



Intel® Virtual RAID on CPU (Intel® VROC) for Windows*

Release Notes for Intel® VROC 9.3PV

Revision 010

October 2025



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](https://www.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.

Altering clock frequency, voltage, or memory interface speeds may void any product warranties and reduce stability, security, performance, and life of the processor and other components. Intel has not validated processor running memory above Plan-Of-Record (POR) speed. DRAM/DIMM devices should support desired speed, check with DRAM/DIMM vendors for details. System manufacturers are responsible for all validation and assume the risk of any stability, security, performance, or other functional issues resulting from such alterations.

© Intel Corporation. Intel, the Intel logo, 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© 2025, Intel Corporation. All rights reserved.

Contents

| | | |
|--------|---|----|
| 1 | Introduction | 6 |
| 1.1 | Overview | 6 |
| 1.2 | Terminology | 6 |
| 1.3 | Reference OEM Platform Documentation | 8 |
| 1.4 | Supported Platforms, Chipsets and SKUs | 8 |
| 1.5 | Supported Operating Systems | 10 |
| 1.6 | Supported PCIe NVMe SSDs | 10 |
| 1.7 | Intel SSD Only VROC Upgrade Key..... | 10 |
| 2 | New Features | 11 |
| 2.1 | New Features Introduced with Intel® VROC 9.3 Release..... | 11 |
| 3 | Drivers, Images and Utilities | 12 |
| 4 | Intel® VROC Limitations..... | 14 |
| 4.1 | Cannot Delete Non-System RAID Volume Behind Intel® VMD | 14 |
| 4.2 | Microsoft .NET Framework Removal | 14 |
| 4.3 | Surprise Hot Plug Limitations..... | 14 |
| 4.4 | Expect Longer Rebuild Times for RAID 5 | 14 |
| 4.5 | Intel® VROC Command Line Interface (CLI) | 14 |
| 4.6 | Intel® VROC Trial Version Limitations | 15 |
| 4.7 | Intel® VROC PreOS UEFI Driver Uninstall Limitations | 15 |
| 4.8 | Intel® NVMe Wear Leveling Recommendations..... | 15 |
| 4.9 | Must Use F6 Install Method | 16 |
| 4.10 | Intel® C620 and C422 Series Chipset Port Limitations..... | 17 |
| 4.11 | Intel® VROC Key Removal/Upgrade Limitation | 18 |
| 4.12 | NVMe Port Assignment by Intel® VROC..... | 18 |
| 4.13 | Windows* 10 RS5 & Windows* Server 2019..... | 18 |
| 4.13.1 | Idle Power Increased..... | 18 |
| 4.13.2 | Intel® VROC Support for Windows* 10 RS5 & Windows* Server 2019 | 18 |
| 4.14 | Intel® VMD Support on 8 Socket Platforms..... | 18 |
| 4.15 | Intel® VROC SATA LED Management | 19 |
| 4.16 | Intel® VROC Creation Volume Sizes..... | 19 |
| 4.17 | MCERR/P_CATERR/Bus Uncorrectable Error with Intel® VMD Enabled | 19 |
| 4.18 | NVMe Drive Model Number Does Not Display Properly in Device Manager | 19 |
| 4.19 | Intel® VROC RAID Driver is not Producing AtaPassThru Protocol | 20 |
| 4.20 | Intel® VROC 8.0 New GUI Design..... | 20 |
| 4.20.1 | Warning Message Displayed When GUI and Driver Version is Mismatching | 20 |
| 4.21 | Intel® Virtual RAID on CPU (VROC): Intel® VROC (SATA RAID) Compatibility Issue with Microsoft Windows* Operating System Versions Released After June 2022 | 20 |
| 4.22 | RAID 5 TRIM Disabled for This Version | 20 |
| 4.23 | RAID 5 Boot or Data Volume in Rebuild State | 21 |
| 5 | Intel® VROC Issues..... | 22 |
| 5.1 | Known Issues in Intel® VROC 9.3 Release | 22 |
| 5.2 | Resolved Issues in Intel® VROC 9.3 Release..... | 23 |
| 5.3 | Resolved Issues in Intel® VROC 9.2 Release..... | 23 |



| | | |
|------|--|----|
| 5.4 | Resolved Issues in Intel® VROC 9.1 Release..... | 24 |
| 5.5 | Resolved Issues in Intel® VROC 9.0 Release..... | 24 |
| 5.6 | Resolved Issues in Intel® VROC 8.6 Release..... | 26 |
| 5.7 | Resolved Issues in Intel® VROC 8.5 Release..... | 27 |
| 5.8 | Resolved Issues in Intel® VROC 8.2 Release..... | 27 |
| 5.9 | Resolved Issues in Intel® VROC 8.0 Release..... | 30 |
| 5.10 | Resolved Issues in Intel® VROC 7.7 Release..... | 31 |
| 5.11 | Resolved Issues in Intel® VROC 7.6 Release..... | 33 |
| 5.12 | Resolved Issues in Intel® VROC 7.5 Release..... | 34 |
| 5.13 | Resolved Issues in Intel® VROC 7.0.2 Release | 35 |
| 5.14 | Resolved Issues in Intel® VROC 7.0 Release..... | 36 |
| 5.15 | Resolved Issues in Intel® VROC 6.3 Release..... | 37 |
| 5.16 | Resolved Issues in Intel® VROC 6.2 Release..... | 37 |

| | | |
|-----------|---|----|
| Table 11. | Terminology..... | 6 |
| Table 12. | Supported Platforms for Intel® VROC (VMD NVMe RAID) | 8 |
| Table 13. | Supported Chipsets for Intel® VROC (SATA RAID)..... | 9 |
| Table 31. | Components of the latest Intel® VROC Release Package | 12 |
| Table 41. | Recommended Strip Size for Intel® NVMe SSDs for Optimal Wear Leveling | 16 |
| Table 51. | Known Issues in Intel® VROC 9.2 Release..... | 22 |

Tables



Revision History

| Version | Description | Date |
|---------|--|----------------|
| 001 | Initial public release | May 2023 |
| 002 | Updated for Intel® VROC 8.2 Release | October 2023 |
| 003 | Updated for Intel® VROC 8.5 Release | November 2023 |
| 004 | Updated for Intel® VROC 8.6 Release | March 2024 |
| 005 | Updated for Intel® VROC 9.0 Release | June 2024 |
| 006 | Updated for Intel® VROC 9.0PV2 Release | October 2024 |
| 007 | Updated for Intel® VROC 9.1 Release | January 2025 |
| 008 | Updated for Intel® VROC 9.2 Release | June 2025 |
| 009 | Updated for Intel® VROC 9.2PV2 Release | September 2025 |
| 010 | Updated for Intel® VROC 9.3 Release | October 2025 |



1 Introduction

1.1 Overview

The Intel® Virtual RAID on CPU (Intel® VROC) family of products provide enterprise RAID solutions for both NVMe SSD and SATA devices for the enterprise servers, workstations, and some high-end desktops.

1. Intel® Virtual RAID on CPU (Intel® VROC) provides an enterprise RAID solution on platforms that supports Intel® Volume Management Device (Intel® VMD) on Intel® Xeon® Scalable Processors.
2. Intel® Virtual RAID on CPU (Intel® VROC) SATA RAID provides an enterprise RAID solution for SATA devices connected to all SATA controllers on the Intel® Platform Control Hub (Intel® PCH) configured for RAID.

Intel® VROC is a high-level blanket product reference for Intel® VROC (VMD NVMe RAID) and Intel® VROC (SATA RAID).

