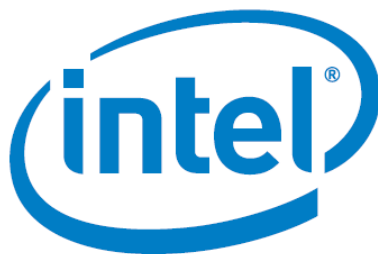


Intel® Rapid Storage Technology enterprise (RSTe) 3.8.0.1111

Customer Release Notes

September, 2013

Revision 1.31



1	Overview.....	7
2	Support on Internet.....	7
3	Package Components and Versions.....	7
3.1	Supported Configurations	9
4	Supported Platforms.....	9
4.1	Intel® RSTe 3.8.0.1111 Release Package Documentation.....	10
4.2	Support	10
5	General Notes: RSTe 3.8.0.1111 - PV Release Package.....	11
5.1	New Features Included in this Release	11
5.2	Features Included in the 3.7.0.1093 Release.....	12
5.3	Features/Configuration Restrictions.....	14
5.4	Firmware Limitations.....	15
5.5	Additional Chipset Configuration Information	15
6	Specific Known Issues.....	16
6.1	Errata	16
6.2	Known Issues Being Worked.....	24
6.3	Issues Resolved in the Maintenance Release 3.8.0.1111	27
6.4	Issues Resolved in the Maintenance Release 3.7.0.1093	30
6.5	Issues Resolved in Maintenance Release 3.6.0.1093.....	36
6.6	Issues Resolved in Maintenance Release 3.2.0.1135.....	40
7	Hardware Compatibly.....	48
7.1	External Hardware Compatibility.....	48
8	Intel® C600 series chipset OEM Parameters	52
8.1	Structure of OEM Parameter Block	52
8.2	BCFS Bit Settings	59

8.3	Recommended Location in SPI Flash	61
8.4	OEM Parameter and SPI Flash Tools	63
8.5	Required BIOS Services	64
8.6	Reference Documentation	69
9	<i>Copyright Notice</i>	70

Legal Disclaimer

This document is a compilation of software and software documentation defects, and software specification clarifications, updates, and changes. It is intended for hardware system manufacturers and software developers of applications, operating systems, or tools.

Except as expressly provided in Intel's standard terms and conditions of sale for the Intel software product or in the Intel software license agreement accompanying the Intel software product, the Intel software product is provided "as is," without warranty of any kind, whether express, implied or statutory, including but not limited to a warranty of merchantability, non-infringement of intellectual property, or fitness for any particular purpose.

This document is provided "as is" without any express, implied, or statutory warranty of any kind including but not limited to warranties of merchantability, non-infringement of intellectual property, or fitness for any particular purpose. Intel does not warrant or assume responsibility for the accuracy, completeness or utility of any information contained herein. Intel may make changes to these materials, or to the Intel products described therein, at any time without notice. Intel makes no commitment to update these materials.

Independent companies manufacture the third-party products that are mentioned in this document. Intel is not responsible for the quality or performance of third-party products and makes no representation or warranty regarding such products. The third-party supplier remains solely responsible for the design, manufacture, sale and functionality of its products.

Intel and the Intel logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

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

Copyright © 2013, Intel Corporation. All rights reserved.

