Intel® Volume Management Device Driver for VMware* ESXi* Version 3.5.1.1002

Release Notes

Revision 004

November 2023

You may not use or facilitate the use of this document in connection with any infringement or other legal analysis. You may not use or facilitate the use of this document in connection with any infringement or other legal analysis concerning Intel products described herein. You agree to grant Intel a non-exclusive, royalty-free license to any patent claim thereafter drafted which includes subject matter disclosed herein.

No license (express or implied, by estoppel or otherwise) to any intellectual property rights is granted by this document.

All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps.

All product plans and roadmaps are subject to change without notice.

The products described may contain design defects or errors known as errata, which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

Intel disclaims all express and implied warranties, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, as well as any warranty arising from course of performance, course of dealing, or usage in trade.

© Intel Corporation. Intel, the Intel logo, Xeon, and other Intel marks are trademarks of Intel Corporation or its subsidiaries.

*Other names and brands may be claimed as the property of others.

Copyright© 2023, Intel Corporation. All rights reserved.

Contents

Revision History

Revision Number	Description	Revision Date
001	Intel® VMD driver for 1st, 2nd & 3rd Generation Intel® Xeon® Scalable Processors. Intel® VMD release 2.7.0.1157 for VMware* ESXi* 6.5, 6.7, and 7.0.	June 2021
002	Intel® VMD driver for 2nd, 3rd & 4th Generation Intel® Xeon® Scalable Processors. Intel® VMD release 3.0.0.1038 for VMware* ESXi* 7.0 and 8.0.	November 2022
003	Intel® VMD driver for 2nd, 3rd & 4th Generation Intel® Xeon® Scalable Processors. Intel® VMD release 3.2.0.1008 for VMware* ESXi* 7.0 and 8.0.	August 2023
004	Intel® VMD driver for 3rd, 4th & 5th Generation Intel® Xeon® Scalable Processors. Intel® VMD release 3.5.1.1002 for VMware* ESXi* 7.0 and 8.0.	November 2023

§§

1 Introduction

1.1 Overview

The Intel® Volume Management Device (Intel® VMD) Driver for VMware* ESXi* release package contains the **3.5.1.1002** release of the Intel® Volume Management Device (Intel® VMD) Driver to support 3rd, 4th and 5th Generation Intel® Xeon® Scalable Processors platforms using the VMWare* ESXi* hypervisor.

Intel® Volume Management Device (Intel® VMD) Driver assists in the management of CPU and PCH attached PCIe NVMe SSDs. Features include ability for PCIe NVMe Surprise Hot Plug, LED Management, and Error Handling within a VMWare* ESXi* environment.

1.2 Reference OEM Platform Documentation

Refer to your OEM for a full list of available feature sets. If any of the information in this document conflicts with the support information provided by the platform OEM, the platform documentation and configurations take precedence.

