

README
Microsemi Adaptec RAID Controllers

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Revision History

Revision	Revision Date	Details of Change
16	December 2020	Updated for 2020.2 release
15	May 2020	2020.1 Series 8 release.
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13	January 2019	2019.1 Series 8 patch release.
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10	August 2017	2016.2 Series 6 firmware patch release (build 19204).
9	July 2017	2017.1 Series 8 FreeBSD Driver Updates.
8	June 2017	2017.1 Series 8 firmware/software patch release (build 33173).
7	February 2017	2016.rel1 Series 7 firmware/software patch release (build 32114).
6	January 2017	2016.rel2 Series 8 firmware patch release (build 33083).
5	November 2016	2016.rel2 Series 8 firmware patch release (build 33072).
4	October 2016	2016.rel2 Series 6 firmware/software refresh; 8x05E RAID controller, first customer release.
3	September 2016	2016.rel2 Series 8 firmware/software maintenance release.
2	May 2016	2016.rel1 Series 7 firmware/software maintenance release.
1	April 2016	2016.rel1 Series 8 firmware/software maintenance release.

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1 New Features in this Release

Microsemi Adaptec Series 8 SAS RAID Controller Patch Release software/firmware refresh, including:

- Driver updates:
 - Updated OS support list.
- Bugfixes (see the *Release Notes* for a complete list)

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.microsemi.com.

- Firmware:
 - Series 8 controllers: Version 7.16.0 Build 33552
- Drivers:
 - Microsoft Windows: Version 7.5.0.60001
 - Linux: Version 1.2.1-60001
 - VMware: Version 1.2.1-60001
 - XenServer: Version 1.2.1-60001
- maxView Storage Manager/ARCCONF/BootUSB: Version 3.07.00 Build 23850

2.2 Documentation

Note: You can download the latest documentation at start.microsemi.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 Adaptec 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/ARCCONF 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 2019
- Microsoft® Windows® Server 2016
- Microsoft® Windows® Server 2012 R2, 2012 (64-bit)
- Microsoft® Windows® Server 2008 R2 SP1 (64-bit)
- Microsoft® Windows® 10 RS5 (64-bit)
- Microsoft® Windows® 8.1, 8 (64-bit)

Linux for x64

- Red Hat® Enterprise Linux/CentOS 8.1, 8.0 (64-bit)
- Red Hat® Enterprise Linux/CentOS 7.6, 7.7, 7.8, 7.9 (64-bit)
- Red Hat® Enterprise Linux/CentOS 6.10, 6.9 (64-bit)
- SuSE Linux Enterprise Server 15 SP1, SP2 (64-bit)
- SuSE Linux Enterprise Server 12 SP5, SP4 (64-bit)
- Ubuntu Linux 18.04.04, 18.05.5 (64-bit)
- Ubuntu Linux 20.04 LTS, 20.041 LTS (64-bit) INBOX driver tested
- Oracle Linux 7.7 with UEK 5 (64-bit)
- Linux Kernel 5.6x, 5.7x, 5.8x (64-bit) INBOX driver tested

Virtual OS Environments

- Citrix XenServer 7.6 LTS, 8.1, 8.2 LTSR

3.2 SAS HD Cable Insertion

Be sure to orient external SAS HD cables correctly, prior to insertion on Microsemi Adaptec 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 Over-Temperature Conditions

When the supercap temperature exceeds the threshold, the backup unit is disabled and the supercap charger is turned off.

The firmware sends notification events to the host and cache layer to disable the write-cache settings for logical drives (if write caching is enabled).

When the supercap temperature returns to normal, notification events are sent to the host and cache layer to turn on write-cache settings, and the backup unit is re-enabled.

3.4 Partition Setup

- Logical drives with >2 TB 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 2 TB of storage space. If the logical drive is >2 TB, it is segmented into two partitions without warning (one up to 2 TB, 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 9.

3.5 DKMS Driver Setup

To install the Linux drivers from source with Dynamic Kernel Module Support (for persistence across kernel updates), download the Linux Driver Source Code package from the support page for your controller at start.adaptec.com, then follow the instructions in the embedded README.

3.6 Windows Setup

- When installing the driver on a Windows 2012 R2 system with two controllers installed (Microsemi Adaptec 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 (e.g., 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 4.

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:

1. Refresh the screen after the driver is installed.
2. 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 uEFI Secure Boot Setup

If you enabled Secure Boot through the uEFI system BIOS setup menu, and you are using Linux distributions with Secure Boot support, you must add a public key to the MOK list (Machine Owner Key) before installing the driver on an existing OS. Refer to your Linux distribution's documentation for details on how to configure Secure Boot.

Note: In this release, secure boot is tested and on Ubuntu 14.04.4 only. Secure Boot may not be supported on your Linux distribution. For more information, see <http://ask.adaptec.com>.

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.

3.8 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 2 TB total capacity
Microsemi Adaptec 7805Q/71605Q	up to 8 SSDs, with 2 TB total capacity
Microsemi Adaptec 6805Q/6805TQ	up to 8 SSDs, with 1 TB total capacity

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

3.9 Dual Firmware Flash Image Support

Microsemi Adaptec 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.

3.10 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 Boot Up 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.

4.3 OS Installation with RAW Devices

With Microsemi Adaptec 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.

4.4 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 8 RAID controllers do not support ATAPI CD-ROM, DVD, or tape devices.

4.6 System Compatibility Issues

- The following servers/enclosures are not supported in this release:
 - ASUS Z9PE-D8 WS
 - Promise J630 and J830 enclosures
- With a 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 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.

