network connections.
- The Remote Management port (marked with a wrench icon) is used for the management network connections.

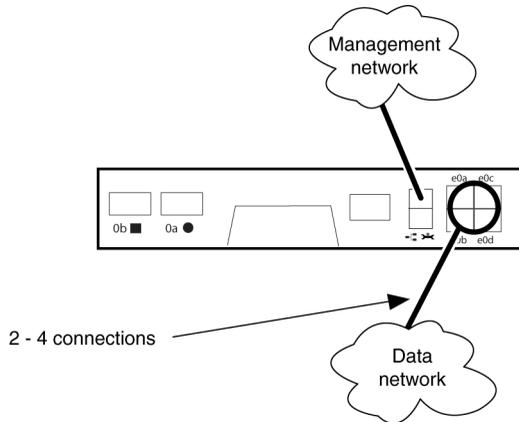
## 8 | Configuration Examples for FAS2240 Systems

This port also allows access to the Service Processor.

- This configuration supports NFS, CIFS, and iSCSI protocols as shown in other configuration examples.
- This configuration can be used with SAS storage only.

### Single-node cluster configuration

The following example shows a single FAS2240 node configured to support clustered Data ONTAP.

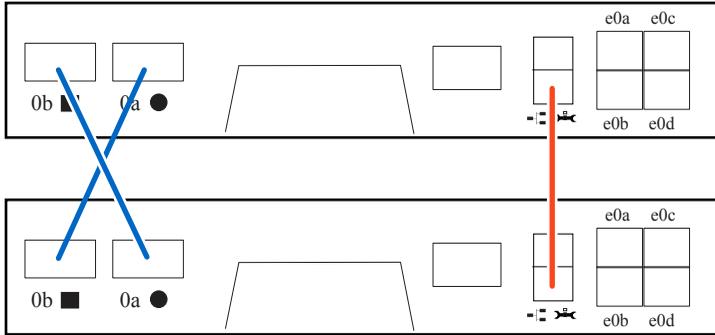


This configuration has the following requirements and options:

- Either of the available mezzanine cards can optionally be used with this configuration. Because this is a single-node configuration, the 10-GbE mezzanine card ports can be used for data connections. The FC mezzanine card can be used for storage or host connections as shown in other configuration examples.
- Either two or four of the onboard GbE ports are used for the data network connections.
- The Remote Management port (marked with a wrench icon) is used for the management network connections. This port also allows access to the Service Processor.
- This configuration supports NFS, CIFS, iSCSI, and FC protocols as shown in other configuration examples.

## Example 1: HA pair with no external disk shelves

The FAS2240 systems can be configured as an HA pair with no external disk drives.



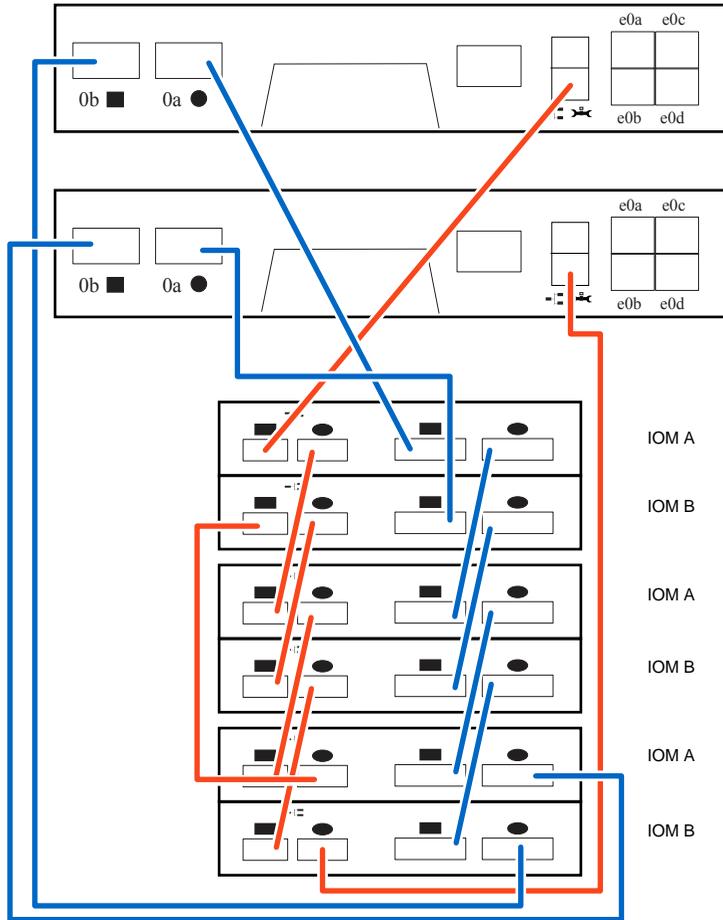
	The red cables are Ethernet ACP connections.
	The blue cables are SAS disk shelf connections.

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, and/or iSCSI
Mezzanine card	None
Controller resiliency	HA pair
Internal/external storage	Internal only
Disk shelf connection redundancy	Multipath HA  <b>Note:</b> This is the recommended configuration. If the external cables are not used, the internal drives have single-path connectivity. Such a configuration is supported but not recommended.
Backup device	None

## Example 2: HA pair with external SAS shelves

The FAS2240 systems can be configured as an HA pair with external SAS disk shelves.



