



Getting Started with your RAID Adapter, Part 1

University Training Module

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Introduction

In other Adaptec University Training Modules, you've read about the features of Adaptec RAID adapters. Now it's time to learn how to get a RAID adapter up and running so that your data is protected.

This module is divided into two parts. In Part 1, you'll read how to physically install and set up a RAID adapter with Zero-Maintenance Cache Protection (ZMCP) in a new server. In Part 2, you'll learn how to build RAID storage for your data and use best practices to keep your data, drives, and RAID adapters safe.

At the completion of Part I, you should be able to:

- List the materials you'll need during the physical installation of a RAID adapter.
- Describe the three steps in the physical installation process.
- Explain how to install and connect a ZMCP module.
- Understand how to check and update the firmware on a RAID adapter.

Before You Begin

Checking System Requirements

Make sure the system in which you're installing the RAID adapter meets all the basic requirements, which are listed in the *Adaptec RAID Controller Installation and User's Guide* available on the Microsemi Web site at www.microsemi.com.

Note: Not all operating systems are supported on all RAID adapters. You can find a list of supported operating systems at the Microsemi Web site at www.microsemi.com.

What You'll Need to Complete the Installation

From the Microsemi Web site (www.microsemi.com), you'll need to download these items onto a USB flash drive:

- The latest drivers for your RAID adapter
- The Adaptec Flash Utility
- The Adaptec RAID Configuration utility, which includes the Array Configuration Utility (ACU)
- Adaptec maxView Storage Manager (MSM) software
- *Adaptec RAID Controller Installation and User's Guide* (pdf)
- *Adaptec maxView Storage Manager User's Guide* (pdf)

Also, in addition to the RAID adapter and a system that meets the basic requirements, you'll need these items to complete RAID adapter installation:

- Hard disk drives (HDDs), Solid State drives (SSDs), and storage enclosures, as required
- SAS and/or SATA cables, as required
- Driver disk (USB flash drive, CD/DVD, or floppy disk)

Note: Even though some operating systems may already contain a driver for your RAID adapter, Adaptec recommends updating to the latest driver for your operating system, which can be downloaded from the Microsemi Web site at www.microsemi.com.

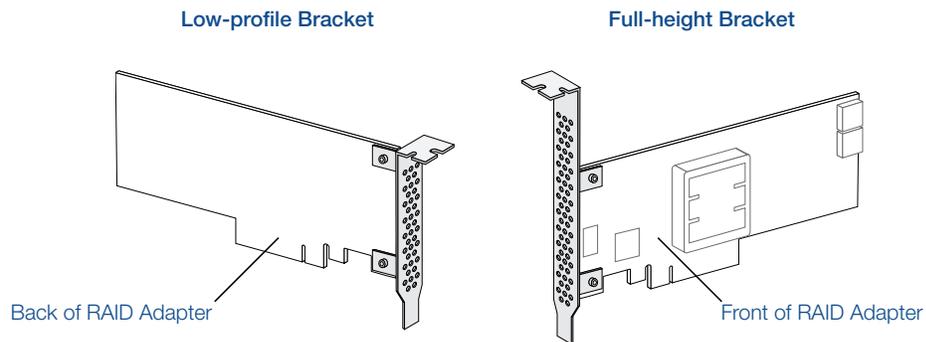
Instructions for creating a driver disk are included in the *Adaptec RAID Controller Installation and User's Guide*.

- Your operating system installation media
- A screwdriver (if the system into which you're installing the RAID adapter uses screws as retention devices)

Installing Low-profile Brackets

If you are installing the RAID adapter into a low-profile computer cabinet, replace the original full-height bracket with the low-profile bracket included in the kit.

The full-height bracket is mounted on the front of the adapter, the low-profile bracket is mounted on the back of the adapter, as shown here.



Safety Reminders

It's important to follow the proper safety protocols when you're installing the RAID adapter and disk drives (or any time you open a computer chassis).

To ensure your personal safety and the safety of your equipment:

- Keep your work area and the computer clean and clear of debris.
- Unplug the power cord before opening the computer chassis.

Safely Handling RAID Adapters with ZMCP. Although brand new ZMCP modules have not been charged and are therefore safe to install when you receive them, please note that you should NEVER install or remove a fully charged super-capacitor module.