4.7 Drive Compatibility Issues

- SMR HM¹ drives are not supported in this release. (SMR HA and SMR DM drives are supported for RAID volumes and hot spares; see [New Features in this Release](#) on page 1.)
- Seagate ST5000AS0011 5 TB DM drives are not supported in this release.
- OCZ Vertex 4 SSDs are not supported in this release.
- With Seagate Constellation ES drives (e.g., 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 Tandberg LTO-4 tape drives, backup fails during longer write sequences with Adaptec Series 8 controllers. The error is seen during writes in the 10 GB–20 GB 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 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 (e.g., 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:

```
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:

¹ SMR: Shingled Magnetic Recording. HM: Host Managed (host system manages new commands)

- 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.

4.10 uEFI BIOS Issues

The following are issues with the uEFI BIOS:

- 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.

4.11 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 three minutes and the power off setting to Never.

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

4.12 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.

4.13 Simple Volume Support

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

4.14 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.

4.15 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.

4.16 Kernel Warning on Enclosure Power Off

On Linux systems running kernel version 3.3 or older (e.g., 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.

4.17 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.

4.18 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 -I` command instead.

4.19 HDA Mode Reset

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

4.20 maxView Storage Manager Issues

- Standard User(Non-Admin) has permission to perform certain tasks that should be blocked for non-administrators. The following tasks should be blocked for Standard User(Non-Admin):
 - Perform all tasks of the Home and Systems groups from the ribbon
 - Add/remove systems
 - Update controller/driver/enclosure firmware
 - Set system settings
 - Save/restore configuration
- When hot-removing a RAW drive from an enclosure, there is no Event and Update in maxView.
- The "Disable write cache operation failed" message is seen when the maxCache write cache disable all operation is performed in maxView.
- In Windows 2012, maxView fails to login after S1/S4 test.

- Restore configuration operation fails when attempting to restore the configuration.

WORKAROUND: Set the DirtyPageThresholdValue set once the logical drive and maxCache are created, then add the DirtyPageThresholdValue in XML.

4.21 IOMeter Issues

The system can crash when running IOMeter on three logical drives with the following configurations:

- Queue depth: 16
- Size: 4K, 16K, 32K for each logical drive, respectively.
- Read ratio: 25%, 50%, and 75%, respectively.

4.22 Boot RAW Drive Issues

During RAW drive check for device ID 0, the firmware tries to verify if this slot can be used by any other container in the system as a copyback slot. This is done by mapping the previousCookie, NextCookie, and OrigCookie partitions. These variables are memset to 0 during logical drive creation. This value matches device ID 0 and the slot is reserved (the RAW drive in the slot was hidden from OS, as this slot was a target for copyback in another container and contents may get overwritten).

WORKAROUND: Add additional qualifiers to decide if the slot was really a copyback target by checking the partition information. If it is a target, the drive will be reserved and will not be exposed; if not, the drive will be exposed.

4.23 VMware Commands Timeout Issues

Some VMWare commands will be timed out immediately when issued, causing a link reset on the controller. In some cases, the timeout for a command will result in 0, and was updated to 1 second. This time was too short for some commands, and it caused a timeout and link reset on the drive. This has been seen in VMWare. However, anytime the timeout is set to zero, this would be possible.

WORKAROUND: When the timeout is detected as 0, set the timeout value to 30 seconds. This will allow for a normal timeout value.

4.24 Stripe Size Limitations

The RAID controller maximum stripe size is 1024K. This value is contingent on the number of drives configured in the array. An array consisting of 1 to 8 drives can have a maximum stripe size of 1024K. An array consisting of between 9 and 16 drives has a maximum stripe size of 512K. An array consisting of between 17 and 32 drives has a maximum stripe size of 256K.

4.25 Removed UEFI Itanium Support

The Series 8 controller firmware has UEFI boot compatibility issues with some new AMI BIOS x64 AMD processor platforms. As a result, ARC firmware has removed UEFI Itanium support from its preboot image. This change allows the Series 8 controller to boot in these AMI BIOS x64 AMD processor platforms.

4.26 Creation of Multiple Logical Drives on Physical Drive Is Not Supported

Although the controller BIOS and management software tools allow for creating multiple logical drives per physical drive, the option is no longer recommended. Physical drives that contain multiple logical drives, however, will continue to work with this release of firmware.

4.27 Legacy BIOS Physical Drive Identify Issue

The controller Legacy BIOS Disk Utilities Identify feature may not blink the correct physical drive slot LED. Some affected enclosures include the HGST 4U60 and HP D3700.

As a physical drive slot Identify feature workaround, the user can select UEFI, maxView, or ARCCONF, which have proper LED functionality.

4.28 READY State Device Can Be Exposed in OS after Exchanging Slots with RAW State Device

After exchanging drive slots, the controller firmware may take time to get the devices in the proper state (maximum 2 minutes). After swapping drive slots, a READY state device can be exposed to the Linux OS.

As a display workaround, the user can run ARCCONF RESCAN after swapping drives between slots for proper device exposure to the OS.

4.29 Participant Physical Drives of a Logical Volume Listed in sg_map and lsscsi

In some versions of RHEL, contrary to the expected behavior, output of utilities `sg_map` and `lsscsi` display the raw drives which are part of a logical volume. Utilities `fdisk` and `lsblk` do not list the drives which are part of a logical volume—which is the expected behavior.

- In such RHEL systems, it is observed that upon logical volume creation, only the `sd` variables are deleted but `sysfs` target variables for raw drives continue to exist. Hence `lsscsi` displays the `sg_info` since it has the access to it (only `sd info` was deleted). On the other hand, `lsblk` and `fdisk` rely on `sd info`—which was deleted and they work as expected.
- The `expose_physicals` module parameter is non-zero in case of RHEL, which is used to mask/unmask the drives which are part of logical drives. RHEL sets this parameter and hence the behavior.

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