AMD NVMe/SATA RAID Quick Start Guide for Windows® Operating Systems

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Revision History

Date	Revision	Description
April 2018	1.02	First public release.
March 2018	1.01	2nd NDA release. Updated Supported Configuration and minor edits.
February 2018	1.00	Initial NDA release.

Chapter 1   General Information

1.1   Purpose

This Quick Start Guide is designed to assist with system setup in **RAID Mode**, by performing these general procedures:

- Copy AMD RAID device drivers to removable storage media for the following operating systems:
  - Microsoft® Windows 10 x64
- Load AMD RAID device drivers on a system at the time during Windows operating system installation.
- Install the AMD-RAIDXpert2 (Web GUI) for RAID array management

1.2   System Requirements

Table 1. System Requirements

Component	Requirements
Memory (RAM)	Minimum: 8 GB Recommended: 32 GB
Hard Disk	One to Fourteen SATA HDD's, SATA SSD's or NVMe
Max number of NVMe devices	10
Max Controller Count	11 (Two controllers with Device ID 0x7917, one controller with device ID 0x43BD and NVMe (one controller per NVMe) 11 (One controller with Device ID 0x7916, one controller with device ID 0x43BD and NVMe (one controller per NVMe)
Supported AMD Controllers	AMD SP3-Series Chipsets AMD AM4-Series Chipsets
Systems used for testing	AMD Family 17h Model 01h Rev B1, SP3 processor based platform code-named "Whitehaven" AMD Family 17h Model 01h Rev B2, AM4 processor based platform code-named "Myrtle". AMD Family 17h Models 10h-1Fh, AM4 processor based platform code-named "Myrtle" AMD Family 15h Models 60h-6Fh, AM4 processor based platform code-named "Myrtle"

Table 2. Information about Supported Configuration by Installer

SoC SATA Mode	Promontory SATA Mode	NVMe RAID Mode	SATA RAID Support	NVMe RAID Support
AHCI / Auto	AHCI / Auto	Disabled	No	No
RAID	RAID	Enabled	Yes	Yes

Maximum Device Support:

- Max support of 14 including both NVMe and SATA

Maximum Supported Controllers:

- Eight NVMe controllers + two SoC controllers + one PT controller when all set to RAID in BIOS

1.3   Generic System Setup

A generic system setup process is described below.

1. Copy the **AMD-RAID** drivers to a removable storage medium. *(Refer to Section 2.1)*
2. Power-on the system.
3. Access the platform BIOS window for the system
   a. RAID Mode shall be enabled on the system after Configuring BIOS settings as mentioned in Section 3.1.
   b. This enables the loading of the **AMD-RAID** UEFI driver
4. Initialize the disks, using the RAIDXpert2 Configuration Utility (HII) or UEFI shell.
5. Create arrays, using the HII Configuration Utility or UEFI shell. (Refer to Section 4.1)
6. Load the **AMD-RAID** drivers during the operating system installation. *(Refer to Section 5.1)*.
7. Complete the rest of the operating system installation.
8. Install the OS RAID Management Suite (AMD RAIDXpert2). *(Refer to Section 6.1)*

IMPORTANT: *To protect your data; always perform a backup prior to installing any new, major hardware or software. If you are adding NVMe as RAID to your existing RAID arrays then update all existing RAID controller drivers to latest version and reboot the system. Later connect NVMe and install RAID driver on the NVMe devices or download driver software form vendor support page.*

Chapter 2   BOOTABLE ARRAYS

Note: *Before beginning, Have the Windows® operating system installation media available and ready to install.*

Note*: Windows: Removable storage (Flash Drive) required for Copying AMD-RAID drivers*

2.1   Copy AMD-RAID Drivers to a Removable Storage Medium: Windows®

A removable storage medium is needed to copy AMD RAID drivers required for OS installation onto an **AMD-RAID** bootable array.

