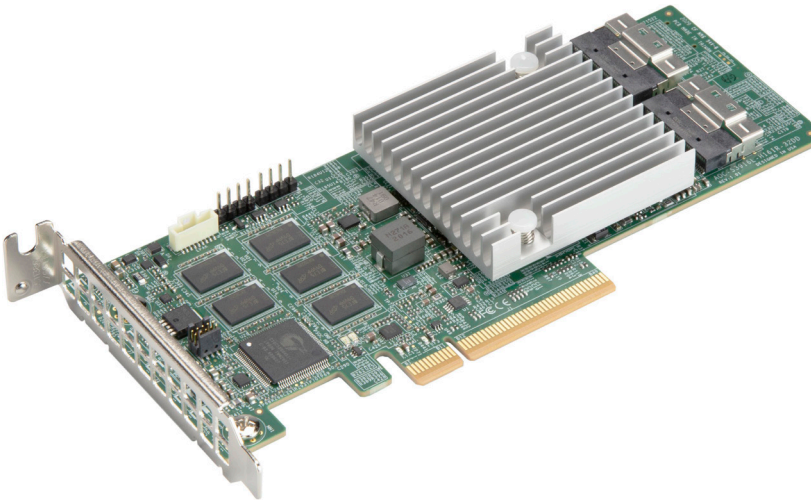
AOC-S3908L-H8iR

AOC-S3908L-H8iR-32DD
AOC-S3908L-H8iR-16DD

AOC-S3916L-H16iR
AOC-S3916L-H16iR-32DD



User's Guide

Revision 1.0b

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User's Guide Revision 1.0b

Release Date: November 4, 2021

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Preface

About this User's Guide

This user's guide is written for system integrators, IT professionals, and knowledgeable end users. It provides information for the installation and use of the AOC-S3908L-H8iR, AOC-S3908L-H8iR-32DD, AOC-S3908L-H8iR-16DD, AOC-S3916L-H16iR, and AOC-S3916L-H16iR-32DD add-on cards.

An Important Note to the User

All images and layouts shown in this user's guide are based upon the latest PCB revision available at the time of publishing of this user guide. The add-on card you have received may or may not look exactly the same as the graphics shown in this user's guide.

Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Conventions Used in the User's Guide

Pay special attention to the following symbols for proper system installation:

Warning: Important information given to ensure proper system installation and to avoid causing damage to the components or causing injury to yourself.

Note: Additional information given for proper system setup.

Important Links

For your system to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your server.

- Supermicro product manuals: http://www.supermicro.com/support/manuals/
- Product drivers and utilities: https://www.supermicro.com/wdl/driver
- Product safety info: http://www.supermicro.com/about/policies/safety_information.cfm
- If you have any questions, please contact our support team at: support@supermicro.com

This manual may be periodically updated without notice. Please check the Supermicro website for possible updates to the manual revision level.

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Chapter 1

Introduction

1-1 Overview

Congratulations on purchasing your add-on card from an acknowledged leader in the industry. Supermicro products are designed with the utmost attention to detail to provide you with the highest standards in quality and performance.

1-2 About this Add-on Card

The Supermicro AOC-S3908L-H8iR, AOC-S3908L-H8iR-16DD, AOC-S3908L-H8iR-32DD, AOC-S3916L-H16iR and AOC-S3916L-H16iR-32DD are the most technologically-advanced, cost-effective, and reliable SAS MegaRAID adapters in today's market. With the Broadcom 3908 or 3916 SAS controller, eight or 16 12Gb/s SAS connectors, and a low-profile PCIe Gen4 x8 slot built in, these add-on cards offer high-performance connectivity with enormous storage capacity to meet the growing needs of enterprise server platforms.

With the optional SuperCap/TFM unit built-in, the add-on cards support 8GB DDR4 on-card cache at a speed of 2666MHz (maximum), providing cached data protection during catastrophic system failures.

In addition, the embedded Broadcom SAS 3908/3916 I/O processor offers optimal RAID performance and a PCI-Express host interface for increased I/O bandwidth. The AOC-S3908L-H8iR, AOC-S3908L-H8iR-16DD, AOC-S3908L-H8iR-32DD, AOC-S3916L-H16iR and AOC-S3916L-H16iR-32DD adapters deliver an intelligent and robust RAID solution to the market.

1-3 Key Features

The key features of this add-on card include the following:

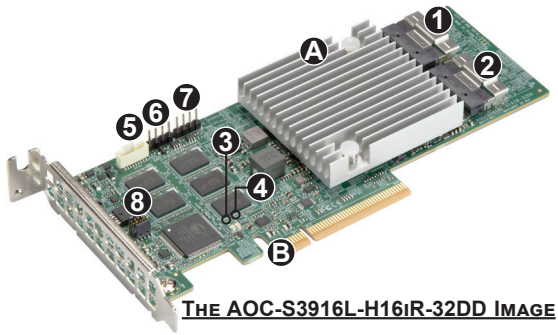
- Low profile x8 PCIe Gen4 controller
- Eight internal SAS3 ports with one SlimSAS HD connector (AOC-S3908L-H8iR, AOC-S3908L-H8iR-16DD, and AOC-S3908L-H8iR-32DD) or 16 internal SAS3 ports with two SlimSAS HD connectors (AOC-S3916L-H16iR and AOC-S3916L-H16iR-32DD)
- Hardware RAID 0, 1, 5, 6,10, 50, and 60 supported

- Supports up to 16 (AOC-S3908L-H8iR-16DD), 32 (AOC-S3908L-H8iR-32DD and AOC-S3916L-H16iR-32DD), or 240 (AOC-S3908L-H8iR and AOC-S3916L-H16iR) physical devices with expander
- 8GB DDR4 on-card cache with a speed of up to 2666MHz for cached data protection
- 1x (AOC-S3908L-H8iR, AOC-S3908L-H8iR-16DD, and AOC-S3908L-H8iR-32DD) or 2x (AOC-S3916L-H16iR and AOC-S3916L-H16iR-32DD) SlimSAS x8 black (100 Ohm) connector(s)
- Supports MCTP over PCIe
- On-board TFM Included
- CacheVault to protect onboard cache memory
- Optional SuperCap BTR-CVPM05
- Supports LSA Storage Authority Software WebGUI
- Secure Boot
- Support includes advanced software encryption
- Supports 3.0, 6.0, and 12.0 Gb/s SAS, and 3.0 & 6.0 Gb SATA data transfer rates
- OS support: Windows and Linux
- UEFI Configuration Utility only
- UEFI/Legacy Boot
- Power consumption: 14 (AOC-S3908L-H8iR, AOC-S3908L-H8iR-16DD, and AOC-S3908L-H8iR-32DD) or 18 (AOC-S3916L-H16iR and AOC-S3916L-H16iR-32DD) watts
- Thermal operating range: system-dependent (55°C or higher with sufficient airflow)
- Dimensions 2.71" (H) x 6.6" (L) (68.83cm (H) x 167.64cm (L))

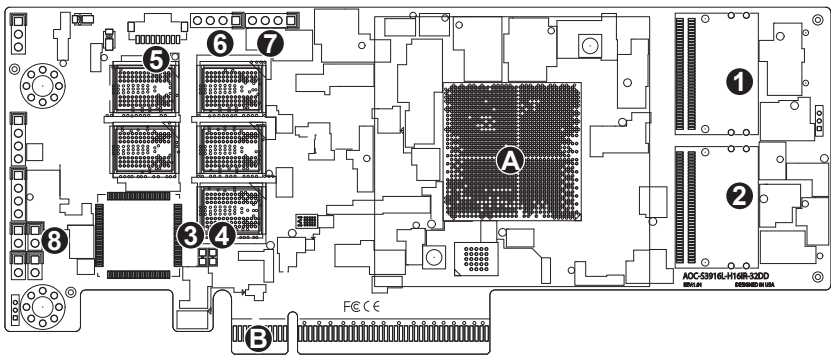
Chapter 2

Hardware Components

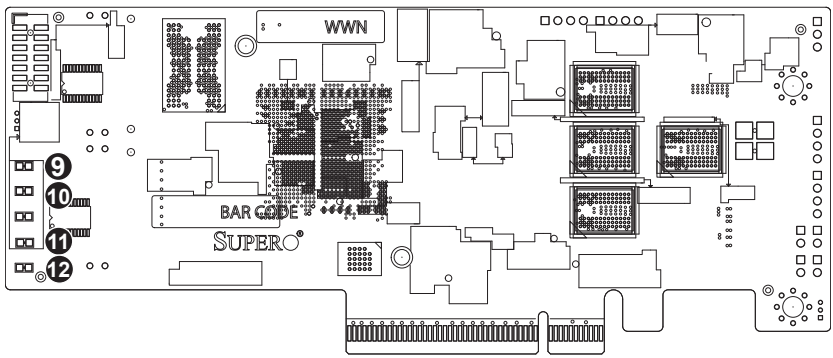
2-1 Add-On Card Image and Layout



The AOC-S3916L-H16iR-32DD Image



The AOC-S3916L-H16iR-32DD Front View



The AOC-S3916L-H16iR-32DD Rear View

2-2 Major Onboard Components

The following major components are installed on the AOC-S3908L-H8iR(-32DD/16DD)/AOC-S3916L-H16iR(-32DD):

Major Components					
No	**Component Name**	**No**	**Component Name**	**No**	**Component Name**
A	3908/3916 SAS CTRL	4	D6: ONFI Activity LED	9	D4: System Error LED
B	PCIe 3.0 x8 slot	5	J6: SuperCap 9-pin Connector	10	D12: Overtemp LED
1	CN0: SAS ports 0-7	6	J2: Serial Debug UART Header	11	D10: EPAK_FLT LED
2	CN1: SAS ports 8-15 (3916 only)	7	J3: UART0 Header	12	D3: System Heartbeat LED
3	D7: PSoC Heartbeat LED	8	JP2: SBL_Disable Jumper		

2-3 SAS 3.0 Ports and Headers

SAS Ports

Eight SAS ports, supported by the CN0 connector on the Broadcom 3908 SAS controller, or 16 SAS ports, supported by the CN0 and CN1 connectors on the Broadcom 3916 SAS controller, are located on the add-on card. SAS 0-7 and SAS 8-15 support SAS3 SFF-8654 connections. See the tables on the following page for pin definitions.

