

README

Microsemi Adaptec RAID Controllers

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The technology discussed in this document may be protected by one or more patent grants.

Revision History

Issue	Issue Date	Details of Change
1	April 2016	2016.rel1 Series 8 firmware/software maintenance release.
2	May 2016	2016.rel1 Series 7 firmware/software maintenance release.

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Important

This file contains important information about issues and errata that were discovered after completion of the standard product documentation.

In the case of conflict between various parts of the documentation set, this file contains the most current information.

Controllers Described in this Document

Microsemi® Adaptec® ASR-8405 / ASR-8805 / ASR-8885 / ASR-8885Q / ASR-81605Z / ASR-81605ZQ

Microsemi® Adaptec® ASR-7805 / ASR-7805Q / ASR-71605 / ASR-71605Q / ASR-71605E / ASR-71685 / ASR-72405 / ASR-78165

Microsemi® Adaptec® ASR-6405 / ASR-6445 / ASR-6805 / ASR-6805Q / ASR-6405E / ASR-6805E / ASR-6805E R5 / ASR-6405T / ASR-6805T / ASR-6805TQ

Microsemi® Adaptec® AFM-700 / AFM-600 Flash Backup Unit

Note: All Microsemi® Adaptec® products are UL listed and for use only with UL listed ITE.

1 New Features of this Release

- Microsemi Adaptec Series 7 and Series 8 SAS RAID Controllers refresh, including:
 - Support for new operating systems/versions (see [Supported Operating Systems](#) on page 8)
 - Support for SMR HA/DM¹ drives for Simple Volumes on Series 8 controllers
 - New power management defaults: IPM disabled for new logical drives
 - Support for latest gcc and Visual Studio versions for SDK
 - Storage management utilities update (see the *maxView Storage Manager & ARCCONF CLI Readme*)
- Bugfixes (see the *Release Notes* for a complete list)

¹ SMR: Shingled Magnetic Recording. HA: Host Aware (host may manage new commands). DM: Device Managed (drive uses legacy commands).

2 Software Versions and Documentation

2.1 Software Versions

Note: You can download the latest firmware, BIOS, driver software, and storage management utilities at start.adaptec.com.

- Firmware:
 - Series 7 controllers: Version 7.5.0, Build 32106
 - Series 8 controllers: Version 7.9.0, Build 33023
- Drivers:
 - Microsoft Windows: Version 7.5.0.41063
 - Linux/VMware: Version 1.2.1-50667
 - Solaris: Version 7.5.0.41018
- maxView Storage Manager/ARCCONF/BootUSB: Version 2.01.00

2.2 Documentation

Note: You can download the latest documentation at start.adaptec.com.

PDF Format

- Microsemi Adaptec SAS RAID Controllers Installation and User's Guide
- Microsemi Adaptec RAID Controller Command Line Utility User's Guide
- maxView Storage Manager User's Guide for Microsemi ARC-Family Controllers
- maxView Storage Manager/ARCCONF Command Line Utility README
- Microsemi Adaptec Event Monitor User's Guide

HTML and Text Format

- maxView Storage Manager Online Help
- maxView Storage Manager README.TXT file

3 Installation and Setup

Refer to these guides for installation and setup details:

- *Microsemi Adaptec SAS RAID Controllers Installation and User's Guide* contains complete installation information for the controllers and drivers.
- *Microsemi Adaptec RAID Controllers Command Line Utility User's Guide* contains complete installation information for ARCCONF.
- *maxView Storage Manager User's Guide for ARC-Family Controllers* contains complete installation information for the maxView Storage Manager software.

3.1 Supported Operating Systems

Drivers for this release have been tested and certified on the following operating systems. You can load the drivers on out-of-box operating system versions, the latest service pack, or software update. Compatibility issues may be seen with untested OS versions.

Note: 32-bit drivers are provided as-is and are not recommended for typical installations. Microsemi recommends using 64-bit drivers only.

