RAID Controller Considerations

This appendix provides RAID controller information, and it includes the following sections:

Supported RAID Controllers and Required Cables

This server supports the RAID controller options and cable requirements shown in Table C-1.

Note Do not mix controller types in the server.

Note NVMe PCIe SSDs cannot be controlled by a SAS RAID controller.

Table C-1   Cisco UCS C460 M4 Server Supported RAID Options

Controller	Style	Maximum Drives	Optional SCPM?	RAID Levels	Required Cables
LSI MegaRAID SAS 9361CV-8i	PCIe	8 internal	Yes	0, 1, 5, 6, 10, 50, 60	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6.
Cisco UCS 12G SAS Modular **8-Port** RAID Controller (UCSC-MRAID12G) Can be ordered with modular flash-based write cache (FBWC) option: 512 MB Note: See also Cisco 12G SAS Modular RAID Controller Considerations, page C-3.	PCIe	8 internal	Yes	0, 1, 5, 10, 50	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6.
Cisco UCS 12G SAS Modular **12-Port** RAID Controller (UCSC-MRAIDC460) Can be ordered with modular flash-based write cache (FBWC) options: 1 GB, 2 GB, 4 GB Note: See also Cisco 12G SAS Modular RAID Controller Considerations, page C-3.	PCIe	12 internal	Yes	0, 1, 5, 6, 10, 50, 60	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6.
LSI 9300-8e HBA (non-RAID) NOTE: See also Cisco UCS SAS 9300-8e HBA Considerations, page C-3.	PCIe	Up to 1024 external drives (JBOD)	No	Non-RAID	External cables not sold by Cisco NOTE: This HBA does not support optical cables for connection to external storage (copper only).

Cisco 12G SAS Modular RAID Controller Considerations

Stripe-Size Limitation When No Flash-Backed Write Cache is Present

This controller can be ordered with several modular flash-backed write cache (FBWC) options: 512 MB (when using UCSC-MRAID12G); or 1 GB, 2 GB, or 4 GB (when using UCSC-MRAIDC460).

- If the controller has a FBWC and you are using a RAID configuration that uses striping (RAID 0, 10, 50, or 60), then the full list of stripe sizes is available (8, 16, 32, 64, 128, 256, 512, or 1024 KB).

- If the controller does not have a FBWC, then the only stripe size available is 64 KB.

Write-Cache Policy for Cisco 12G SAS Modular RAID Controller

For this server and other Cisco Generation M4 servers, the default write-cache policy for the Cisco Modular RAID controller is *Write Through* (irrespective of the presence of a charged Supercap power module or "good BBU"). This utilizes the optimal performance characteristics of the controller.

If you have Cisco IMC 2.0(5) or later firmware installed to the M4 server, the write policy can be set to *Write Back*, if preferred.

You can set the write policy using the following methods:

- For standalone servers, use the Cisco IMC interface to set Virtual Drive Properties > Write Policy. See the "Managing Storage Adapters" section in your Cisco IMC Configuration Guide. Cisco IMC GUI and CLI Configuration Guides

- For Cisco UCS-integrated servers, use the Cisco UCS Manager interface to set the write-cache policy as part of virtual drive configuration in your storage profile. Cisco UCS Manager Configuration Guides

- Use the LSI Option ROM Configuration Utility.

Cisco UCS SAS 9300-8e HBA Considerations

This section contains the following topics:

Optical Cables Not Supported for 9300-8e HBA

The 9300-8e HBA does not support optical cables for connection to external storage (copper only).

Mixing Rules for 9300-8e HBA

Mixing the Cisco UCS 9300-8e HBA in the same server as the Cisco UCS 12G SAS Modular HBA requires the following firmware levels:

- Cisco IMC/BIOS 2.0(8) or later
- Cisco UCS Manager 2.2(6) or later (for integrated servers only)

Bad Drive and Predictive Failure Behavior for 9300-8e HBA

The bad drive and predictive failure behavior for the Cisco UCS SAS 9300-e HBA cards is different than that for LSI MegaRAID cards. The list below compares behavior for these HBA cards and LSI MegaRAID cards.

- Bad/invalid/0MB drive handling:
  - MegaRAID: The bad drive is marked BAD in the GUI/CLI interfaces and the fault LED on the drive is solid amber.
  - HBA: The bad drive is not shown in the GUI/CLI and there is no LED indication.
- Drive predictive failure:
  - MegaRAID: If the drive is part of a RAID volume with a spare, the software performs an auto-copy backup and then marks the drive failed/BAD with the fault LED on the drive solid amber.
  - HBA: There is no error handling and there is no LED indication. The operating system must handle the fault.

Setting the Preferred Boot Device For 9300-8e HBA

Currently, the boot device order for these HBAs does not map to a physical slot as seen in the Boot Option dialog of the server BIOS Setup Utility. This makes it difficult to differentiate between multiple devices.