CN0 Pin Definitions

Pin#	Signal	Pin#	Signal
A1	GND	B1	GND
A2	RX0+	B2	TX0+
A3	RX0-	B3	TX0-
A4	GND	B4	GND
A5	RX1+	B5	TX1+
A6	RX1-	B6	TX1-
A7	GND	B7	GND
A8	BP_TYPEA	B8	SClockA
A9	SDataOutA	B9	SloadA
A10	GND	B10	GND
A11	NC	B11	SDatainA
A12	NC	B12	CNTRLR_TYPEA
A13	GND	B13	GND
A14	RX2+	B14	TX2+
A15	RX2-	B15	TX2-
A16	GND	B16	GND
A17	RX3+	B17	TX3+
A18	RX3-	B18	TX3-
A19	GND	B19	GND
A20	RX4+	B20	TX4+
A21	RX4-	B21	TX4-
A22	GND	B22	GND
A23	RX5+	B23	TX5+
A24	RX5-	B24	TX5-
A25	GND	B25	GND
A26	BP_TYPEB	B26	SClockB
A27	SDataOutB	B27	SLoadB
A28	GND	B28	GND
A29	NC	B29	SDataInB
A30	NC	B30	CNTRLR_TYPEB
A31	GND	B31	GND
A32	RX6+	B32	TX6+
A33	RX6-	B33	TX6-
A34	GND	B34	GND
A35	RX7+	B35	TX7+
A36	RX7-	B36	TX7-
A37	GND	B37	GND

CN1 Pin Definitions

Pin#	Signal	Pin#	Signal
A1	GND	B1	GND
A2	RX8+	B2	TX8+
A3	RX8-	B3	TX8-
A4	GND	B4	GND
A5	RX9+	B5	TX9+
A6	RX9-	B6	TX9-
A7	GND	B7	GND
A8	BP_TYPEC	B8	SClockC
A9	SDataOutC	B9	SloadC
A10	GND	B10	GND
A11	NC	B11	SDatainC
A12	NC	B12	CNTRLR_TYPEC
A13	GND	B13	GND
A14	RX10+	B14	TX10+
A15	RX10-	B15	TX10-
A16	GND	B16	GND
A17	RX11+	B17	TX11+
A18	RX11-	B18	TX11-
A19	GND	B19	GND
A20	RX12+	B20	TX12+
A21	RX12-	B21	TX12-
A22	GND	B22	GND
A23	RX13+	B23	TX13+
A24	RX13-	B24	TX13-
A25	GND	B25	GND
A26	BP_TYPED	B26	SClockD
A27	SDataOutD	B27	SLoadD
A28	GND	B28	GND
A29	NC	B29	SDataInD
A30	NC	B30	CNTRLR_TYPED
A31	GND	B31	GND
A32	RX14+	B32	TX14+
A33	RX14-	B33	TX14-
A34	GND	B34	GND
A35	RX15+	B35	TX15+
A36	RX15-	B36	TX15-
A37	GND	B37	GND

Serial Debug UART Header

A four-pin Serial Debug header, located at J2, is used for the manufacturer's diagnostic purposes only. See the layout below for the location.

UART0 Header

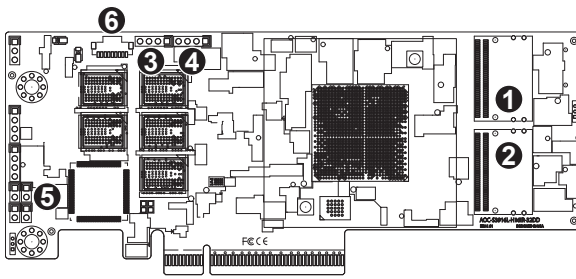
The universal asynchronous receiver/transmitter (UART) header is located on J3 and is for engineering diagnostic purposes only.

SBL_Disable Jumper

The jumper is located on JP2 and is for manufacturer's programming purposes only.

SuperCap 9-pin Connector

The SuperCap connector, designated J6, is used for a TFM cable connection to a SuperCap.



1. CN0 SFF-8654 Internal Connector for Ports 0-7
2. CN1 SFF-8654 Internal Connector for Ports 8-15
3. Serial Debug UART Header
4. UART0 Header
5. SBL_Disable Jumper
6. SuperCap 9-pin Connector

2-4 Front LED Indicators

PSoC Heartbeat LED

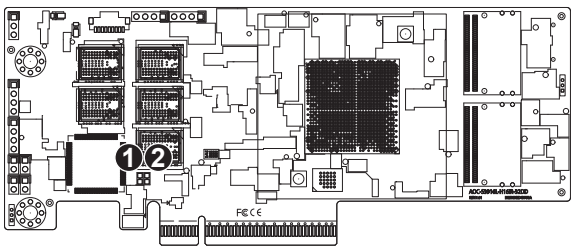
The PSoC Heartbeat LED is located at D7 on the add-on card. When D7 is blinking, the system is functioning normally. See the table below for more information.

System Heartbeat LED Status	
Color/State	Definition
Green: Blinking	System: Normal
Off	Power failure on board

ONFI Activity LED

The ONFI Activity LED is located at D6 on the add-on card. When D6 is on, the Cache Offload from DDR4 memory to NAND Flash or Restore Operation from NAND Flash to DDR4 memory is active. See the table below for more information.

ONFI Activity LED Status	
Color/State	Definition
Green: Solid	ONFI: Cache Offload/ Restore Operation is in progress



1. PSoC Heartbeat LED
2. ONFI Activity LED

2-5 Rear LED Indicators

System Error LED

The System Error LED is located at D4 on the add-on card. When D4 is illuminated, a fault has occurred with the controller chip. See the table below for more information.

System Error LED Status	
Color/State	Definition
Red: Solid	Controller: Fault
Off	Controller: Normal

Overtemp LED

The Overtemp LED is located at D12 on the add-on card. When D12 is on, the controller chip temperature exceeds the threshold for the operating temperature. See the table below for more information.

Overtemp LED Status	
Color/State	Definition
Yellow: Solid	Controller: Overheat

EPAK_FLT LED

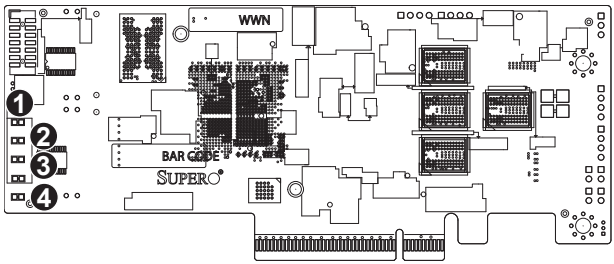
The EPAK_FLT LED is located at D10 on the add-on card. When D10 is illuminated, a fault or overheated temperature has occurred with the SuperCap power module. See the table below for more information.

EPAK_FLT LED Status	
Color/State	Definition
Yellow: Solid	SuperCap: Overheat or Fault
Off	SuperCap: Normal

System Heartbeat LED

The System Heartbeat LED is located at D3 on the add-on card. When D3 is blinking at 1Hz, the controller is functioning normally. See the table below for more information.

System Heartbeat LED Status	
Color/State	Definition
Green: Blinking	Controller: Normal
Off	Power failure on controller



1. System Heartbeat LED
2. Overtemp LED
3. EPAK_FLT LED
4. System Heartbeat LED

Chapter 3

Installation

Note: Your system came with the adapter pre-installed as a part of an integrated solution. We do not recommend that any part of your system components be removed and re-installed. However, if you do need to remove or re-install a system component, including this add-on card, please follow the instructions below to ensure proper system setup. Also, be sure to remove the power cord first before adding, removing or changing any hardware components to avoid damaging the system or components.

3-1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To avoid damaging your add-on card, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing the add-on card from the antistatic bag.
- Handle the add-on card by its edges only; do not touch its components, or peripheral chips.
- Put the add-on card back into the antistatic bags when not in use.
- For grounding purposes, make sure that your system chassis provides excellent conductivity between the power supply, the case, the mounting fasteners, and the add-on card.

3-2 Before Installation

To install the add-on card properly, be sure to follow the instructions below.

1. Power down the system.
2. Remove the power cord from the wall socket.
3. Use industry-standard anti-static equipment (such as gloves or wrist strap) and follow the instructions listed on Page 3-1 to avoid damage caused by ESD.
4. Familiarize yourself with the server, motherboard, and/or chassis documentation.
5. Make sure that your operating system includes the latest updates and hotfixes.

3-3 Installing the Add-on Card

Follow the steps below to install the add-on card into your system.

1. Remove the server cover and, if necessary, set aside any screws for later use.
2. Remove the add-on card slot cover. If the case requires a screw, place the screw aside for later use.
3. Position the add-on card in the slot directly over the connector, and gently push down on both sides of the card until it slides into the PCI connector.
4. Secure the add-on card to the chassis. If required, use the screw that you previously removed.
5. Attach any necessary external cables to the add-on card.
6. Replace the chassis cover.
7. Plug the power cord into the wall socket, and power up the system.

Chapter 4

Configuring the Broadcom MegaRAID Setting

This chapter provides instructions on how to configure MegaRAID settings for the Broadcom 3908 and 3916 SAS controllers. If you do not wish to configure MegaRAID settings, skip this section and go directly to OS installation.

4-1 RAID Minimum Drive Requirements

The add-on cards support up to 240 HDDs (AOC-S3908L-H8iR/AOC-S3916L-H16iR), 32 HDDs (AOC-S3916L-H16iR-32DD/AOC-S3908L-H8iR-32DD), or 16 HDDs (AOC-S3908L-H8iR-16DD) with RAID 0, 1, 5, 6, 10, 50, and 60. Use the table below to determine the minimum number of hard drives needed to set up a RAID environment.

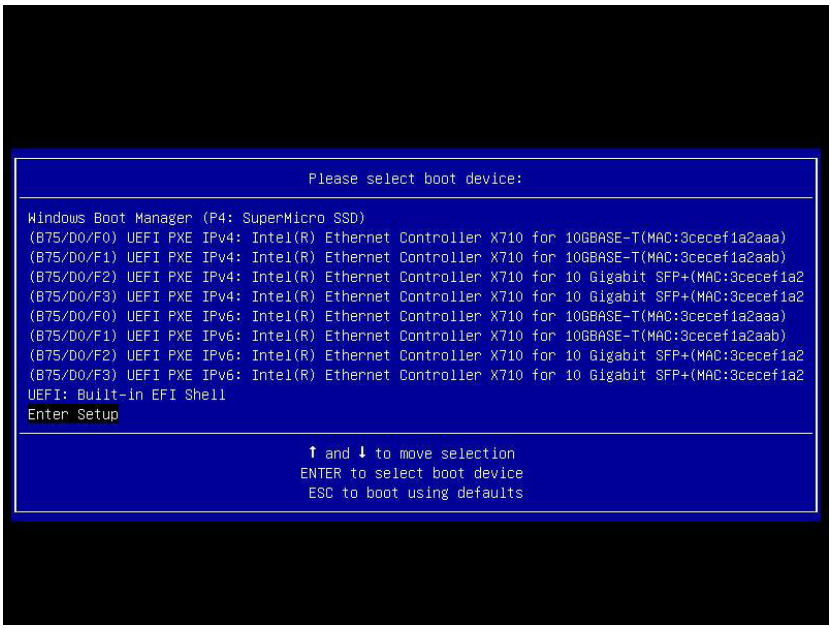
RAID	Minimum Hard Drives
RAID 0	1
RAID 1	2
RAID 5	3
RAID 6	4
RAID 10	4 (Two RAID 1 arrays)
RAID 50	6 (Two RAID 5 arrays)
RAID 60	8 (Two RAID 6 arrays)

4-2 Using the Broadcom MegaRAID Configuration Utility

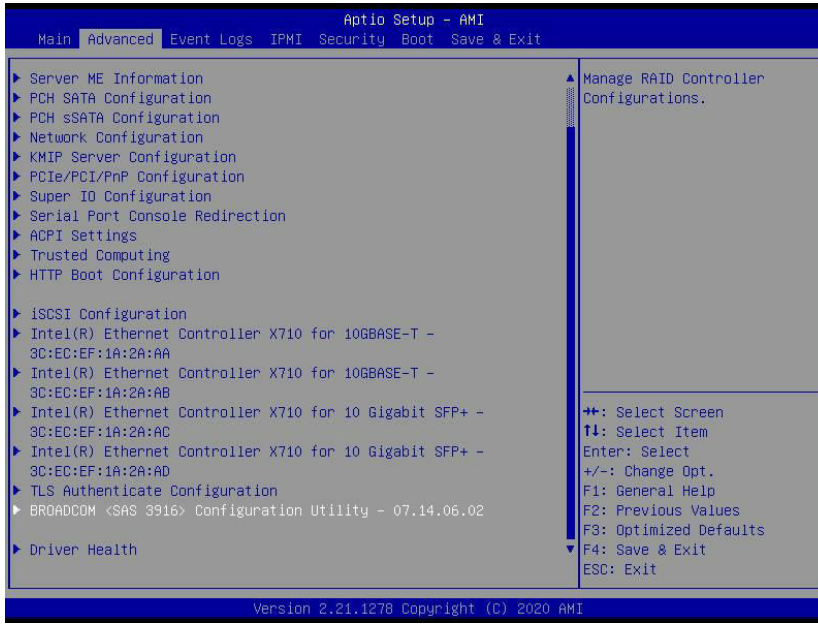
Follow the steps below to start the Broadcom MegaRAID Configuration Utility.

