



INTEL® VIRTUAL RAID ON CPU (INTEL® VROC) FAQ FOR INTEL® XEON SCALABLE FAMILY LAUNCH

Updated: September 29, 2017

Q1: What is Intel® VROC?

A1: Intel VROC stands for Intel® Virtual RAID on CPU. It is an enterprise RAID solution specifically designed for NVMe*-based Solid State Drives (SSDs).

Q2: What is the biggest advantage of Intel VROC?

A2: The biggest advantage of Intel VROC is to be able to directly connect NVMe-based SSDs to the new Intel Xeon™ Scalable Processor PCIe* lanes, then make a RAID solution using those SSDs. The ability to manage RAID volumes with NVMe-based SSDs directly connected to CPU PCIe* lanes without using a RAID hot bus adapter (HBA). As a result, Intel VROC unleashes NVMe SSD performance potential without the complexity and power of a traditional Hardware RAID HBA.

Q3: Since Intel VROC can RAID SSDs directly connected to the CPU, does that mean hardware RAID HBA is no longer needed?

A3: Hardware RAID HBAs have been serving the RAID industry for dozens of years in support of legacy SATA and SAS HDDs and SSDs, and are evolving to add NVMe functionality. Intel VROC does not need a hardware RAID HBA for NVMe-based SSDs, but this does not mean this industry does not need it. Intel VROC provides a compelling alternative way to RAID NVMe SSDs. Our goal is to migrate SSDs from the legacy SATA/SAS interfaces that were designed for much slower HDDs to the modern NVMe protocol.

Q4: How is Intel VROC performance and CPU utilization compared to a hardware RAID HBA solution?

A4: The new NVMe enabled hardware RAID HBA products are just arriving in the market, so we do not have such data yet.

Q5: Which platform will support Intel VROC?

A5: Intel VROC is primarily targeted to professional workstations and server platforms. It requires the Intel® Volume Management Device (Intel® VMD), a hardware feature only available on the new Intel® Xeon® Scalable processors. Because the types of RAID support are very specific to the OEM platform configuration, it is up to OEM/ODM to decide whether to offer Intel VROC. Please consult your server or workstation provider for specific information.

Q6: We saw Intel VROC on an Intel Core processor and X299 chipset -based high-end desktop motherboard shown at Computex 2017. Will Intel VROC be supported by this platform?

A6: Intel VROC is primarily targeted to professional workstations and server platforms at launch, but can potentially be enabled on any platform with the Intel Volume Management Device (Intel VMD) feature. Starting Sept. 25, 2017, Intel VROC will be supported on X299 High End Desktop platforms as well. Please check HEDT marketing team for specific Intel VROC support on X299 platforms.



Q7: Is Intel VROC software or hardware RAID?

A7: Intel VROC is a hybrid RAID solution.

It has attributes like hardware RAID because of the key silicon feature called Intel Volume Management Device (Intel VMD) which is offered with the new Intel Xeon™ Scalable processors. Intel Virtual RAID on CPU (VROC) utilizes Intel VMD to aggregate NVMe SSDs allowing bootable RAID. Intel VROC also has attributes like software RAID. For instance: it uses some of the CPU cores to calculate the RAID logic. Because of this combination of software and silicon, Intel VROC is called a hybrid RAID solution.

Q8: Does Intel VROC support 3rd party SSDs?

A8: Intel VROC supports both Intel® SSDs and selected 3rd party SSDs. Please see the Product Brief for supported 3rd party SSDs.

Q9: What is Intel VROC hardware key?

A9: Intel VROC is a licensed product for sale through the OEMs or ODMs with a support service level agreement. The Intel VROC hardware key is the mechanism to obtain a license to the Intel VROC software. Certain OEMs/ODM have built servers and workstations that support Intel VROC by adding a key header to their motherboards. The Intel VROC hardware key is required to be inserted into that motherboard to enable the RAID license. Only one key is needed per system.

Q10: Where can I get an Intel VROC hardware key?

A10: End users can expect the hardware keys to be installed by their OEMs and/or system integrators in their servers, as long as end-users request a server with a complete Intel VROC solution. OEMs and/or system integrators obtain the keys from Intel or Intel's distributors.

Q11: Which OEM or ODM has designed in Intel VROC?

A11: Several OEMs and ODMs have designed in Intel VROC into appropriate server and workstation platforms. We can provide guidance after the OEMs and ODMs launch their products, but at this moment, please query your server or workstation provider directly.

Q11: What are the different Intel VROC SKUs?

A11: Intel VROC has three different SKUs:

- **Intel VROC Pass-Through:** No RAID support, just stand alone NVMe-based SSDs connected to Intel VMD enabled PCIe lanes. No hardware key needed. License included in Platform Control Hub (PCH).
- **Intel VROC Standard:** RAID 0/1/10 support. Standard hardware key needed.
- **Intel VROC Premium:** RAID 0/1/5/10 support. Premium hardware key needed.



Q12: How is Intel VROC different from Intel® RSTe?

A12: Intel VROC is under the umbrella of the Intel Rapid Storage Technology Enterprise product family. The SATA RAID portion of Intel RSTe is still the same, however, the NVMe RAID is replaced by Intel VROC. For NVMe RAID, Intel VROC is architected to use Intel VMD to provide the following new features that Intel RSTe legacy NVMe RAID does not have:

- Bootable RAID
- Surprise hot-plug
- LED management
- RAID5 Double Fault Protection
- Support for 3rd party SSDs

Q13: What is RAID5 Double Fault Protection?

A13: Intel VROC can protect RAID5 data even when both unexpected power loss and RAID volume degradation occur at the same time. This double fault condition is also, at times, referred to as RAID5 Write Hole. Many RAID solutions dealt with this challenge by requiring a backup power unit. Intel VROC addresses this problem by using patent-pending journaling.

Q14: What is LED management?

A14: The LED management feature supports SSD indicator lights on the server enclosure that will blink different patterns to indicate the different statuses of each SSD in the RAID array. LED management provides easier maintenance and avoid accidental human errors. Intel VROC follows the blinking patterns defined by the International Blinking Pattern Interpretation standard.

Q15: How can I try Intel VROC?

A15: Intel VROC support is specific to certain workstations and/or servers from OEMs and ODMs or channel motherboard providers. Please ask your server or workstation provider for sampling opportunity.

Q16: I found RAID0 works without Intel VROC HW key. But the product brief says I need VROC HW key for RAID0. What should I do? ?

A16: An Intel VROC HW Key is required to use RAID 0/1/5/10 for most SSDs. However, Intel VROC is also designed to provide RAID0 for Intel PCIe Gen3 x8 SSDs without requiring HW key. For instance: Intel DC P3708. For any other regular x4 SSDs, without HW key, RAID0 might work, might not work. In short, an Intel VROC HW Key is required for official support for RAID0 with regular PCIe Gen3 x4 SSDs.

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