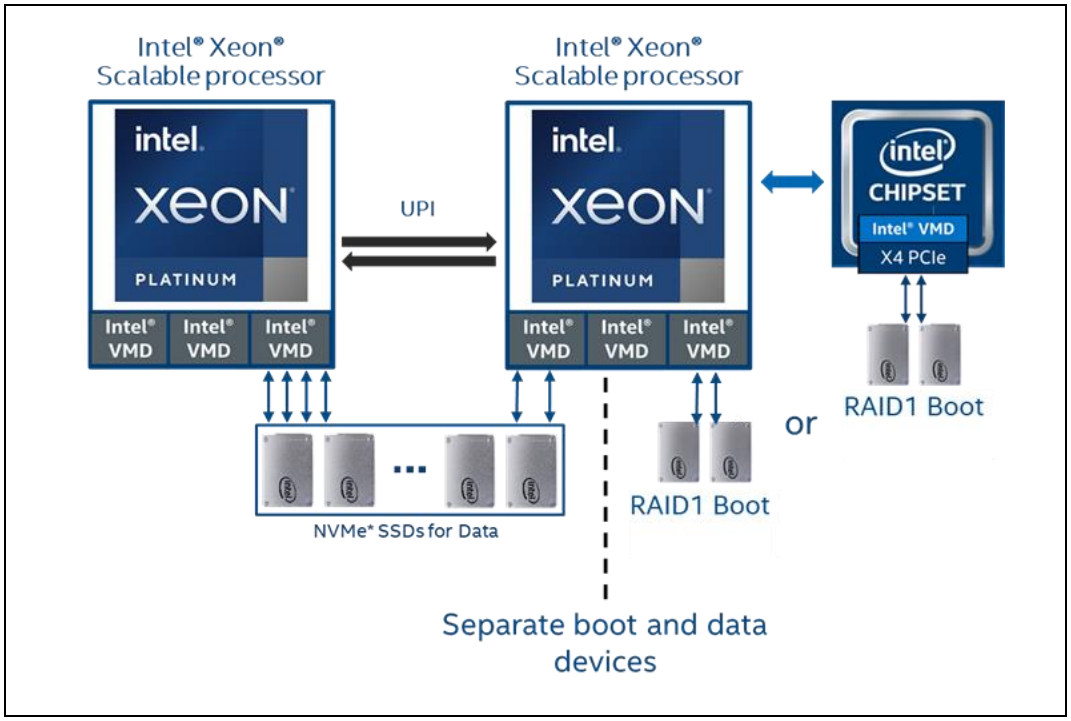
Customers should always contact the place of purchase or system/software manufacturer with support questions about their specific hardware or software configuration.

1.3 Key Features

1.3.1 RAID 1 Support

Intel® Volume Management Device (Intel® VMD) Driver version **3.5.1.1002** supports the 3rd, 4th and 5th Generation Intel® Xeon® Scalable Processors platforms for NVMe devices behind Intel® VMD. Multiple RAID 1 volumes, including both boot and data, are supported per Intel® VMD domain/controller. Intel currently verifies functionality of two volumes per domain/controller. See the illustration below for clarification.

Figure 1-1. Graphical Representation of Boot Options



For all Generations (3rd through 5th) Intel® Xeon® Scalable Processors platforms, RAID 1 can be created on devices that are CPU attached NVMe.

Only Intel® VMD enabled NVMe devices can be managed with this driver version. For devices not on Intel® VMD enabled lanes, the native VMware* NVMe driver will load on SSD PCIe NVMe devices. SATA devices are not supported.

The LSU vSAN/vCenter Framework LED Management tool is available inbox as of ESXi* 7.0U3.

Note: The name of the Intel® VMD driver has been updated from *intel-nvme-vmd* to *iavmd*.

1.3.2 NPEM LED Management for Switch Attached NVMe

The Intel® VMD ESXi* driver supports NPEM LED management on switch attached NVMe that are enabled for Intel® VMD. Switches that support NPEM can enable Intel® VMD on their PCIe lanes to manage LED blinking patterns. For NVMe devices directly attached to the platform and enabled by Intel® VMD, the Intel® VMD LED management method will be used.

§§

2 Support

2.1 Supported Operating Systems

- 3rd Generation Intel® Xeon® Scalable Platforms – VMware* ESXi* versions 7.0U2+ and 8.0x
- 4th Generation Intel® Xeon® Scalable Platforms – VMware* ESXi* versions 7.0U3 and 8.0x
- 5th Generation Intel® Xeon® Scalable Platforms – VMware* ESXi* versions 7.0U3 and 8.0x

2.2 Supported Platforms

- 3rd, 4th and 5th Generation Intel® Xeon® Scalable platforms.

2.3 Supported Configurations

- Up to 2 level deep switch.
- Up to 48 PCIe NVMe SSDs.

2.4 Supported PCIe NVMe SSD

Intel® Volume Management Device (Intel® VMD) Driver supports most shipping enterprise NVMe SSDs. Refer to Intel® Virtual RAID on CPU (Intel® VROC) Supported Configurations for more information.

Note: NVMe dual controller devices not supported in this release.