1. Power-on the system.
2. Locate and use a system that is running a Windows operating system and has a CD DVD drive or an I/O port for removable storage media (such as a USB flash drive).
3. Insert the storage medium into the system:
   Windows 10: Connect a USB flash drive to a USB I/O port, or insert a blank CD-DVD disk into the applicable drive.

4. Go to a browser and access the web site of your system supplier or motherboard vendor.
5. Download the AMD-RAID drivers from the web site to the appropriate removable storage medium.
6. Proceed to Windows Install and load AMD-RAID drivers during a Windows OS installation.

Chapter 3   Pre-Installation Steps

3.1   Platform BIOS Settings - Enable RAID for the AMD SP3-Series Chipsets

*Note: The steps to configure a system to RAID mentioned here are specific to **AMD NDA BIOS** based off the **AMI BIOS**.*

1. Power-on the system.
2. Press **Delete** or **ESC** to get into the Platform BIOS setup page.
3. In the BIOS setup:
   a. Select the **Advanced** tab, then press **Enter**
   b. Select the **AMD PBS** tab, then press **Enter**
   c. Set **NVMe RAID Mode** to **Enabled**
4. In the BIOS setup:
   a. Select the **Advanced** tab, then press **Enter**
   b. Select the **AMD CBS** tab, then press **Enter**
   c. Select **FCH Common Options**, then press **Enter**
   d. Select **SATA Configuration Options**, then press **Enter**
   e. Set **SATA Controller** to **Enabled**.
5. In the BIOS setup:
   a. Select the **Advanced** tab, then press **Enter**
   b. Select the **AMD CBS** tab, then press **Enter**
   c. Select **FCH Common Options**, then press **Enter**
   d. Select **SATA Configuration Options**, then press **Enter**
   e. Set **SATA Mode** to **RAID**.
6. In the BIOS setup:
   a. Select the **Advanced** tab, then press **Enter**
   b. Select **Promontory Common Options**, then press **Enter**
   c. Select **PT SATA Configuration Options**, then press **Enter**
   d. Set **PT SATA Port Enable** to **Enabled**.
7. In the BIOS setup:
   a. Select the **Advanced** tab, then press **Enter**
   b. Select **Promontory Common Options**, then press **Enter**
   c. Select **PT SATA Configuration Options**, then press **Enter**
   d. Set **PT SATA Mode** to **RAID**.
8. In the BIOS setup:

   a.   Select the **Advanced** tab, then press **Enter**

   b.   **Select CSM Configuration**, then press **Enter**

   c.   Set **CSM Support** to **Enabled**

9.   In the BIOS setup:

   a.   Select the **Advanced** tab, then press **Enter**

   b.   Select **CSM Configuration**, then press **Enter**

   c.   Set **Boot Option Filter** to **UEFI and Legacy** or **UEFI Only**.

10. In the BIOS setup:

   a.   Select the **Advanced** tab, then press **Enter**

   b.   Select **CSM Configuration**, then press **Enter**

   c.   Set Storage -> **UEFI**

11. Save (**F4**) the setting and restart the system.

3.2   Platform BIOS Settings – Enable RAID for the AMD Socket AM4-Compatible Processors

*Note: The steps to configure a system to RAID mentioned here are specific to **AMD NDA BIOS** based off the **Insyde BIOS**.*

1.   Power-on the system
2.   Press **ESC** to enter the **System BIOS** setup page
3.   Select **Setup Utility**, then press **Enter**
4.   In the BIOS setup:

   a.   Select the **Advanced** tab

   b.   Select **IDE Configuration**, then press **Enter**

   c.   Set **SATA Configure** as to **RAID**, then press **Enter**

   d.   Set **Force RAID Mode** to **Enabled**, then press **Enter**

5.   In the BIOS setup:

   a.   Select the **Boot** tab

   b.   **Set Boot Type** to **UEFI Boot Type**, then press **Enter**

   c.   Set **EFI Device First** to **Enable**, then press **Enter**

6.   In the BIOS setup:

   a.   Select the **AMD-PBS** tab

   b.   Set **NVME RAID Mode** to **Enabled**, then press **Enter**

7.   In the BIOS setup:

   a.   Select the **AMD-CBS tab**

   b.   Select **FCH Common Options**, then press **Enter**

   c.   Select **SATA Configuration Options**, then press **Enter**

   d.   Set **SATA Controller** to **Enabled**, then press **Enter**

   e. Set **SATA Mode** to **RAID**, then press **Enter**

8. In the BIOS setup:

   a. Select the **AMD-CBS** tab

   b. Select **Promontory Common Options**, then press **Enter**

   c. Select **PT SATA Configuration Options**, then press **Enter**

   d. Set **PT SATA Port Enable** to **Enabled**, then press **Enter**

   e. Set **PT SATA Mode** to **RAID**, then press **Enter**

9. Save and restart.

Chapter 4   Create the Bootable Virtual Disk

4.1   RAIDXpert2 Configuration Utility (HII Mode) For the AMD Ryzen™ Threadripper™ Processor

*Note: The steps to configure arrays in RAID mode mentioned here are specific to **AMD NDA
BIOS** and are based off **AMI BIOS**.*

1. Power-on the system.
   a. Press **ESC** or **DEL** to get into the **Platform BIOS**
   b. Select the **Advanced** tab
   c. Select **RAIDXpert2 Configuration Utility**, then press **Enter**
2. At the RAIDXpert2 Configuration Utility's Main Menu, use the arrow keys to select Array Management, then press Enter
3. Use the **arrow keys** to select **Create Array**, then press **Enter**
4. Select Select RAID Level, then press Enter
   a. From the **Select RAID Level** drop down menu, use the **arrow keys** to select the desired RAID level, then press **Enter**
5. Select the disks with which to create the array:
   a. Use the **arrow keys** to select **Select Physical Disks**, then press **Enter**
   b. To select individual disks, highlight a disk with the **arrow keys** and press the **Space Bar** or **Enter**. Any number of disks may be selected using this method
   c. To select all disks, use the **arrow keys** to select **Check All**, then press **Enter**
   d. Use the **arrow keys** to select **Apply Changes**, then press **Enter**
6. Select an array size by doing the following:
   a. Use the **arrow keys** to select **Array Size**, then press **Enter**
   b. The Array size will default to the Maximum size allowed by the number of physical disks and RAID level selected. If you want a smaller size Array size, enter the desired value.
   c. Press **Enter** when the desired size is reached.
7. Use the arrow keys to select **Cache Tag Size**
   a. Any Array with only HDD/SSD will have default CTS of 64 k
   b. Any Array with only NVMe or NVMe with HDD/SSD will have default CTS of 256 k
8. Using the **arrow keys** to select **Read Cache Policy**, then press **Enter**
   a. Select the desired Read Cache Policy, then press **Enter**
9. Using the **arrow keys** to select **Write Cache Policy**, then press **Enter**
   a. Select the desired **Write Cache Policy**, then press **Enter**
   b. Use the **arrow keys** to select **Create Array**, then press **Enter**

10. After completion of array creation save and reboot the BIOS

4.2 RAIDXpert2 Configuration Utility (HII Mode) For the AMD Ryzen™ Desktop Processor

*Note: The steps to configure arrays in RAID mode mentioned here are specific to **AMD NDA BIOS** based off **Insyde BIOS**.*

1. Power-on the system.
   a. Press **ESC** to get into the **Platform BIOS**
   b. Select **Device Management**, then press **Enter**
   c. Select **RAIDXpert2 Configuration Utility**, then press **Enter**
2. At the RAIDXpert2 Configuration Utility's Main Menu, use the **arrow keys** to select **Array Management**, then press **Enter**
3. Use the **arrow keys** to select **Create Array**, then press **Enter**
4. Select Select RAID Level, then press Enter