Microsoft Windows

- Microsoft® Windows® Server 2012 R2 (64-bit)
- Microsoft® Windows® Server 2008 R2 SP1 (64-bit)
- Microsoft® Windows® SBS 2011 SP2 (Standard and Essential, 32-bit and 64-bit)
- Microsoft® Windows® 10 (32-bit and 64-bit)
- Microsoft® Windows® 8, 8.1 (32-bit and 64-bit)
- Microsoft® Windows® 7 (32-bit and 64-bit)
- Microsoft® WinPE 5.x (32-bit and 64-bit)

Linux

- Red Hat® Enterprise Linux/CentOS 7.2, 7.1 (32-bit and 64-bit)
- Red Hat® Enterprise Linux/CentOS 6.7, 6.6 (32-bit and 64-bit)
- Red Hat® Enterprise Linux/CentOS 5.11, 5.10 (32-bit and 64-bit)
- SuSE Linux Enterprise Server 12 SP1 (64-bit)
- SuSE Linux Enterprise Server 12 (32-bit and 64-bit)
- SuSE Linux Enterprise Server 11 SP4, SP3 (32-bit and 64-bit)
- Debian Linux 8.1 (64-bit)
- Ubuntu Linux 12.04.5, 12.04.4 (32-bit and 64-bit)
- Ubuntu Linux 14.04.3, 14.04.2 (32-bit and 64-bit)
- Fedora Linux 22 (64-bit)

FreeBSD

- FreeBSD® 10.2 (64-bit)
- FreeBSD® 9.3 (64-bit)

Virtual OS Environments

- VMware ESXi 6.0 (64-bit)
- VMware ESXi 5.5 U3, U2 (64-bit)
- Citrix XenServer 6.5.1 (64-bit)

Solaris

- Solaris 11.2 (32-bit)
- Solaris 10 U9 (32-bit)

3.2 SAS HD Cable Insertion

Be sure to orient external SAS HD cables correctly, prior to insertion on Microsemi Adaptec Series 7 and Series 8 RAID controllers. With most standard implementations (Molex, Amphenol, FCI receptacles), it's possible to defeat the mechanical keying of the mini-SAS HD plug connector system by turning the plug upside-down.

3.3 Flash Backup Unit Setup

3.3.1 Supercapacitor Setup with Microsemi Adaptec Series 6Q Controllers

With Microsemi Adaptec Series 6Q controllers, you must affix the supercapacitor module to the computer chassis with cable ties. For instructions, refer to the Flash Backup Unit Installation Guide, available at start.adaptec.com.

Note: The RAID Controller User's Guide describes how to install the supercapacitor module using the mounting plate method. The instructions apply only to Microsemi Adaptec Series 7Q/8Q/8ZQ controllers and Microsemi Adaptec Series 7/8 controllers with optional flash backup unit.

3.3.2 AFM-700 Cross-Controller Migration

Migrating the AFM-700 daughterboard/supercapacitor module from one controller series to another is not supported in this release; eg, from a Microsemi Adaptec Series 7 controller to a Microsemi Adaptec Series 8 controller, or vice-versa.

3.3.3 AFM-700 Status LEDs

- LED DS2: Charger Enabled
 - DS2 Solid On: Charger Enabled
 - DS2 Blinks: Charger Off (during cap learn cycle)
 - DS2 Temporary Blinks: No Supercapacitor attached
- LED DS3: Supercapacitor power indication; Supercapacitor charge Bleeding LED
- LED DS4: Blinks faster when backup in progress

3.4 Partition Setup

- Logical drives with >2TB of storage require GPT partitioning (GUID Partition Table) for OS installation or use as a data container.

Note: Windows creates MBR partitions (Master Boot Record), by default, which can address only 2TB of storage space. If the logical drive is >2TB, it is segmented into two partitions without warning, one up to 2TB, the other with the remaining disk space. Linux displays a pop-up message that the disk needs to be partitioned.