1.2 Terminology

Table 1-1. Terminology

| Term | Description |
|-------------|--|
| AHCI | Advanced Host Controller Interface |
| API | Application Programming Interface |
| ASM | Intel® Accelerated Storage Manager (Intel® ASM) |
| BIOS | Basic Input/Output System |
| GB | Gigabyte |
| GUI | Graphical User Interface |
| HII | Human Interface Infrastructure |
| Hot-Plug | The unannounced removal and insertion of a drive while the system is powered on. |
| I/O | Input/Output |
| KB | Kilobyte |
| Matrix RAID | Two independent RAID volumes within a single RAID array. |
| MB | Megabyte |



| Term | Description |
|----------------------------------|--|
| Member Disk | An NVMe drive used within a RAID array. |
| NVMe | Non-volatile Memory Express |
| OS | Operating System |
| POST | Power On Self-Test |
| PreOS | The Intel VROC images incorporated into the platform BIOS to access the drives and providing the interface to configure Intel VROC UEFI Drivers. |
| RAID | Redundant Array of Independent Disks: allows data to be distributed across multiple drives to provide data redundancy or to enhance data storage performance. |
| RAID 0 (striping) | The data in the RAID volume is striped across the array's members. Striping divides data into units and distributes those units across the members without creating data redundancy but improving read/write performance. |
| RAID 1 (mirroring) | The data in the RAID volume is mirrored across the RAID array's members. Mirroring is the term used to describe the key feature of RAID 1, which writes duplicate data from one drive to another; therefore, creating data redundancy and increasing fault tolerance. |
| RAID 5 (striping with parity) | The data in the RAID volume and parity are striped across the array's members. Parity information is written with the data in a rotating sequence across the members of the array. This RAID level is a preferred configuration for efficiency, fault-tolerance, and performance. |
| RAID 10 (striping and mirroring) | The RAID level where information is striped across two drive arrays for system performance. Each of the drive in the array has a mirror for fault tolerance. RAID 10 provides the performance benefits of RAID 0 and the redundancy of RAID 1. However, it requires four hard drives so it's the least cost effective. |
| RAID Array | A logical grouping of physical drives. |
| RAID Volume | A fixed amount of space across a RAID array that appears as a single physical drive to the operating system. Each RAID volume is created with a specific RAID level to provide data redundancy or to enhance data storage performance. |
| RDC | The Resource & Documentation Center (RDC) is a section of Intel's Developer Zone where users can find technical collateral, software, tools, and other developer resources. Within the RDC, content is organized into collections based on topic, tool, product, or platform. |
| Spare | The drive that is the designated target drive in a RAID Volume recovery. The Spare drive is a global setting (not designated to a specific RAID volume). Spare drives on a SATA Controller are not available on the sSATA Controller (and visa-versa). Spare drives designated on Intel VROC (VMD NVMe RAID) are exposed and available on all Intel VMD domains. |

| Term | Description |
|-------------|---|
| Strip | The size of the data block that is to be written in each write cycle across the RAID array. |
| Stripe | Block size that is assigned to evenly distribute portions of the stripe across a designated number of drives within a RAID array. A collection of Strips is called a Stripe |
| Intel® RSTe | Intel® Rapid Storage Technology enterprise. |
| RWH | RAID Write Hole |
| SSD | Solid State Drive |
| TB | Terabyte |
| UEFI Mode | <i>Unified Extensible Firmware Interface</i> . Refers to the system setting in the BIOS |
| Intel® VMD | Intel® Volume Management Device |
| Intel® VROC | Intel® Virtual RAID on CPU |
| PEI | Pre-EFI Initialization |

1.3 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.

1.4 Supported Platforms, Chipsets and SKUs

The Intel® VROC package was designed to work on customer platforms that are based on the following Intel reference platforms:

Table 1-2. Supported Platforms for Intel® VROC (VMD NVMe RAID)

| CPU | Platform | VMD 1.0 Device ID | VMD 2.0/3.0/4.0 Device ID | # Of VMD |
|---|--|-------------------|---------------------------|-----------|
| Intel® Xeon® Scalable Processor Family – W | Intel® Xeon® Scalable Processor family workstation† | 201D | N/A | 3 per CPU |
| Intel® Xeon® Scalable Processor Family – SP | Intel® Xeon® Scalable Processor family server and workstation† | 201D | 28C0 | 4 per CPU |



| CPU | Platform | VMD 1.0 Device ID | VMD 2.0/3.0/4.0 Device ID | # Of VMD |
|---|--|-------------------|---------------------------|--|
| Intel® Xeon® Processor D Product Family | Intel® Xeon® Processor D Product Family based platform† | 201D | 28C0 | 3 per CPU |
| Intel® Xeon® Processor Scalable Memory Family | Intel® Xeon® Scalable Processor family server and workstation† | 201D | 28C0 | 3 per CPU (VMD 1.0) 4 per CPU / 1 for PCH (VMD 2.0/3.0/4.0) |
| Intel® X299 High End Desktop | Intel® Xeon® Scalable Processor family server and workstation† | 201D | N/A | 3 per CPU |

† Unless otherwise specified in the Release Notes.

Note: Intel® VROC (VMD NVMe RAID) support on the Intel® X299 High End Desktop platforms is restricted to Intel® NVMe SSDs only. This is a platform limitation. As a result, when Intel® VROC is installed onto an Intel® X299 High End Desktop platform, the customer will only see Intel® NVMe SSDs plugged into the platform.

Note: Intel® VROC (Non-VMD NVMe RAID) is no longer included in the Intel® VROC package. If support for this product is required refer to the Intel® VROC 7.x based family of products.

Table 1-3. Supported Chipsets for Intel® VROC (SATA RAID)

| Chipset | Platform | RAID controller Device ID | # Of Ports |
|----------------------------|--|-----------------------------|-------------------|
| Intel® C610 series chipset | Platforms containing the Intel® C610 series chipset† | 2826 (SATA) 2827 (sSATA) | 6 SATA 4 sSATA |
| Intel® C610 series chipset | Platforms Refreshes containing the Intel® C610 series chipset† | 2826 (SATA) 2827 (sSATA) | 8 SATA 6 sSATA |
| Intel® C220 series chipset | Platforms containing the Intel® C220 series chipset† | 2826 (SATA) | 6 SATA |
| Intel® C230 series chipset | Platforms containing the Intel® C230 series chipset Platform† | 2826 (SATA) | 8 SATA |
| Intel® C240 series chipset | Platforms containing the Intel® C240 Series Chipset† | 2826 (SATA) | 8 SATA |
| Intel® C620 series chipset | Platforms containing the Intel® 620 series chipset† | 2826 (SATA) 2827 (sSATA) | 8 SATA 6 sSATA |
| Intel® C422 series chipset | Platforms containing the Intel® C422 series chipset† | 2826 (SATA) | 8 SATA |



您想要在此處顯示的文字。

錯誤! 使用 [常用] 索引標籤將 Heading 1 套用到

| | | | |
|----------------------------|--|---|------------------------------|
| Intel® C741 series chipset | Platforms containing the Intel® C741 series chipset† | 2826 (SATA) 2827 (sSATA) 282F (tSATA) | 8 SATA 6 sSATA 6 tSATA |
|----------------------------|--|---|------------------------------|

† Unless otherwise specified in the Release Notes.

1.5 Supported Operating Systems

Please navigate to the following link to view the latest support matrix for operating systems with Intel® VROC. [Intel® Virtual RAID on CPU \(Intel® VROC\) Operating Systems Support List](#)

1.6 Supported PCIe NVMe SSDs

All shipping Intel® NVMe SSDs are supported by the latest version of Intel® VROC, except dual port NVMe SSDs. For the latest list of supported Non-Intel PCIe NVMe SSDs, refer to [Intel® Virtual RAID on CPU \(Intel® VROC\) Supported Configurations](#).

Platform providers are now allowed to self-validate their own list of NVMe SSDs for use with Intel® VROC (VMD NVMe RAID). For more details, contact your platform provider.

1.7 Intel SSD Only VROC Upgrade Key

Intel SSD Only keys will no longer be supported on new platforms starting with 4th Gen Intel® Xeon® Scalable Processors based platforms. This feature has not been disabled due to legacy platform support. Any issues against 4th Gen Intel® Xeon® Scalable Processors based platforms using *Intel SSD Only* keys will not be supported.

§§



2 *New Features*

2.1 **New Features Introduced with Intel® VROC 9.3 Release**

Review the [Intel® Virtual RAID on CPU \(Intel® VROC\) Technical Product Specification for Windows*](#) for the details on the latest features and updates.

Note: These new features will not be addressed in this version of the Release Notes.

§§

3 Drivers, Images and Utilities

The latest Intel® VROC release package is constructed of several components. The following is the list of those components and their corresponding version numbers.

Note: Due to the components being different entities (but are required for the product to work properly), the component version number may not match and will be different from the package version number.

The number convention has also changed starting in VROC Version 9.3 PV, please see the TPS for more details.