1. Power on the system.

2. When the following screen displays, use the up arrow and down arrow keys to move your selection to Enter Setup, then press <Enter>.

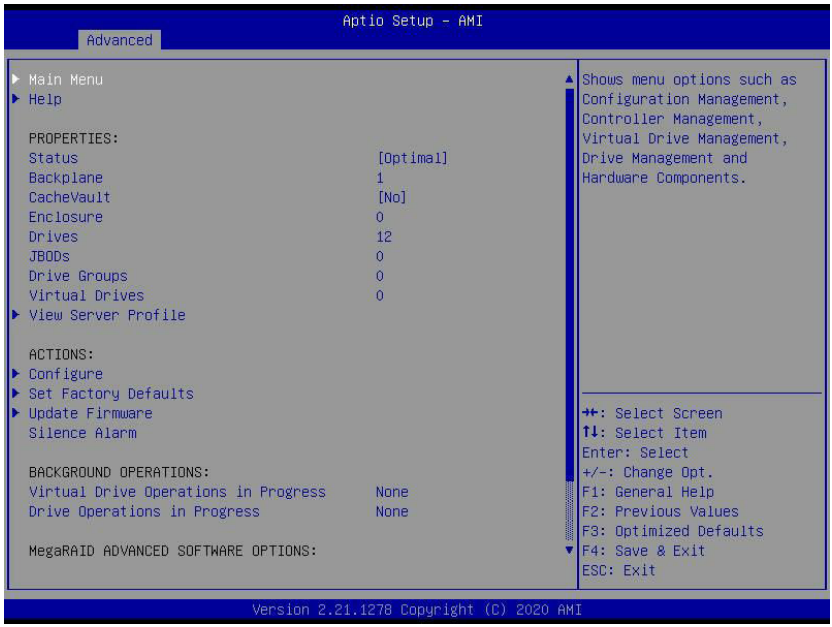


3. In the Advanced tab of the Aptio Setup display, use the up arrow and down arrow keys to move your selection to the Broadcom MegaRAID Configuration Utility, then press <Enter>.



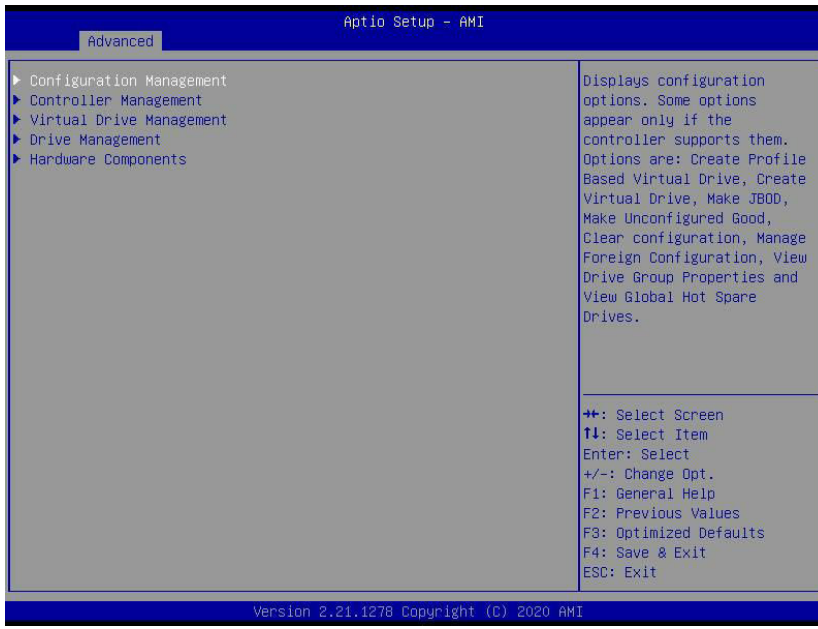
4-3 The Broadcom MegaRAID Main Screen

In the Broadcom MegaRAID Configuration Utility, the main menu is the first option displayed. Press <Enter> to be taken to a list of configurable menus.



Press the up arrow or down arrow to select a menu. The main screen includes the following menus:

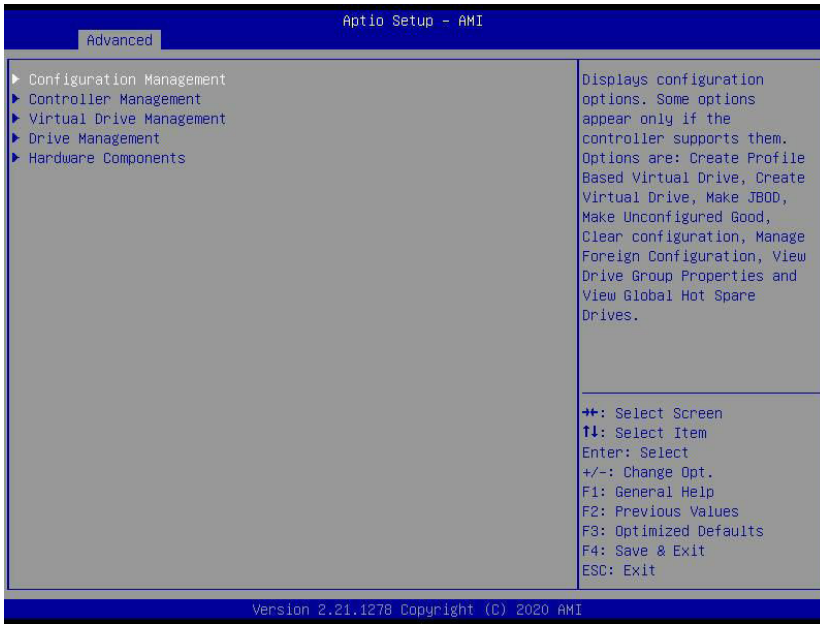
- Configuration Management
- Controller Management
- Virtual Drive Management
- Drive Management
- Hardware Components



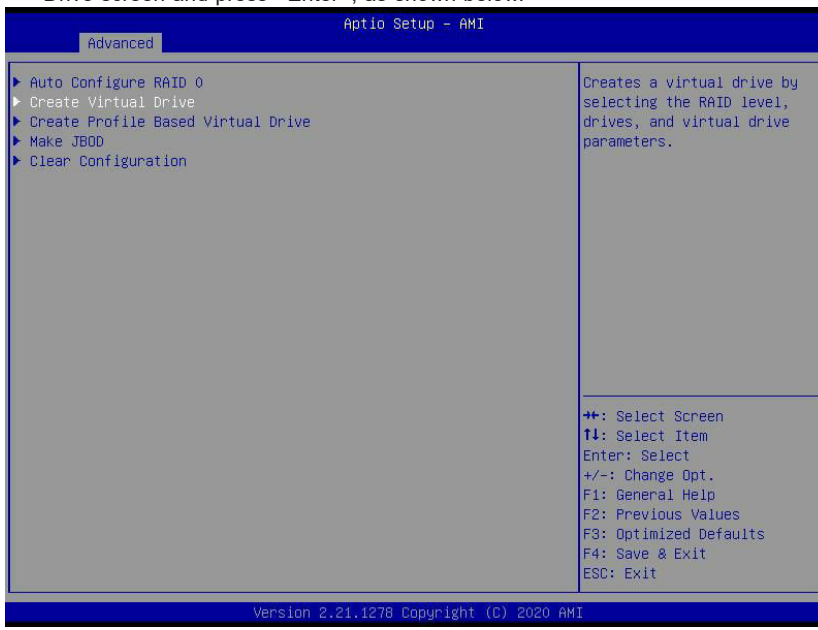
Broadcom MegaRAID Configuration Utility Main Screen

4-4 Creating a Virtual Drive

When you enter the main menu of the MegaRAID Configuration Utility, Configuration Management is the first menu screen listed, as shown below. This screen provides information about the configuration of controllers, drive groups, and virtual drives. To select a submenu item, use the up arrow and down arrow keys. Press <Enter> to open a submenu, and <Esc> to close a submenu.

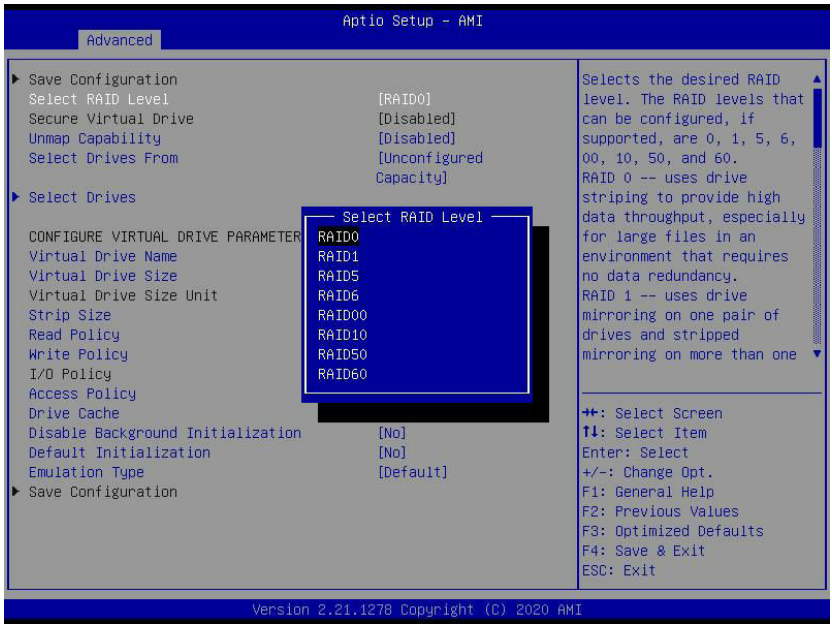


To create new virtual drives, use the down arrow key to select the Create Virtual Drive screen and press <Enter>, as shown below.