Document Revision History

Date	Version	Description
17 June, 2010	1.0	Initial pre-Beta release
September 2010	1.1	Initial RSTe 3.0 pre-Beta release
November 2010	1.2	RSTe 3.0 pre-Beta release 3.0.0.1040
December 2010	1.3	RSTe 3.0 pre-Beta release 3.0.0.1045
February 2011	1.4	RSTe 3.0 Beta1 release 3.0.0.1047
February 2011	1.5	RSTe 3.0 Beta1 release 3.0.0.1052
March 2011	1.6	RSTe 3.0 Beta1 release 3.0.0.1059
April 2011	1.7	RSTe 3.0 Beta release 3.0.0.1065
June 2011	1.8	RSTe 3.0 Beta release 3.0.0.1080
June 2011	1.9	RSTe 3.0 Pre-PC release 3.0.0.1086
August 2011	1.10	RSTe 3.0 Pre-PC release 3.0.0.1111
September 2011	1.12	RSTe 3.0 Pre-PC release 3.0.0.1112
October 2011	1.14	RSTe 3.0 Pre-PC release 3.0.0.3002
December 2011	1.15	RSTe 3.0 PC Release 3.0.0.3016
December 2011	1.16	RSTe 3.0 PV Release 3.0.0.3020
March 2012	1.18	RSTe 3.1 Maintenance Release 3.1.0.1069
April 2012	1.19	RSTe 3.1 Maintenance Release 3.1.0.1085
July 2012	1.20	RSTe 3.2 Maintenance Release 3.2.0.1135
July 2012	1.21	Add errata for 6 Gps HDD's
August 2012	1.22	Added RX recipe change included in 3.2.0.1135 release, also removed a few sighting that were inadvertently added.

August 2012	1.23	Adding support for Windows 8 and Windows Server 2012
November 2012	1.25	RSTe 3.6 Maintenance Release 3.6.0.1093
March 2013	1.27	RSTe 3.7 Maintenance Release 3.7.0.1093. Removed all resolved issues prior to the release of 3.2 maintenance release.
Sept 2013	1.31	RSTe 3.8 Maintenance Release 3.8.0.1111

1 Overview

Intel® RSTe 3.8.0.1111 maintenance release package contains the production version of the Windows* drivers, Pre-OS components and utilities to support platforms built with the Intel® C600/C610 series chipset. It provides support for the Intel® C600 series chipset Storage Controller Unit(s) (SCU) and Advanced Host Controller Interface (AHCI) when set to either AHCI mode or RAID mode. Support is also provided for the Intel® C610 series chipset two and Advanced Host Controller Interfaces (AHCI)/

NOTE: Due to the two driver configuration in this release, upgrading to Windows* 8, Windows* 8.1, Windows* Server 2012 or Windows* Server 2012 R2 will require the following steps to be taken:

1. Run the install executable to upgrade the RSTe driver to 3.8 or (3.7 or 3.6 or 3.5)
2. Perform the Windows* 8/8.1 (or Server 2012/2012 R2) upgrade process
3. Upon successful upgrade, the installation executable must be re-run.

This document covers the package contents, supported hardware configurations, credits, support, known issues and resolved issues.

2 Support on Internet

Support for Intel® RSTe 3.8 shall be provided via the Intel® Validation Internet Portal <https://platformsw.intel.com/>.

For answers to your Intel® C600/C610 series chipset questions and to obtain other technical collateral, please contact your local Intel FAE.

3 Package Components and Versions

Intel® RSTe 3.8.0.1111 maintenance release is the latest release package to support Windows* 8.1 and Windows* Server 2012 R2. It is available on Intel® Validation Internet Portal as a kit. The contents of this kit include the following components:

- Rapid Storage Technology enterprise
 - Supporting Documents
 - RSTe 3.8.0.1111 Release Notes
 - RSTe_3.8.0.1111_Install.zip Install package includes drivers and user applications (GUI) for all supported OS's as well as both AHCI and SCU controllers.
 - IATA_CD.exe
 - IATA_ENU.exe
 - IATA_ALL.zip