	The red cables are Ethernet ACP connections.
	The blue cables are SAS disk shelf connections.

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

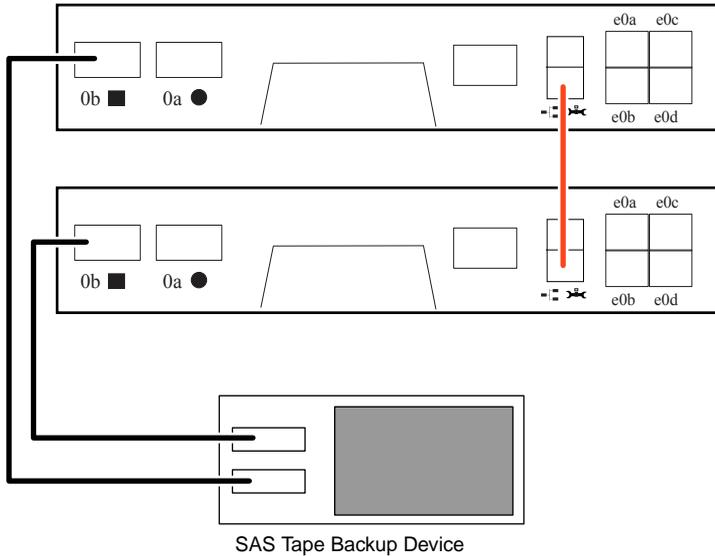
<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	NFS, CIFS, FC, iSCSI
Mezzanine card	None
Controller resiliency	HA pair
External storage	External SAS disk shelves
Disk shelf connection redundancy	Multipath HA
Backup device	None

### **If you have SSD shelves**

If you have SAS disk shelves with SSDs, the shelves with the SSDs should be the last shelves in the stack and connect to the 0b port on each controller. This allows the SSD drives to have the shortest possible SAS path to the controller.

## Example 3: HA pair with SAS tape backup

The FAS2240 systems can be configured as an HA pair with an external SAS tape backup device.



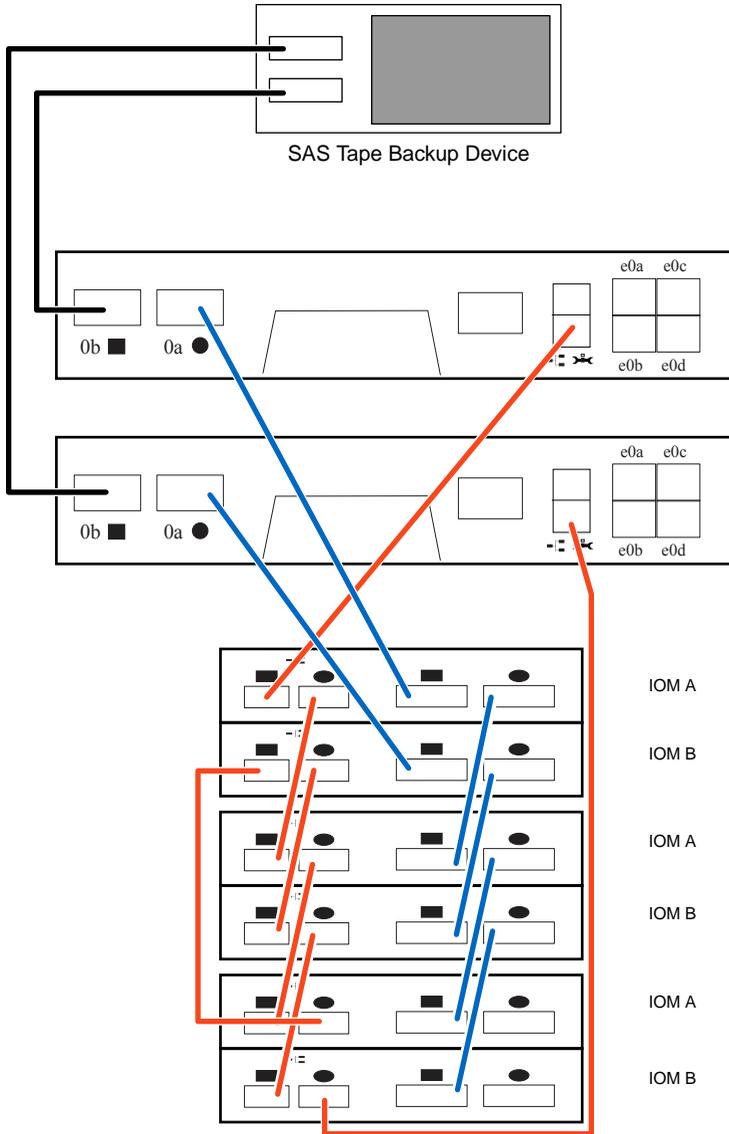
	The red cables are Ethernet ACP connections.
	The black cables are SAS tape drive connections.

