APPENDIX C

RAID Controller Considerations

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

- Supported RAID Controllers and Required Cables, page C-1
- Battery Backup Unit, page C-2
- Mixing Drive Types in RAID Groups, page C-2
- RAID Controller Cabling, page C-2
- Restoring RAID Configuration After Replacing a RAID Controller, page C-6
- For More Information, page C-7

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.

Table C-1 Cisco UCS C260 Server Supported RAID Options

Controller	Style	Max. Internal Drives	SAS	SATA	Opt. BBU	RAID Levels	Required Cables
LSI MegaRAID SAS 9261-8i	PCIe	8[1] or 16 with expander[2]	Yes[3]	Yes	Yes	0, 1, 5, 6, 10, 50, 60	2 or 4 SAS[4] UCSC-RC-1M-C260 or UCSC-RC-P8M-C260

1. When using the nonexpander-style transition card, each controller can support 8 drives. You can install two controllers and two nonexpander transition cards to control 16 drives.
2. When using two expander-style transition card, one controller can control 16 drives.
3. You can mix SAS and SATA drives when using an LSI MegaRAID card. However, you cannot mix SAS and SATA drives within a volume.
4. The number of cables required varies, depending on how many controllers and transition cards are used. See Mixing Drive Types in RAID Groups, page C-2.

Battery Backup Unit

This server supports installation of two LSI RAID battery backup units (BBUs). The units mount to holders on the chassis wall (see Replacing the RAID Controller Battery Backup Unit, page 3-54).

This BBU provides approximately 72 hours of battery backup for the disk write-back cache DRAM in the case of sudden power loss.

Mixing Drive Types in RAID Groups

Table C-2 lists the technical capabilities for mixing hard disk drive (HDD) and solid state drive (SSD) types in a RAID group. However, see the best practices recommendations that follow for the best performance.

Table C-2 Drive Type Mixing in RAID Groups

Mix of Drive Types in RAID Group	Allowed?
SAS HDD + SATA HDD	Yes
SAS SSD + SATA SSD	Yes
HDD + SSD	No

Best Practices For Mixing Drive Types in RAID Groups

For the best performance, follow these guidelines:

- Use either all SAS or all SATA drives in a RAID group.
- Use the same capacity for each drive in the RAID group.
- Never mix HDDs and SSDs in the same RAID group.

RAID Controller Cabling

The maximum two supported RAID controller cards should be populated in PCIe slots in the following order (see Figure 3-26 on page 3-45):

1. PCIe slot 3
2. PCIe slot 5

Refer to the following examples for cable routing guidelines:

- Example 1—One Nonexpander and One RAID Controller With Eight Drives, page C-3
- Example 2—Two Nonexpanders and Two RAID Controllers With 16 Drives, page C-4
- Example 3—Two Expanders and One RAID Controller With Sixteen Drives, page C-5

For more information about transition cards, see Replacing a Modular Drive Bay Assembly, page 3-14.

Example 1—One Nonexpander and One RAID Controller With Eight Drives

Figure C-1 shows an example of a server that is using one RAID controller in PCIe slot 3 and a *nonexpander* transition card to control eight drives in the modular drive bay.

Two RAID cables are required (1 UCSC-RC-1M-C260 and 1 UCSC-RC-P8M-C260).

- Slot 3 RAID Controller to bay 1 drives 1–4:

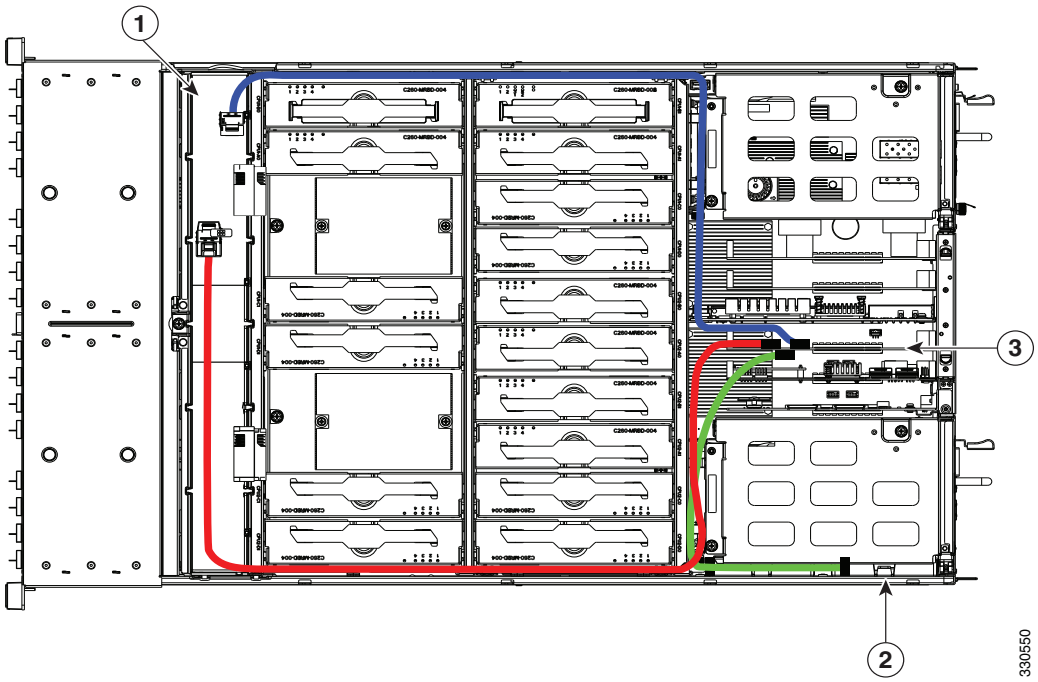
  The blue line is a 0.8m cable (UCSC-RC-P8M-C260) from the RAID controller SAS 0 connector to the nonexpander connector for PORT 1– 4.