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

- IATA_CD.zip
 - IATA_ENG.zip
- RSTe Pre-OS component images and utilities
 - RSTe3.8.0.1111_PV_Pre-OS_readme.txt
 - PreOS-1029.zip
 - Intel® RSTe 3.8.0.1111 SATA Legacy RAID Option ROM image
 - Intel® RSTe 3.8.0.1111 sSATA Legacy RAID Option ROM image
 - Intel® RSTe 3.8.0.1111 SATA DOS* based RAID Configuration utility
 - Intel® RSTe 3.8.0.1111 SATA DOS* based RAID Comply utility
 - Intel® RSTe 3.8.0.1111 sSATA DOS* based RAID Configuration utility
 - Intel® RSTe 3.8.0.1111 sSATA DOS* based RAID Comply utility
 - Intel® RSTe 3.8.0.1111 SCU Legacy RAID Option ROM image
 - Intel® RSTe 3.8.0.1111 SCU DOS* based RAID Configuration utility
 - Intel® RSTe 3.8.0.1111 SCU DOS* based RAID Comply utility
 - Intel® RSTe 3.8.0.1111 UEFI SATA driver
 - Intel® RSTe 3.8.0.1111 UEFI based SATA RAID Comply utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI based SATA RAID Command Line Interface (CLI) utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI based SATA SGPIO/LED Test Command Line Interface (CLI) utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI sSATA driver
 - Intel® RSTe 3.8.0.1111 UEFI based sSATA RAID Comply utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI based sSATA RAID Command Line Interface (CLI) utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI based sSATA SGPIO/LED Test Command Line Interface (CLI) utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI SCU driver
 - Intel® RSTe 3.8.0.1111 UEFI based SCU RAID Comply utility (Secure Boot must be disabled to use this tool)
 - Intel® RSTe 3.8.0.1111 UEFI based SCU CLI utility (Secure Boot must be disabled to use this tool)
- RSTe f6 Drivers (drivers and utilities)
 - RSTe_3.8.0.1111_Drivers.zip
 - RSTe_3.8.0.1111_F6-Drivers

- Intel® RSTe 3.8.0.1111 F6 SCU Installation Drivers
 - iaStorS.free.win732bit.3.8.0.1106
 - iaStorS.free.win764bit.3.8.0.1106
- Intel® RSTe 3.8.0.1111 F6 AHCI Installation Drivers
 - iaStorA.free.win732bit.3.8.0.1106
 - iaStorA.free.win764bit.3.8.0.1106
- Intel® RSTe 3.8.0.1111 **Windows* 8(8.1)/Server 2012 (2012 R2)** F6 SCU Installation Drivers
 - iaStorS.free.win8.32bit.3.8.0.1106
 - iaStorS.free.win8.64bit.3.8.0.1106
- Intel® RSTe 3.8.0.1111 **Windows* 8(8.1)/Server 2012 (2012 R2)** F6 AHCI Installation Drivers
 - iaStorA.free.win8.32bit.3.8.0.1106
 - iaStorA.free.win8.64bit.3.8.0.1106
- RSTe CLI Staging
 - RSTe CLI Specifications.pdf
 - RSTe_3.8.0.1111_CLI.zip
 - Win32\Rstcli.exe (32-bit version)
 - X64\Rstcli64.exe
- RSTe CIM Staging
 - CIM_Readme.txt
 - setupCIM.exe

3.1 Supported Configurations

3.1.1 Intel® C600 series chipsets Silicon Stepping

- C0 (driver and firmware)
- C1 (driver and firmware)

3.1.1.1 SKUs:

All SKUs are supported (-A, -B, -D and -T) from an operational standpoint but not all of the specific SKU features have been fully implemented.

3.1.2 Intel® C220 series chipsets Silicon Stepping

The C1 stepping of the Intel® C220 series chipset (both AHCI Mode and RAID Mode) is supported.

4 Supported Platforms

This Intel® RSTe 3.8.0.1111 release package is intended to be used on customer platforms that are based off of the Intel® Romley architecture that contains the Intel® C600 series chipset as well as the Intel® Grantley platforms that contain the Intel® C610 series chipset.

Please contact your Intel FAE for up to date information related to Romley platform components.

4.1 Intel® RSTe 3.8.0.1111 Release Package Documentation

It is strongly recommended that all documentation provided with this release package be reviewed prior to installing the Intel® RSTe 3.8.0.1111 Windows* driver package.

4.2 Support

With this release, Intel will accept and process issues reported by customers. Intel makes no commitment to provide a driver update prior to the next scheduled release.

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

5 General Notes: RSTe 3.8.0.1111 - PV Release Package

5.1 New Features Included in this Release

5.1.1 Beta Support for Grantley Platforms with Intel® C610 series chipset sSATA Controller

With the release of 3.8.0.1111, introduces Beta level support for the Intel® Grantley platform with the Intel® C610 series chipset. These platforms contain two SATA controllers that can be configured for either AHCI mode or RAID mode. The first SATA controller is a six 6 Gigabits per second port controller. The second (sSATA controller) will provide an additional four - 6 Gigabits per second ports. These two controllers are treated as two separate and independent controllers. As such, the RSTe driver included in the release does not support spanning RAID volumes across the two controllers.