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, and/or iSCSI
Mezzanine card	None
Controller resiliency	HA pair
External storage	Internal only
Disk shelf connection redundancy	n/a
Backup device	SAS tape backup device

# Example 4: HA pair with external SAS shelves and tape backup

The FAS2240 systems can be configured as an HA pair connected to external SAS disk shelves and a SAS tape backup device.



## 14 | Configuration Examples for FAS2240 Systems

	The red cables are Ethernet ACP connections.
	The blue cables are SAS disk shelf connections.
	The black cables are SAS tape drive connections.

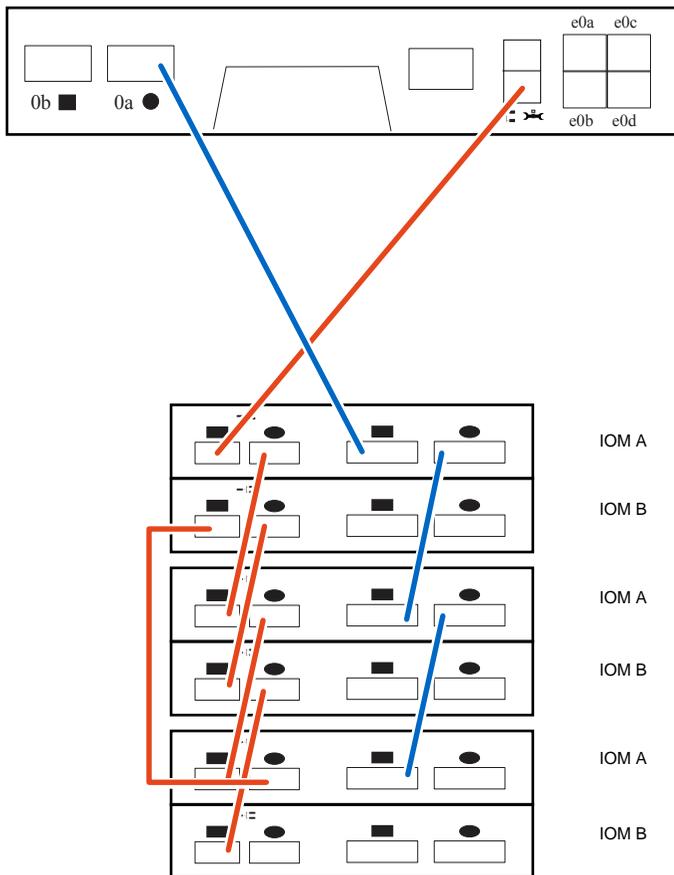
**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, iSCSI
Mezzanine card	None
Controller resiliency	HA pair
External storage	External SAS
Disk shelf connection redundancy	Single-path
Backup device	Single-path SAS tape backup device

## Example 5: Stand-alone controller with SAS shelves (single-path)

The FAS2240 systems can be configured as stand-alone controllers with an external stack of SAS disk shelves, with single-path connectivity. Although the single-path connections provide less resiliency than a dual-path configuration, Data ONTAP does not display the intermittent alert messages that appear when a dual-path configuration is used.

**Note:** This configuration is not recommended for shelves with SSDs.



	The red cables are Ethernet ACP connections.
	The blue cables are SAS disk shelf connections.

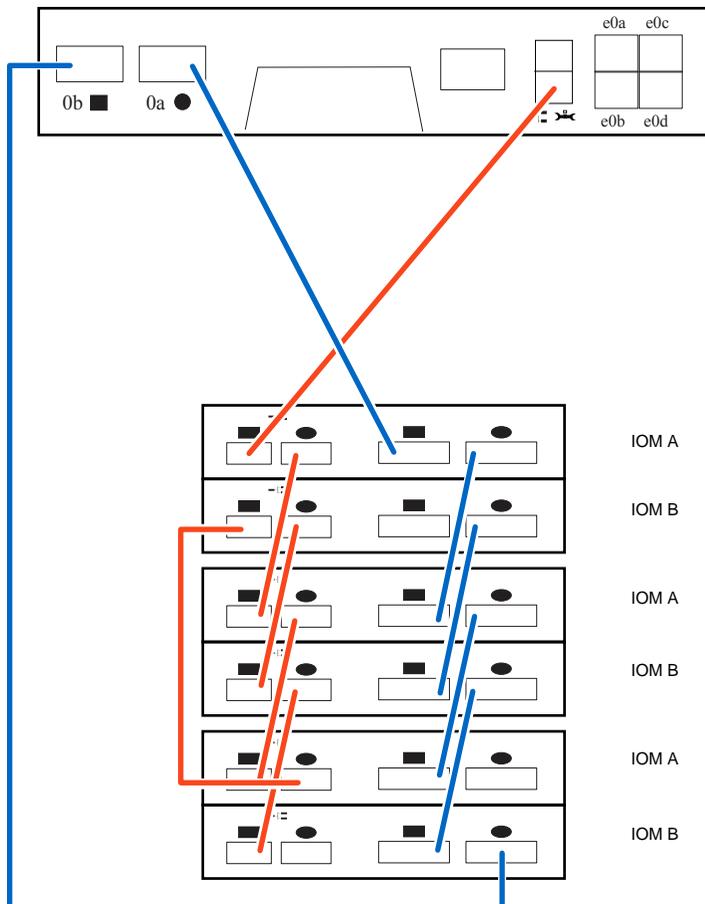
## 16 | Configuration Examples for FAS2240 Systems

<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	NFS, CIFS, FC, iSCSI
Mezzanine card	None
Controller resiliency	Stand-alone
External storage	External SAS disk shelves
Disk shelf connection redundancy	Single-path
Backup device	None

## Example 6: Stand-alone controller with SAS shelves (dual-path)

The FAS2240 system can be configured as a stand-alone controller with dual-path connectivity to external SAS storage. This configuration provides more resiliency than the single-path configuration, but Data ONTAP displays intermittent alert messages that the system is in a mixed-path configuration.