   From the Select RAID Level drop down menu, use the **arrow keys** to select the desired **RAID** level, then press **Enter**
5. Select the disks with which to create the array:

   Use the **arrow keys** to select **Select Physical Disks**, then press **Enter**

   To select individual disks, highlight a disk with the arrow keys and press the **Space Bar** or **Enter**. Any number of disks may be selected using this method

   To select all disks, use the **arrow keys** to select **Check All**, then press **Enter**

   Use the **arrow keys** to select **Apply Changes**, then press **Enter**
6. Select an array size by doing the following:

   Use the **arrow key**s to select **Array Size**, then press **Enter**

   The Array size will default to the Maximum size allowed by the number of physical disks and RAID level selected. If you want a smaller size Array size, enter the desired value.

   Press **Enter** when the desired size is reached.
7. Use the arrow keys to select **Cache Tag Size**
   a. Any Array with only HDD/SSD will have default CTS of 64 k
   b. Any Array with only NVMe or NVMe with HDD/SSD will have default CTS of 256 k
8. Using the **arrow keys** to select **Read Cache Policy**, then press **Enter**

   Select the desired **Read Cache Policy**, then press **Enter**
9. Using the **arrow keys** to select **Write Cache Policy**, then press **Enter**

   Select the desired **Write Cache Policy**, then press **Enter**
10. Use the **arrow keys** to select **Create Array**, then press **Enter**
11. After completion of array creation save and reboot the BIOS

4.3   UEFI Mode

1. At the system's Power-On Self-Test (POST) screen, press F7 / F12 / ESC (or similar) to access the UEFI Configuration Utility (aka UEFI Boot Manager).
2. Boot to the EFI Internal shell

Note: obtain the rcadm.efi file from your system supplier or motherboard vendor and copy it onto a UEFI flash drive, in the root directory.

3. Enter **fsx:** where x is the number of the UEFI Flash Drive.
4. Use rcadm to create the desired Boot Virtual Disk.

   Examples:

Note: the user may have to press the page up key to see more of the information.

   a. Query the devices connected in the system: (Output will display the UEFI Version, physical devices and arrays)

   ```
   rcadm.efi –M -qa
   ```

   b. Create a Volume on disk 1 with a size of 80 Gbs and disables Read/Write Cache:

   ```
   rcadm.efi –C –v –d 1 –s 80000 –ca nc
   ```

   c. Create a RAID0 on disks 1, 2 with a size of 100 Gbs and enables Read Cache:

   ```
   rcadm.efi –C –r0 –d 1 2 –s 100000 –ca r
   ```

   d. Create a RAID1 on disks 2, 3 with a max size available and enables Read/Write Cache:

   ```
   rcadm.efi –C –r1 –d 2 3 –ca rw
   ```

   e. Create a RAID10 on disks 1, 2, 3, 4 with a size of 125 Gbs and enables Write Cache:

   ```
   rcadm.efi –C –r10 –d 1 2 3 4 –s 125000 –ca w
   ```

Chapter 5   Install AMD-RAID Drivers

5.1   Windows®: Install AMD-RAID UEFI Drivers during Windows® OS Installation

Install the AMD-RAID UEFI drivers during Windows 10 OS Installation

Note: The windows described in this guide are typical. Path names and text can vary, depending on user-designated selections and other parameters.

*Note: NVMe devices will be listed in the "**Where do you want to install Windows?"**, do not delete any of the partitions or format the NVMe devices. Doing so will delete the **AMD-RAID** metadata and the desired RAID level will be deleted. Once the **AMD-RAID** drivers (rcbottom and rcraid) have been loaded, a valid **AMD- RAID** Virtual Disk will appear.*

1. Power-on the system. Create a bootable array, see Chapter 4.
2. Insert the Microsoft Windows operating system CD‑ROM or DVD into the system's CD or DVD drive.
3. Boot the system and allow it to access the Microsoft Windows operating system CD‑ROM or DVD.
4. At the Windows setup window:
   - Select the language, time and keyboard options
   - Click **Next**
   - Click **Install Now** or similar
   - If prompted, select the desired Operating System
   - Click **Next**
   - Insert the storage medium with the **AMD-RAID** drivers into the USB port or applicable system drive.
   - Click **Browse**
   - Navigate to the directory containing the saved **AMD-RAID** drivers
   - Click **OK**

     Note: If the installation has multiple controllers, there will be two or more rcbottom.inf's listed.