§§

3 Release Package Guidance

3.1 Release Package Driver Components

VMware* ESXi* 7.0U2+ Intel® Volume Management Device (Intel® VMD) Driver Component:

- **Intel-Volume-Mgmt-Device-3.5.1.1002-1OEM.700.1.0.*.zip**

VMware* ESXi* 7.0U2+ Intel® VMD/VROC and LED Management Tool Component:

- **INT-intel-vmdr-user_3.5-0.0.2274_*.zip**

VMware* ESXi* 8.0x Intel® Volume Management Device (Intel® VMD) Driver Component:

- **Intel-Volume-Mgmt-Device-3.5.1.1002-1OEM.800.1.0.*.zip**

VMware* ESXi* 8.0x Intel® VMD/VROC and LED Management Tool Component:

- **intel-vmdr-cli_3.5.0.2274-1OEM.800.1.0.*.zip**

Note: Component naming has been abbreviated.

To update or install the Intel® VMD driver, VMware* recommends using the following component installation command syntax:

```
# esxcli software component apply -d <path_to_component.zip>
```

3.2 Intel® VMD/VROC and LED Management Tool

Volume and LED management command line (CLI) version(s) are listed in Section 3.1. Versions may differ due to ESXi* version development kit requirements.

Downloads may be obtained from the following links (signed/certified releases only). For unsigned versions, contact your Intel representative. Note compatibility requirements between the tool version and the ESXi* version as listed on the download page(s):

- Intel® VMD/VROC and LED Management Tool for VMware* ESXi 7.x
- Intel® VMD/VROC and LED Management Tool for VMware* ESXi 8.x

3.3 BIOS-Integrated Intel® VMD/VROC UEFI Drivers

Note: Both UEFI drivers are required to perform enumeration and exposure of Intel® VMD-enabled attached devices in the pre-boot environment.

The following Intel® VMD/VROC UEFI drivers should be BIOS integrated for best performance:

- **`VMDVROC_1.efi`**
- **`VMDVROC_2.efi`**
- **`RCmpVROC.efi`** – Utility for verifying system compliance.

3.4 Limitations

3.4.1 VT-d Must Be Disabled When Booting to Installer

On platform CRB ArcherCity_005 with full BKC#35 with 18434556 ESXi* build, VT-d must be disabled due to a PSOD while booting to installer.

3.4.2 Immediate Reboot Required After Migrating a System Device from Pass-Thru to RAID 1 using CLI Tool in Hypervisor

A reboot is required if using the CLI tool in the hypervisor environment to migrate a bootable pass-thru (non-RAID) ESXi* hypervisor drive to a second drive, to create a RAID 1 volume. DO NOT perform any IO to the RAID 1 volume before rebooting.

3.4.3 Certain NVMe Switches Cause Intel® VMD LED Status on Other Slots to be OFF During Hot Plug

Certain switches may cause the LED Status Locate blinking state to go to *OFF* when hot plugging other NVMe devices attached to the same switch. This issue cannot be reproduced on other switches Intel® VMD has validated, however, it may occur on those not tested.

3.4.4 vSphere Hot Plug Insertion Event Tab Limitation

When hot removing an Intel® VMD-enabled NVMe SSD, and hot inserting the exact same drive, vSphere events/monitor reports a warning and the device as inaccessible. The *Event* tab does not report that the drive is re-inserted. This is not specific to NVMe but occurs with SATA devices as well. Refer to the *Devices* tab that shows when the device is re-inserted, or the **`VMKernel.log`** to validate that the hot reinserted NVMe device is correctly logged.

3.4.5 Intel® Virtual RAID on CPU (Intel® VROC) HII Menu in Pass-Thru Mode

Intel® VMD and Intel® VROC UEFI drivers are packaged together. Intel® VMD UEFI driver enumerates and assigns resources for all NVMe devices under the root port. The Intel® VROC UEFI driver exposes those devices to the system.

Due to this packaging, the devices in the UEFI HII BIOS menu will be found under the Intel® Virtual RAID on CPU (Intel® VROC) HII menu when Intel® VMD is enabled.

Intel® VROC in Pass-Thru mode is seen so that the user knows that NVMe RAID is not supported when Intel® VROC is in pass-thru mode.