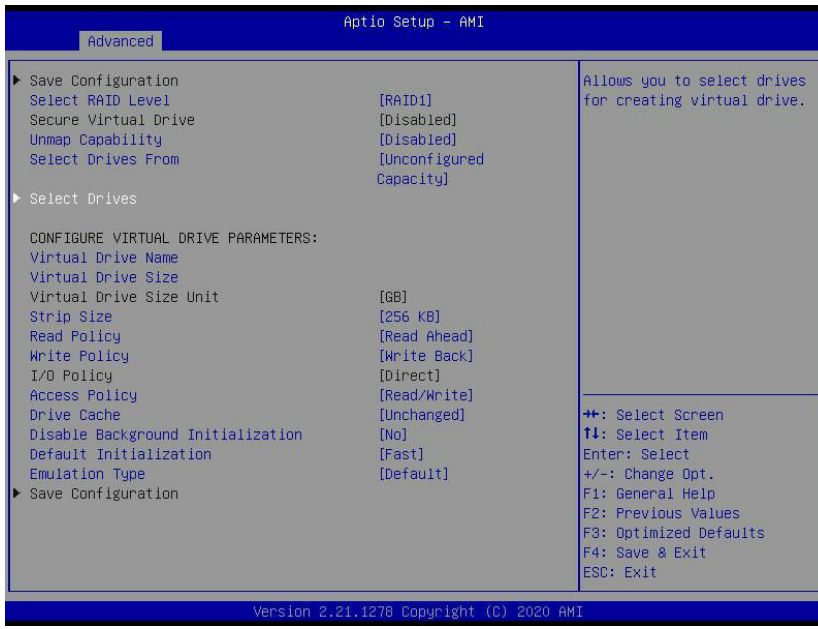
Navigate to Select RAID Level and press <Enter> when the following screen displays.

Use the up arrow and down arrow keys to select the RAID level, as shown below, and press <Enter>.

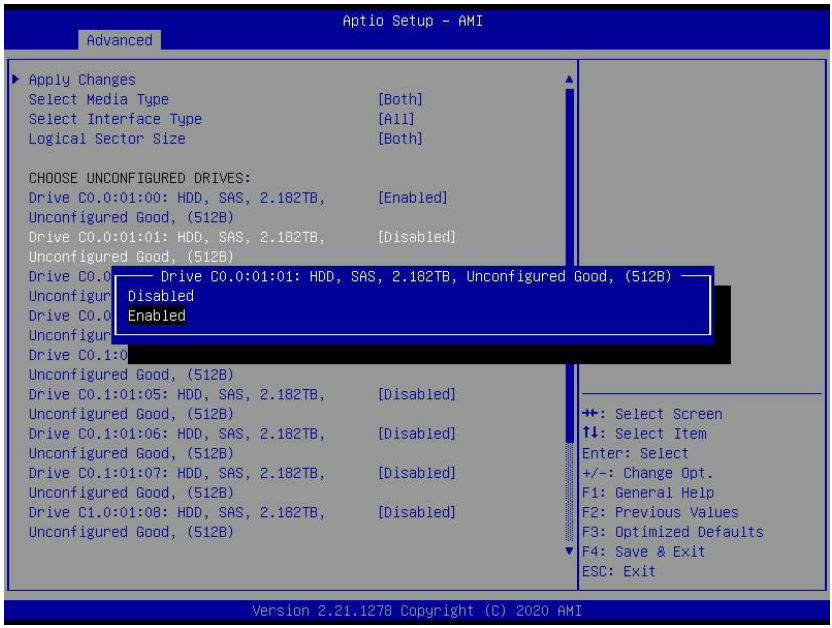


Note: The corresponding RAID level(s) will display based on the number of hard drives connected to the selected controller.

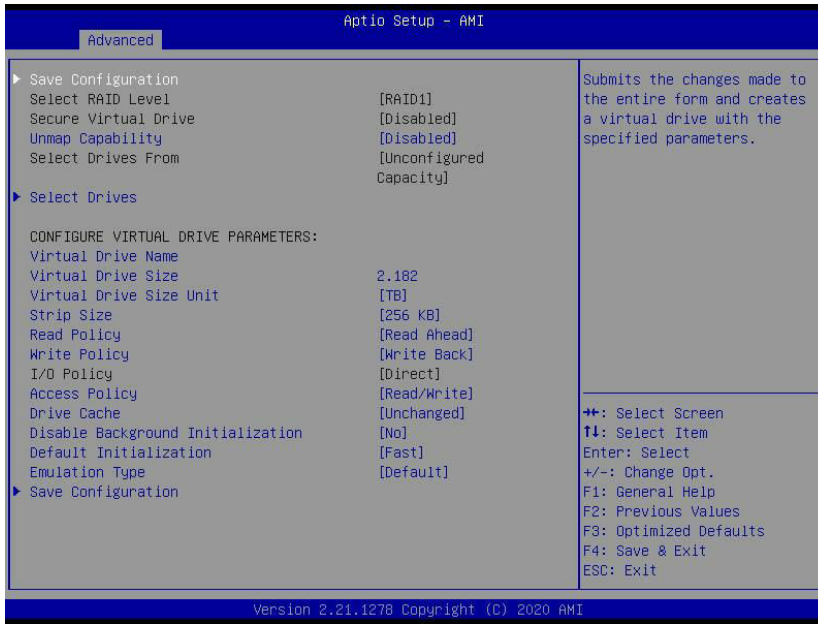
Navigate to Select Drives and press <Enter> to open the screen for selecting drives for the new virtual drive.



Use the up arrow and down arrow to navigate the list of drives and press <Enter> to select one. When the following display appears, use the up arrow or down arrow to select whether a drive will be enabled or disabled and then press <Enter>.

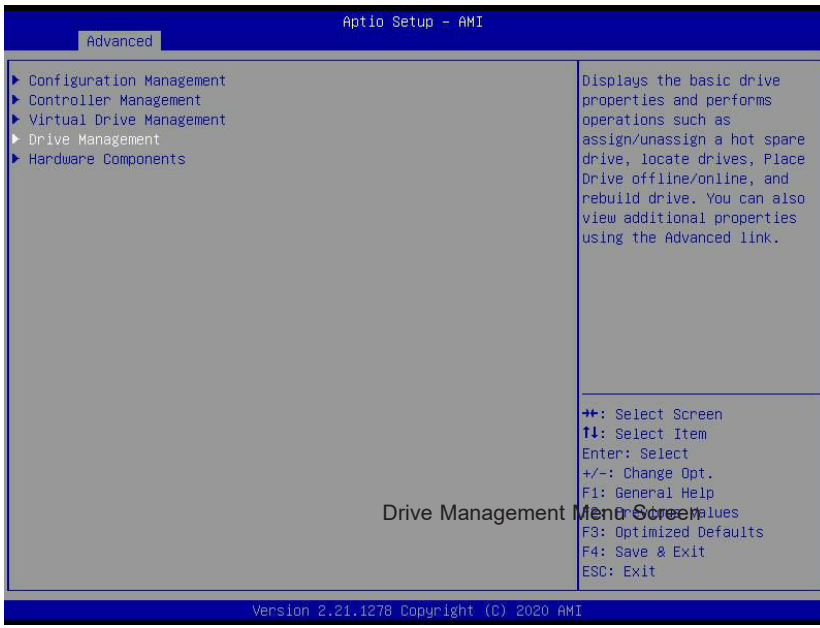


Once you are ready to create the new virtual drive, navigate to the Save Configuration option and select it. This will create a virtual drive with the parameters you chose.



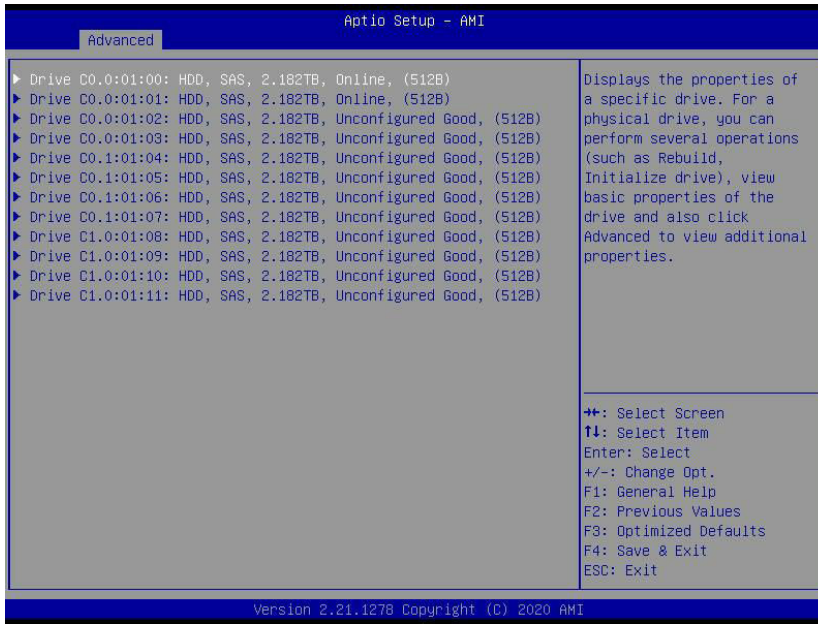
4-5 Drive Management

Press the up arrow or down arrow to select the Drive Management menu, as shown below. This screen provides information about hard drives connected to the selected controller. Information about a specific device is displayed by selecting it from the list of devices.

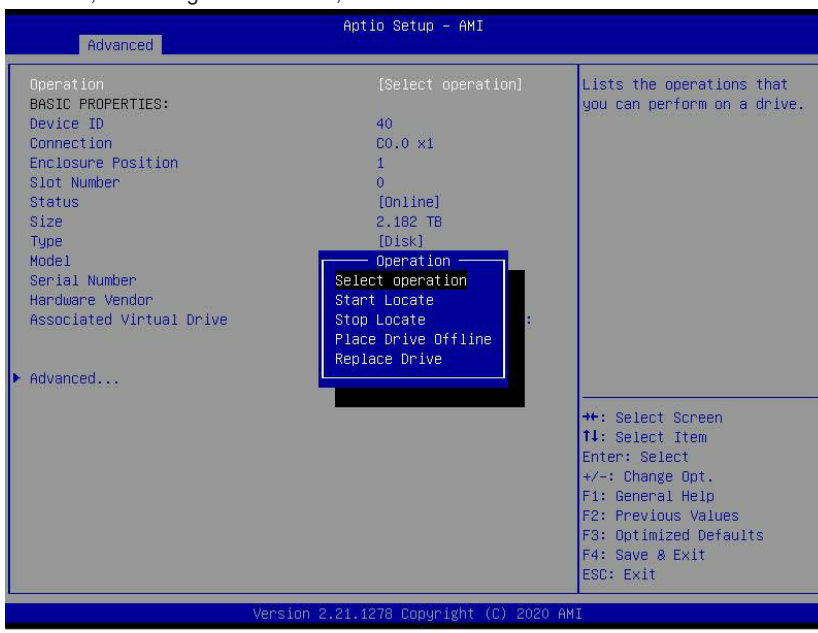


Drive Management Menu Screen

To select a device, use the up arrow or down arrow and then press <Enter>.