Always discharge a super-capacitor module before installing or removing it to avoid damage to the RAID adapter or flash backup module. (The risk is to the hardware only; the super-capacitor module runs at a maximum value of 5.4 volts and poses no possible danger to users.)

To discharge the super-capacitor module to a safe working value, leave the ZMCP module in the system for at least 5 minutes with the system powered off. After 5 minutes, detach the super-capacitor module from the daughter card. The yellow LED on the daughterboard will continue to be illuminated, indicating that the super-capacitor module has a charge, but Adaptec has determined that the charge level after 5 minutes is well below the level required for safe handling.

 **Caution:** Never connect a Battery Backup Module to an Adaptec RAID adapter with Zero Maintenance Cache Protection. The battery can overheat and may even explode.

Avoiding Electrostatic Discharge (ESD).

! Caution: ESD can damage electronic components and can result in total equipment failure. Always follow ESD-prevention procedures when removing and replacing components.

To prevent ESD damage:

- Use an ESD wrist or ankle strap and ensure that it makes skin contact. Connect the equipment end of the strap to an unpainted metal surface on the chassis.
If a wrist strap is not available, ground yourself by touching the metal chassis before handling the adapter or any other part of the computer.
- Avoid touching the adapter to your clothing. The wrist strap protects components from ESD on the body only.
- Handle the adapter by its bracket or edges only. Avoid touching the printed circuit board or the connectors.
- Put the adapter down only on an anti-static surface such as the bag supplied in your kit.
- If you are returning the adapter to Adaptec Product Support, put it back in its anti-static bag immediately.

Step 1: Install the RAID Adapter and ZMCP Module

Adaptec RAID adapters with ZMCP include a flash module daughterboard (an Adaptec Flash Module such as the AFM-700) and a super-capacitor module:

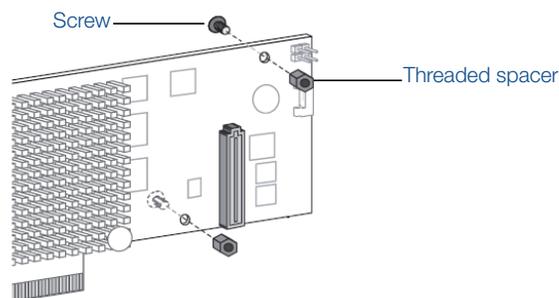
- On Q-Series RAID adapters, the flash module daughterboard is already installed (or flash memory is embedded on the adapter itself) but you have to manually install the super-capacitor module.
- On Adaptec RAID adapters where ZMCP is supported but optional, you have to manually install the daughterboard and the super-capacitor module.

Installing the Flash Module Daughterboard

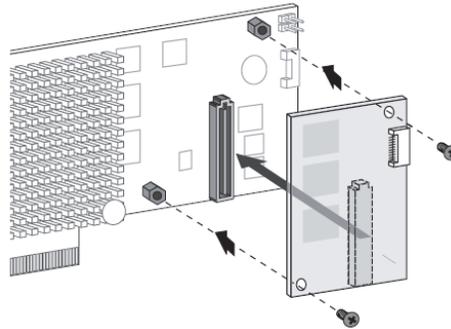
You will need a Phillips screwdriver to complete this installation.

! Caution: The torque should be less than 0.45Nm to avoid deforming the RAID adapter. Be sure that the RAID adapter is not bent after the daughterboard is attached.

1. Insert the screws through the back of the RAID adapter, then attach the threaded spacers, using your screwdriver.



2. Match the holes in the flash module daughterboard to the spacers on the RAID adapter, then use the screws to secure the daughterboard in place.



The flash module daughterboard is now installed.

Installing the ZMCP Module

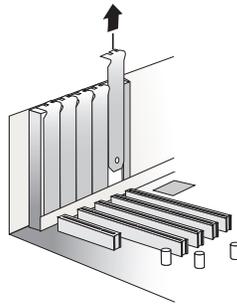
You have two options for installing the ZMCP module:

- The chassis-mount method (see [page 4](#))
- The mounting-plate method (see [page 6](#))

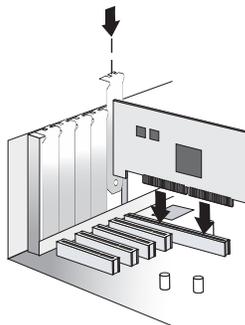
 **Caution:** Remember to follow all safety guidelines discussed on [page 2](#).