   - Select the first **AMD-RAID Bottom Device** (**rcbottom.inf**) driver in the list
   - Click **Next**
5. At the Load Driver Warning message

- Click **OK**
6. At the Select the Driver to install window
    - Click **Browse**
    - Navigate to the directory containing the saved **AMD-RAID** drivers
    - Click **OK**
    - Select the **AMD-RAID Controller (rcraid.inf)** driver in the list
    - Click **Next**
    - Select (Check Mark) **I Accept the License Terms**
    - Click **Next**
    - Select **Custom: Install Windows Only (advanced)** or similar
7. Once both drivers have been loaded, a valid Virtual Disk appears:
    - Click **Load Drivers**
    - Click **Browse**
    - Navigate to the directory containing the saved **AMD-RAID** drivers
    - Click **OK**
    - Select the **AMD-RAID Config Device** (**rccfg.inf**) driver from the list
    - Click **Next**
8. At the Where do you want to install Windows
    - Click **Next**
9. Follow the on-screen instructions to complete the installation of the applicable Windows operating system.
10. After the OS is installed, Open Device Manager and verify the following:
    - Expand Storage Controllers: there will be an entry(ies) listed as **AMD-RAID Bottom Device**
    - Expand Storage Controllers: there will be an entry(ies) listed as **AMD-RAID Controller**
    - Expand System Devices: there will be an entry listed as **AMD-RAID Config Device**
11. Remove the storage medium and Microsoft Windows OS CD-ROM or DVD from the applicable drive(s) or port.
12. Proceed Installing the **AMD RAIDXpert2 Management Suite for Windows**®, Refer to Chapter 6.

Chapter 6   Install the AMD-RAIDXpert2 Management Suite and Web GUI

6.1   Windows® – AMD-RAIDXpert2 Management Suite

Obtain the latest Catalyst executable file from your system supplier or motherboard vendor. Download the file to the system's desktop, execute it and follow the on-screen prompts.

6.1.1   Windows® – AMD-RAIDXpert2 Management Suite

1. Obtain the latest Catalyst executable file from your system supplier or motherboard vendor.
2. Download the file to the system's desktop, execute it and follow the on-screen prompts.
3. Click on the RAIDXpert2 Desktop Icon
4. Select the applicable **language** from the drop-down menu (defaults on English)
5. Default credentials are:
   - Username – **admin**
   - Password – **admin**
6. Change the credentials:
   - Create new username
   - Create new password
7. Re-log into the system with the new credentials.

6.1.2   Windows® – AMD RAIDXpert2 Management Suite Installation (Manually)

1. Obtain the AMD RAIDXpert2 Management Suite executable file (Setup.exe) from your system supplier or motherboard vendor. Download Setup.exe to the system's desktop.
2. Install AMD RAIDXpert2 (setup.exe) by:
   - Open a command prompt, must be run as Administrator
   - **`cd C:\User\User_Name\Desktop`**
   - `For silent installation: setup.exe`
   - `For GUI installation: setup.exe -i gui`

Note: *For the Web GUI to function correctly, rc_cgi and apache must be running.*

3. Turn off Windows Firewall (or unblock during step 2).

4. Click on the RAIDXpert2 Desktop Icon

    Default credentials are:
    - Username – **admin**

    - Password – **admin**

    Change the credentials:
    - Create new **username**

    - Create new **password**

5. Re-log into the **AMD RAIDXpert2 Management Suite** or **Web GUI** with the new credentials.