Intel® Rapid Storage Technology (Intel® RST) 16.0.2.1086 Production Version Release

23 Feb 2018

Supported Operating Systems

Microsoft Windows 10 RS2 x64*
Microsoft Windows 10 RS3 x64*
Microsoft Windows Server 2016 x64 Edition*

Revision History

Date	Driver Revision	Build Number
23 Feb 2018	16.0.2.1086 PV Release	1086
30 Jan 2018	16.0.2.1078 Release	1078

Notes:

1. Known Issue is defined as a potential Intel® RST issue that has been replicated internally by the Intel® RST team but has not been root caused to be an Intel® RST defect.

2. The RAID OROM & UEFI version for this release is 16.0.2.3402, the driver and user interface version is 16.0.2.1086. For Intel® RST Premium features (e.g. RAID, Intel® Optane™ memory, CPU Attached Storage), it is recommended that both the Intel® RST pre-OS and Intel® RST OS driver components are updated. Please contact your CE for further details.

3. If RTD3 is enabled, Windows can turn off disk for very short time (e.g. 20ms). The minimum off time for some disks can be much longer (even 1s). If the disk is turned on too fast, it can hang in some undefined state. RTD3 should be disabled if the disk specification states longer minimum off time.

Supported Hardware

Initial Intel® RST Release Version					Chipset Name	Platform / PCH / (Segment)	PCH SKU Details
16.0						Cannon Lake (CNL)/Coffee Lake (CFL) PCH: Cannon Point-H (CNP-H) (DT)	- H310(A) - H370 - Z390 - Q370 - Q360(O) - B360(O)
					Intel® 300/240 Series Chipset Family	CNL/CFL PCH: CNP-H (WS)	- C246
						CNL/CFL PCH: CNP-H (HEDT)	- X399SX
						CNL/CFL PCH: CNP-H (Mobile Halo)	- QM370 - HM370 - CM246
					9th Generation Intel® Core™ Processor Family Platform I/O SATA AHCI/RAID Controller	CNL PCH: CNP-LP (Mobile LP)	- Premium-U - Base-U(A)
N - 1							
	15.8 / 15.9				Intel® 200 Series Chipset Family	Coffee Lake (CFL-S) PCH: Kaby Point (KBP-H) (Desktop)	- Z370
		15.7			Intel® 200 Series Chipset Family	Basin Falls (w/ KBL-X, SKL-X CPU) PCH: KBP-H (HEDT)	- X299
					8th Generation Intel® Core™ Processor Family Platform I/O SATA AHCI/RAID Controller	Kaby Lake Refresh (KBL-R) PCH: SPT-LP (Mobile-LP)	- Base-U(A) - Premium-U - Premium-Y
			15.5		Intel® 100/C230 Series Chipset Family	Greenlow-Refresh (w/ KBL CPU) PCH: SPT PCH-H (WS)	- C236
				15.2	Intel® 200 Series Chipset Family	KBL PCH: KBP-H (Desktop)	- Q250(O) - B250(O) - Z270 - H270 - Q270
					Intel® 100/C230 Series Chipset Family	(w/ KBL CPU) PCH: SPT-H (Mobile Halo)	- HM175 - QM175 - CM238
				15.0	7th Generation Intel® Core™ Processor Family Platform I/O SATA AHCI/RAID Controller	(w/ KBL CPU) PCH: SPT-LP (Mobile-LP)	- Base-U(A) - Premium-U - Premium-Y

(A) This base SKU of the chipset supports AHCI mode only
(O) This base SKU of the chipset supports both AHCI and Intel® Optane™ memory modes only (non-RAID)
SX This SKU is supported with SKL-X CPU only