- Slot 3 RAID Controller to bay 1 drives 5–8:

  The red line is a 1m cable (UCSC-RC-1M-C260) from the RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.

- The green line is the cable from the RAID controller to an optional battery backup unit.

Figure C-1 RAID Controller Cabling Guidelines, Nonexpander Transition Card



1	Nonexpander transition card (shown with fan tray removed)	**3**	RAID controller card in PCIe slot 3
2	Battery backup unit (mounted to chassis inner wall)		–

Example 2—Two Nonexpanders and Two RAID Controllers With 16 Drives

Figure C-2 shows an example of a server that is using two RAID controllers in PCIe slots 3 and 5 and two *nonexpander* transition cards to control eight drives in each of the two modular drive bays.

Four RAID cables are required (2 x UCSC-RC-1M-C260 and 2 x UCSC-RC-P8M-C260).

- Slot 5 RAID Controller to bay 1 drives 1–4:

  The upper blue line is a 0.8m cable (UCSC-RC-P8M-C260) from the Slot 5 RAID controller SAS 0 connector to the nonexpander connector for PORT 1–4.

- Slot 5 RAID Controller to bay 1 drives 5–8:

  The red line is a 1m cable (UCSC-RC-1M-C260) from the Slot 5 RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.

- Slot 3 RAID Controller to bay 2 drives 1–4:

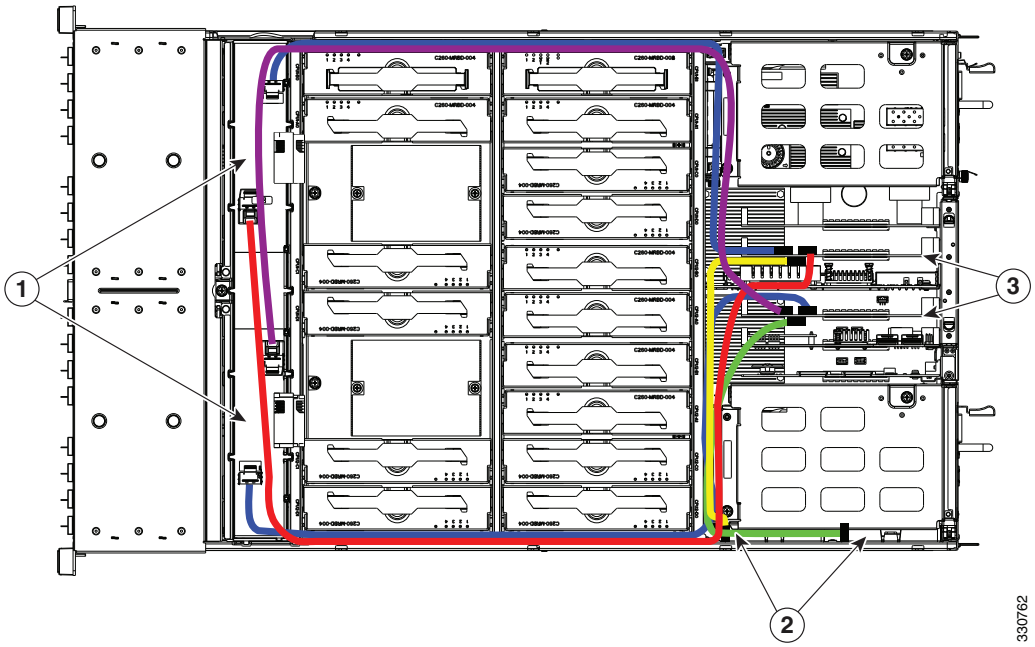
  The violet line is a 1m cable (UCSC-RC-1M-C260) from the Slot 3 RAID controller SAS 0 connector to the nonexpander connector for PORT 1–4.