- Before attempting to install an operating system in uEFI mode, you must delete all MBR partitions from the disk or reformat the disk with GPT. The installation may fail if you try to install on a disk with a MBR partitioning scheme. See also [uEFI BIOS Issues](#) on page 14.

3.5 DKMS Driver Setup

Instructions for installing Linux drivers with Dynamic Kernel Module Support (DKMS) are provided in the *RAID Controllers Installation and User's Guide*. DKMS ensures that the driver remains installed across OS or kernel updates.

3.6 Windows Setup

- When installing the driver on a Windows 2012 R2 system with two controllers installed (Microsemi Adaptec Series 7 or Series 8) and at least one logical drive on each controller, the OS fails to detect the logical drives during installation. (The issue is not seen with only one controller.)
WORKAROUND: Use the Windows inbox driver for installation, then update with the driver after the installation completes.
- When installing the driver on Windows SBS 2011 Essential, the installer times out before listing all discovered drives. The number of listed drives varies, depending on the drive type (eg, SAS vs SATA). This is a limitation in the Windows SBS installer; the RAID controller driver detects all attached drives.
- See also, [Booting from 4K Sector Drives on Windows](#) on page 10.

3.6.1 Booting from 4K Sector Drives on Windows

Note: Boot support for 4K sector hard drives varies by vendor and OS version and is supported on uEFI systems only. (For more information, see <http://ask.adaptec.com>.)

To install Windows on a 4K sector drive in uEFI mode:

- Refresh the screen after the driver is installed.
- Delete the two extra partitions (created erroneously) before continuing: the 'Recovery' partition and the 'System' partition.
- Do NOT remove the USB driver disk until the installation completes. If you remove the USB drive early, Windows displays a message saying it could not continue to the next phase of the installation.

3.7 Solaris 11 Setup

- To install the in-box driver on Solaris 11:
 - Remove the old RAID controller driver if already installed on your computer, then reboot:

```
pkginfo -l SUNWaac
pkg uninstall aac
```

- Install the new in-box driver, then reboot:

```
pkgadd -d AAC.PKG
```

- Installing Solaris 11 on a bootable array is not supported in this release.

3.8 Fedora Linux Setup

To avoid a known PCIe Active State Power Management issue under Fedora Linux 14, you must add the OS option `pcie_aspm=off` in the GRUB bootloader file "menu.lst". Follow these steps:

- When the first Fedora installation screen appears, press the 'Tab' key.
- Before pressing the first 'reboot' button, edit grub/menu.lst:
 - Press Alt+F2
 - cd /mnt/sysimage/boot/grub/
 - Open the menu.lst file
- Add 'pcie_aspm=off' just after 'rhgb quiet'. The new line should look like this:

```
root (hd0,0)
kernel /vmlinuz-2.6.33.3-85.fc13.i686.PAE... rhgb quiet pcie_aspm=off
```

3.9 uEFI Secure Boot Setup

If your RHEL 7, SLES 11 SP3, or SLES 12 system is booted with uEFI Secure Boot, you must add a public key to the MOK list (Machine Owner Key) before installing the driver on an existing OS.

To add the key to the MOK list using the mokutil utility:

```
mokutil --import aacraid_key_pub.der
```

Enter and confirm a password for the MOK enrollment request, then reboot. The pending MOK key enrollment request will be noticed by shim.efi, which will launch MokManager.efi to allow you to complete the enrollment from the uEFI console.

Enter the password you previously associated with this request (using mokutil), or enter your root password, then confirm the enrollment. The public key is added to the MOK list, which is persistent. Once a key is on the MOK list, it is propagated automatically to the system key ring for this and subsequent reboots, when uEFI Secure Boot is enabled.

3.10 maxCache Setup

maxCache SSD caching is supported on Microsemi Adaptec Series Q controllers only.

The maximum number of SSDs that you can install on a controller for maxCache applications is:

Controller Model	Max SSDs
Microsemi Adaptec 8885Q/81605ZQ	up to 8 SSDs, with 2TB total capacity
Microsemi Adaptec 7805Q/71605Q	up to 8 SSDs, with 2TB total capacity
Microsemi Adaptec 6805Q/6805TQ	up to 8 SSDs, with 1TB total capacity

See www.adaptec.com/compatibility for a list of maxCache-compatible SSD drives.