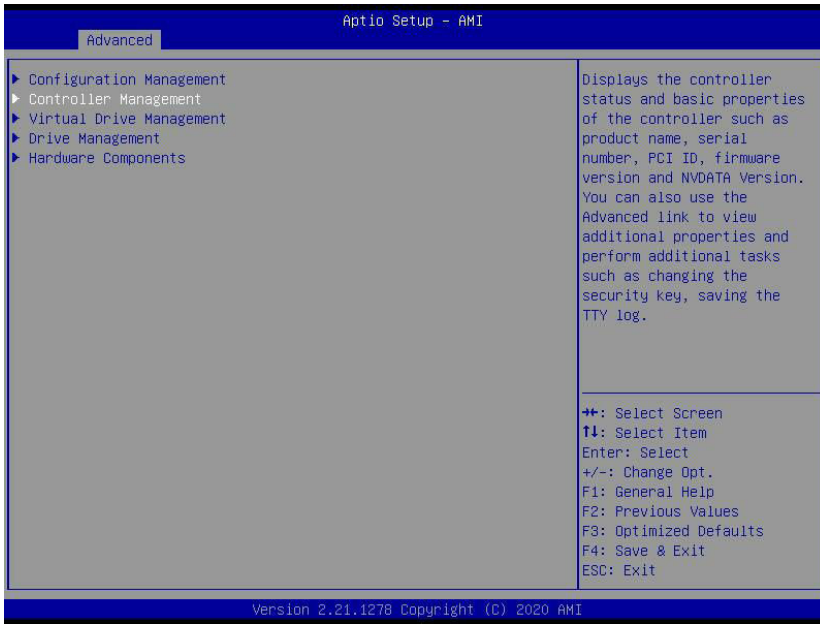


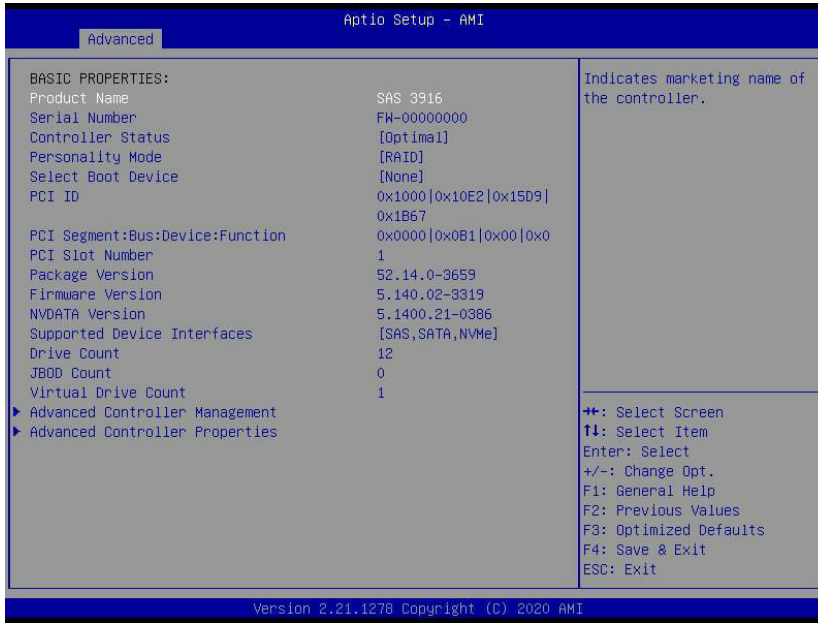
Press <Enter> to perform a command, such as rebuilding a failed drive, locating a drive, or making a drive offline, as shown below.



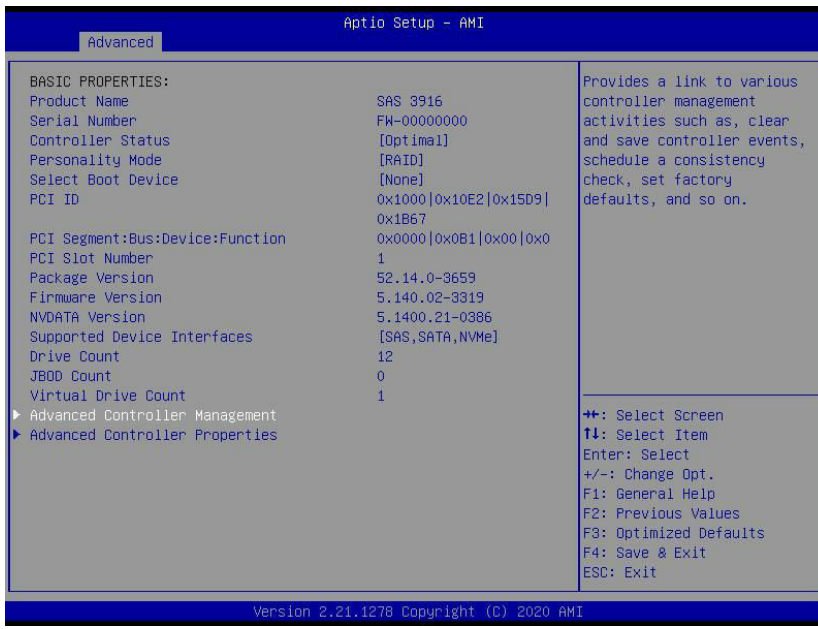
4-6 Controller Management

The Controller Management screen is the second item listed on the main menu, as shown below. This menu provides information about the settings of the selected controller.

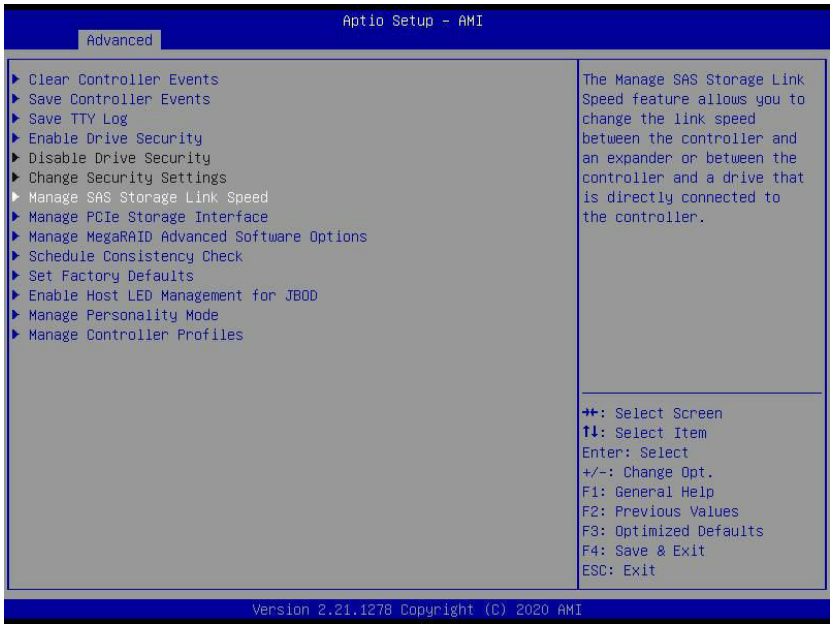




Navigate to Advanced Controller Management and press <Enter> to open the submenu.

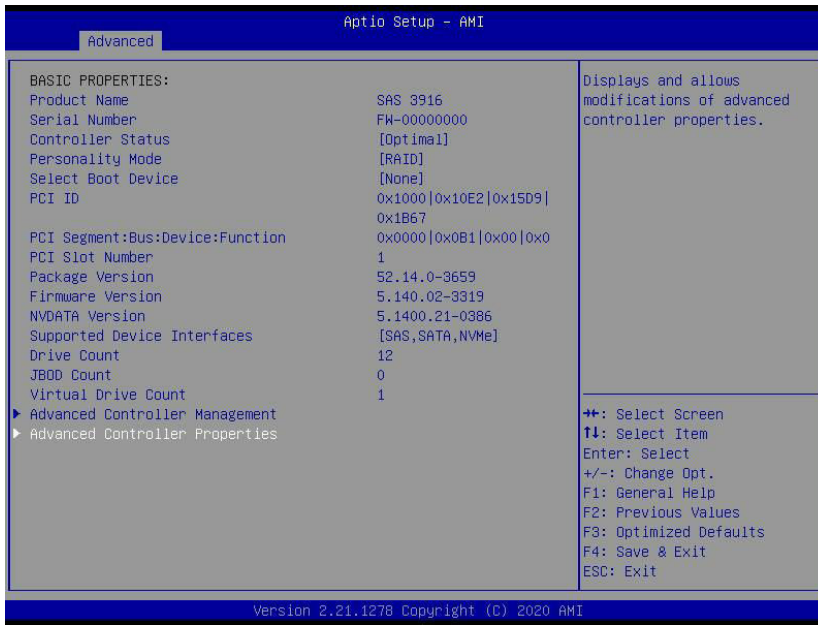


The following screen allows you to view and change settings, such as the link speed or the drive security.

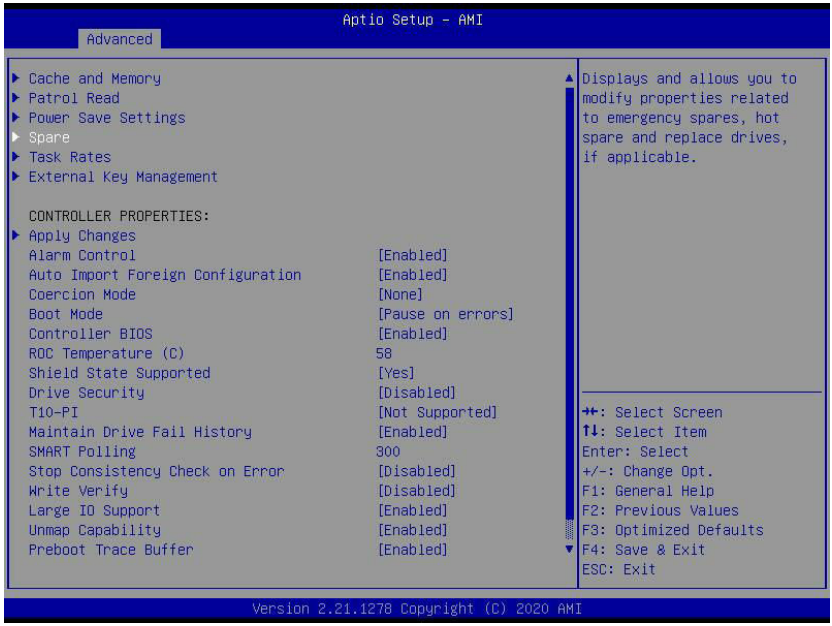


4-7 Properties

From the Controller Management menu, use the up arrow or down arrow to select the Advanced Controller Properties menu, as shown below. This menu provides information about and allows changes to the properties of the selected controller.