Completing a Chassis-mount Installation.

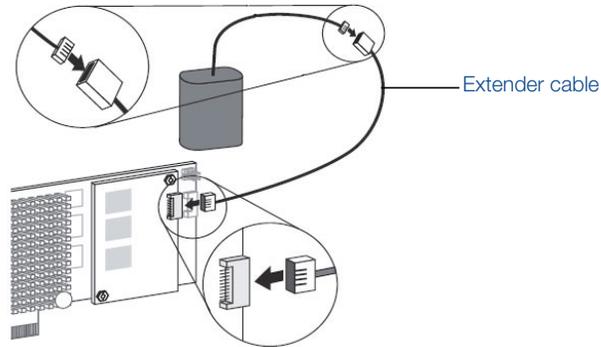
1. Turn off your computer, disconnect the power cord, and open the computer chassis.
2. Remove the slot cover of a compatible PCIe expansion slot.



3. Insert the RAID adapter into the expansion slot and press down gently but firmly until it clicks into place. When installed properly, the RAID adapter should appear level with the expansion slot.

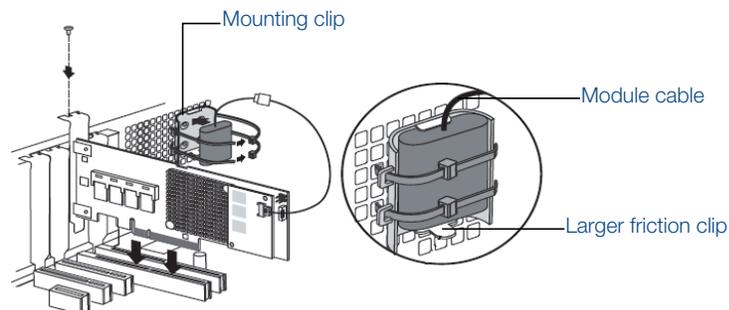


- Secure the bracket in the expansion slot, using the retention device (for instance, a screw or lever) supplied with the computer.
- Attach the super-capacitor module to the RAID adapter by inserting the connector into the socket on the flash module daughterboard. Use the extender cable, in required. The connector attaches to the socket in only one direction.



- Pick a spot on the chassis where you can connect the tethered super-capacitor module using the included mounting clip and cable ties. Make sure that from the spot you choose:
 - The module cable will reach the connector on the RAID adapter. (You can use the extender cable, if necessary.)
 - The module cable won't be in contact with any moving parts inside the chassis (like fans).
 - The module will be protected from heat.
 - Airflow in the chassis won't be restricted.
- Place the super-capacitor module in the mounting clip by snapping it into place so that the module cable is at one end and the larger friction clip on the mounting clip is at the other end (see the next figure).
- Use the cable ties to connect the super-capacitor module to the chassis.

Thread the cable ties through the slots on the mounting clip, making sure that they completely encircle the super-capacitor module to hold it in place securely.

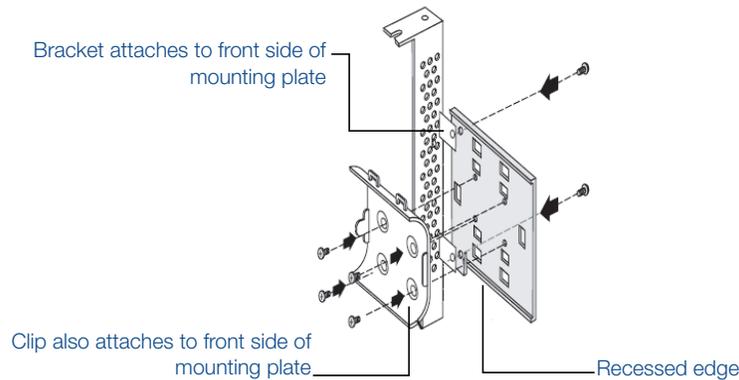


The RAID adapter and ZMCP module are installed.