**Note:** The dual-path configuration is not recommended for shelves with SSDs. However, if you have SAS disk shelves with SSDs, the shelves with the SSDs should be the last shelves in the stack and connect to the 0b port on each controller. This allows the SSD drives to have the shortest possible SAS path to the controller.



The red cables are Ethernet ACP connections.

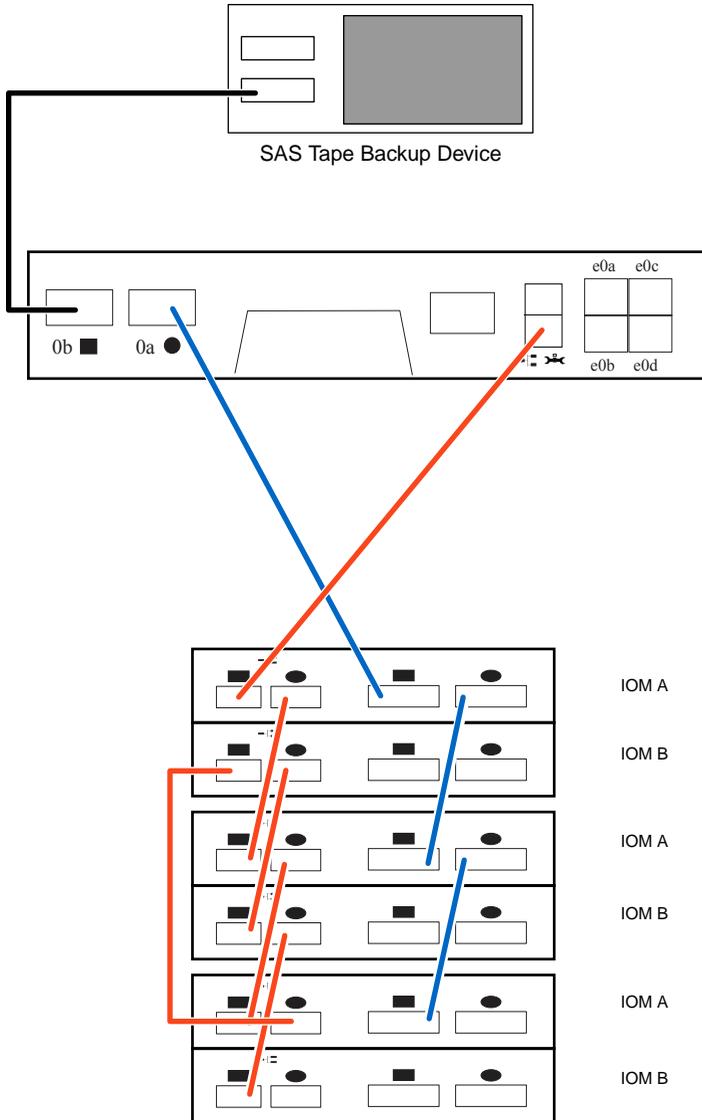
## 18 | Configuration Examples for FAS2240 Systems

	The blue cables are SAS disk shelf connections.
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<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	NFS, CIFS, FC, iSCSI
Mezzanine card	None
Controller resiliency	Stand-alone
External storage	External SAS disk shelves
Disk shelf connection redundancy	Dual-path
Backup device	None

# Example 7: Stand-alone controller with SAS shelves (single-path) and tape backup

The FAS2240 system can be configured as a stand-alone controller with single-path connections to a stack of SAS disk shelves and a SAS tape backup device.



 The red cables are Ethernet ACP connections.

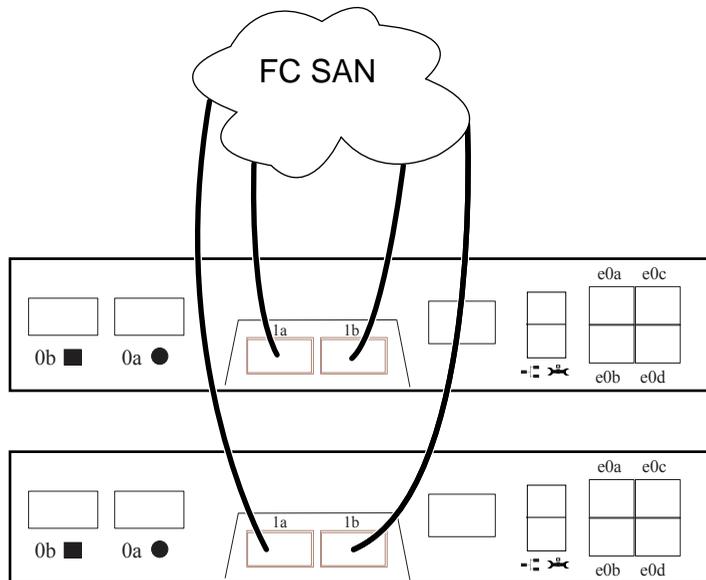
## 20 | Configuration Examples for FAS2240 Systems

	The blue cables are SAS disk shelf connections.
	The black cables are SAS tape drive connections.