Use the following procedure to select the preferred boot device in the LSI BIOS CU SAS Topology screen. When you select the preferred boot device in the BIOS CU SAS Topology screen, it is displayed at the top of the list in the server BIOS Setup Utility Boot Option dialog, making it easy to identify.

Step 1   In the LSI SAS BIOS CU, navigate to the SAS Topology screen.

Step 2   Press **Alt+B** to select or deselect a device as the preferred boot device. On this screen, you can identify the device by slot number.

Step 3   Press **Alt+A** to select or deselect a device as the alternate boot device. On this screen, you can identify the device by slot number. The alternate boot device is used if the preferred boot device is not detected.

Step 4   Return to the BIOS CU SAS Topology screen.

The Device Info column shows which devices you selected with the designators `Boot` and `Alt`.

Step 5   In the server BIOS Setup Utility, open the Boot Option dialog.

The preferred device that you selected in the LSI BIOS CU is listed at the top of the list.

Step 6   Select the device at the top of the list as your boot option.

RAID Card Firmware Compatibility

Firmware on the RAID controller must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the server. If not compatible, upgrade or downgrade the RAID controller firmware accordingly using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: HUU Guides

Supercap Power Module (RAID Backup Unit)

This server supports installation of one supercap power module (SCPM) backup unit. The unit mounts to a bracket on the chassis wall adjacent to the internal RAID controller slot (see Replacing the Supercap Power Module (RAID Backup Unit), page 3-47).

The SCPM provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

RAID Controller Cabling

This section contains the following topics:

SAS Cable-to-Drive Bay Mapping

The server chassis comes with three SAS cables pre-attached to the drive backplane SAS ports. It is important to know which SAS cable ports on the drive backplane control the drive bays when attaching SAS cables to your RAID controller card. See Figure C-1.

✎ **Note**   The view shown in the diagram in Figure C-1 is facing the *front* of the server. The SAS ports on the drive backplane are shown in their physical position on the reverse (interior) side of the backplane.

Figure C-1   SAS Cable to Drive Bay Mapping (Facing the Front of the Server)
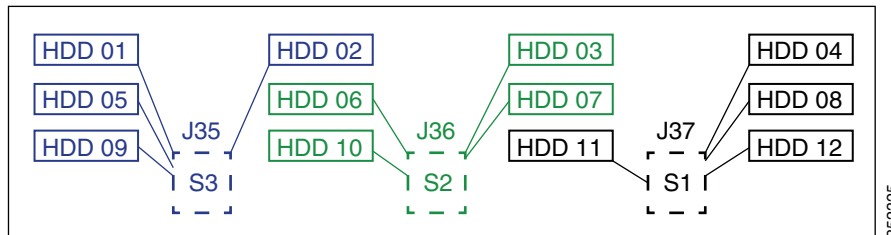
Cabling an 8-Port RAID Controller

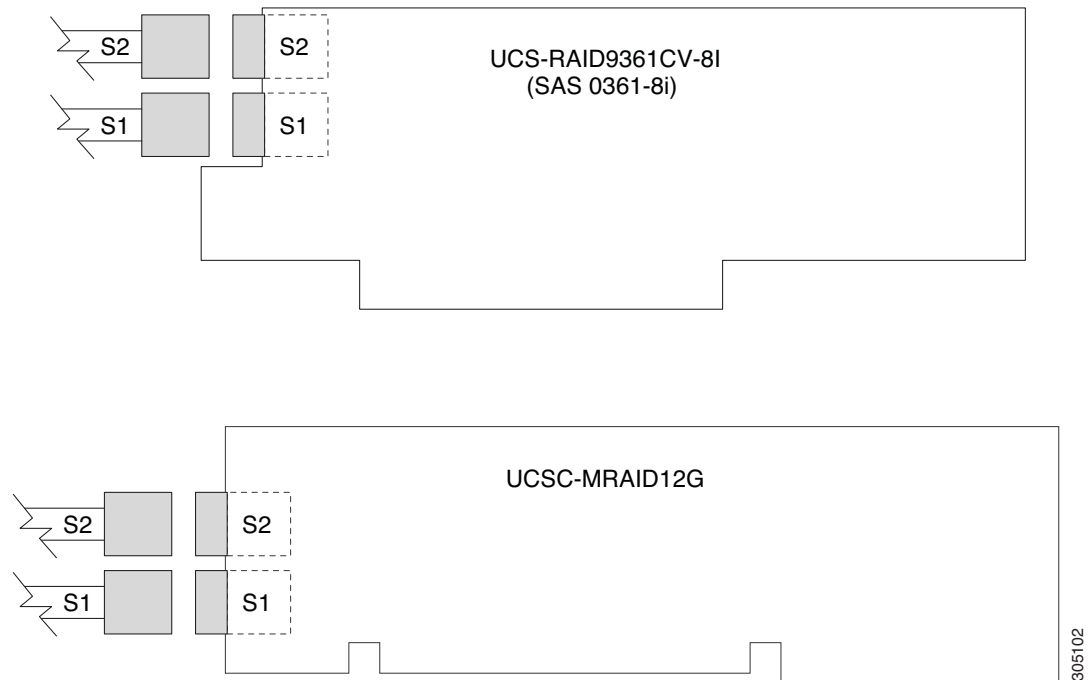An 8-port RAID controller can control 8 drives.