Table 3-1. Components of the latest Intel® VROC Release Package

| Feature | Notes |
|--|--|
| Intel® UEFI Drivers | <ul style="list-style-type: none"> Intel® VROC UEFI Driver version 9.3.0.1132 <ul style="list-style-type: none"> VMDVROC_1.efi (HW key enforcement in effect) Intel® VMD UEFI version 4.1.0.10009 <ul style="list-style-type: none"> VMDVROC_2.efi <p>Note: All these images are required and intended to support Intel® VMD and Intel® VROC (SATA RAID) functionality as a combined installed package.</p> <ul style="list-style-type: none"> Intel® VROC (SATA RAID) SATA / sSATA UEFI Driver version 9.3.0.10034 <ul style="list-style-type: none"> SataDriver.efi sSataDriver.efi |
| Intel® VROC Windows* Drivers | <ul style="list-style-type: none"> Intel® VROC Windows* GUI version 9.3.0.10037 Intel® VROC Windows* Installer Package version 9.1 - 9.1.5.0 - UI ver VROC_9.3.0.10034 <ul style="list-style-type: none"> SetupVROC.exe (Multi-lingual) Intel® VROC (VMD NVMe RAID) Windows F6 Driver version 9.3.0.10034 Win10 Intel® VROC CLI version 9.3.0.10034 |
| UEFI Based RAID Configuration Utility | <ul style="list-style-type: none"> Intel® VROC version 9.3.0.1132 Intel® VROC SATA / sSATA version 9.3.0.10034 <p>Note: Secure Boot must be disabled to use this tool.</p> |
| UEFI Based Comply Utility | <ul style="list-style-type: none"> Intel® VROC version 9.3.0.1132 Intel® VROC SATA / sSATA version 9.3.0.10034 <p>Note: Secure Boot must be disabled to use this tool.</p> |
| UEFI based SATA SGPIO/LED Test utility | <ul style="list-style-type: none"> Intel® VROC SATA / sSATA version 9.3.0.10034 <p>Note: Secure Boot must be disabled to use this tool.</p> |
| UEFI based Intel® VROC LED Test utility | <ul style="list-style-type: none"> Intel® VROC version 9.3.0.1132 <p>Note: This tool can be used to exercise LEDs for NVMe disks behind VMD.</p> |
| UEFI Based Clear Metadata Utility | <ul style="list-style-type: none"> Intel® VROC SATA / sSATA version 9.3.0.10034 |

錯誤! 使用 [常用] 索引標籤將 *Heading 1* 套用到您想要在此處顯示的文字。



§§

4 **Intel® VROC Limitations**

4.1 **Cannot Delete Non-System RAID Volume Behind Intel® VMD**

When a RAID volume is created with a drive that has an operating system on it (the system drive) and then migration is in progress, if a separate RAID volume is created shortly after, this new non-system RAID volume cannot be deleted within the Intel® VROC GUI or CLI tool. The user who attempts to do so will be greeted with an error pop-up in the Intel® VROC GUI or an error message: *Request is formatted correctly but failed to execute*, within the CLI tool.

4.2 **Microsoft .NET Framework Removal**

The Intel® VROC product installation application does not include Microsoft .NET Framework. Visit Microsoft to download the latest version. Intel® VROC installation may not complete successfully without this feature.

4.3 **Surprise Hot Plug Limitations**

Due to Microsoft Windows* time restrictions for resuming from S3 and S4, and Intel® VMD device identification requirements, Hot Plug of Intel® VMD enabled NVMe devices is not supported during S3 and S4 states.

Surprise removal of multiple NVMe SSDs at one time are not supported. The user must wait until a device is reflected as removed/inserted in device manager for spacing surprise hot plug of Intel® VMD enabled PCIe NVMe SSDs in Microsoft Windows*.

Due to these limitations, Intel strongly discourages performing Hot Plugs during an S3 power state change.

4.4 **Expect Longer Rebuild Times for RAID 5**

On a RAID 5 volume, disk cache is being turned off when a volume is degraded. Due to this, the rebuilding times have increased expectedly until the rebuild is completed, and disk cache is enabled again.

This extends to drives being added to a RAID 5 volume as well.

4.5 **Intel® VROC Command Line Interface (CLI)**

The Intel® VROC Command Line Interface (CLI) does not support the RAID volume name beginning with blank space.

4.6 Intel® VROC Trial Version Limitations

Note: While it's possible to use bootable RAID volumes, it is highly recommended to use only data RAID volumes during the trial period. Having the operating system in a bootable RAID volume may cause users to be locked out completely from their system if the trial period runs out.

Note: During trial period, it's highly recommended to use data RAID volumes on same make/model of NVMe devices. This is the suggested configuration leading to less potential issues, although it's possible to create volumes with different make/model drives.

Once an Intel® VROC upgrade key has been inserted into the system, the trial version is concluded. Removing the upgrade key does not re-enable the trial version. As a result, any existing RAID volumes present while the upgrade key was installed, won't be seen and could be in an unknown state.

When creating a RAID volume using the trial version, don't mix SSD NVMe vendors. Mixing vendors may result in unexpected behavior.

4.7 Intel® VROC PreOS UEFI Driver Uninstall Limitations

The Intel® VROC UEFI RAID drivers comply with the UEFI Specifications for PCI Driver Model for PCI Device Drivers (Section 13.3.3) and may return the status code "access denied" from the **UninstallProtocolInterface** routine from boot services (spec. 6.3). This is expected behavior.

4.8 Intel® NVMe Wear Leveling Recommendations

NVMe SSD Wear Leveling refers to techniques used to prolong the service life of NVMe drives. This section outlines the recommended configurations (number of drives vs strip size) to maximize Wear Leveling on Intel NVMe SSDs when configured as part of RAID 5 volume. When creating an Intel® VROC (VMD NVMe RAID) RAID 5 volume, several configuration parameters can be selected, and the number of drives used along with the strip size chosen can have an impact on the wear leveling. The following table outlines the different options for number of drives vs strip size to achieve the optimal wear leveling on Intel® NVMe SSDs.

Table 4-1. Recommended Strip Size for Intel® NVMe SSDs for Optimal Wear Leveling

| Strip Size Drives | 4 | 8 | 16 | 32 | 64 | 128 |
|----------------------|---------|---------|------------|------------|------------|------------|
| 3 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 4 | Optimal | Optimal | Optimal | Optimal | Suboptimal | Suboptimal |
| 5 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 6 | Optimal | Optimal | Optimal | Optimal | Optimal | Suboptimal |
| 7 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 8 | Optimal | Optimal | Optimal | Suboptimal | Suboptimal | Suboptimal |
| 9 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 10 | Optimal | Optimal | Optimal | Optimal | Optimal | Suboptimal |
| 11 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 12 | Optimal | Optimal | Optimal | Optimal | Suboptimal | Suboptimal |
| 13 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 14 | Optimal | Optimal | Optimal | Optimal | Optimal | Suboptimal |
| 15 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 16 | Optimal | Optimal | Suboptimal | Suboptimal | Suboptimal | Suboptimal |
| 17 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 18 | Optimal | Optimal | Optimal | Optimal | Optimal | Suboptimal |
| 19 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 20 | Optimal | Optimal | Optimal | Optimal | Suboptimal | Suboptimal |
| 21 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 22 | Optimal | Optimal | Optimal | Optimal | Optimal | Suboptimal |
| 23 | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| 24 | Optimal | Optimal | Optimal | Suboptimal | Suboptimal | Suboptimal |

Note: It is left to the customer to determine the most effective combination of parameters (number of drives vs strip size) to achieve their desired performance goals, usage models and drive endurance.

Note: If a RAID volume is being migrated to RAID 5 (or a new RAID 5 volume is being created), the strip size chosen should be based off the most optimal performance as defined in the above table.

4.9 Must Use F6 Install Method

The use of the included Intel® VROC F6 drivers are required to install an OS onto an Intel® VROC managed device(s). There is no Microsoft inbox driver that supports Intel® VROC 8.0.



The supported Microsoft operating systems for this product include inbox drivers that support the Intel® C620, C422 and C741 series chipset Platform Controller Hub (PCH) when configured for RAID mode. It is strongly recommended that the Intel® VROC (SATA RAID) F6 drivers included in this release are used instead of the available Microsoft inbox driver. The provided inbox driver is intended only for those customers who may not have the Intel® VROC (SATA RAID) F6 drivers readily available and **ONLY** for installing to a single drive (NOT to a RAID volume). Once the OS is installed, it is required for proper Intel® VROC support that the Intel® VROC 8.0 installer package is installed immediately. At that point, it will be safe to migrate the SATA system disk into a RAID volume (using the Intel® VROC GUI).