<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	NFS, CIFS, FC, iSCSI
Mezzanine card	None
Controller resiliency	Stand-alone
External storage	External SAS disk shelves
Disk shelf connection redundancy	Single-path
Backup device	SAS tape backup device

## Example 8: HA pair connected to an FC SAN

The FAS2240 system can be configured as an HA pair connected to a SAN network. SAS disk shelves or tape storage devices can optionally be attached to the onboard SAS ports as shown in other examples.



— The black cables are connections to the FC SAN.

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

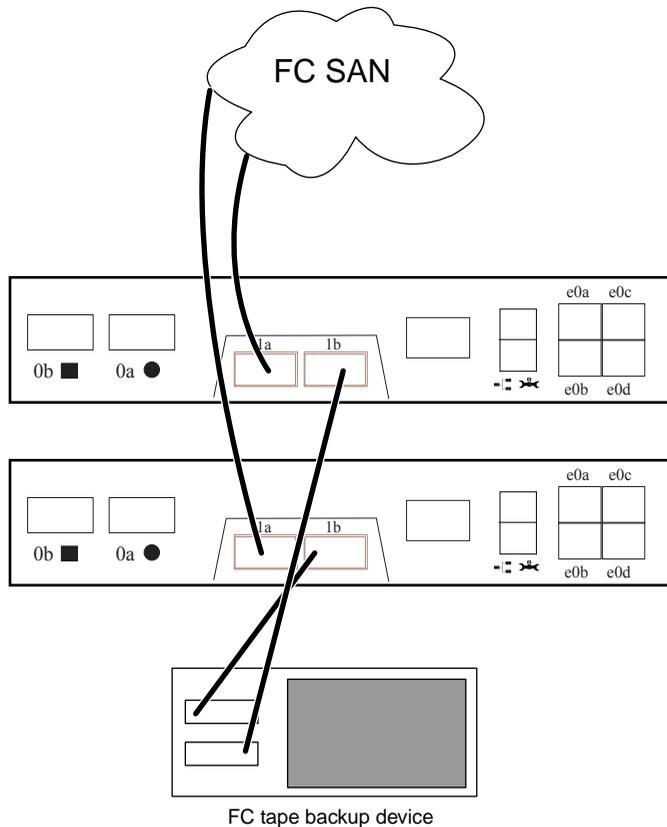
Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, and/or iSCSI
Mezzanine card	FC
Controller resiliency	HA pair
External storage	None shown, but this configuration can be used with SAS disk shelves or backup devices attached to the onboard SAS ports, as shown in Examples 2, 3, and 4.

## 22 | Configuration Examples for FAS2240 Systems

<b>Configuration details</b>	<b>Configuration used</b>
Disk shelf or host connection redundancy	Dual-path
Backup device	None

## Example 9: HA pair connected to an FC SAN with FC tape backup

The FAS2240 system can be connected to a SAN network and an FC tape device.



 The black cables are connections to the FC SAN and the FC tape device.

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

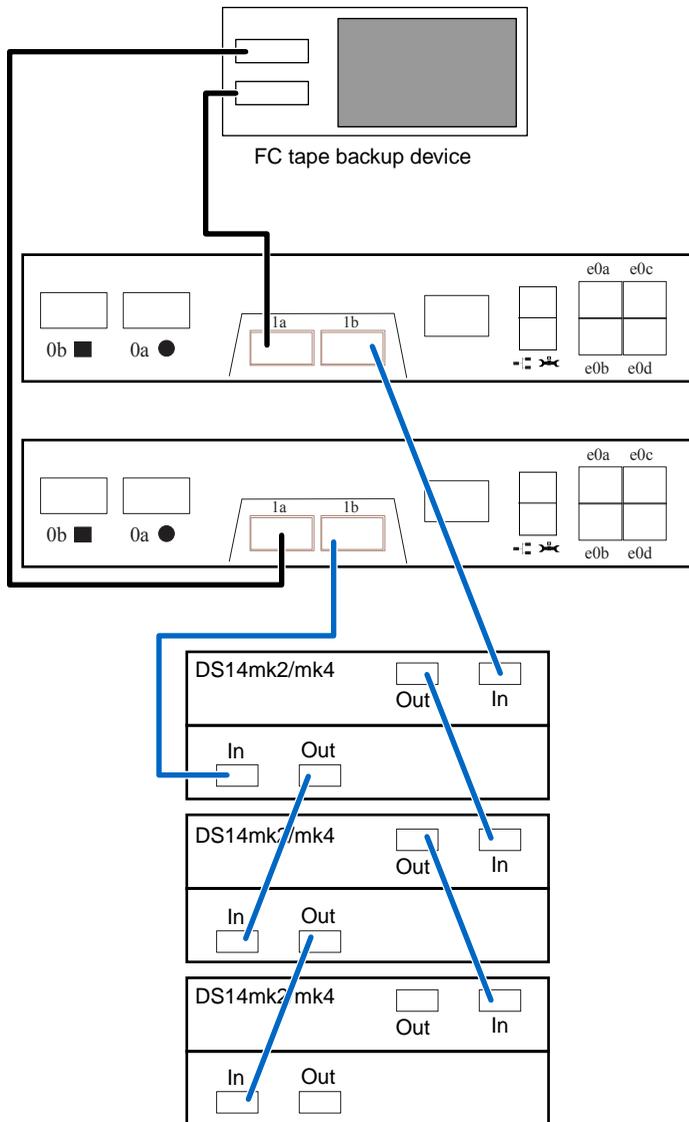
Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, and/or iSCSI
Mezzanine card	FC

