



RAID Controller Considerations

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

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Supported RAID Controllers and Required Cables

This server supports the RAID controller options and cable requirements shown in [Table C-1](#).

Table C-1 Cisco UCS C3160 Server Supported RAID Options

| Controller | Style | Maximum Drives | SCPM? | RAID Levels | Required Cables |
|---|-----------|----------------|-------|---|---|
| Cisco UCS C3X60 12G SAS RAID UCSC-C3X60-R1GB UCSC-C3X60-R4GB (with 1-GB or 4-GB write cache) | Mezzanine | 60 internal | Yes | 0, 1, 5, 6, 10, 50, 60 JBOD is also supported. | None. Card installs to mezzanine socket inside the server node. |
| Cisco UCS 12G SAS HBA pass-through controller UCSC-C3X60-HBA | Mezzanine | 60 internal | No | Non-RAID | None. Card installs to mezzanine socket inside the server node. |

For instructions on installing a RAID controller card, see [Replacing a RAID Controller Card Inside the Server Node, page 3-46](#).

Cisco UCS C3X60 12G SAS RAID Controller Specifications

The Cisco UCS C3X60 12G SAS RAID controller can be ordered with a 1-GB or a 4-GB write cache (UCSC-C3X60-R1GB or UCSC-C3X60-R4GB).

The controller can be used in JBOD mode (non-RAID) or in RAID mode with a choice of RAID levels 0,1,5,6,10, 50, or 60.

- Maximum drives controllable—64 (the server has maximum 60 internal drives)
- Maximum drives per span—32
- Maximum spans—8

Best Practices For Configuring RAID Controllers

- [RAID Card Firmware Compatibility, page C-2](#)
- [Choosing Between RAID 0 and JBOD, page C-2](#)
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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](#)

Choosing Between RAID 0 and JBOD

The Cisco UCS C3X60 12G SAS RAID controller supports JBOD mode (non-RAID) on physical drives that are in pass-through mode and directly exposed to the OS. We recommended that you use JBOD mode instead of individual RAID 0 volumes when possible.

RAID 5/RAID 6 Volume Creation

The Cisco UCS C3X60 12G SAS RAID controller allows you to create of large RAID 5 or 6 volume by including all the drives in the system with a spanned array configuration (RAID 50/RAID 60). Where possible, we recommended you create multiple, smaller RAID 5/6 volumes with fewer drives per RAID array. This provides redundancy and reduces the operations time for initialization, RAID rebuilds, and other operations.

Choosing I/O Policy

The I/O policy applies to reads on a specific virtual drive. It does not affect the read-ahead cache. RAID volumes can be configured in two types of I/O policies. These are:

- **Cached I/O**—In this mode, all reads are buffered in cache memory. Cached I/O provides faster processing.
- **Direct I/O**—In this mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. Direct I/O makes sure that the cache and the host contain the same data.

Although Cached I/O provides faster processing, it is useful only when the RAID volume has a small number of slower drives. With the C3X60 4-TB SAS drives, Cached I/O has not shown any significant advantage over Direct I/O. Instead, Direct I/O has shown better results over Cached I/O in a majority of I/O patterns. We recommended you use Direct I/O (the default) in all cases and to use Cached I/O cautiously.

Background Operations (BGOPS)

The Cisco UCS 12G SAS RAID controller conducts different background operations like Consistency Check (CC), Background Initialization (BGI), Rebuild (RBLD), Volume Expansion & Reconstruction (RLM), and Patrol Real (PR).

While these BGOPS are expected to limit their impact to I/O operations, there have been cases of higher impact during some of the operations like Format or similar I/O operations. In these cases, both the I/O operation and the BGOPS may take more time to complete. In such cases, we recommend you limit concurrent BGOPS and other intensive I/O operations where possible.

BGOPS on large volumes can take an extended period of time to complete, presenting a situation where operations complete and begin with limited time between operations. Since BGOPS are intended to have a very low impact in most I/O operations, the system should function without any issues. If there are any issues that arise while running concurrent BGOPS and I/O operations, we recommend you to stop either activity to let the other complete before reusing and/or schedule the BGOPS at a later time when the I/O operations are low.

Supercap Power Module (RAID Backup Unit)

This server supports installation of one supercap power module (SCPM) backup unit. The unit mounts directly to the Cisco modular RAID controller card inside the server node. The unit comes already attached to the card and is not sold as a separate component.

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.

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.

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- Step 1** Replace your RAID controller. See [Replacing a RAID Controller Card Inside the Server Node, page 3-46](#).
- 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 node.
- Step 4** 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 5** 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. In this case, reboot the server and try the import operation again.  

```
0 Virtual Drive(s) found on host adapter.
```
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## 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 Avago Technologies/LSI documentation is also available:

[Avago Technologies/LSI 12 Gb/s MegaRAID SAS Software User's Guide, Rev. F](#)



■ For More Information