4.10 Intel® C620 and C422 Series Chipset Port Limitations

This limitation is in reference to platforms having a PCH that supports more than 6 SATA ports. The Intel® C620 and C422 series chipset SATA controller supports 8 SATA ports. As referenced above, the Microsoft Windows* operating systems that contain the inbox drivers for the Intel® C620 and C422 series chipset Platform Controller Hub (PCH) when configured for RAID mode, only support 6 ports. Drives on ports 7 and/or 8 are not enumerated. For this reason, Intel recommends not using these 2 ports as part of the Windows* OS boot installation (as a pass-thru drive or as part of a RAID volume). However, if you do need to use these ports as part of your Windows* boot volume, the steps below can be used as a workaround.

Note: You will need a USB drive with the Intel® VROC IntelVROCCLI.exe utility.

Step 1: After you have created the desired RAID volume that includes ports 7 and/or 8 (which you intend to use as your Windows* boot volume) in the PreOS environment, begin the Windows* installation process. **Make note of the RAID volume name.**

Step 2: Navigate to the Windows* disk selection window. At this point, select the *Load Driver* button and install the Intel® VROC F6 driver (included in this package).

Step 3: Attempt to continue installing the Windows* OS onto the RAID volume. If the installation process does not continue, this error has been encountered.

Step 4: Press F10 to invoke a CMD window.

Step 5: If you have not already done so, insert the USB drive into the system. Navigate to your USB drive with the RSTCLI.exe utility.

Step 6: Run command: **IntelVROCCLI.exe --manage --normal-volume <volumeName>**

Step 7: This will reset the volume to a normal state.

Step 8: Close the CMD window.

Step 9: In the Windows* disk selection window, reload the Intel® VROC F6 driver.

Step 10: Once completed, Windows* should allow the installation on the RAID volume.

4.11 Intel® VROC Key Removal/Upgrade Limitation

With Microsoft Windows* 10 and Windows* 11, *Fast Startup* is enabled by default. Disable *Fast Startup* prior to removing/upgrading the Intel® VROC hardware key, or alternatively, perform a complete reboot when removing/inserting a Intel® VROC hardware key when *Fast Startup* is enabled.

4.12 NVMe Port Assignment by Intel® VROC

In Windows* and UEFI, the port number shown in the Intel® VROC interfaces depends on the disk enumeration order by the Intel® VMD-enabled NVMe driver, which can be different on each platform. The port numbers shown does not reflect the physical PCIe slot. After each hot plug, there is an enumeration process which is NOT fixed.

4.13 Windows* 10 RS5 & Windows* Server 2019

4.13.1 Idle Power Increased

Installing Intel® VROC 8.0 onto a platform running Windows* 10 RS5, in Windows* and UEFI, the port number shown in the Intel® VROC interfaces depends on the disk enumeration order by the Intel® VMD-enabled NVMe driver, which can be different on each platform. The port numbers shown does not reflect the physical PCIe slot. After each hot plug, there is an enumeration process which is NOT fixed.

4.13.2 Intel® VROC Support for Windows* 10 RS5 & Windows* Server 2019

Intel® RSTe 5.5.0.2013 introduces support for Windows* 10 RS5 and Windows* Server 2019.

Note: There is a known issue trying to install Windows* 10 RS5 or Windows* Server 2019. Installing Windows* 10 RS5 or Windows* Server 2019 onto an Intel® VMD managed device is limited to a single CPU. For more information, see the *Known Issues* section in this document.

Note: This limitation only applies to Intel® RSTe 5.5 and earlier releases. Intel® VROC 6.x and newer are not impacted.

4.14 Intel® VMD Support on 8 Socket Platforms

Due to restrictions on NVM Express implementations that reside behind PCI compliant bridges, address space is limited to 32 bit assigned base address registers (for non-prefetchable memory). This means that there is only 4 Gigabytes of addressable (non-prefetchable) memory space available. This memory space must be shared between the entire platform. As a result, there is a limitation on the number of Intel® VMD controllers that can be enabled (due to these resource constraints). The following two configurations can be used without encountering memory restriction errors:



1. Three Intel® VMDs can be enabled on CPU0 up to CPU6. Intel® VMDs on CPU7 need to remain disabled. This results in a maximum of 21 Intel® VMDs that can be enabled in this configuration.
2. No more than two Intel® VMDs can be enabled on each CPU in an 8-socket platform. This results in a total of 16 Intel® VMD domains.

Note: This limitation does not apply to 1, 2 or 4 socket platforms.

4.15 Intel® VROC SATA LED Management

When designing a Hot Swap Backplane (HSBP) into a new platform, make sure that the backplane design supports the platform's external design document specification for HSBP support.

The sSATA controller on the Intel® Cooper City and Wilson City Customer Reference Boards (CRBs) have very limited support for using and/or testing backplane management. Make sure to review all Intel® Cooper City or Wilson City CRB design documentation to understand how the sSATA controller is laid out.

4.16 Intel® VROC Creation Volume Sizes

When creating a RAID volume, there will be a volume size difference seen when comparing a RAID volume created using the Intel® VROC PreOS HII environment and volumes created in the OS. This has to do with the way the size information is displayed and computed between the two environments.

4.17 MCERR/P_CATERR/Bus Uncorrectable Error with Intel® VMD Enabled

When CTO occurs, Intel® VMD must be chosen to handle these conditions when the root port of the Intel® VMD controller is enabled. This is accomplished by disabling IOMCA on the x16 Intel® VMD enabled lanes.

4.18 NVMe Drive Model Number Does Not Display Properly in Device Manager

The NVMe device name in Device Manager is created by Microsoft. Within Device Manager, the model number of NVMe devices may not be completely displayed once Intel® VMD is enabled. A workaround with a new parameter in `UnitControl`, `ScsiUnitRichDescription` to show all model number in the device name. The workaround can only solve the problem when the drives have the same model number but different sizes.

4.19 Intel® VROC RAID Driver is not Producing AtaPassThru Protocol

When using **AtaPassThru** protocol to get information on attached devices from the Intel® VROC PreOS, the value of **GetNextTargetLun** may not be successful. A workaround is to set the value of the "Timeout" field inside "Packet" to a larger value (e.g., 3 seconds).

4.20 Intel® VROC 8.0 New GUI Design

4.20.1 Warning Message Displayed When GUI and Driver Version is Mismatching

When this warning message condition is detected from one major version or two minor versions difference, the Intel® VROC GUI will not allow to manage the storage controller but can provide a set of functionalities corresponding to the lowest driver version. The Intel® VROC GUI still can start even if there is no driver installed.

4.21 Intel® Virtual RAID on CPU (VROC): Intel® VROC (SATA RAID) Compatibility Issue with Microsoft Windows* Operating System Versions Released After June 2022

Beginning with Microsoft Windows* 11 SV2 release timeframe, Microsoft has implemented a correctness fix to address a potential race condition that could result in a system failure (bugcheck). The issue corrected was in the device PnP removal process. This correctness fix has been backported to Microsoft Windows* 11 SV from 2021.10C, Windows* Server 2022 from 2021.08C and Windows* 10 22H2. As a result of this Microsoft correction, one of the Windows inbox RAID drivers; the Intel® Rapid Storage Technology (Intel® RST) driver now fails the device PnP removal process. This process failure blocks the Intel® RST driver from being properly removed. As a result, a replacement driver cannot be installed. Long-term solutions to resolve this issue has been brought up to Microsoft to enact corrective measures.

4.22 RAID 5 TRIM Disabled for This Version

A potential silent data loss/corruption condition exists in all Intel® Rapid Storage Technology enterprise (Intel® RSTe) Windows* drivers, beginning with version 5.4.0.1465, as well as all Intel® Virtual RAID on CPU (Intel® VROC) Windows* driver versions (until Intel® VROC 7.x). This potential silent data loss/corruption condition occurs on Intel® VROC managed RAID 5 volumes, consisting of at least one SSD that supports TRIM/UNMAP commands, by methods other than the use of zeros.



4.23 RAID 5 Boot or Data Volume in Rebuild State

A potential silent data loss/corruption condition (SDC) exists in all Intel® Virtual RAID on CPU (Intel® VROC) Windows* driver versions beginning with the release package version 7.0.0.2291. The issue has been root caused to a very small timing window where a particular sequence of event occurs. A customer may be exposed to this SDC condition when all the following conditions have been met:

- The platform is configured with a RAID 5 volume, and it is in a Rebuild state.
- The platform is under very heavy I/O.
- The I/O operation generates a WRITE operation to a RAID volume stripe that is not being rebuilt yet.
- The I/O operation generates a READ operation to the RAID volume, in which the READ address range overlaps with two stripes: the stripe that is being rebuilt, and the next stripe that has yet to be rebuild.