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<b>Configuration details</b>	<b>Configuration used</b>
Controller resiliency	HA pair
External storage	None
Disk shelf and host connection redundancy	Single-path
Backup device	FC tape backup device

## Example 10: HA pair with FC shelves and FC tape backup

The FAS2240 system can be connected to an FC disk shelf loop and an FC tape device.



 The blue cables are FC disk shelf connections.

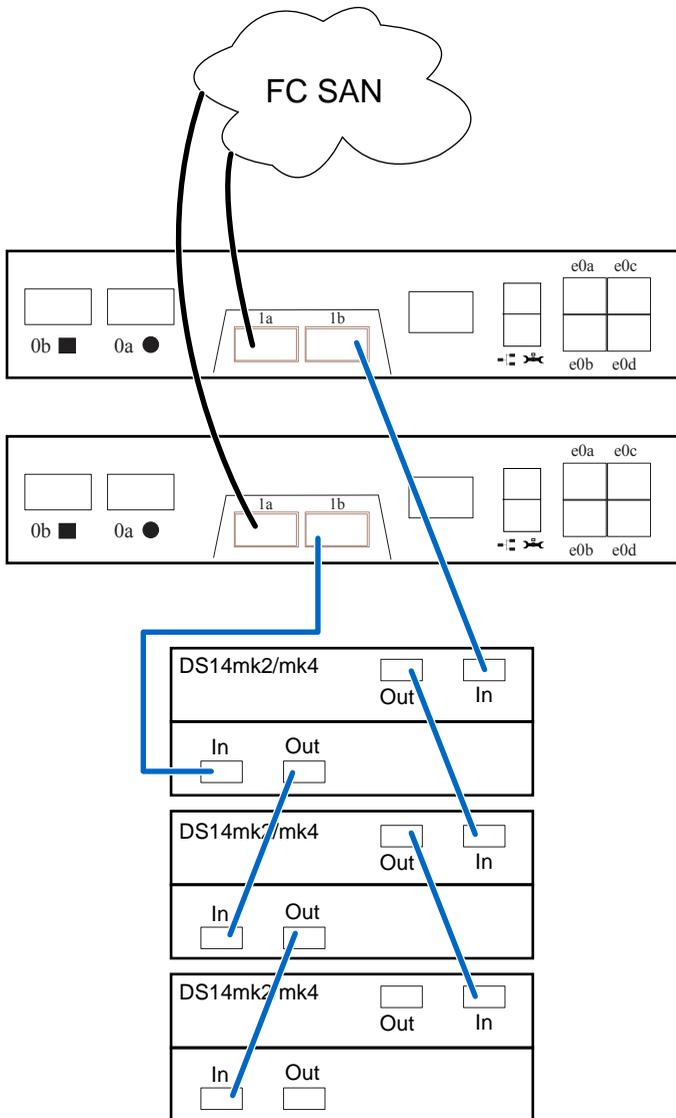
	The black cables are FC SAN connections.
---	--

**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, and/or iSCSI
Mezzanine card	FC
Controller resiliency	HA pair
External storage	External FC disk shelves
Disk shelf connection redundancy	Dual-path
Backup device	FC tape backup device

## Example 11: HA pair connected to an FC SAN and with FC disk shelves

The FAS2240 system can be connected to an FC SAN and an FC disk shelf loop.



 The blue cables are FC disk shelf connections.