§§

4 Known Issues

4.1 Known Issues in Intel® VMD Driver 3.5.0.1008

Table 4-1. Known Issues in Intel® VMD Driver 3.5.0.1008

Issue ID	Description
18027916020	[EGS-R 2S][EMR](Hot Plug) Hot plug does not work for half of slots in CRB HSBP - ESXI80GA – verifying the issue, it occurs intermittent

§§

5 Resolved Issues

Note: Issue history for Intel® Volume Management Device (Intel® VMD) Driver for VMware* ESXi*.

5.1 Resolved Issues in Intel® VMD Driver 3.5.1.1002

Table 5-1. Resolved Issues in Intel® VMD Driver 3.5.1.1002

Issue ID	Description
14020545480	[EGS-R 2S][EMR]VROC 8.5 PreOS flexible VMD cfgbar/membar MMIO memory allocation

5.2 Resolved Issues in Intel® VMD Driver 3.5.0.1008

Table 5-2. Resolved Issues in Intel® VMD Driver 3.5.0.1008

Issue ID	Description
18027757118	[EGS-R 2S][EMR](Hot Plugs) Hot plug does not work for half of slots in CRB HSBP - RHEL9.0 – Intel CRB
18027757252	[EGS-R 2S][EMR](LED Management) LEDs do not blink properly with disks connected to CRB HSBP (VMD) - RHEL9.0 – Intel CRB

5.3 Resolved Issues in Intel® VMD Driver 3.2.0.1008

Table 5-3. Resolved Issues in Intel® VMD Driver 3.2.0.1008

Issue ID	Description
16018177812	Deviation in the LED pattern during RAID background operation (rebuild, initialization, verification, and migration) with locate ON and OFF on ESXi 8.0
14017984058	When Intel® VMD is enabled, observed PSOD, P_CATERR & IERR catastrophic fault on specific customer NVMe SKUs

5.3.1 Inbox Driver Fixes Reported to Intel by VMware

- Added inbox change to stop PSA continue to retry a failed command.
- Fixed NVME Status logic if status is 0x82.

- Remove erroneous **`rp_deletedisk`** API call in **`rp_setPathLostTimer`** to allow for **`DESTOY_PATH`** by PSA layer – Fix for RAID1 Hot plug use case.
- v3.2 updated to use GA version of vSphere 8.0 NDDK.

5.4 Resolved Issues in Intel® VMD Driver 3.0.0.1038 and Prior

Table 5-4. Resolved Issues in Intel® VMD Driver 3.0.0.1038 and Prior

Issue ID	Description
18017638574	ESXi 7.0u3 - PSOD during booting to ESXi installer – fixed with BKC #35 + Latest ESXi 7.0U3
14014595452	VMD driver hotfix 2.7.1.1002 can't detect any NVMe under VMD controllers
16015870651	When system in idle state getting continuous prints of dirty flag set in Vmkernel logs
15010191131	Cedar Island_Cooper lake VMware7.0U1 OS + iavmd 2.7.0.1157 driver. When the nvme disk is hot unplugged under the system, the OS purple screen is stuck with high probability
15010773008	[ESXi 6.7 VMDR CLI 2.7-0.0.2177] missing a xml file for HPE smart component creation
14015496529	Intel SATA & NVMe SSD H:0xc error reported with iavmd 2.7 driver in ESXi
14016114981	ESXI 8.0 inbox IAVMD driver - DriverLoadUnloadWithHighMemUsage PSOD
14016115169	ESXI 8.0 Inbox IAMVD driver - Driver Load/Unload non-empty Heap PSOD
14016212688	ESXi 8.0 Inbox IAVMD driver - Mismatched metadata causing volume failure
16016097730	[VMD] Allow to create RAID1 volume with odd count drives and driver continue to perform operations on that volume then PSOD occurs
16016108261	[VMDR CLI] Help messages correction on Create RAID volume and suggest to add implement Migration command
16016104276	[EGS]Creating Raid Volume in VMDRCLI getting PSOD error with ESXI OS 7.0.u3D 19311931 Debug build
19311931	Debug build
15011454129	After NVMe hot-insert, Samsung U.3 drives do not list in VMware Client (ESXi 7.0U3d and 8.0)

Binaries Compiled with Official ESXi 8.0 DDK(s).

§§