If these conditions have been encountered in an operational environment, the platform may encounter the SDC condition.

Intel strongly recommends that customers, who may be exposed to this silent data loss condition, immediately update to the Intel® VROC 8.2 release package version.



5 Intel® VROC Issues

This chapter outlines the issues reported and internally found that customers need to be aware of. The issues are broken down into known issues and resolved issues.

5.1 Known Issues in Intel® VROC 9.3 Release

Table 5-1. Known Issues in Intel® VROC 9.3 Release

| Issue ID | Description |
|--------------------|---|
| 14015389340 | When using AtaPassThru protocol to get information on attached devices from the Intel® VROC PreOS, the value of GetNextTargetLun may not be successful. |
| 18015334984 | Warning Message "Warning: The AHCI driver will be updated to the latest Microsoft AHCI driver in the system" does not occur when installing Intel® VROC in AHCI Mode using installer. |
| 18020541368 | While within SED Manager, unencrypted drives that are unplugged and then are selected to have a security key to be setup may experience a platform hang. |
| 15010088464 | When SATA controller is switched to RAID mode, SATA drive information will be displayed in Intel® VROC SATA HII instead. So, user can reference the device information in Intel® VROC SATA HII. |
| 18016767645 | Within Intel® VROC SED Manager, a physical drive may appear in twice. |
| 15011986293 | When booting the platform with a degraded Intel® VROC RAID 1 data volume, the Intel® VROC 8.0 GUI may not properly display the RAID volume. |
| 18012869559 | Intel® VROC GUI And CLI may not forbid performing operations that use self-encrypting drives in locked state. Creating RAID volume with locked member may result in failed volume state. |
| 18022812016 | When the OS performs a TRIM command onto an Intel® VROC RAID 1 or RAID 10 comprised of drives that perform TRIM activities in different ways may encounter a data inconsistency on those areas that had been TRIMed. |
| 15012192390 | Intel® VROC SATA HDD may have a problem unlocking after sending the 0xf2 command. |
| 15013821671 | Windows GUI did not show "rebuilding" event as disk hot-plug and inserted when RAID member only 100 MB. |
| 18029487344 | Intel® VROC OS interfaces (Windows* GUI CLI, Linux* <i>mdadm</i> , Linux*/Windows* OOB) may not forbid performing operations that use self-encrypting drives in locked/foreign state. RAID volume operations with locked / foreign device will be failed (e.g. RAID volume creation will be failed). |
| 18040635664 | There is a possibility that certain platforms may not reboot as expected after product installation using "-s -b" parameters during the GUI installation process. |
| 18037794909 | The installation may unexpectedly start with flag -ver and additional parameters during the VROC GUI installation process. |
| 15016690395 | Customers running Intel® VROC under a Microsoft Windows* environment, using Gen5 NVMe SSDs, may not see the expected performance benefits when running in a RAID 0 configuration. Customers generally utilize a RAID 0 configuration to achieve (and expect to see) a linear scaling of the aggregate bandwidth of the RAID |

| Issue ID | Description |
|--------------------|--|
| | member drives. Running in this configuration, customers may see approximately 60% of that value. |
| 15017580021 | Due to potential changes made by Microsoft in the new Windows installer introduced with Windows 2025, there is a possibility issue where the VROC NVMe RAID volume may not be recognized after loading the F6 driver during the Windows 2025 OS installation. This issue can occur with any Windows 2025 build, regardless of the VROC driver version or the specific version of Windows 2025. The current workaround is to click "Refresh" five to ten seconds after initially loading the VROC driver. |

5.2 Resolved Issues in Intel® VROC 9.3 Release

Table 53. Resolved Issues in Intel® VROC 9.3 Release

| Issue ID | Description |
|--------------------|--|
| 15018073505 | Post sleep cycle during re-enumeration may take longer than expected for certain drives to enumerate. |
| 14024524599 | Potential for when a standard or premium VROC hardware keys to show in "pass-thru" mode. |
| 14025503954 | Locating a drive within the BIOS' HII menu may result in abnormal LED patterns such as continual blinking even though the "locate LED" functionality was turned off. |

5.3 Resolved Issues in Intel® VROC 9.2 Release

Table 54. Resolved Issues in Intel® VROC 9.2 Release

| Issue ID | Description |
|--------------------|---|
| 18041258961 | RAID volume may fail or become degraded after upgrading the Intel VROC driver to Intel VROC 9.0 PV or 9.1 PV from previous versions. |
| 18042389059 | While utilizing 8.5 .inf drivers, there is a possibility that marking failed RAID volumes cannot be set back to "Normal" status |
| 15017205347 | It is possible that memory.dmp files cannot be acquired after a BSOD while utilizing 9.0 VROC driver versions with Windows 2019. |
| 15017516420 | There may be a inconsistent initialized status shown between the VROC GUI and OOB Redfish for RAID Volumes in environments using Windows OS versions. |
| 15017603758 | VMD device handle may return as "NULL" for a RAID member drive when using the VROC UEFI 9.1 PV driver. |

| | |
|--------------------|--|
| 18041189847 | The amber LED functionality may not work as expected with the potential of turning on a different disk after a hot insert. |
| 18041224723 | While using the RCmp tool, there may be a possibility that the correct VMD device ID will be displayed. |
| 14022651991 | Under extreme heavy workloads, customers using Microsoft Windows Server 2019, 2022, and 2025 may experience blue screens and potential system resets when operating DATA RAID 5 configurations |
| 15018053391 | The VROC 9.2 PV1 encoding may not be categorized consistently as legacy releases within .inf files, which may result in incomplete VROC driver installation in multi-language environments. |
| 18038817102 | A potential undesired prompt requesting administrator credentials may appear when attempting to open the VROC GUI application if the user is logged in without administrator rights. |
| 14024524599 | There is a possibility that low power mode may result in the system to not detect the VROC Key properly when SATA RAID is disabled. |

5.4 Resolved Issues in Intel® VROC 9.1 Release

Table 5-5. Resolved Issues in Intel® VROC 9.1 Release

| Issue ID | Description |
|--------------------|--|
| 14020231660 | A BSOD may have occurred when installing a chipset driver with a TBT4 configuration. |
| 18038349933 | An incorrect output may have been displayed in the CLI while using an account without admin privileges. |
| 18038544179 | In some Intel VROC interfaces, the default RAID volume name is proposed in the format VrocVolumeX, e.g. VrocVolume0. In Intel VROC OOB and in Intel VROC Windows GUI: Volume_XXXX, e.g. Volume_0000. In this latest change the new display will be in the following format: VrocVolumeXXX. |
| 18034442524 | Unlocked Opal drive is present alongside with hot plugged non-opal drives in OS in which the RAID volume rebuild may not be blocked and hot-inserted device detection may be failed. |

5.5 Resolved Issues in Intel® VROC 9.0 Release

Table 5-6. Resolved Issues in Intel® VROC 9.0 Release

| Issue ID | Description |
|--------------------|--|
| 15014712764 | A RAID 10 volume rebuild may fail while VROC was in use with a NVME drive with Windows OOB Driver. |



| | |
|--------------------|---|
| 18036862050 | A variable may be read too early in the boot process by VROC UEFI SATA DXE drivers which may result in a Red Screen of Death (RSOD) |
| 15015886092 | A CPU exception affecting an unsupported configuration cause a BIOS boot hang when SATA RAID is enabled on two Montage IOH devices. |
| 18037206458 | A potential error may occur when changing RWH policy of encrypted RAID with using unencrypted drive. |
| 18037206493 | RAID creation with using locked drive may not have been blocked in UEFI HII Menu. |
| 18037985742 | A disk should be in normal state after a hot plug action is committed and the volume after migration should be in normal state. There was a possibility that instead the disk could be marked as missing, and volume could be degraded after migration. |
| 15016194073 | Consistency checks may initiate with a bad request while the NVMe drives that are in a RAID0 configuration. |
| 15016259559 | SATA drive Port information, such as the location, may be displayed Incorrectly in the Intel VROC GUI Platform Drives menu. |
| 14023391263 | NVMe drive Port information, such as the location, may be displayed Incorrectly in the Intel VROC GUI Platform Drives menu. |
| 18033481077 | Renaming a VROC volume with background initialization may return with an internal error on Windows. |