When running on these platforms, the customer will see two instances of the RSTe driver installed (one for each controller). To support these two controllers, the platform BIOS will need to contain two RAID Legacy OROM and/or two RAID EFI drivers (one image for each of the SATA controller).

NOTE: The RSTe driver for the Intel® C610 series chipset sSATA (AHCI) Controller is not WHQL'ed at this time. That is scheduled to be officially released in the RSTe 4.0 release.

5.1.2 Windows* 8.1 and Server 2012 R2 Support

The release of 3.8.0.1111 introduces support for Windows* 8.1 and Windows* Server 2012 R2 operating systems. These new operating systems will contain an "inbox" driver that will support the SATA controllers for the Intel® C600 and C610 series chipset Platform Controller Hub (PCH) when configured for RAID mode. It is strongly recommended that the RSTe 3.8.0.1111 F6 drivers be used instead of the available "inbox" driver. The provided "inbox" driver is intended only for those customers who may not have the RSTe 3.8.0.1111 F6 drivers readily available and ONLY for installing to a single drive (NOT to a RAID volume). Once the OS is installed, it is strongly recommended that the RSTe 3.8.0.1111 package be installed immediately. At that point, it will be safe to migrate the system disk into a RAID Volume (using the RSTe GUI).

When upgrading the existing operating system to Windows* 8.1 or Windows* Server 2012 R2, it is strongly recommended that the RSTe driver be updated to the RSTe 3.8.0.1111 package prior to the OS upgrade.

5.1.3 RSTe INF File Split

The release of 3.8.0.1111 introduces support for those customers who need to dynamically install either the 32-bit or 64-bit versions of the RSTe driver in a manufacturing environment. Now a single manufacturing environment utility can be used to install either the 32-bit or the 64-bit version of the RSTe 3.8.0.1111 driver.

5.1.4 Device Information Display in UEFI

The release of 3.8.0.1111 introduces the support of the UEFI driver reporting the physical port a device is connected to. In previous releases of the RSTe UEFI driver, the device information provided (i.e. to the UEFI shell environment) was based off of the enumeration values created during the discovery of the devices attached. To support a manufacturing environment that relies of this information to identify the physical port the device is connected too, the UEFI driver now reports out the physical port value instead of the enumerated value. The data is displayed as a set of 3 values in the following order: X-Y-Z

X - 0: passthru disk, 1: volume

Y- PHY number: 1 (phy0), 2 (phy1), 4 (phy3), 8 (phy3), 16 (phy4), 32 (phy6), 64 (phy7)

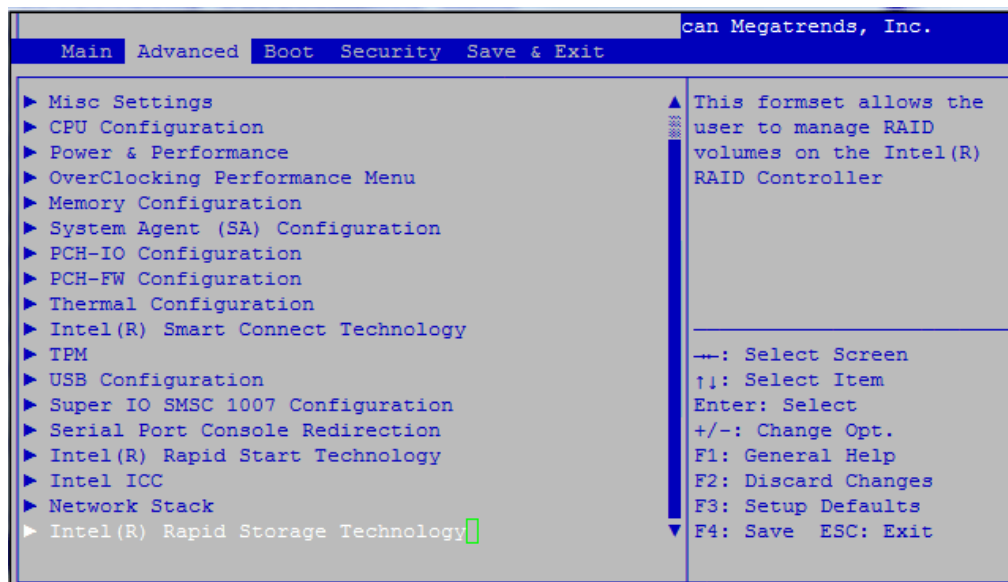
Z - disk number on PHY (in case of an expander)