Resolved Issues In 16.0.2.1086 PV Release

ID	Title	Operating System
1805826565	OptaneVolume is disabled when downgrading from 16.0.1 to 15.9 driver	
1805897167	[CLI] Incorrect volume information is seen when Optane Data Drive is enabled	
1805836528	Waking up from S3/S4/S5 is resulting in Bug Check 1A with 2x NVMe SSD's(2TB) as DATA drives (RST Controlled)	windows.10_rs2.x64 windows.10_rs3.x64
1805837451	BSOD SYSTEM_THREAD_EXCEPTION_NOT_HANDLED (7E) occurred after Optane separation	windows.10_rs3.x64
1805867987	"Logs are here" characters are not translated to non-English language in IRST Installation UI.	windows.10_rs3.x64
1805814595	RAID 0 performance does not meet expectation with 3 760p drives.	windows.10_rs3.x64

Resolved Issues In 16.0.2.1078 Release

ID	Title	Operating System
1805880640	Enable Optane in OS, system BSOD occurs after first reboot. (0x7B)	windows.10_rs3.x64
1805868136	HDD Abnormal Power off with Optane when entering DS3/S3	windows.10_rs3.x64
1805841055	BSOD 0x154 occurred when performing s4 stress with some HDD's.	windows.10_rs3.x64
1805881494	Partition created on slow drive in WinPE is not available in OS	
1805752456	After making all disks spare except Optane volume, system cannot boot again (BSOD: SYSTEM_THREAD_EXCEPTION_NOT_HANDLED (7e))	
1805844854	CRITICAL_PROCESS_DIED after Optane separation and creation with different drive	
1805836784	BSOD "Process1 initialization failed" occurred during S4 testing	
1805823477	BSOD on NVMe drives during Sx cycling	windows.10_rs3.x64

1805799973	D1 Bug check in hiber_iastora during S4 cycling	windows.10_rs3.x64
1805769430	UNEXPECTED_STORE_EXCEPTION (154) - OS disk disappeared during S4 flow	Window10_x64
1805752025	IRST UI show Unknown Controller in Hardware info of help page- > System Report in AHCI mode.	windows.10_rs3.x64
1805544813	BSOD 0xA0 (HIBERSTACK_INIT_FAILED) occurs when driver is upgraded without reboot and enter S4	Window10_x64
1805799258	XML validation error on 16.0.0.1048 RST installer mup.xml	windows.10_rs3.x64
1805751581	Some words in Intel Rapid Storage Technology UI "Help" page are not localized in Chinese language	windows.10_rs3.x64
1805747309	NvmePassthrough VendorSpecific commands are blocked by driver	windows.10_rs3.x64
1805779850	Error message show up with error code "0xA008001F" when launch OptaneMemory UI	windows.10_rs3.x64
1805786875	Error "An unknown error occurred while running this application..." appears when IRST is launched from the control panel.	windows.10_rs3.x64
1805752015	Optane PCMARK HDD score is around 50K on CFL system	windows.10_rs3.x64
1805299987	Modern standby test causes PDC_WATCHDOG_TIMEOUT (14f)	windows.10_rs2.x64
1805767354	BSOD during migration after enabling Optane	windows.10_rs3.x64
1805553241	BSOD during Optane separation	windows.10_rs2.x64
1805490090	"Intel Optane Memory" tab is seen in IRST UI even when Optane device is not connected to the system	windows.10_rs2.x64
1805751691	Optane PCMV HDD cycles test score is low (around 50K) in cache full (~100%) condition	Windows10_x64
1805743416	Unexpected reboot during S3 test	
1805767390	RAID0 volume state is "normal" when one of drives is disconnected.	preOS
1805751867	Intel 600P SSD has slow performance on Coffee Lake platform after storage stress test	windows.10_rs2.x64
1805544813	Bugcheck 0xA0 [HIBERSTACK_INIT_FAILED] when driver is upgraded without reboot and entered S4	
1805910997	ATTO Disk Benchmark freezes on 3xHDD RAID5 with Write back cache on.	windows.10_rs2.x64