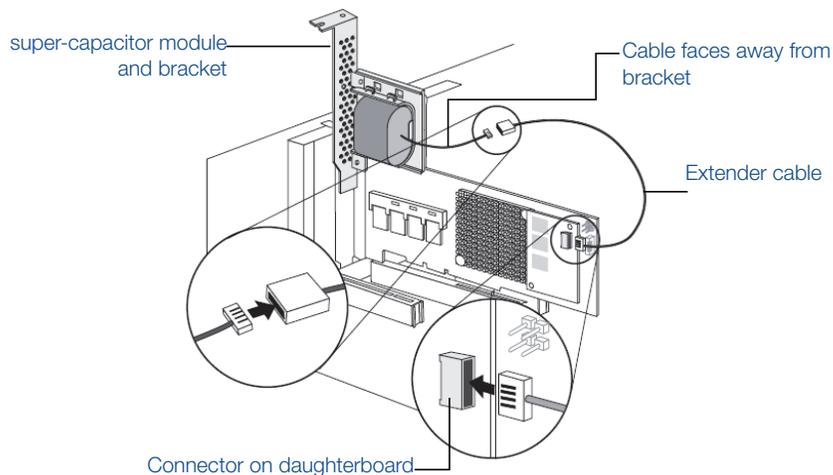
- Prepare and install your internal drives.
If you are not installing internal drives, close your computer cabinet, reattach the power cord, then restart your computer.
The super-capacitor starts charging automatically. It should reach full charge in 4–6 minutes.

Completing a Mounting-plate Installation.

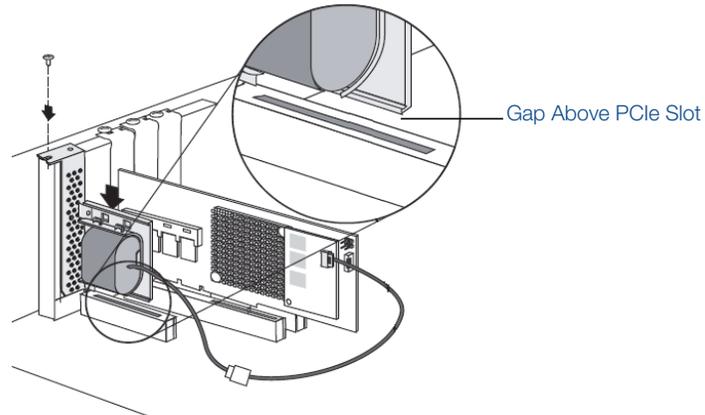
1. Turn off your computer, disconnect the power cord, and open the computer chassis. Remove the slot cover of a compatible PCIe expansion slot next to an empty slot in the backplane. (You'll need the empty slot for the super-capacitor.)
2. Insert the RAID adapter into the expansion slot and press down gently but firmly until it clicks into place. When installed properly, the RAID adapter should appear level with the expansion slot.
3. Secure the bracket in the expansion slot, using the retention device (for instance, a screw or lever) supplied with the computer.
4. Attach the full-height bracket to the mounting plate, making sure the bracket is the right way up with its recessed edge along the bottom. The bracket attaches to the front side of the mounting plate (the side with the bent edges) and the mounting screws go in from the back.
5. Attach the clip to the front side of the mounting plate.



6. Place the super-capacitor module in the mounting clip by snapping it into place between the friction clips so that the module cable faces away from the bracket (see the next figure).
7. Attach the super-capacitor module to the RAID adapter by inserting the connector into the socket on the flash module daughterboard. Use the extender cable, in required. The connector attaches to the socket in only one direction.



8. Install the super-capacitor module in the empty slot next to the RAID adapter. Secure the bracket in the expansion slot, using the retention device supplied with the computer. Make sure that the super-capacitor module and mounting plate sit above (and do not touch) the PCIe slot.



Note: The RAID adapter requires 200 LFM (linear feet/minute) of airflow across the heat sink. Where possible position the super-capacitor at least 1 empty socket away from the card to enable adequate airflow.

The RAID adapter and ZMCP module are completely installed.

Step 2: Install and Connect Internal Drives

The next step is to install the SAS/SATA HDDs and/or SSDs and connect them to the RAID adapter.

There are no jumpers or switches to set before installation.