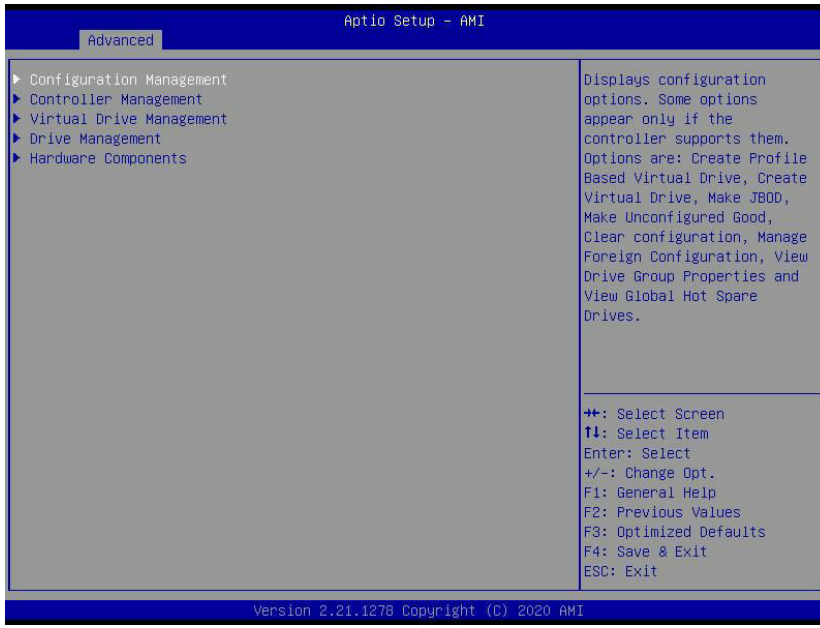


The following screen allows you to view and change properties related to power save, hot spare drives, and other items shown below.

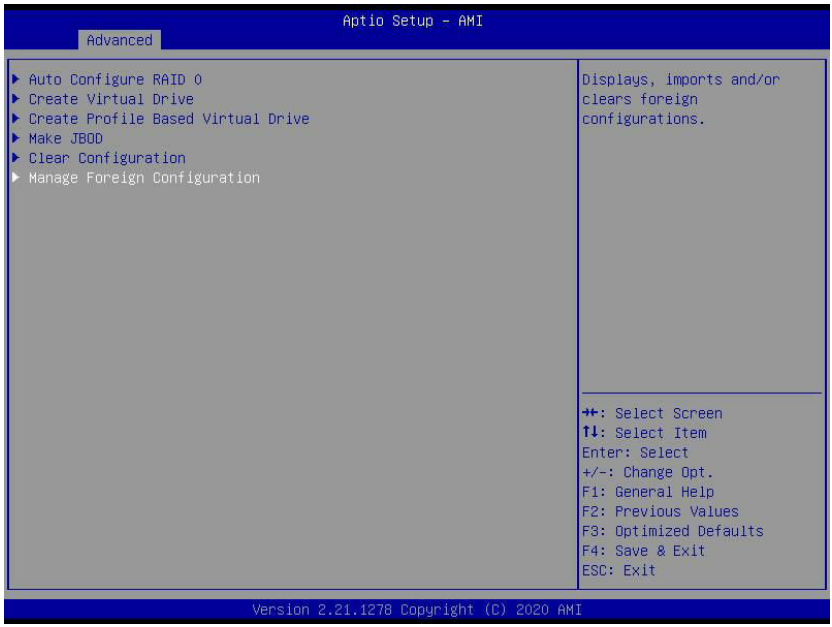


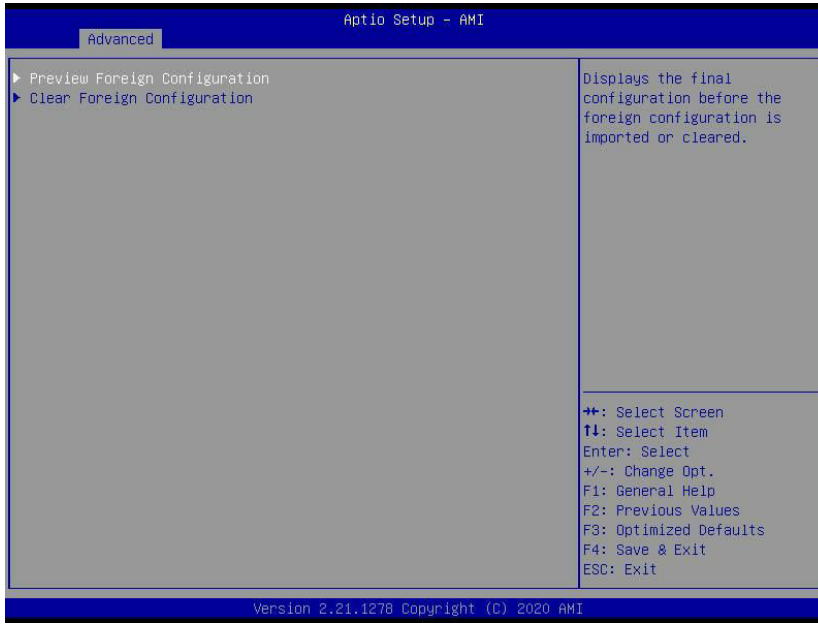
4-8 Foreign Configuration Management

The Foreign Configuration Management menu provides information about the foreign configurations, and allows you to import or clear the foreign configurations. To reach it, navigate from the main menu to Configuration Management and press <Enter>.

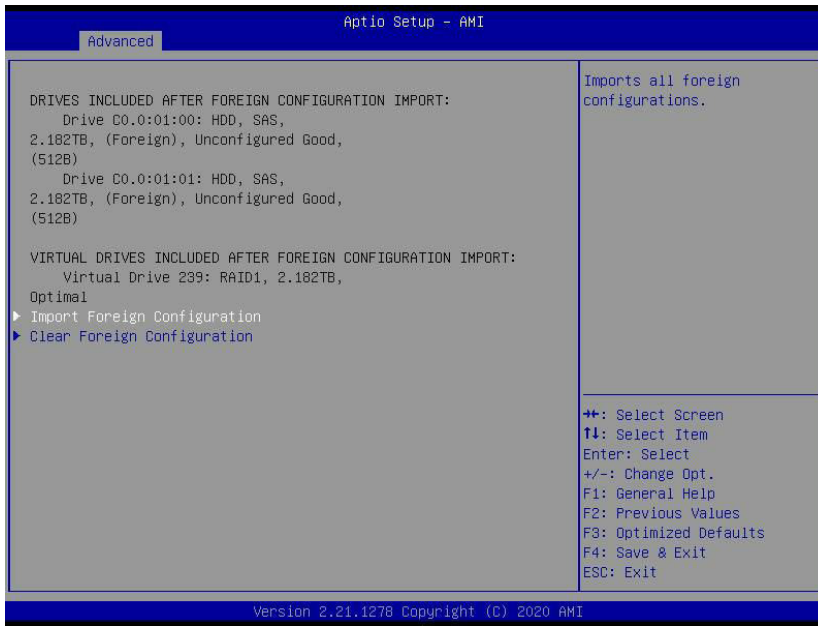


Press the down arrow key to navigate to the Manage Foreign Configuration menu and select it, as shown below. Please note that the Manage Foreign Configuration menu displays only when a foreign configuration has been connected to the controller.





Foreign View Menu Screen



Chapter 5

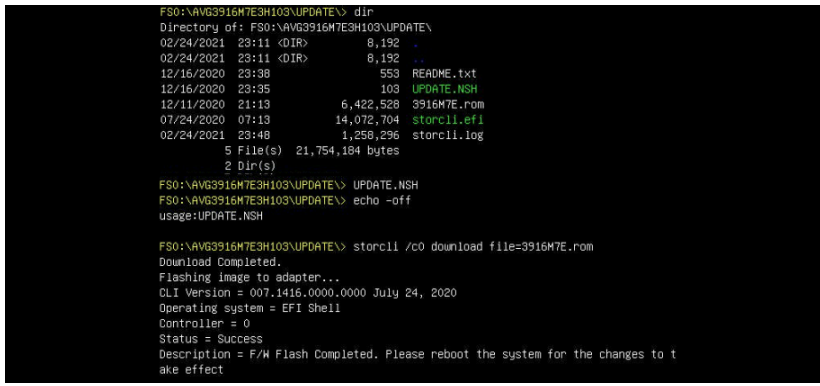
MegaRAID Controller Firmware Update Procedures

This chapter provides instructions on how to flash MegaRAID controller firmware. Please visit our website at www.supermicro.com for more information about firmware/utilities downloads.

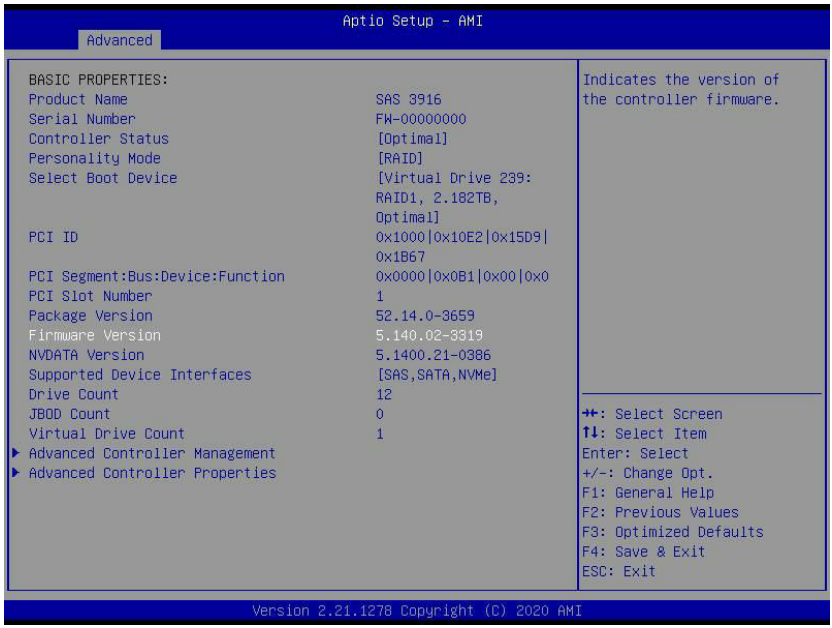
5-1 Flashing Firmware Using StorCLI under DOS

1. You need the StorcCLI EFI utility and ROM file (smc3908.rom/smc3916.rom) to flash the MegaRAID firmware (all included in the Firmware Upgrade package).