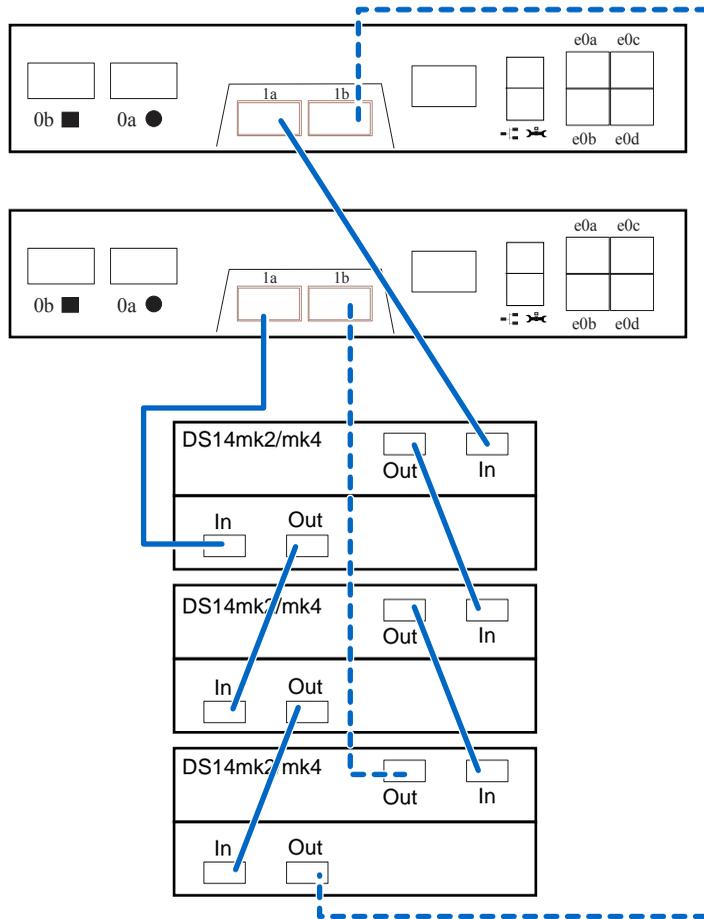
	The black cables are FC SAN connections.
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**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, FC, and/or iSCSI
Mezzanine card	FC
Controller resiliency	HA pair
External storage	External FC disk shelves
Disk shelf connection redundancy	Dual-path
Backup device	None

## Example 12: HA pair with FC disk shelves

The FAS2240 system can be connected to an FC disk shelf loop.



	The blue cables are FC disk shelf connections.
	The blue dashed cables are FC disk shelf multipath HA connections.

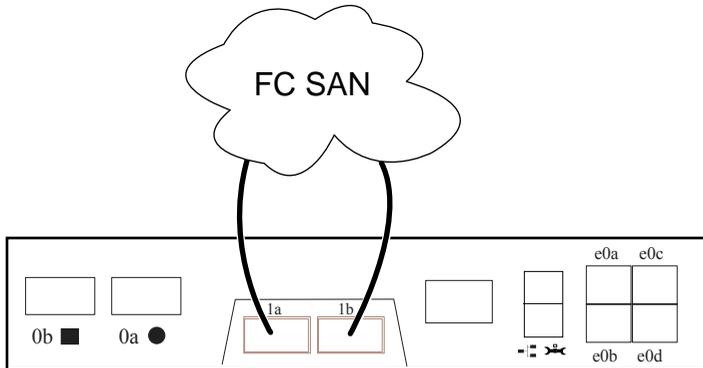
**Note:** This example shows a FAS2240-4 system, which has its controller modules arranged vertically, with one above the other. A FAS2240-2 system's controller modules are arranged side by side in the chassis. The cabling is the same, regardless of the model or the position of the controller modules.

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<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	NFS, CIFS, and/or iSCSI
Mezzanine card	FC
Controller resiliency	HA pair
External storage	External FC disk shelves
Disk shelf connection redundancy	Multipath HA
Backup device	None

## Example 13: Stand-alone controller connected to an FC SAN

The FAS2240 system with a stand-alone controller can be connected an FC SAN.

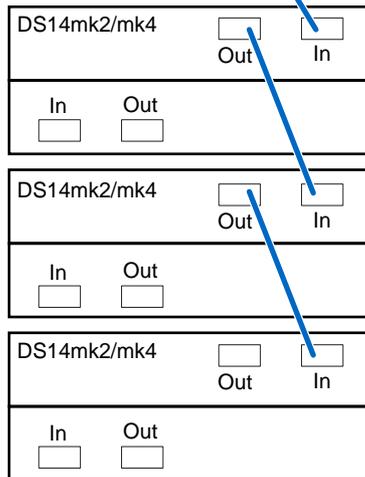
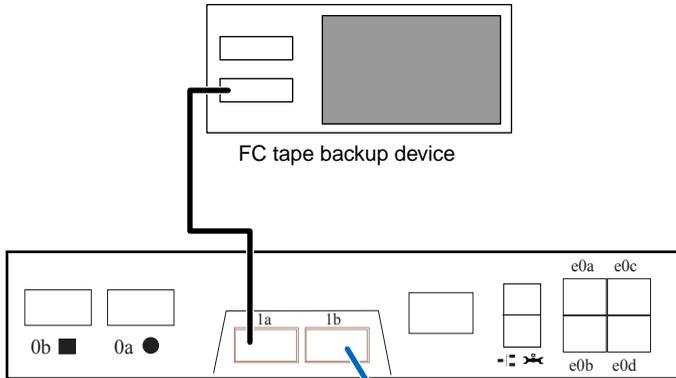


 The black cables are connections to the FC SAN.

Configuration details	Configuration used
Storage protocol	FC SAN
Mezzanine card	FC
Controller resiliency	Stand-alone controller
External storage	Internal only
Disk shelf connection redundancy	n/a
Backup device	None

## Example 14: Stand-alone controller with FC disk shelves and FC tape backup

The FAS2240 system with a stand-alone controller can be connected to FC disk shelves and to an FC tape backup device.