3.11 Dual Firmware Flash Image Support

Microsemi Adaptec Series 7 and Series 8 controllers support active and passive firmware images. Built-in logic determines the "right time" to update from passive to active, either at shutdown or boot up, and is designed to protect against image corruption or data loss due to power failure during image update. If the update occurs in the boot path, a server reboot is expected. Additionally, you must be running the latest drivers.

Note: This feature is enabled only when upgrading from and to a firmware version that supports dual firmware images. For customers upgrading from a release prior to May 2013 (specifically, Firmware Version 7.2.0, Build 30260), there is no change in behavior. The firmware image is updated in one stage.

3.12 Adaptec Flash Utility (AFU) Support

Microsemi Adaptec Series 8 controllers do not support the DOS-based Adaptec Flash Utility (described in the user's guide). To flash a Series 8 controller, use the uEFI BIOS, ARCCONF, maxView Storage Manager, or the maxView Storage Manager bootable USB image.

4 Known Limitations

4.1 Linux Boot Device

Regardless of which device you select to install the OS, the boot record is always written to Device 0. As a result, Linux will fail to boot if you delete or swap away Device 0. For example, if you create three arrays in the BIOS--VOL-0, VOL-1, and VOL-2--install the OS on VOL-1, then swap VOL-0 and VOL-2, Linux will fail to boot. Restore the original array sequence and Linux boots normally. Ideally, you should always install on Device 0.

4.2 OS Installation with RAW Devices

With Microsemi Adaptec Series 7 and Series 8 controllers, installing the OS in a mixed configuration with RAID Arrays and RAW devices is not supported.

WORKAROUND: Remove the RAW devices, install the OS on the RAID array, then re-install the RAW devices.

4.3 Microsemi Adaptec Series 6 Controller Issues

The following issues are seen only with Microsemi Adaptec Series 6 RAID controllers:

- Due to a PCIe configuration problem with ASUS Z9PE-D8 WS motherboards, Series 6 controllers are not detected in slots with x8 links (eg, slots, 2,4,6).
WORKAROUND: Use a slot with x16 links.
- Hybrid RAID 10 logical drives (comprised of an equal number of SSDs and HDDs) are not built correctly in the CTRL-A BIOS; the segment order is incorrect.
WORKAROUND: Create the Hybrid RAID 10 in maxView Storage Manager or ARCCONF.

4.4 Hot-plugging the Flash Backup Module

Hot-plugging the AFM-700/AFM-600 supercapacitor module is not recommended. Doing so may result in unusual status updates, such as Preparing to Dead to Ready.

4.5 ATAPI Device Support

Microsemi Adaptec Series 6, Series 7, and Series 8 RAID controllers do not support ATAPI CD-ROM, DVD, or tape devices.

4.6 System Compatibility Issues

- Discovery of Series 7 RAID controllers during system POST may be delayed in some PCIe 3.0 systems, if link-up errors occur during PCIe link negotiation. These link-up errors occur rarely, are corrected automatically, and pose no risk of performance or data integrity issues. If your system is configured to log correctable PCIe errors you may see a small number of errors recorded at the time of link training.
- With a Series 7 or Series 8 controller connected to an ASUS P8Z77V-LK motherboard, the controller may not be detected in slot 7.
WORKAROUND: Use slot 2 or slot 5.
- With a Series 7 or Series 8 controller connected to an ASUS P8B-M motherboard, the CTRL-A BIOS fails to load automatically after POST.
WORKAROUND: Press ENTER to load the BIOS during POST.
- Intel servers do not completely clear popup messages when there are multiple popups in a single operation in the uEFI/HII interface.

- With the HP StorageWorks D2700 enclosure, a maximum of 25 SAS drives or 24 SATA drives are supported. Slot 0 cannot be used with SATA drives.
- Promise J630 and J830 enclosures are not supported in this release.