2. Boot to the UEFI shell and enter the USB key to apply the batch file (UPDATE. NSH) and update the firmware.



3. Reboot the system and check the firmware version in the controller banner during boot up as shown below.

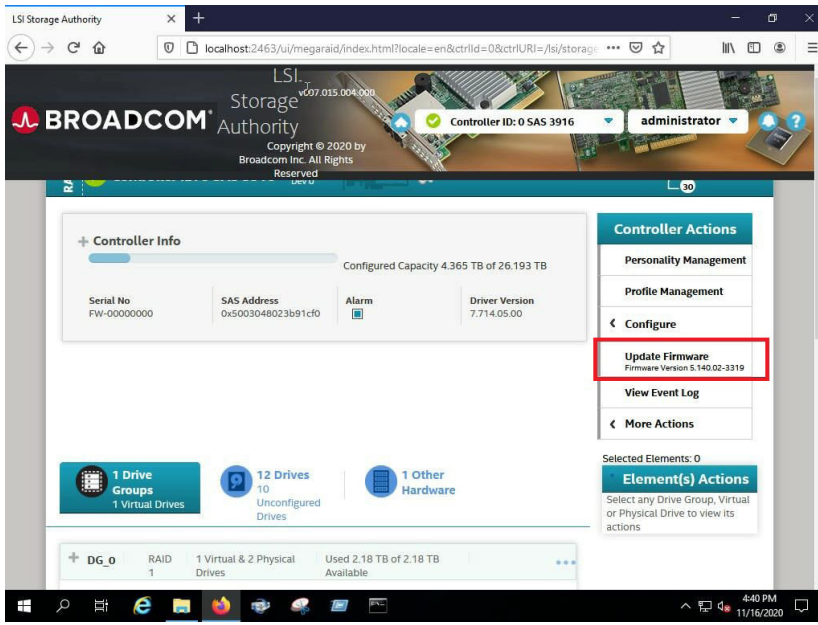


5-2 Flashing Firmware Using MegaRAID Storage Manager

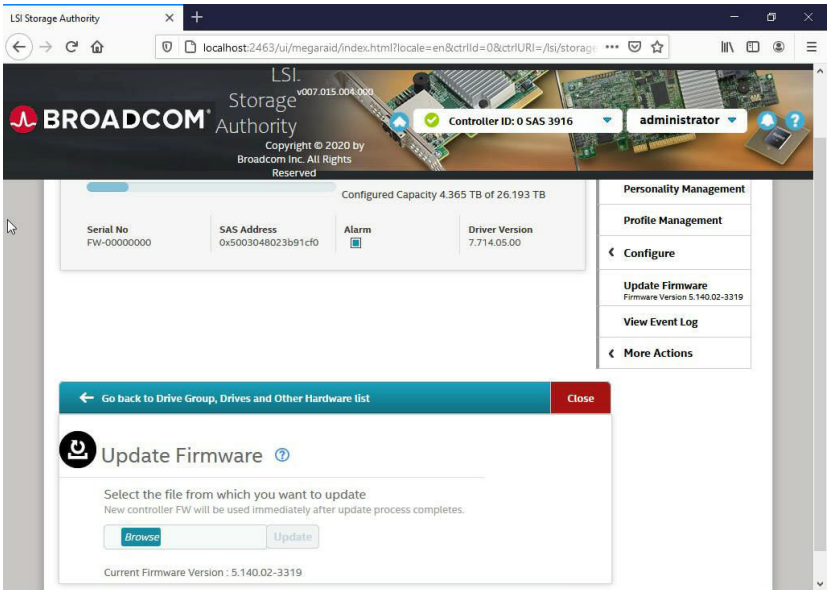
You need the MegaRAID Storage Manager software and ROM file (smc3908.rom/ smc3916.rom) to flash the MegaRAID firmware. Follow the steps below to use the MegaRAID Storage Manager software on the following platforms: Microsoft Windows operating system and Linux operating system.

1. Open the MegaRAID Storage Manager application.

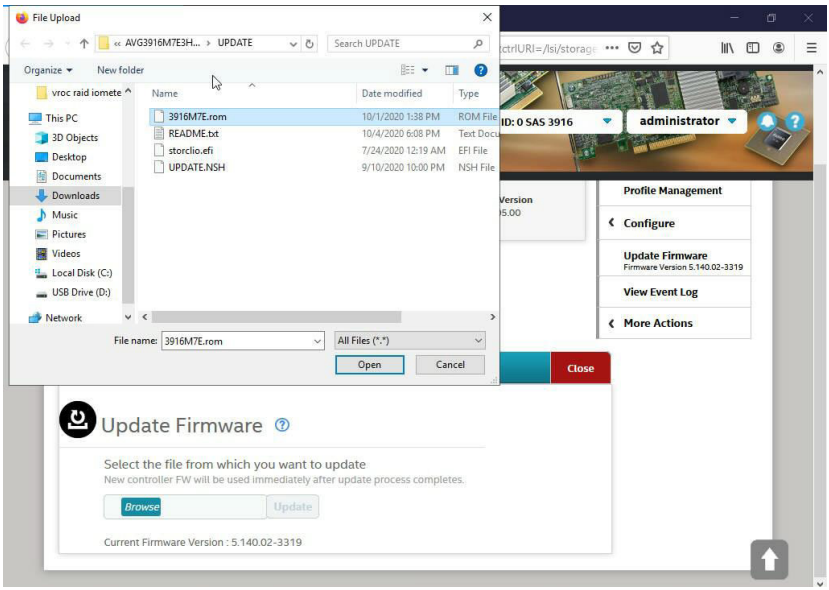
2. After selecting the Broadcom 3908/3916 controller to be updated, click the Update Firmware menu option as shown below.



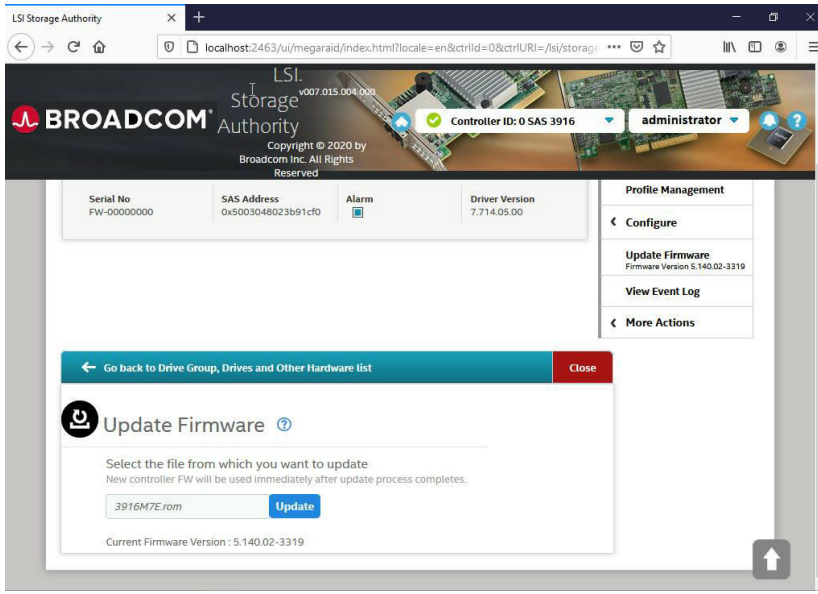
3. Press the **Browse** button to search for new firmware.



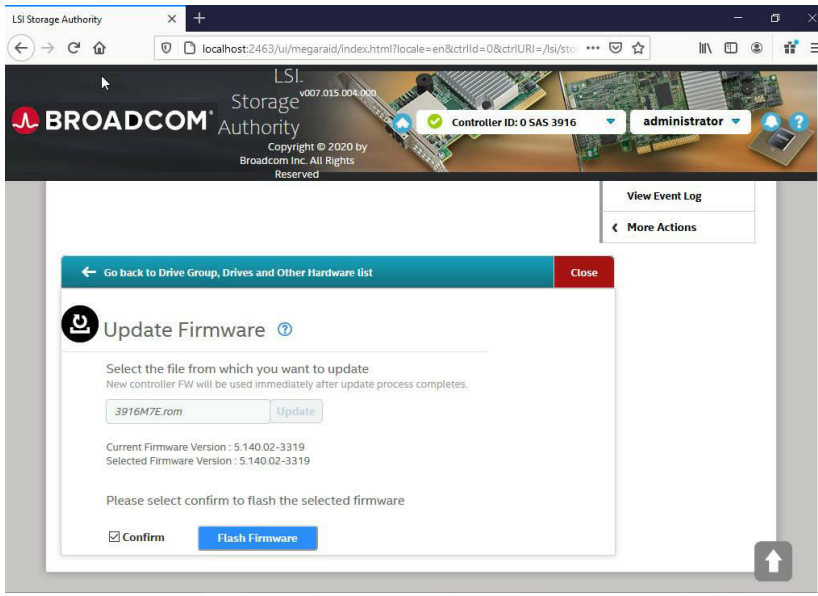
4. Select the new MegaRAID controller firmware as shown below.