1804926443	System hung up at desktop when run S4 stress test using pwrtest.exe	windows.10_rs1.x64
1805625734	IRQL_Not_Less_Or_Equal - Bugcheck D1 observed during S3 cycling.	windows.10_rs3.x64
1805625510	System encounter "C1" BSOD when run Velocity Test Suite for the second time. (FR: 100%)	windows.7.x64
1805161214	Unable to enable Optane when 2 or more RAID data volumes exist on the system	windows.10_rs2.x64
1805565098	[AHCI mode] Bugcheck PAGE_FAULT_IN_NONPAGED_AREA (50) occurs when SATA AHCI Controller is disabled	
1805542752	Incorrect Optane Volume name for HDD 2TB, SB 32GB on CFL-S	
1805543401	Wrong HMB memory size returned in CLI	
1805545189	Different Optane Name in UI and in disk manager.	
1804279934	[RcfgSata] Could not create Intel® Optane™ memory volume on existing OS	uefi
1804280004	Serial number of the RAID member reported by RCfgSata.efi when drive is connected and when it is removed is different.	uefi
1805254826	CPU Attached Storage responsiveness (Hibernate S4 BIOS Initialization Duration) does not meet target	windows.10_rs2.x64
1805449538	Error in Rcmpsata.efi log file	uefi
1805489373	No "Optane" bit in RCmpSata BCFS output.	uefi
1805475125	Legacy RST OROM does not load on CFL platform, when enabling CSM and "Use legacy OROM" option in SATA configuration	uefi
1805544123	Trying to create a RAID volume out of two NVMe drives results in unexpected behavior	
1805533240	[PreOS][CFL-S] Drives not visible under TPV RST menu after setting RAID Device ID to "Alternate"	uefi
1805475106	CPU Attached Storage HDD Password not work	uefi
1805289325	[CNL-U] Intel® RST reports abnormal status after Intel® Optane™ memory enable	windows.10_rs2.x64
1804927501	Raid volume listed as "locked" - although it is UNlocked	uefi

1805449417	Intel® RST UEFI driver does not update the entire content of NVM_EXPRESS_COMPLETION structure after sending a command to the NVMe* device.	uefi
1805114781	System crashes and goes to recovery after deconcatenating Intel® Optane™ memory using RcfgSata	
1804325140	Intel RAID UEFI driver will build an unknown device	uefi
1804926100	"Migration type" in BIOS show "unknown" after creating Intel® Optane™ memory using RCfgsata.efi	uefi
1804669456	RAID0 is lost after un-plugging and re-plugging PCH-NVMe* RAID0 volume.	windows.10_rs1.x64
1805135393	S3/S4 tests with remapped PCIe when MSI-X MessageNumberLimit is set to 1	
1805281155	[Cpu Attached] Intel NVMe* connected to CPU are not visible in PreOS	uefi
1805466224	CPU Attached Storage causing CAT_ERR on CFL platforms	windows.10_rs3.x64
1805531738	0xD1 BSOD (DRIVER IRQL NOT LESS OR EQUAL) during S4 stress test	windows.10_rs2.x64
1805531747	Stress S4 causes BSOD 0x154 (UNEXPECTED STORE EXCEPTION).	windows.10_rs2.x64
1805436606	Intel RRT volume is displayed as "Intel RAID1 volume" in device manager.	windows.10_rs2.x64
1805445921	Unable to unpin moved application	
1805499844	Intel® Optane™ memory application ran into a problem after closing tray icon notification	windows.10_rs2.x64
1805490108	Cannot boot to OS when Hyper threading = Disable and Multi-processor = Disable.	windows.10_rs3.x64
1805494907	System will BSOD after Win10 RS3 OS installation on NVMe* drive.	windows.10_rs2.x64
1805476772	Shrinking OEM partition does not work when some gpt attributes are set.	
1805480543	BSOD "0xD1" occurred when system resumes from S3	windows.10_rs2.x64
1805474013	Inaccessible boot device BSOD after creating Raid5 volume and going through Safe Mode	windows.10_rs3.x64
1805491045	Change default APST ITPT value for non-operational power states to 3s	
1805490634	[RAID0 NVMe*] Low scores when run PCMark Vantage*	windows.10_rs1.x64