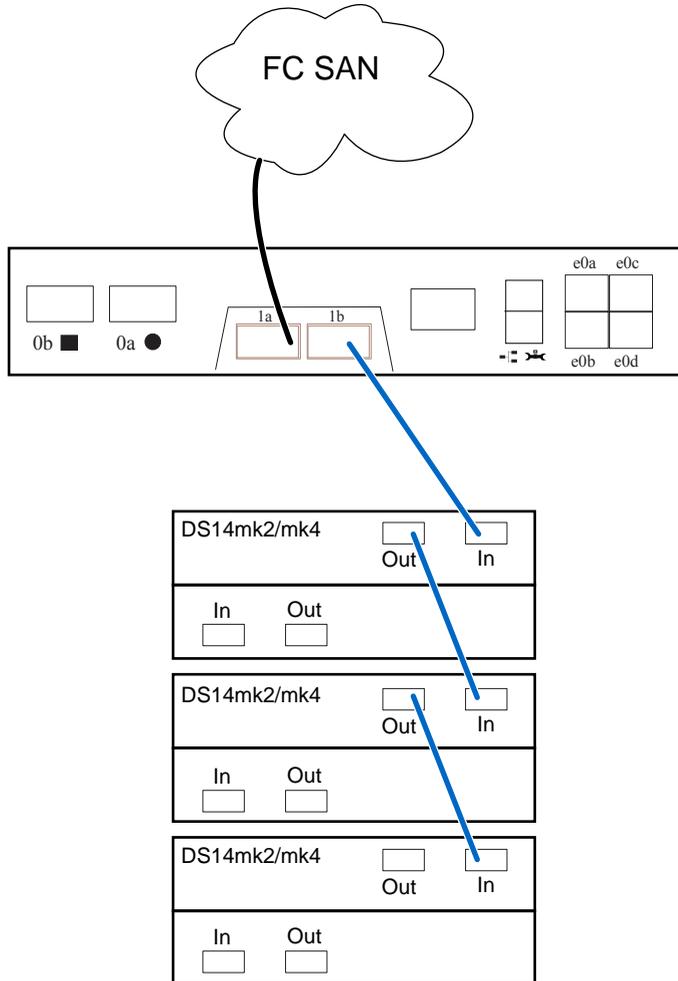


	The blue cables are FC disk shelf connections.
	The black cables are FC tape drive connections.

<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	FC SAN
Mezzanine card	FC
Controller resiliency	Stand-alone controller
External storage	Internal only
Disk shelf connection redundancy	Single-path
Backup device	FC tape

## Example 15: Stand-alone controller connected to an FC SAN with FC disk shelves

The FAS2240 system with a stand-alone controller can be connected to an FC SAN and FC disk shelves.

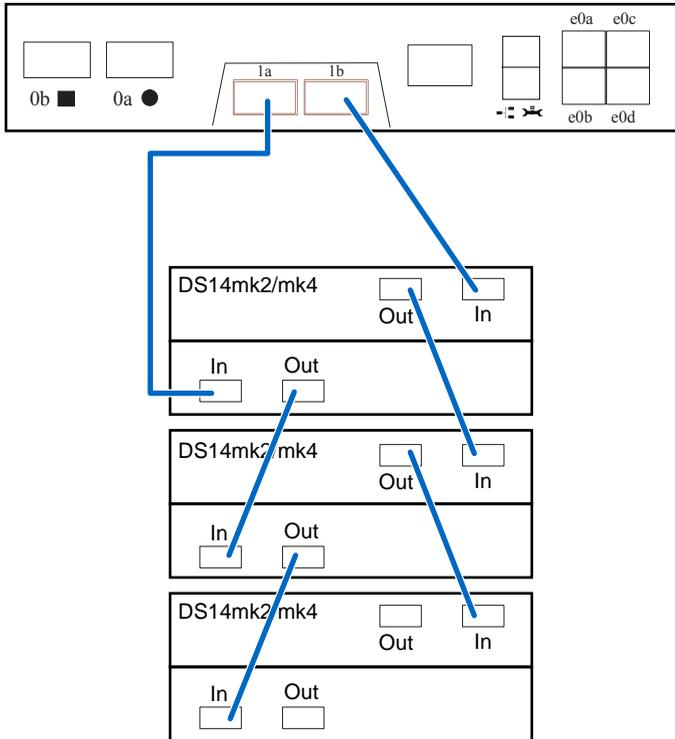


	The blue cables are FC disk shelf connections.
	The black cables connect to the FC SAN.

<b>Configuration details</b>	<b>Configuration used</b>
Storage protocol	FC SAN
Mezzanine card	FC
Controller resiliency	Stand-alone controller
External storage	External FC disk shelves
Disk shelf and host connection redundancy	Single path
Backup device	None

## Example 16: Stand-alone controller with FC disk shelves

The FAS2240 system with a stand-alone controller can be connected to FC disk shelves.



 The blue cables are FC disk shelf connections.

Configuration details	Configuration used
Storage protocol	NFS, CIFS, and/or iSCSI
Mezzanine card	FC
Controller resiliency	Stand-alone controller
External storage	FC disk shelves
Disk shelf connection redundancy	Dual-path
Backup device	None

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