4.7 Drive Compatibility Issues

- SMR HM² drives are not supported in this release. (SMR HA/DM drives are supported on Series 8 controllers for Simple Volumes; see [New Features of this Release](#) on page 6.)
- Seagate ST5000AS0011 5TB DM drives are not supported in this release.
- OCZ Vertex 4 SSDs are not supported in this release.
- With Seagate Constellation ES drives (eg, ST3500514NS) with FW SN11, a medium error might result in SCSI command timeouts, depending on the I/O load. This condition might be seen when creating a logical drive with the 'build' initialization method.
- With Hitachi HUA721050KLA330 hard drives, the drive LED blinks just once when using the CTRL-A BIOS 'Identify Drive' option. The LED blinks continuously if blinked from ARCCONF or maxView Storage Manager.
- With HP LTO-4 Ultrium 1840 tape drives, backup fails with Adaptec Series 7 controllers.
WORKAROUND: Upgrade the drive firmware to A63D using an on-board SAS or SATA controller, then try again.
- With Tandberg LTO-4 tape drives, backup fails during longer write sequences with Adaptec Series 7 and Adaptec Series 8 controllers. The error is seen during writes in the 10GB-20GB range, causing the operation to be aborted.

4.8 RAID 50/RAID 60 Max Drives

The maximum number of drives in a RAID 50 or RAID 60 differ between maxView Storage Manager, ARCCONF, and the BIOS:

- BIOS and ARCCONF: 128 drives max
 - RAID 50 - From 2-16 legs with 3-32 drives/leg
 - RAID 60 - From 2-16 legs with 4-16 drives/leg
- maxView Storage Manager:
 - Assumes 2 legs for RAID 50/RAID 60 (non-selectable)
 - RAID 50 3-32 drives/leg (64 total)
 - RAID 60 4-16 drives/leg (32 total)

4.9 Solaris 32-bit Array Size Limits

Due to an OS limitation in Solaris 32-bit systems, the practical size limit for an array on Solaris 32 is 1TB.

Note: If you create a >1TB array, OS tools, such as format or fdisk, won't detect them.

4.10 SLES 11 Boot Device Migration Issues

By default, SuSE Linux uses the 'by-id' method to identify drives/partitions on the boot device. As a result, migration from one controller to another (eg, ASR-8885 to ASR-81605ZQ) fails because the original boot drive ID is not found on the new controller.

WORKAROUND: Switch to the "by-uuid" method, then perform the migration. Follow these steps:

1. Use the blkid command (built-in utility) to find the UUIDs of file systems:

² SMR: Shingled Magnetic Recording. HM: Host Managed (host system manages new commands)

```
sles11splboot:~ # blkid
/dev/sda1: UUID="4512cf7d-4e22-4dfa-8991-4084dae41409" TYPE="swap"
/dev/sda2: UUID="b144a0a2-b7fc-47fd-8459-ba40d0f663cd" TYPE="ext3"
```

2. `cd /etc`, then:
 - a. Edit `fstab` file
 - b. Change the "by-id" names of file systems to their corresponding "uuid" names found in Step #1

Note: Make a backup of the `fstab` file before modifying it.
3. `cd /boot/grub`, then:
 - a. Edit `menu.lst` file
 - b. Change the "by-id" names of file systems to their corresponding "uuid" names found in Step #1

Note: Make a backup of the `menu.lst` file before modifying it.
4. Shutdown the SuSE system, change the HBA/controller, then boot the system.

4.11 uEFI BIOS Issues

- The uEFI utility may become unresponsive after 15-30 minutes of continuous use when you perform a large number of steps or continuously navigate through multiple screens (array creation, deletion, viewing array properties, etc.).
WORKAROUND: Restart the server if uEFI becomes unresponsive.
- Using "FW Update from Media" and "Save Support Archive" in the same uEFI session may cause the system to become unresponsive.
WORKAROUND: Restart the server if uEFI becomes unresponsive.
- uEFI-mode setup is not supported on Supermicro X9SCL-LN4F and X9DRI-F motherboards.