- Slot 3 RAID Controller to bay 2 drives 5–8:

  The lower blue line is a 0.8m cable (UCSC-RC-P8M-C260) from the Slot 3 RAID controller SAS 1 connector to the nonexpander connector for PORT 5–8.

- The green and yellow lines are the cables from the RAID controllers to their respective battery backup units.

Figure C-2 RAID Controller Cabling Guidelines, Two Nonexpanders and Two Controllers



1	Transition cards, nonexpander version (shown with fan tray removed)	**3**	RAID controller cards in PCIe slots 3 and 5
2	Battery backup units (2, mounted to the inner chassis wall)		–

Example 3—Two Expanders and One RAID Controller With Sixteen Drives

Figure C-3 shows an example of a server that is using one RAID controller in PCIe slot 3 and two *expander* transition cards to control eight drives in each of the two modular drive bays.

Two RAID cables are required (2 x UCSC-RC-P8M-C260).

- Slot 3 RAID Controller to bay 1 drives 1–8:

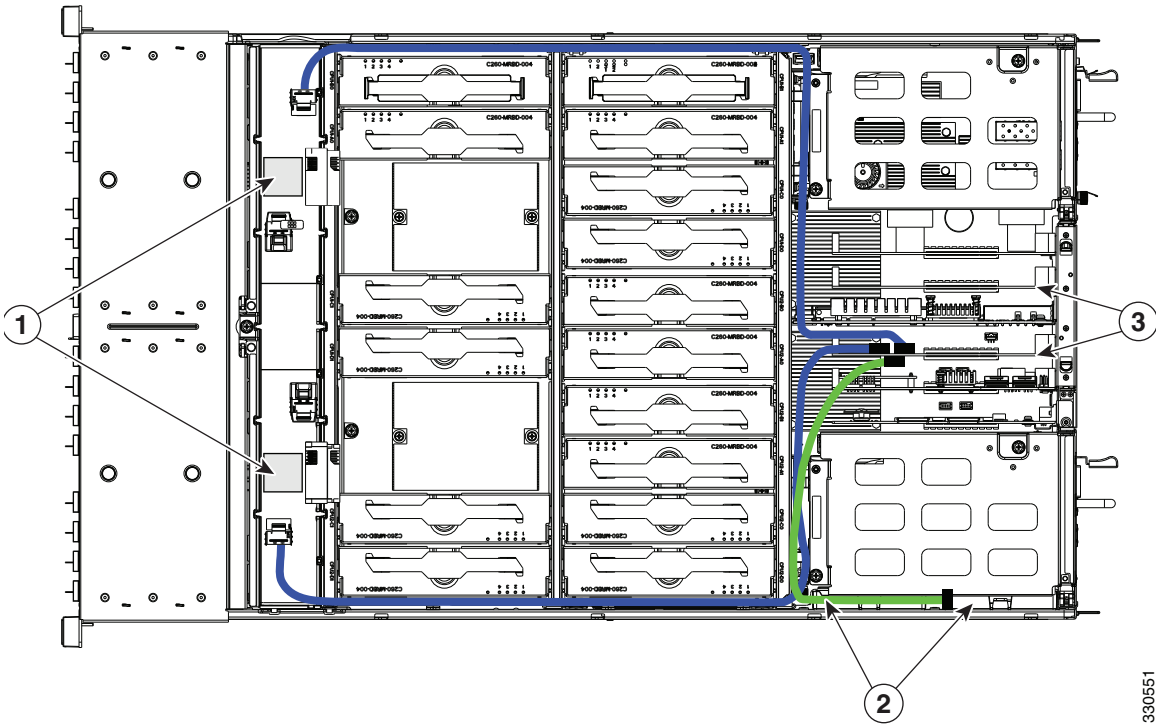
  The upper blue line is a 0.8m cable (UCSC-RC-P8M-C260) from the RAID controller SAS 0 connector to the first expander connector A (for drives 1–8).

- Slot 3 RAID Controller to bay 2 drives 9–16:

  The lower blue line is a 0.8m cable (UCSC-RC-P8M-C260) from the RAID controller SAS 1 connector to the second expander connector B (for drives 9–16).

- The green line is a cable from the RAID controller to the battery backup unit.

Figure C-3 RAID Controller Cabling Guidelines, Two Expanders and One Controller



1	Expander transition cards (shown with fan tray removed)	**3**	RAID controller card in PCIe slot 3
2	Battery backup unit (mounted to the inner chassis wall)		–

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. To restore your RAID configuration to your new RAID controller, follow these steps.

Step 1 Replace your RAID controller. See Replacing a PCIe Card in a Motherboard Slot, page 3-48.

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.

Note For newer RAID controllers, you are not prompted to press F. Instead, the RAID configuration is imported automatically. In this case, skip to Step 6.

Step 4 Press **F** when you see the following on-screen 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 on-screen 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 screens 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 can happen if you do not press F quickly enough when prompted. In this case, reboot the server and try the import operation again wen 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