ID	Title	Operating System
1805490878	SB FW version mismatch detected when Intel® Optane™ memory is being enabled	

Known Issues In 16.0.2.1086 PV Release

ID	Title	Operating System
1805935657	Intel Rapid Storage Technology content will be cut off on Brazil & Spanish OS	windows.10_rs3.x64
1805935651	Optane volume - System will show black screen without Back Light (BSOD 0x9F) when run S4 stress.	windows.10_rs3.x64
1805935644	Optane Memory enable item is greyed out and cannot launch after resume from S3	windows.10_rs3.x64
1805911640	SYSTEM hang (BSOD with bugcheck code: 0x1000007E)	windows.10_rs3.x64
1805894760	RAID 10 volume cannot be created using SATA ports 6, 7 and two other ports between 0 - 5.	windows.10_rs2.x64
1805893933	Intel RST - Spend too much time when run the ADK Standby performance test.	windows.10_rs3.x64
1805890013	BIOS couldn't see the following SMM SSCP installed by Intel (R) RST 16.0.0.3318 RAID driver.	windows.10_th.x64
1805878931	Report error for "unsupported chipset" when optane RST driver is installed.	windows.10_rs3.x64
1805878923	Intel RST - In RAID 5 mode, HDD utilization is always high.	windows.10_rs3.x64
1805873591	PreOS does not list disks in Boot Manager	preOS
1805867425	The "Auto-rebuild on hot plug" option in Preferences page cannot be enabled.	windows.10_rs3.x64
1805856154	Plugged in TBT device (connected DP) will hang or causes BSOD (km:0xfc_iastorac!nvmrequest::complete)	windows.10_rs3.x64
1805827687	System can't do BIOS recovery with RstPeim driver installed in RAID mode.	windows.10_th.x64
1805827543	System show BSOD - 0x133 DPC_WATCHDOG_VIOLATION when run stress S4 test.	windows.10_rs3.x64
1805823478	Optane Volume gets disabled if we use rstcli to clear cache.	windows.10_rs1.x64

1805816635	Updating storage driver intermittently causes drive letter swaps	
1805815700	Sporadically restart option does not show up after enabling/disabling Optane	windows.10_rs3.x64
1805800222	[CATERR][CPUattached] Issue observed after restart from OS	windows.10_rs3.x64
1805799491	[0x9F_3_disk_IMAGE_iaStorA.sys] Data drive visible and there is 1 request (bypass queued) in Storport for this drive.	
1805782067	Certain SATA SSD's cannot boot to OS after installing iRST driver.	windows.10_rs3.x64
1805767393	RST CLI tool hang	windows.10_rs2.x64
1805766960	Intel RST - The result of ATTO Disk Benchmark with RAID0/RAID1 and enable/disable writeback cache is lower than the Non-RAID JBOD value at 64KB size.	windows.10_rs3.x64
1805490049	RST UI crashes after system wakes up from Hyrbid S3 or Deep S4 or Hibernate, only if RST UI application was open earlier.	windows.10_rs3.x64
1805480515	[Optane] Windows is not detecting Optane drive after disruptive power off during disabling process	windows.10_rs2.x64
1805480510	Windows is not detecting Optane drive after disruptive power off during disabling process	windows.10_rs2.x64
1805464013	Error event log ID7000/ID7009 (iaStorAfsService) show up after PBR reset/refresh.	windows.10_rs2.x64
1805116821	Unexpected page will show. It would not go back to previous page when press "ESC".	windows.10_rs2.x64
1305482762	Volume label of ODD drive remain unchanged after ejecting CD/DVD disc in Optane model.	windows.10_rs3.x64
1805898415	Data corruption may occur in extreme stress testing corner case scenario	windows.10_rs3.x64