5.2 Features Included in the 3.7.0.1093 Release

5.2.1 Human Interface Infrastructure (HII) support

With the release 3.7.0.1093, customers will be able to configure RAID volumes using Intel® RSTe UEFI Human Interface Infrastructure (HII). HII is a simple “Walk Up and Use” interface that allows users to create, delete, and manage RSTe RAID Volumes within the BIOS Setup Menu.

The UEFI driver will provide an entry point which can be called to invoke the HII interface. The entry point can be called from any place in the BIOS UI that an IBV chooses.



The BIOS must support the 2.3.1 UEFI Specification. In addition, the following protocols must be supported for the RSTe UEFI HII to be used in the BIOS Setup Screen:

- EFI HII PROTOCOLS
- Form Browser 2 Protocol
- Config Routing Protocol
- HII String Protocol
- HII Database Protocol

5.2.2 Expander Exposed to Device Manager

With the release of RSTe 3.7 driver, the RSTe driver now supports exposing expanders that are connected to the Storage Controller Unit (SCU). So, when the Device Manager is opened, the expander will be seen.

5.2.3 Trim on RAID0, RAID1 and RAID 10

With the release of RSTe 3.7 driver, the RSTe driver now supports TRIM on RAID1 and or RAID10 volumes. This feature is automatic and nothing is required to enable this functionality.

5.2.4 RSTe UEFI Command Line Tool to support Supports Testing SGPIO

With the release of RSTe 3.7 driver, a new RSTe UEFI CLI utility (LedTool.efi) is being introduced to support the issuing of SGPIO commands to an SGPIO enabled backplane. The purpose is to ensure that the platform SGPIO functionality is working properly in a factory environment. As before, the platform has to be booted into a UEFI Shell and LedTool.efi needs to be copied to a USB key in order to utilize this

feature. Please reference the help option available in the utility for detailed instructions.

5.2.5 RSTe GUI Supports Showing SAS Link Width

With the release of RSTe 3.7 driver, the RSTe GUI now provides support for showing the SAS Link Width. This information can be obtained by viewing the System Report.

5.2.6 SCU Controller Legacy Option ROM Splash Screen Timing Adjustment

With the release of RSTe 3.7 driver, the RSTe SCU Legacy OROM splash screen display duration is now adjustable. To utilize this feature, a change must be made to the OEM Parameter field in SPI Flash. Please reference the section 8.2 BCFS Bit Settings for detailed information.

NOTE: If no changes are made to the OEM Parameter field, there will be no change in the behavior of the SCU Legacy OROM splash screen behavior.

5.3 Features/Configuration Restrictions

The following configurations and test scenarios are not supported in this release, and as such, any issues reported against these configurations will not be accepted:

- MPIO Load Balancing in RAID Mode is unsupported
 - A SAS Wide port spanning SCU0 and SCU1 is not supported. SCU0 and SCU1 are independent units and are thus unable to combine the buffers necessary to create a combined port. Consequently, plugging both SCU's into the same SAS topology will create a multi-path IO scenario (which is unsupported).
 - Setting up this configuration is not a valid RSTe 3.0 use case. If connected in this configuration, any redundant objects will not be reported to OS upper layers.
- The SCU PHY's maximum speed is limited to 3 Gbs.
- Intel® C610 series chipset (Grantley Platforms) RAID Spanning across the two AHCI controllers is not supported
- Windows* 8/Windows* Server 2012 "inbox" driver limitations
 - With Windows* 8 and Windows* Server 2012, the "inbox" driver included does not support installing to a RAID volume. It only supports installing to a single drive. It is recommended that the RSTe F6 driver be used.
 - With Windows* 8 and Windows* Server 2012, the "inbox" driver included does not support installing to a drive greater than 2 Terabytes. The drive size reported during installation may be smaller than the actual size of the drive. It is recommended that the RSTe F6 driver be used.