> **Note** When using an 8-port RAID controller, you must populate the eight drives that you want to control in drive bays (3, 6, 7, 10) and (4, 8, 11, 12). That is, you must populate the bays that are controlled by SAS backplane ports S1 and S2 as shown in Figure C-1.

The connectors on the card might not be labeled. See Figure C-2 for the card connector numbering.

Step 1 Attach the S1 SAS cable from drive backplane port J37 to the S1 port on the RAID controller card.

Step 2 Attach the S2 SAS cable from drive backplane port J36 to the S2 port on the RAID controller card.

Figure C-2 **Cabling 8-Port RAID Controller Cards**

Cabling a 12-Port RAID Controller

A 12-port RAID controller can control 12 drives.

The connectors on the card might not be labeled. See Figure C-3 for the card connector numbering.

Step 1   Attach the S1 SAS cable from drive backplane port J37 to the S1 port on the RAID controller card.

Step 2   Attach the S2 SAS cable from drive backplane port J36 to the S2 port on the RAID controller card.

Step 3   Attach the S3 SAS cable from drive backplane port J35 to the S3 port on the RAID controller card

Figure C-3   Cabling a 12-Port RAID Controller Card
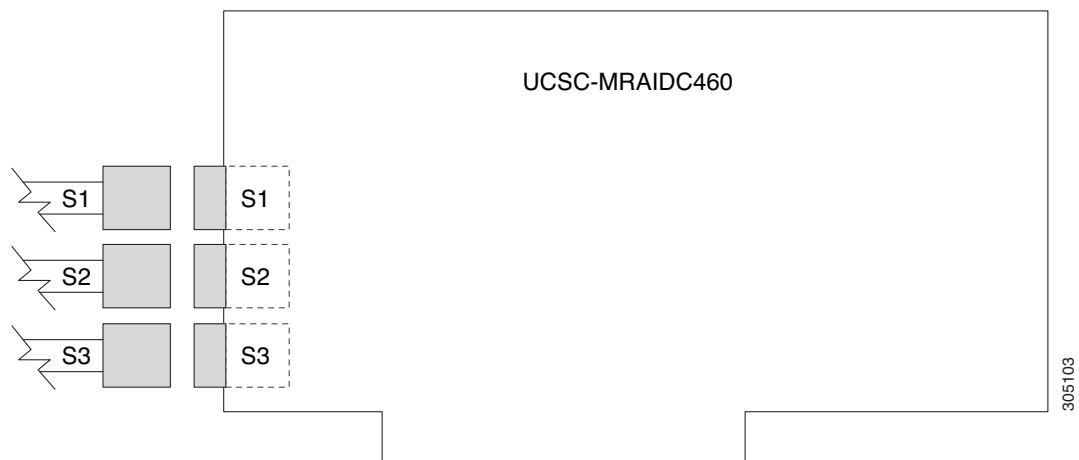
Restoring RAID Configuration After Replacing a RAID Controller

When you replace a RAID controller, the RAID configuration that is stored in the controller is lost.

Step 1 Replace your RAID controller. See Special Considerations for Cisco UCS Virtual Interface Cards, page 3-54.

Step 2 If this was a full chassis swap, replace all drives into the drive bays, in the same order that they were installed in the old chassis.

Step 3 Reboot the server and watch for the prompt to press F.

Step 4 Press **F** when you see the following onscreen prompt:

```
Foreign configuration(s) found on adapter.
Press any key to continue or 'C' load the configuration utility,
or 'F' to import foreign configuration(s) and continue.
```

Step 5 Press any key (other than C) to continue when you see the following onscreen prompt:

```
All of the disks from your previous configuration are gone. If this is
an unexpected message, then please power of your system and check your cables
to ensure all disks are present.
Press any key to continue, or 'C' to load the configuration utility.
```

Step 6 Watch the subsequent windows for confirmation that your RAID configuration was imported correctly:

- If you see the following message, your configuration was successfully imported. The LSI virtual drive is also listed among the storage devices.

  ```
  N Virtual Drive(s) found on host adapter.
  ```

- If you see the following message, your configuration was not imported. This problem can occur if you do not press F quickly enough when prompted. In this case, reboot the server and try the import operation again when you are prompted to press F.

  ```
  0 Virtual Drive(s) found on host adapter.
  ```

For More Information

The LSI utilities have help documentation for more information about using the utilities.

For basic information about RAID and for using the utilities for the RAID controller cards, see the Cisco UCS Servers RAID Guide.

Full LSI documentation is also available:

LSI MegaRAID SAS Software User's Guide (for LSI MegaRAID)

http://www.lsi.com/DistributionSystem/AssetDocument/80-00156-01_RevH_SAS_SW_UG.pdf