Note: Although you can connect both SAS and SATA drives to your SAS RAID adapter, we recommend that you not combine SAS and SATA drives within the same array or logical drive. (Keep this in mind as you plan for a bootable array where your operating system will be installed.)

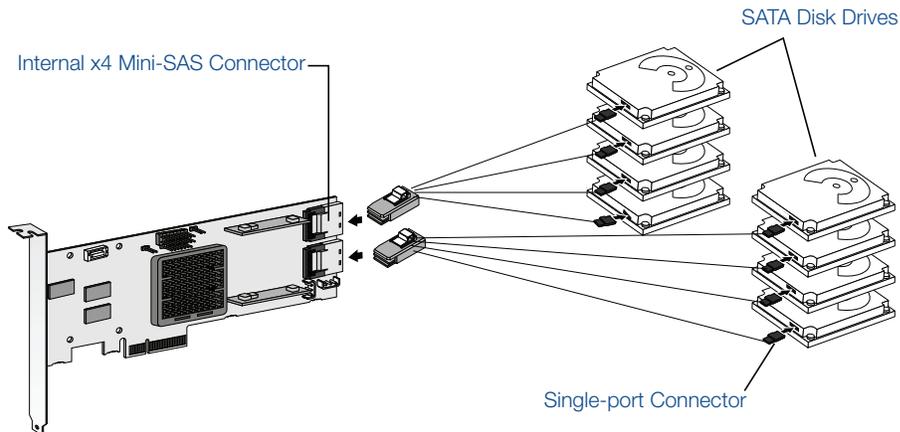
There are multiple ways to connect drives to the RAID adapter. The next sections describe these connection options.

Connecting Drives Directly to the Adapter

In a direct-attach connection, hard disk drives (HDDs) and Solid State drives (SSDs) are connected directly to the RAID adapter with SAS or SATA cables. The number of direct-attached drives supported is limited to the number of ports on the RAID adapter.

1. Install the internal HDDs and/or SSDs, following the manufacturer's instructions.

2. Use internal mini-SAS-to-SATA or mini-SAS-to-SAS cables to attach the drives directly to the RAID adapter. (In the figure on the next page, eight HDDs are shown connected to a RAID adapter.)



3. When all internal drives are installed and connected to the RAID adapter, close the computer chassis, reattach the power cord, then connect external devices, if required.

Connecting Drives to a System Backplane

In a backplane connection, drives and RAID adapters are attached to and communicate with each other through a system backplane.

The number of HDDs and/or SSDs is limited to the number of slots available on the backplane. Some backplanes have embedded SAS expanders and can support up to 128 end devices. (More information about SAS expanders is included in the Microsemi Adaptec University Training Module, *Introduction to Adaptec SAS RAID*.)

1. Connect the drives to the backplane, following the manufacturer's instructions.
2. Use an appropriate internal SAS cable to connect the adapter to the backplane.

Because Adaptec RAID adapters have mini-SAS (8087) or mini-SAS-HD (SFF-8643) connectors, you will need an internal SAS cable that has a mini-SAS (8087) or mini-SAS-HD (SFF-8643) connector at one end and a connector that will fit your backplane on the other. You can find the connector type required for your backplane in the backplane's documentation.

You can use any of these cables, depending on your RAID adapter and backplane:

- Mini-SAS to mini-SAS or mini-SAS to SATA
- Mini-SAS-HD to mini-SAS-HD or mini-SAS-HD to SATA

Step 3: Connecting External Devices and Powering On

When all internal drives are installed and connected to the backplane, close the computer chassis, reattach the power cord, then connect external devices, if required.

Use high-quality cables to connect your RAID adapter to your external devices (such as drive enclosures). We recommend using only Adaptec cables.

When all external devices are connected, restart your computer.

As part of the start-up process, the ZMCP super-capacitor automatically starts charging. (It should reach full charge in 4–6 minutes.)

What's Next?

Now that you have completed the physical installation and flashed the RAID adapter, it's time to get your server up and running by installing your operating system and the storage management software, building your first array, and establishing some best RAID practices to keep your storage system running smoothly.

You'll read all about these next steps in Getting Started with Your RAID Adapter, Part 2.

For the most recent updates to our product line and for detailed information and specifications, please call, email or visit our website:

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