- Windows 8.1/Windows* Server 2012 R2 “inbox” driver limitations
 - With Windows* 8.1 and Windows* Server 2012 R2, the “inbox” driver included does not support installing to a RAID volume. It only supports installing to a single drive. It is recommended that the RSTe F6 driver be used.

NOTE: It is highly recommended that the Platform BIOS be updated with the Pre-OS images contained in this release.

5.4 Firmware Limitations

The SCU Legacy OROM supports the following configurations:

- Recommended to be the last OROM loaded
- BIOS will need to load both SATA RAID Legacy RAID OROM and SCU RAID Legacy RAID OROM or both SATA EFI and SCU EFI drivers
 - This is to ensure that the OEM Parameters are loaded and the SCU Controller is properly configured
- POST messages are displayed only if more than one drive is attached to the SCU
- BIOS MUST support the INT15 function call to obtain the OEM Parameter information that MUST be programmed into SPI Flash
 - Please contact you FAE for additional information.

5.5 Additional Chipset Configuration Information

The PCI Device ID for the AHCI controller in RAID mode must be 0x2826. In order to program the controller to report this ID, it is necessary to set a reserved bit in the SATA Clock General Configuration Register (SCLKGC, as referenced by the latest Intel® C600 series chipset EDS). The register is in the memory mapped region of bus 0, device 31, function 2, at offset 9Ch-9Fh, bit position 9. The bit is R/WO, following the usage semantics of the Alternate ID Enable (AIE) bit.

It is Intel’s recommendation that the PCHSTRP16 strapping be left to the default –T SKU value. Please reference CDI/IBL Document No. 454672 for information on properly configuring the PCHSTRP16 strap in BIOS.

6 Specific Known Issues

This section outlines the known issues with the Intel® RSTe 3.8.0.1111.

Note: This is neither a complete nor comprehensive list.

The known issues are broken down into two sub sections. The first outlines those issues that are being worked on or are planned to be corrected in a future release. The second outlines those issues that are considered permanent erratum.

KEY:

Title	Brief description of the issue to assist in identifying whether it affects the reader's application or no
Reference #	Used to reference Intel's internal database for further follow-up on inquiry
Product	Identifies which products are affected by this issue
Version	Identified which release set versions area affected by this issue
Operating System	Where applicable, identifies which operations systems are affected by this issue
Problem Description	Additional information to help the reader determine if this issue affects their application
Resolution/Status	Provides either the current status of the issue or the targeted release for a fix

6.1 Errata

The following is a list of issues that RSTe has no current plans for resolving.

Title	Some 6 Gps HDD's do not link train to 3 Gps
Reference #	3000000
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	<p>Late in the Intel C600 series chipset release cycle, the SCU had its PHY's limited to a max rate of 3 Gps. As a consequence, some high performance drives may not link train to the lower speed.</p> <p>The advised course of action is to contact your HDD manufacturer and obtain the latest firmware for 6 Gps HDD's</p>

Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline.
--------------------------	---

Title#	SATA PHY Power Management Idle Timers May Not Be Properly Managed
Reference #	3006800
Product	Intel® RSTe 3.0
Version	3.0.0.1065
Operating System	Windows*
Problem Description	Running heavy I/O to a HIPM capable drive, on a platform that has Power Management enabled, may result in a failure condition. Workaround: Avoid running with Power Management enabled when HIPM capable drives attached.
Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	Vista and earlier OS's; RAID Volume Creation or Deletion May Result in Event Log Error
Reference #	3006850
Product	Intel® RSTe 3.0
Version	3.0.0.1019
Operating System	Windows*
Problem Description	Creating or deleting a RAID volume may result in an error being reported to the System Event Log. The storport driver may fail to recognize the surprise removal flag exported by the driver.
Resolution/Status	No plans to resolve this issue in the RSTe 3.x product baseline.