4.12 BIOS Power Management Settings

When setting the power management timers for a logical drive in the CTRL-A BIOS, the RPM slow down timer must be less than the power off setting. Otherwise, the BIOS returns an error. For instance, an error occurs if you set the slow down timer to 3 minutes and the power off setting to Never.

WORKAROUND: Use maxView Storage Manager or ARCCONF to set the timer values for the logical drive.

4.13 BIOS Feature Disparity: Selectable Performance Mode

In the Legacy (CTRL-A) BIOS, the Selectable Performance Mode option is enabled for controllers operating in HBA Mode. This differs from maxView Storage Manager and ARCCONF, which disable Selectable Performance Mode if the controller is in HBA Mode.

4.14 Simple Volume Support

This release supports a maximum of 128 Simple Volumes in maxView Storage Manager, ARCCONF, and the BIOS.

4.15 Auto-Volume Support

- Changing a controller into Auto-Volume mode (ARCCONF/BIOS) is not supported if the configuration includes any logical device type other than Simple Volume, including a maxCache Device. The mode switch from RAID mode to Auto-Volume mode is blocked if any other type of logical volume exists (including maxCache). After switching to Auto-Volume mode, you can create and delete Simple Volumes only in maxView Storage Manager, ARCCONF, and the BIOS.

- In Auto-Volume mode, only the first 128 RAW drives are converted to Simple Volumes; the rest of the RAW drives remain unchanged. If you uninitialize a Ready drive while the controller is in Auto-Volume mode, the firmware converts the drive automatically until the Simple Volume count reaches the maximum.

4.16 Force Rebuild in CTRL-A and uEFI BIOS

With Automatic Failover disabled, Force Rebuild in the CTRL-A (Legacy) BIOS fails if you insert a new drive in place of a pulled member drive. If same member drive is pulled and re-inserted, the logical drive rebuilds successfully. In the uEFI BIOS, Force Rebuild fails in both cases; that is, when inserting a new drive or re-inserting the pulled member drive.

4.17 Kernel Warning on Enclosure Power Off

On Linux systems running kernel version 3.3 or older (eg, RHEL 6.5), powering off an enclosure may result in a kernel warning because the enclosure device goes offline before the attached drives go offline. To avoid these warnings, install the kernel patch provided at this link:

<https://git.kernel.org/cgit/linux/kernel/git/jejb/scsi.git/commit/?h=fixes&id=11e52a699aff576606ceb6cf697270459f1a4aa>

Note: Newer Linux distributions, such as RHEL 7 (which uses Linux kernel 3.10), do not have this issue.

4.18 Boot Drive Issues

The BIOS returns an error if you attempt to make a logical drive Bootable when the previous Bootable logical drive is in the Failed state.

WORKAROUND: Delete the failed logical drive first, then set the other logical drive as Bootable.

4.19 RAID 1 Drive Order

In a RAID 1 "mirrored set," the lower slot location of the two drives is treated as the master. When a master drive in a RAID 1 is removed, the slave becomes the new master. When the old master is re-inserted, it is treated as a new member of the RAID 1 and becomes the mirror set slave. In the BIOS, the drive order changes to reflect the new master/slave relationship.

This is expected behavior.

4.20 hdparm Support

On Windows and Linux, the 'hdparm -i' command, used to set and view ATA hard disk drive parameters, is not supported for direct-attached drives on Microsemi Adaptec SAS controllers. Since 'hdparm -i' is designed for native libata/ide drivers, the command works as designed and the behavior is expected.

WORKAROUND: Use the 'hdparm -l' command instead.

4.21 HDA Mode Reset

Microsemi Adaptec Series 6/7/8 controllers use the HDA mode jumper on the controller board for performing a controller reset. If a HDA reset is required, contact Microsemi Adaptec Support for assistance.