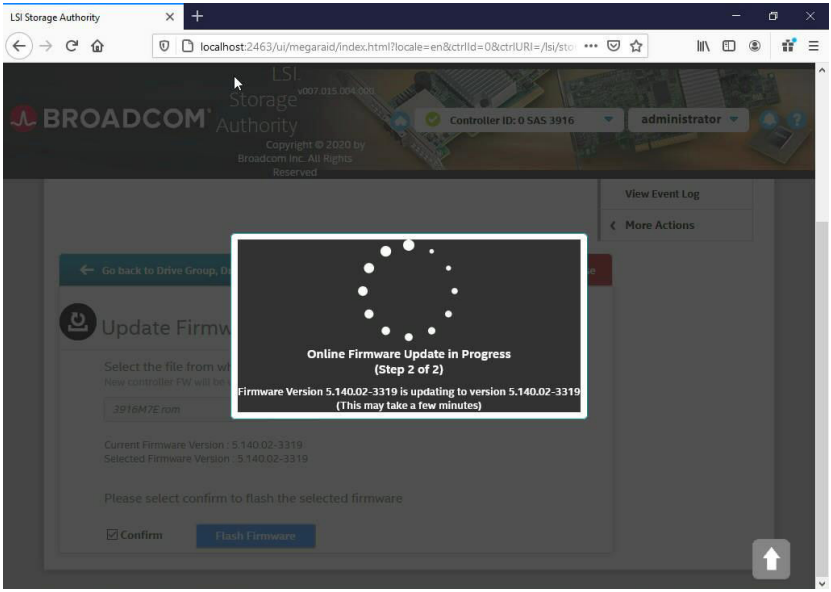


5. Click **Update** to continue.

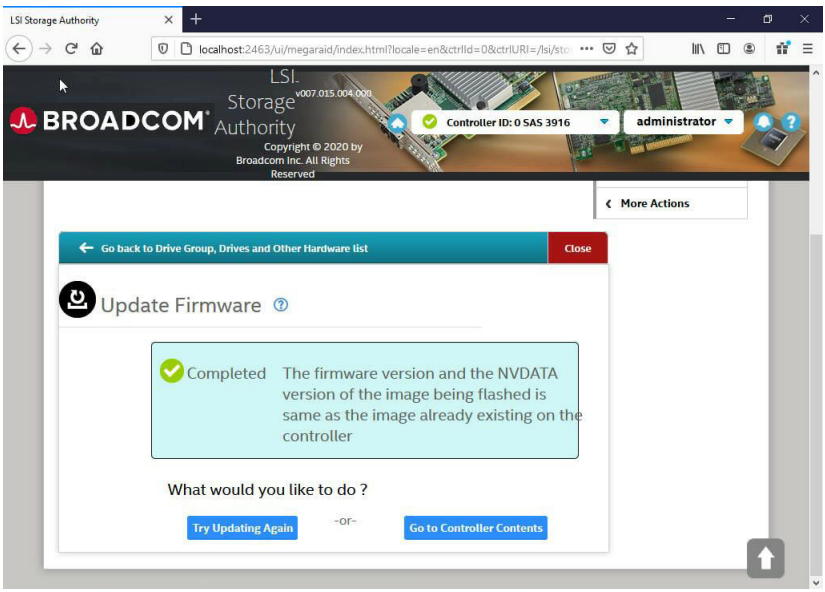


6. Check **Confirm** in the dialog box and click **Flash Firmware** to continue, as shown below.

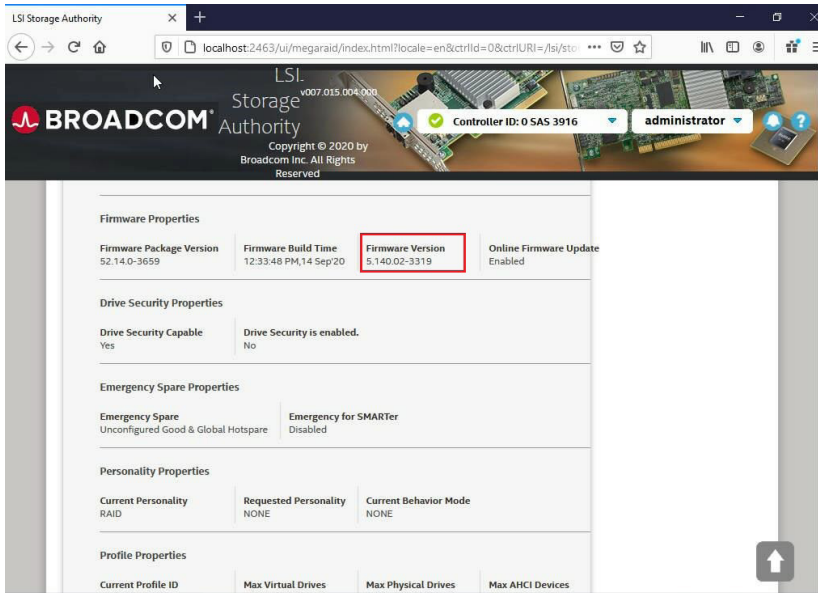




7. Do not reboot the system until the firmware update is completed, as shown below.



9. Reboot the system and check the firmware version using the MegaRAID Storage Manager application as shown below.



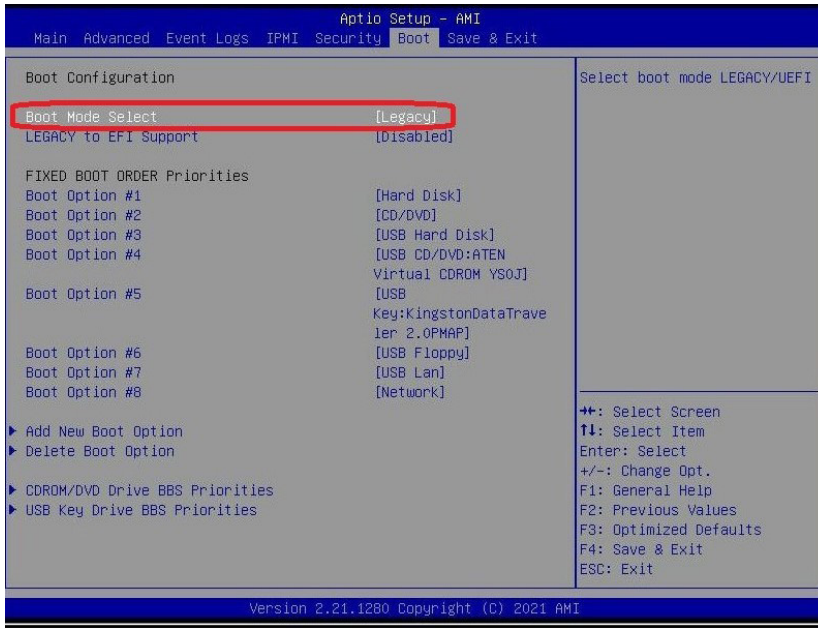
Chapter 6

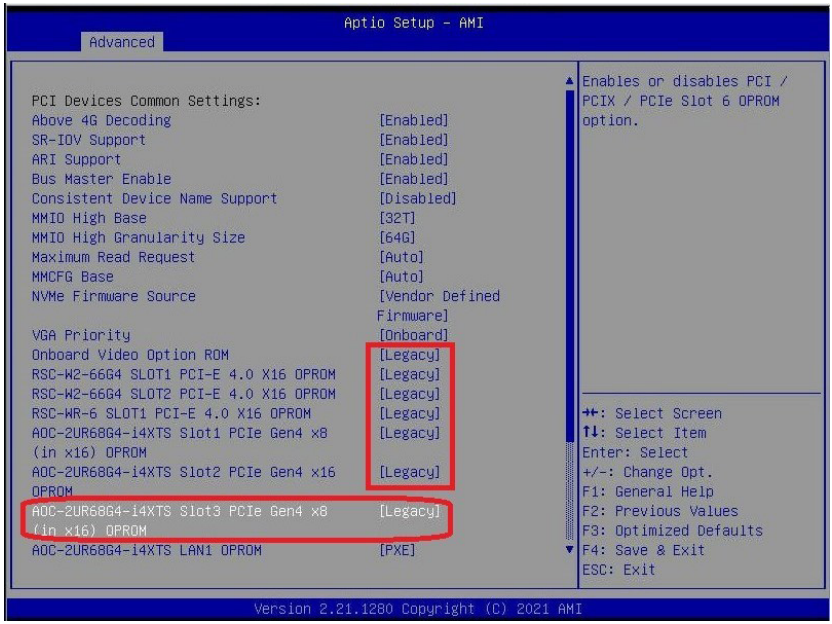
Booting

Depending on the system, motherboard, and BIOS version, use this feature to configure Boot Settings to boot as UEFI or Legacy mode.

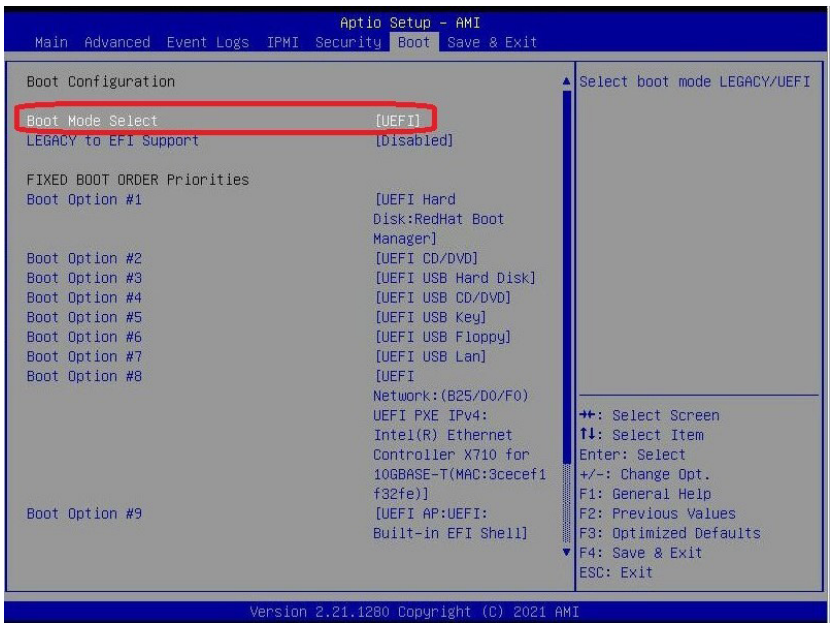
6-1 Configuring Boot Settings

1. If the boot mode changes to “Legacy”, the PCIe settings change to “Legacy”.

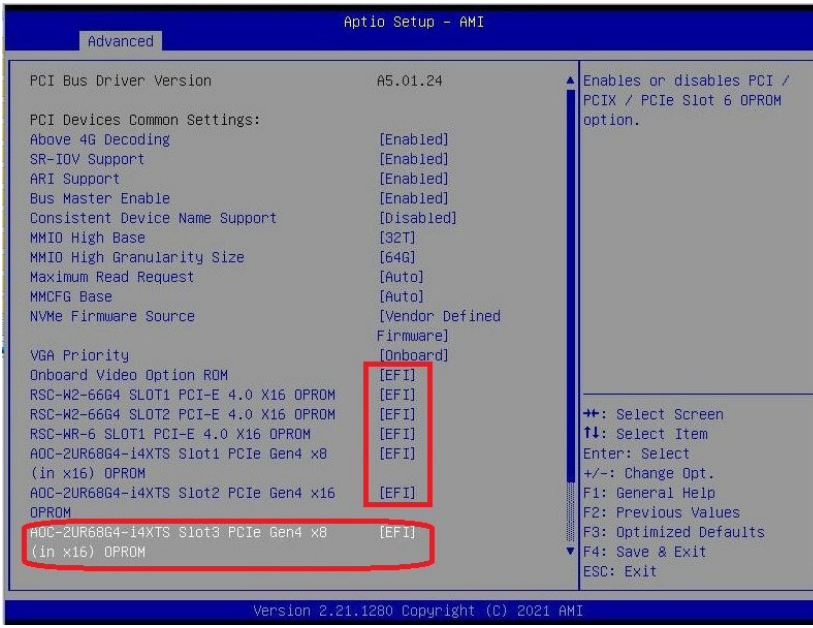




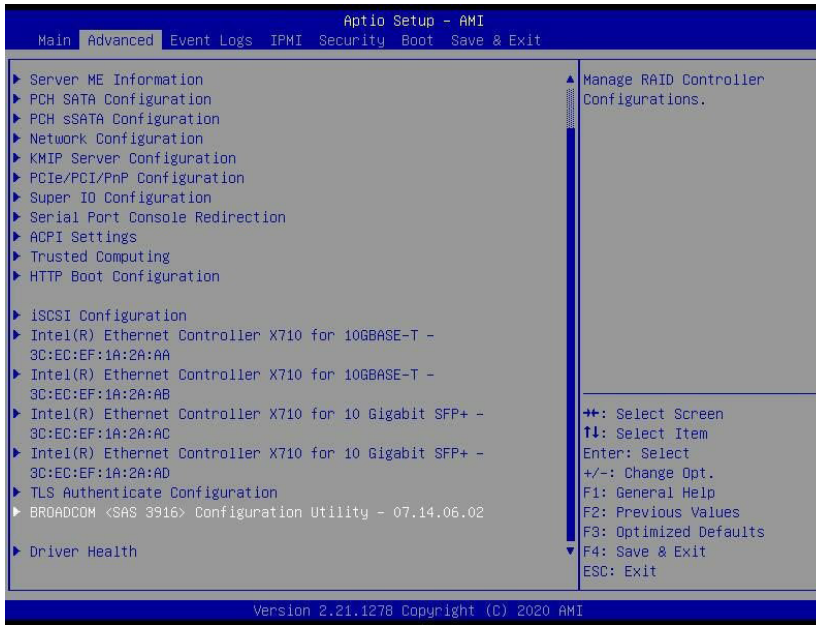
2. If the boot mode changes to “UEFI”, the PCIe settings change to “UEFI”.



3. The add-on card installed in the riser slot changes to EFI mode.



4. The controller configuration utility can only be supported under UEFI mode.



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