Storage Controller Considerations

This appendix provides storage controller (RAID and HBA) information.

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Supported Storage Controllers and Cables

This server supports a single, PCIe-style, SAS RAID or HBA controller that plugs into a dedicated internal riser.

Note Do not mix controller types in the server.

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

This server supports the RAID and HBA controller options and cable requirements shown in the following table.

Storage Adapter (PID)	Product Name	Supported Server	Maximum Number of Drives Supported	Supported RAID Type	Cache Size (GB)
UCSC-RAID-M6T	Cisco 12G SAS RAID Controller with 4GB FBWC (16 Drives)	UCSC-C220-M6S	10 10 2.5-inch SFF front-loading drives Slots 1-10	RAID	4
UCSC-SAS-M6T	Cisco 12G SAS HBA (16 Drives)	UCSC-C220-M6S	10 10 2.5-inch SFF front-loading drives Slots 1-10	SAS HBA	NA
UCSC-9500-8E	Cisco 9500-8e 12G SAS HBA for external JBOD attach	All models of UCS C220 M6 and UCS Cs240 M6 server	NA	SAS HBA	NA

Storage Controller Card Firmware Compatibility

Firmware on the storage controller (RAID or HBA) 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 storage controller firmware using the Cisco 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.

Note **For servers running in standalone mode only:** After you replace controller hardware, you must run the Cisco Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the server SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

RAID Backup (Supercap)

This server supports installation of one Supercap unit (UCS-SCAP-M6). The unit mounts to a bracket in-line with the fan modules.

The optional SCPM provides approximately three years of backup for the disk write-back cache DRAM in the case of a sudden power loss.

For Supercap unit replacement instructions, see Replacing the Supercap (RAID Backup).

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

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

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.

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 Migration

This server supports SAS/SATA hardware RAID (controller card) and embedded software SATA RAID. You cannot use hardware RAID and software RAID at the same time. See the table below for which data migrations are allowed and a summary of migration steps.

Starting RAID Controller	Migrate to Hardware RAID Allowed?	Migrate to Software RAID Allowed?
None (no drives). Embedded RAID is disabled in the BIOS.	Allowed 1. Install RAID card. 2. Install SAS cables.	Allowed 1. Install SATA interposer card. 2. Install SATA cables. 3. Enable embedded RAID in BIOS.

Embedded software RAID. Embedded RAID is enabled in the BIOS.	**Caution** Data migration from software RAID to hardware RAID is *not* supported and could result in data loss. Allowed only before there is data on the drives; data migration is not supported. **1.** Disable embedded RAID in the BIOS. **2.** Install RAID card. **3.** Install SAS cables.	-
Hardware RAID. Embedded RAID is disabled in the BIOS.	-	Not allowed.

Storage Controller and Backplane Connectors

This section describes cabling connections for the storage controllers and the backplane. The SAS/SATA cables are factory-installed and are used for all supported internal controllers in the SFF 10-drive version of the server.

This section also contains diagrams that show the cable-to-drive mapping.

Note The SFF 10-drive version with NVMe drives only, and so does not use SAS or SATA RAID. This version of the server comes with an NVMe-switch card factory-installed in the internal mRAID riser and a PCIe cable connected to PCIe riser 2. The NVMe switch card is not orderable separately.

Embedded RAID

This SW RAID option can control up to 8 SATA drives in the SFF 10-drive version.

This embedded RAID option requires that you have a SATA interposer card installed in internal mRAID riser 3. Use the SAS/SATA cables that came with the server.

1. Connect SAS/SATA cable A1 from the A1 interposer connector to the A1 backplane connector.
2. Connect SAS/SATA cable A2 from the A2 interposer connector to the A2 backplane connector.

Note See the following figures that illustrate cable connections and which drives are controlled by each cable. In the SFF 10-drive version, drives 5 and 10 cannot be controlled by the embedded SATA RAID controller.

Cisco 12G Modular SAS RAID Controller or HBA

This HW RAID option can control up to 10 SAS/SATA drives in the SFF 10-drive version.

This option requires that you have a SAS RAID or HBA card installed in internal mRAID riser 3. Use the SAS/SATA cables that came with the server.

1. Connect SAS/SATA cable A1 from the A1 card connector to the A1 backplane connector.
2. Connect SAS/SATA cable A2 from the A2 card connector to the A2 backplane connector.
3. For SFF-10-drive servers only: Connect SAS/SATA cable B2 from the B2 card connector to the B2 backplane connector.

Note See the following figures that illustrate cable connections and which drives are controlled by each cable.

For More RAID Utility Information

The Broadcom 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 that are supported in Cisco servers, see the Cisco Servers RAID Guide.
- For hardware SAS MegaRAID configuration—Broadcom 12Gb/s MegaRAID SAS Software User Guide, Version 2.8
- For embedded software MegaRAID and the utility that is accessed via the server BIOS (refer to Chapter 4)—Broadcom Embedded MegaRAID Software User Guide, March 2018.