5.6 Resolved Issues in Intel® VROC 8.6 Release

Table 57. Resolved Issues in Intel® VROC 8.6 Release

| Issue ID | Description |
|--------------------|---|
| 18033787199 | Renaming a RAID volume with background initialization may return internal error on Windows*. |
| 18035022296 | Changed the library for unit tests to further enhance security and deter vulnerability concerns. |
| 18035042739 | --xm1 IntelVROCCLI.exe option from the CLI tool has been adjusted to work properly in the current release Intel® VROC 8.6 version. |
| 18035044826 | The incorrect value for SKU property for <i>RAID1 Only</i> license may have been displayed. |
| 18035522716 | UI includes .NET 7.0.0. |
| 15014353528 | The Intel® VROC driver might have hung due to the heavy IO workload on RAID 5 configurations. |
| 15014353528 | The Intel® VROC installer could possibly have shown an empty list of used third party software. |
| 18035464333 | Intel® VROC could be installed on unsupported platform. |
| 18037097526 | The Intel® VROC installer could put important files in the unprotected temporary directory of the current user. |
| 18037125636 | Intel® VROC OS interfaces (Windows* GUI CLI, Linux* <i>mdadm</i> , Linux*/Windows* OOB) may not forbid performing operations on hot-inserted self-encrypting drives in locked/foreign state. RAID volume hot-plug related operations with locked/foreign device will be failed (e.g. RAID volume rebuild may not be blocked, hot-inserted device detection will be failed). |

| Issue ID | Description |
|--------------------|--|
| 18030259585 | State of drive resource for locked Opal drive is enabled where it should be <i>StandbyOffline</i> in which the RAID volume rebuild may not be blocked and hot-inserted device detection may be failed. |
| Issue ID | Description |
| 18032276087 | Windows* agent may not respond after sending volume creation volume with 16 characters. |
| 15014295238 | Operation property may not show ongoing rebuild process. |
| 15014373112 | Some volume parameters provided during volume creation may be considered mandatory when they should have been optional. |
| 18033850568 | Awhile adding a disk, it may not be added to the existing RAID 0, and an Internal error message may also be returned. |
| 18031201791 | CLI may return wrong error message after stripe size change in RAID 0. |
| 18031659741 | The placeholder may have had incorrectly stored information. |
| 18033689418 | Data could be corrupted on RAID 5 under specific conditions. This has been addressed in a technical advisory that can be provided by Intel. |
| 18033876218 | The trial notification at the start of the trial may display 0 days instead of 90. |
| 18024185962 | A RAID volume may become degraded after the Initialization process completes, if two of the drives encounter a Bad Block condition in the same sector. |

5.7 Resolved Issues in Intel® VROC 8.5 Release

Table 58. Resolved Issues in Intel® VROC 8.5 Release

5.8 Resolved Issues in Intel® VROC 8.2 Release

Table 59. Resolved Issues in Intel® VROC 8.2 Release

| Issue ID | Description |
|--------------------|---|
| 15012341358 | Wrong chipset number may be displayed incorrectly in the Intel® VROC GUI summary page. |
| 15012745887 | With the Micron M.2 SSD, there may be a disk error in which BurnIn test:Test file could not be created. |
| 18025836360 | With a SATA RAID 5, there may be an OS System Hang 72 during the period when a system enters into S4 hibernate state. |

| Issue ID | Description |
|--------------------|---|
| 15012158141 | Enable Intel® VMD may increase boot time by 15 sec without a hardware key plugged in. |
| 15012744995 | Page-Fault Exception may occur while calling EfiNvmExpressPassThru to send EnableBlock SID command after hot remove a NVMe SSD behind Intel® VMD. |
| 18023073780 | Migrating volume to another level may be impossible when user changes the name of volume. |
| 18022000029 | <i>VolumeDegraded</i> and <i>DriveRemoved</i> events may not be detected after unplugging volume member. |
| 18027972005 | The LED behavior between Linux*, Windows* and HII has been unified. It is now possible to turn off the LED manually in Windows*. |
| 18030599433 | Secure erase feature for NVMe has been added. |
| 13010941224 | When creating volume with 16-character name, the last character was being cut. |
| 14019194649 | Missing disk used to have ID 0-255-0-0 after reboot. |
| 15012777627 | Event ID 4155 regarding CD/DVD rom used to show invalid serial number of the device. |
| 15012986924 | The SATA RAID 1 rebuild speed was slower than expected which was fixed from very slow rebuild speeds from baseline, to what it should be at. |
| 15013305559 | Error events used to appear while activating OOB agent with Intel® VMD disabled. |
| 15013356966 | After hot-unplug of RAID member, clear metadata with another platform and re-plug back, disk usage is displayed incorrectly. |
| 15013452250 | Disk usage is displayed as unknown, after creating RAID, deleting it, rebooting, setting disks to non-RAID, and checking usage in UI. |
| 15013631093 | Confusing message used to appear after RAID member hot unplug, and plug back in. |
| 18025145965 | Under specific circumstances journaling drive may be in incorrect state. |
| 18025342659 | Eject disk button was unintentionally enabled in UI, suggesting it is possible to perform illegal action. |



| Issue ID | Description |
|--------------------|--|
| 18025556051 | Under specific circumstances it was possible to fail spanned RAID 5 volume while updating Intel® VROC driver version. |
| 18025942408 | Once user invoked SetEventReceiver command with value = disable, all events generated by Intel® VROC OOB were supposed to be cleared in the event queue, which was not implemented correctly. |
| 18030917271 | Volume name may not be shown fully and properly if it is equal to 16 characters. |
| 18031491855 | Smart App Control could block Intel® VROC driver actions. |
| 18025555817 | Volume state may be incorrect in HII during initialization process. |
| 18022848256 | Rebuild action may be very slow with some cache settings set incorrectly. |
| 18023423304 | System RAID 5 (with RWH JD) could not be created when other OS was present in machine. |
| 18023561138 | Unexpected event log could be seen after platform reboot during volume Rebuild action. |
| 18024043614 | Media errors could be counted incorrectly after Initialization. |
| 18024488340 | Volume type could be changed from RAID 0 to RAID 5 with x8 drive. |
| 18024577214 | Invalid RAID Write Hole Policy may return incorrect error for R0. |
| 18024662541 | Strip size of volume could be changed during adding disk in one command. |
| 18025418868 | "InitializeMethod" value could be set incorrectly. |
| 18025554947 | Creating volume may be impossible without stating optional parameters. |
| 18028910237 | Creating volume with invalid strip size value may be possible. |
| 18031169423 | Creating volume on disk with data and non-existing OdataId may return incorrect error. |

| Issue ID | Description |
|--------------------|---|
| 15013389958 | Optimize HW key detection, Upgrade key is changed from "premium" to "pass-thru" during running reboot stress in WIn10 22H2 OS with BCB VMD. |
| 18022969815 | User may be unable to choose strip size 128 for RAID 10 in PreOS. |
| 18023576509 | No warning about JD RWH not being supported for Linux* may appear during RAID 5 creation in HII. |
| 18020894568 | While the disks are connected to PCH, migrating OS volume to RAID 5 with additional drive from the same domain as member drives may end with error in CLI/UI. |
| 18020894601 | While connected to disks under Intel® VMD domain, migrating OS volume to RAID 5 with additional drive from the same domain as member drives may end with error in CLI/UI. |
| 18024634800 | Spanning warning string may be incorrect during creating spanned RAID in EFI. |
| 18021555907 | "Increase Size" action could not be performed sometimes in GUI because of refreshing issue. |
| 18023113317 | When attempting to create a Matrix RAID volume, the Intel® VROC 8.0 GUI may become unresponsive or fail. |
| 18024874787 | Registers used for saving AVX instructions states could get corrupted during using RAID 5. |
| 15014154518 | When heavy IO is added onto a degraded RAID 5, there may be an experienced errors relating to data mis-compare failures. |