Terminology

Common Terms and Acronyms	Definition
AEN	Asynchronous Event Notification
AHCI	Advanced Host Controller Interface
ATA	Advanced Technology Attachment
ATAPI	Advanced Technology Attachment Packet Interface
BIOS	Basic Input / Output System
BUS PROTOCOL GROUP	A bus protocol group represents a set of bus protocols with similar performance characteristics. Bus Protocol Groups are listed here in decending order of speed: 1- PCIe* 2- SATA
Chipset	A term used to define a collection of The PNHCI components required to make a PC function.
CSMI	OEM Common Storage Management Interface for reporting RAID configurations and SMP, SSP, STP pass through.
DEVSLP	Serial ATA Device Sleep
DMA	Direct Memory Access
DOS	Disk Operating System
DIPM	Device Initiated Power Management
Disk's Write Cache	A memory device within a hard drive, which is allocated for the temporary storage of data before that data is copied to its permanent storage location.
GB	Giga-byte = 1024^3 bytes
HDD	Hard Disk Drive
HIPM	Host Initiated Power Management
Hot Plug	A term used to describe the removal or insertion of a SATA disk while the system is powered on.
ICH	Input / Output Controller Hub
InstantGo*	Microsoft Windows* 8.1 connected standby low-power state that features extremely low power consumption while maintaining Internet connectivity.
KB	Kilo-byte = 1024 bytes
LPM	Link Power Management
M.2	Specification for internally mounted computer expansion cards and associated connectors. It replaces the mSATA standard. Formerly known as the Next Generation Form Factor (NGFF)
MB	Mega-bytes = 1024^2 bytes
MEMORY GROUP	A memory group represents a set of backend storage media types with similar performance characteristics. Memory Groups are listed here in ascending order of speed: 1- Spindle Device (HDD) 4- PCIe* NAND Device (SSD) 2- NAND Spindle Hybrid Device 5- PCIe* NAND Device (SXP) 3- PCH SATA NAND Device (SSD)

mSATA	Computer bus interface that connects host bus adapters to mass storage devices such as hard disk drives and optical drives. Uses PCI Express Mini Card-like connector that is electrically SATA.
NAI	Notification Area Icon
NTFS	NT File System
NVC	Non-Volatile Cache
NVMe*	Non-Volatile Memory Express: Non-Volatile Memory Host Controller Interface Specification (NVMHCI), is a specification for accessing solid-state drives (SSDs) attached through the PCI Express (PCIe*) bus
OEM	Original Equipment Manufacturer
ODD	Optical Disk Drive
OROM	Option ROM
OS	Operating System
PCH	Platform Controller Hub
PCIe*	PCI Express (Peripheral Component Interconnect Express): is a high-speed serial computer expansion bus standard
Port	The point at which a SATA drive physically connects to the SATA controller.
PRD	Product Requirements Document
PUIS	Power Up In Standby - Drive feature that allows a spindle device to be powered up in standby mode without spinning the disk up.
RAID	Redundant Array of Independent Disks Matrix RAID: A configuration supporting two RAID levels by having two volumes in a single RAID array that use Intel® RST
RTD3	Runtime D3
RS2	Redstone2
RS3	Redstone3
SATA	Serial ATA
SIPM	Software Initiated Power Management
S.M.A.R.T.	Self-Monitoring, Analysis and Reporting Technology: an open standard for developing hard drives and software systems that automatically monitors a hard drive's health and reports potential problems.
SED	Self-Encrypting Drive
SRT	Intel® Smart Response Technology. Intel® RST's premium feature to use caching technology that enables caching of a device or volume using a faster device
SSD	Solid State Drive – non volatile memory used as storage media
SSHD	Solid-State Hybrid Drive
TB	Tera-byte = 1024^4 bytes
UEFI	UEFI pre-OS driver
UI	User Interface
VC	Validation Candidate
ZPODD	Zero Power Optical Disk Drive