5.9 Resolved Issues in Intel® VROC 8.0 Release

Table 510. Resolved Issues in Intel® VROC 8.0 Release

| Issue ID | Description |
|--------------------|--|
| 18015582447 | When attempting to rebuild a degraded RAID 10 matrix (second RAID volume is a RAID 5) with 2 drive failures (RAID 10 - Degraded; RAID 5 - Fail), the Intel® VROC driver may become unresponsive. |
| 1808018122 | Trying to clear a SMART event from a drive after a RAID volume is rebuilt (to another drive), may show up as a unknown disk. |
| 18010986194 | Intel® VROC PreOS may not properly show a boot RAID volume as bootable after the RAID volume encounters a FAIL condition. |

| Issue ID | Description |
|--------------------|---|
| 18012964787 | Number of media errors reported in Intel® VROC GUI may be different than expected after performing <i>Verify and Fix</i> on RAID 1. |
| 18016591025 | I/O may become unresponsive with NVMe VROC for Windows* under heavy I/O while using matrix RAID. |
| 14014436257 | Exceptional boot delay with WD Gold HDD used as SATA data drive attached to RAID mode port, but not in a RAID volume. |
| 18011148984 | Intel® VROC GUI may not indicate which drives are connected to PCH for pass through system drives and system RAID volumes. |
| 18016453364 | When using the Intel® VROC HII to create a RAID volume, the warning message that all data on the member disks will be lost, may not be displayed. |
| 18023331378 | Intel® VROC Bad Block Management (BBM) logging may report the wrong drive serial number when logging BBM events. |
| 1808094827 | The Intel® VROC (VMD NVMe RAID) PreOS environment may only show 32 NVMe SSDs in the Intel® VROC HII. |
| 18012896024 | Intel® VROC GUI may not report proper number of media errors encountered during initialization of RAID 5. |
| 18010956435 | Output may not appear in Intel® VROC CLI after attempting to create RAID 1 volume from two parts of x8 drive. |
| 1508749788 | A second RAID volume may not rebuild to the hot-spare drive after resetting one member disk to non-RAID. |
| 18015729524 | Intel® VROC OOB Management may report wrong error message during the attempt to create RAID volume from third party vendor drives when using <i>Intel SSD Only</i> key. |

5.10 Resolved Issues in Intel® VROC 7.7 Release

Table 511. Resolved Issues in Intel® VROC 7.7 Release

| Issue ID | Description |
|--------------------|---|
| 18016058101 | Intel® VROC bad block management process may take (3 to 4 times) longer than in previous versions. |
| 18014127243 | Performing an Intel® VROC (SDATA RAID) RAID 5 write hole recovery on a degraded SATA RAID 5 volume may not complete successfully. |
| 14014598311 | Intel® VROC SATA/sSATA RAID volumes may degrade or fail under high I/O load if an ATA pass through command is issued. |

| Issue ID | Description |
|--------------------|--|
| 14013794942 | The Intel® VROC CLI tool may terminate operation with an error if the user attempts to use the command with -M option, with a drive volume that does not exist. |
| 14013356415 | [CPX-6] Install Protocol Interface failure message after loading VMD UEFI driver. |
| 1508964983 | This issue is caused by unsigned iaNullVMD.inf. |
| 1508793548 | Fail to install Windows* Server 2019 with QWMB CPU. |
| 1508747791 | Hot removal of a matrix RAID member may result in a system failure. |
| 22011598177 | NVMe drives connected to certain Icelake CPU SKU may not be accessible by Intel® VROC when VMD is enabled. |
| 18016895347 | Intel® VROC (SATA RAID) PreOS Health Protocol may not properly report the driver/controller information. |
| 18015474102 | Trying to clear a SMART event from a drive after a RAID volume is rebuilt (to another drive), may show up as a unknown disk. |
| 18014791546 | Using the Intel® VROC CLI tool to remove the metadata on all the specified drives may not complete successfully on drives identified as "unknown". |
| 18014524336 | When using the Intel® VROC CLI tool to identify the attached devices on the SATA/ssATA controller, attached ATAPI devices may not be properly reported. |
| 18013439721 | When running in a matrix RAID configuration (two RAID volumes in a single RAID array), the bad block management process may not properly detect bad blocks. |
| 18011530136 | The Intel® VROC RCfg tool may not properly display the warning message when trying to rebuild a volume to a drive that is at least 10% bigger than the largest member drive. |
| 1806564424 | System may fail to start after an unexpected power loss. |
| 18012842292 | An incorrect error message ("REQUEST_FAILED: Request is formatted correctly but failed to execute.") may be reported by the Intel® VROC CLI tool when trying to perform a migration to unsupported RAID level. |
| 18012255612 | The Intel® VROC CLI tool may return the wrong error message ("INVALID_DEVICE: Request not formatted correctly; device does not exist.") when trying to rebuild degraded RAID volume to drive in an incompatible state. |
| 18012236043 | The Intel® VROC CLI tool may report wrong error message ("REQUEST_FAILED: Request is formatted correctly but failed to execute.") when trying to remove member drive of system RAID volume. |

| Issue ID | Description |
|--------------------|--|
| 18011483476 | When using the Intel® VROC HII to create a RAID volume, the warning message that all data on the member disks will be lost, may not be displayed. |
| 1808963497 | RAID initialization may not be automatically performed when <i>Verify</i> or <i>Verify and Repair</i> is initiated by the Intel® VROC CLI tool on an uninitialized volume. |
| 18018934449 | On Wolfpass platform, NVMe RAID submenu is not available and RCFG needs to be used to manage RAID functionalities in UEFI. |
| 22011592946 | Intel® VROC (SATA RAID) PreOS Health Protocol may not properly report the driver/controller information. |
| 18016174423 | Performance issue may occur after switching from legacy to MSI-X interrupts mode on SATA RAID. |

5.11 Resolved Issues in Intel® VROC 7.6 Release

Table 5-12. Resolved Issues in Intel® VROC 7.6 Release

| Issue ID | Description |
|---|--|
| 22012232430 | Using the Intel® VROC CLI tool with the -R option may not properly result in the RAID volume rebuild occurring. |
| 14013209937 | Intel® VROC bad block management process may take (3 to 4 times) longer than in previous versions. |
| 1508906750 | [VROC] Drive failure messages seen on initiating IO. |
| 14012975200 1508768056 22011598177 | Not able to install Windows* on Intel® VROC-managed NVMe or may not be able to access NVMe drives behind VMD with certain Icelake CPU SKUs. |
| 22011073918 | A potential silent data loss condition exists in both the Intel® VROC (SATA RAID) and the Intel® RSTe Windows-based products. The potential silent data loss condition exists when the Intel® VROC Read Patrol feature is enabled for redundant SATA RAID volumes (RAID 1, 5 or 10) and one of the RAID member drives is found to have a bad block condition. The Read Patrol process, of using the redundant data to correct the bad block, can result in invalid data being written. |
| 1509073224 | The Intel® VROC 7.5 installation application may not properly install the Null Driver to support Device ID 0x09AB. |
| 18016160241 | This issue is caused by unsigned iaNullVMD.inf. |
| 14012975200 | NVMe drives connected to certain Icelake CPU SKU may not be accessible by Intel® VROC when VMD is enabled. |

| Issue ID | Description |
|-------------------|--|
| 1508793548 | Fail to install Windows* Server 2019 with QWMB CPU. |
| 1507753655 | when running stress testing on M.2 slots managed by the sSATA controller, an isStorB error may be logged. |

5.12 Resolved Issues in Intel® VROC 7.5 Release

Table 513. Resolved Issues in Intel® VROC 7.5 Release

| Issue ID | Description |
|--------------------|--|
| 22011196948 | Intel® VROC may not properly calculate the LBA locations when performing the Read Patrol Bad Block Recovery process, inadvertently missing some bad blocks. |
| 22011073918 | A potential silent data loss condition exists in both the Intel® VROC (SATA RAID) and the Intel® RSTe Windows-based products. The potential silent data loss condition exists when the Intel® VROC Read Patrol feature is enabled for redundant SATA RAID volumes (RAID 1, 5 or 10) and one of the RAID member drives is found to have a bad block condition. The Read Patrol process, of using the redundant data to correct the bad block, can result in invalid data being written. |
| 14012886123 | Intel® VROC RAID Write Hole parity calculation may be computed incorrectly. |
| 22011547837 | NVMe drives listed in the Intel® VROC BIOS HII page may state incorrect CPU on which it is connected to. |
| 22010691032 | Intel® VROC Installer Help Dialog does not contain all available setup options. |
| 14011249412 | Activate LED option may not work for non-Intel drives when using <i>Intel SSD Only</i> license. |
| 14011049937 | The order of the SATA drives attached to the sSATA controller may not match that of how they may be reported in the SATA controller |
| 1808275753 | The wrong RAID volume state may be displayed after a dirty shutdown. |
| 1507753655 | When running stress testing on M.2 slots managed by the sSATA controller, an isStorB error may be logged. Expected under such heavy I/O loads. |
| 18012678098 | When installing Intel® VROC using installer with option -nodrv all drivers are uninstalled, and no driver is installed in replacement. This option may break operating system and it shall not be used. |
| 18011258092 | Clearing RAID metadata using the RCfg tool may result in a platform hang in UEFI and an ASSERT. |



| Issue ID | Description |
|--------------------|---|
| 18010905203 | Creating a RAID volume in Intel® VROC (VMD NVMe RAID) PreOS from drives connected through a JBOF may not succeed and result in error message: "Create volume failed! Cannot write to disk". |
| 1806564424 | System may fail to start after an unexpected power loss. |
| 1508007585 | Intel® VROC HII may display the RAID volume capacity improperly when it is larger than 10000GB. |
| 1507520073 | Uninstall the Intel® VROC Windows* driver may encounter an error when it is installed and uninstalled multiple times. |
| 1306412122 | Setting LED Configuration of Empty Slot as Fail may not show Fail when slot is empty. |
| 22011382393 | Locate LED may not work properly in VROC HII when using PCIe switch with NPEM support. |

5.13 Resolved Issues in Intel® VROC 7.0.2 Release

Table 5-1. Resolved Issues in Intel® VROC 7.0.2 Release

| Issue ID | Description |
|--------------------|---|
| 22011071259 | With Read Patrol is enabled, recovering from a bad block could result in a data loss condition. |

5.14 Resolved Issues in Intel® VROC 7.0 Release

Table 5-15. Resolved Issues in Intel® VROC 7.0 Release

| Issue ID | Description |
|--------------------|--|
| 14010261577 | Intel® VROC IASorIcon Scheduled Task may be inadvertently removed during a package upgrade. |
| 22010314523 | Migration of one RAID 10 volume to a RAID 5 volume may cause another RAID 10 volume, in the system, to automatically re-initialize. |
| 18011792455 | When using a Hot Spare Back Plane from a Whitley platform in Cedar Island platform, the SATA LEDs may not work properly. This is not an Intel® VROC issue. |
| 14010852023 | Intel® VROC HII may not display RAID volume information correctly when the raid volume is greater than 10 Terabytes. |
| 1808514953 | Booting a platform with 48 NVMe drives may result in a system failure. |
| 1808389290 | The Intel® VROC Rebuild LED behavior may not operate properly when customized to blink all LEDs during a RAID rebuild. |
| 1806994368 | Performing Hot Plug drive replacement on a degraded RAID volume, with Rebuild on Hot Insert enabled, may not properly initiate an automatic RAID rebuild. |
| 1507501583 | When resuming from and S3 power state change, the "System" label may not be displayed properly in the Intel® VROC GUI. |
| 1409667894 | LED Locate from the HII BIOS VROC Menu causes page to exit prematurely. |
| 1808703820 | When Using the Intel® VROC CLI tool to add a drive to an existing array, the volume strip size may not be displayed properly. |
| 1808580403 | when performing a drive Hot Plug, the event logger may show other drives (not involved in the Hot Plug) having encountered hot plug events. |
| 1807170210 | An Intel® VROC GUI volume creation warning message may overlay on top of a submenu. |
| 1806564426 | Event Log may not properly show "RAID volume {VolumeName} is normal" message after a rebuild completes. |
| 18011690000 | Activate LED Option may not work in Intel® VROC CLI and GUI, when using the <i>Intel SSD Only</i> license. |

5.15 Resolved Issues in Intel® VROC 6.3 Release

Table 5-16. Resolved Issues in Intel® VROC 6.3 Release

| Issue ID | Description |
|--------------------|---|
| 14010267807 | Performing a Drive Surprise Hot Remove from a Matrix raid array may result in a platform failure. |
| 1507649523 | Using the <code>CC_CSMI_SAS_GET_DRIVER_INFO</code> command may not report correct drive and driver information. |
| 18010792702 | Intel® VROC IASTorIcon Scheduled Task may be inadvertently removed during a package upgrade. |
| 1809577436 | An Intel® VROC spanned RAID 10 volume may not start rebuilding automatically after a rebuild on hot insert condition. |
| 1806397184 | In Intel® RSTe NVMe Pre-Purley platform with 48 NVMe drives and max volumes, degraded RAID volume may encounter a system failure while booting. |
| 1507369786 | Migrating a single NVMe boot drive to an Intel® VROC (VMD NVMe RAID) volume and perform a system sleep power state change may result in a system crash. |
| 1806411891 | RAID volume may become degraded after reboot. |
| 1806397164 | Intel® RSTe NVMe Pre-Purley Platform with 48 NVMe drives and 24 volumes may encounter a boot failure. |
| 1507522222 | Intel® VROC LED Management may illuminate the Locate LED option during another RAID operation and may not stop when the operation completes. |
| 1806930160 | An error message in event viewer " <i>The driver detected a controller error.</i> " may be displayed when performing platform power state changes with Intel® VROC installed. |
| 1806419240 | Intel® VROC (VMD RAID) NVMe drive may be marked as available after removal. |

5.16 Resolved Issues in Intel® VROC 6.2 Release

Table 5-17. Resolved Issues in Intel® VROC 6.2 Release

| Issue ID | Description |
|-------------------|---|
| 1606900429 | System crash may occur when load Intel® VROC (VMD NVMe RAID) F6 driver while the Intel® VROC RAID is under an initialize state. |

| Issue ID | Description |
|-------------------|---|
| 1409230595 | Intel® VROC UEFI may not properly report the VMD controller BDF in the HII. |
| 1409017125 | UEFI driver hangs when the metadata is malformed. |
| 1408968353 | Intel® VROC (VMD NVMe RAID) UEFI HII Menu may cause the BIOS Setup Menu to be improperly displayed. |
| 1409194760 | Activity LED is not blinking when SATA drive in RAID mode. |
| 1808452676 | A system, with the OS installed onto a RAID volume, may not properly resume after several hybrid sleeps. |
| 1808377588 | A system running Intel® VROC, with the OS installed onto a RAID volume, may not properly resume from a hybrid sleep state, after performing multiple hybrid sleeps. |
| 1808060543 | The Intel® VROC 6.2 UWD UI application may not properly function on a platform with Intel® VROC 6.0 driver package. Make sure that when using the Intel® VROC UWD UI application, that the UI version matches the driver package (i.e. both should be Intel® VROC 6.0 or both should be Intel® VROC 6.2). |
| 1807345165 | The Intel® VROC CLI tool may not properly expand existing RAID volumes. |
| 1807107325 | When using the Intel® VROC CLI tool to create RAID volumes one of the disks may show a disk size of 0GB after the volume creation completes. |
| 1806677977 | Bad blocks may not be properly reported in a RAID 5 volume. |
| 1806534894 | The Intel® VROC CLI tool may allow data migration with a smaller drive. |
| 1806503629 | Creating a RAID 1 volume from an existing drive may result in a failed RAID volume. |
| 1507222187 | The Intel® VROC icon is missing in system tray in Windows* 10. |
| 1409784946 | Hot Removal of a RAID 5 Write Hole (RWH) Journaling Drive may cause the platform to become unstable and may cause a system failure system instability and BSODs. |
| 1409371408 | Intel® VROC GUI may require the "Proceed with deleting data" box be selected when not expected. |



| Issue ID | Description |
|-------------------|---|
| 1407853994 | Degraded SATA RAID 5 may not boot if disk on SATA controller port 0 is removed or fails. |
| 1407801045 | The Intel® VROC RWH policy may inadvertently change from Journaling to Distributed if one member drive is missing. |
| 1407219909 | New VMDVROC_1.efi and VMDVROC_2.efi drivers will increase boot time around 4 seconds. |
| 1806782204 | Intel® VROC GUI may not properly open unless "Run as Administrator". |
| 1506398660 | RAID 10, hot-plug two member disks, re-plugged second disk can't rebuild. |
| 1409584095 | Event log error 4156/4155 seen during stress testing. |
| 1807977956 | The platform may encounter a system failure as a result of performing a hybrid sleep cycle on an Intel® VROC RAID 5 volume (the first hybrid sleep after running the Intel® VROC installation application). |
| 1807962656 | The Intel® VROC PreOS UEFI may not properly display the full serial number of a removed/offline volume member drive in the UEFI Health Protocol information. |
| 1807158496 | The Intel® VROC RWH policy may change from Journaling to Distributed after a Drive Hot Unplug. |
| 1806564409 | Platform may not properly boot after a dirty shutdown with I/O on a RAID 5 volume (RWH Distributed). |