Title#	The 'Browse Back' Button in the RSTe UI May Not Be Functioning Properly
Reference #	3006893
Product	Intel® RSTe 3.0
Version	3.0.0.1047
Operating System	Windows*
Problem Description	When viewing the Help topics from the RSTe UI, on some topics (e.g. Managing Volumes), the 'Browse Back' option may not function properly
Resolution/Status	No plans to resolve this issue in the RSTe 3.x product baseline.

Title#	Rename Volume - Upon Rename the Page May Jump to First Enumerated Disk
Reference #	3007075
Product	Intel® RSTe 3.0
Version	3.0.0.1062
Operating System	Windows*
Problem Description	After renaming a volume, the UI jumps to the first enumerated disk and displays that disk properties. Expected behavior should be that the 'Volume Properties' page refreshes with the new volume name and stays at that page.
Resolution/Status	No plan to resolve this issue in the RSTe 3.x baseline.

Title#	RSTe UI Create Wizard May Lose Disk Focus
Reference #	3234466
Product	Intel® RSTe 3.0
Version	3.0.0.1080
Operating System	Windows*
Problem Description	While using the RSTe UI after selecting a disk the Create wizard focus may return to the top of the drive list instead of staying on the selected disk.
Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	Selecting the Create Wizard or Help Button May Take Some Time to Launch
Reference #	3234469
Product	Intel® RSTe 3.0
Version	3.0.0.1080
Operating System	Windows*
Problem Description	When running the RSTe 3.0 UI selecting the Create Wizard or Help buttons may take some time before they launch.
Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	Running Heavy IO to 256 Drives May Fail
Reference	3234607
Product	Intel® RSTe 3.0

Version	3.0.0.1080
Operating System	Windows*
Problem Description	Running in a configuration of 256 drives running heavy I/O (like IOmeter) with a block size of 512 bytes and a queue depth of 8 may result in an I/O failure. RSTe only supports a single level of expanders.
Resolution	No plan to resolve this issue in the RSTe 3.0 product baseline.

Title	Windows* 2003 Server 64 bit Cannot be Installed on a RAID volumes (AHCI or SCU Controllers)
Reference #	3234688
Product	Intel® RSTe 3.0
Version	3.0.0.1080
Operating System	Windows*
Problem Description	<p>The In Box installation image for Windows 2003 does not support the Microsoft Storport Miniport Driver Model. Microsoft made enhancements to the Storport Miniport architecture that was implemented following the release of Windows 2003. Microsoft made a Hot-Fix available for download. This issue will be encountered only when accessing a RAID volume. For more detailed instruction on applying the Hot-Fix to the installation images can be found http://technet.microsoft.com/en-us/library/cc766320(ws.10).aspx Workaround: On platforms with C0 C600 series chipsets:</p> <p>Install to a single Pass-thru disk Apply the appropriate Hot-Fix to bring the StorPort driver up to current standards. * The hotfix can be downloaded at: http://support.microsoft.com/kb/932755 Reboot the system Use RSTe GUI to create the desired RAID Volume from the existing boot drive.</p> <p>Note: using B0 C600 series chipset may not support installing Windows* 2003 due to a known errata that was fixed in C0.</p>
Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline.

Title	'Remove Safely' not presented when eSATA drives are attached
Reference #	3235187
Product	Intel® RSTe 3.0

Version	3.0.0.1080
Operating System	Windows*
Problem Description	When a drive is attached to an eSATA port, Windows is not notified that an external, and thus removal, drive is present.
Resolution/Status	No plan to resolve this issue in the RSTe 3.x product baseline

Title#	A system failure may occur when Hot Plugging Expander configuration with many drives.
Reference	3235324
Product	Intel® RSTe 3.0
Version	3.0.0.1111
Operating System	Windows*
Problem Description	When Hot Plugging more than 120 Drives using multiple Expanders that are Daisy Chained and plugged into the SCU phy 1 and 2 ports causes a BSOD D1 while hot plugging the 121st Disk on an Expander that has a free open slot.
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline

Title#	RSTe driver version may appear to be older than Intel(R) C600 series chipset driver version
Reference	3235327
Product	Intel® RSTe 3.0
Version	3.0.0.1111
Operating System	Windows*
Problem Description	When installing the RSTe driver on Intel(R) C600 series chipset based platform (after the chipset drivers have been installed), the installation process may report that the chipset driver version is newer than the RSTe driver version.
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline

Title#	System May Crash with a 0xD1 Error When Hot Plugging more than 120 Drives using Expanders that are Daisy Chained on SCU Ports
Reference	3235502
Product	Intel® RSTe 3.0

Version	3.0.0.1019
Operating System	Windows*
Problem Description	When Hot Plugging more than 120 Drives using multiple Expanders that are Daisy Chained and plugged into the SCU phy 1 and 2 (ports) may result in a system crash (BSOD 0xD1) while hot plugging the 121st Disk on an Expander.
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	RSTe 3.0 GUI May Show the Port of a Hot-plugged Drive as Unknown
Reference	3236248
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Win7
Problem Description	When hot-plugging drives, the RSTe 3.0 GUI information bubble may randomly show the port of the hot plugged device as unknown.
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	WHQL Audio Fidelity Test fails with HDD or SSD boot/data disks on Intel controllers
Reference	3236685
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	WHQL Audio Fidelity Test fails with HDD or SSD boot/data disks on Intel controllers
Resolution	Issue root caused to Microsoft WHQL test. Please refer to latest updates on this issue @winqual.microsoft.com.

Title#	Flashing Cursor May Be Seen When Booting With the RSTe SCU Legacy OROM
---------------	---

Reference	4159273
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	When booting from the SCU controller using the RSTe SCU Legacy OROM UI may result in a flashing cursor when the focus changes from one menu option to the next.
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	System May Become Unresponsive Under Certain Stress Testing
Reference	CCG0100297804
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	<p>With the 3.1.0.1068 maintenance release, some performance modifications/improvements have been implemented. One modification was the addition of a performance specific registry key (PerformanceOptimizationsEnable) in the INF file. The default setting (established in the 3.1.0.1068 release) improves the performance of installations of the OS and other applications such as Windows* Live Essentials.</p> <p>On systems configured with 5 or more high performance SAS drives connected to the SCU controller, running specific small block I/O heavy stress tests (e.g. IOMeter 512 Byte Sequential READs) may result in the system becoming unresponsive. This unresponsiveness can become more pronounced with more drives attached and (the corresponding) heavier stress load placed on the system. Under some conditions, if stopping the I/O test does not recover, a system reboot may be required.</p> <p>It is believed that this issue will only be encountered with 5 or more high performance SAS drives running IOMeter 512B Sequential READs stress test. The architecture of IOMeter in conjunction with the RSTe optimizations create a potential scenario were the CPU's</p>

	<p>(that are processing the I/Os) are 100% utilized and the system becomes unresponsive. It is possible that a custom kernel based (not application) stress tool may potentially encounter this issue. Application based stress tools will not encounter this issue.</p> <p>Workaround: Go into the registry and change the value of PerformanceOptimizationsEnable from 0 to 1. Exit the registry edit tool and reboot the system.</p>
Resolution	No plan to resolve this issue in the RSTe 3.x product baseline.

Title#	Rapid Hot-Plugging of an Expander Can Result in the RSTe UI Becoming Unresponsive
Reference	CCG0100467978/4160879
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	<p>When attempting to perform a (or series) of rapid hot-plugs (remove and quickly re-insert) expanders connected to the SCU controller can result in the RSTe UI becoming unresponsive.</p> <p>Work around: Closing and reopening the RSTe UI usually resolved the issue.</p>
Resolution	Not plan to resolve this issue.

Title#	RSTe Installer Does Not Look For RAID Metadata
Reference	CCG0100616963
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	<p>When running in a configuration with the AHCI Controller is in AHCI Mode and the OS installed using the Microsoft Inbox driver (on a drive attached to the AHCI Controller), running the RSTe installer may result in the system becoming unbootable with no recovery method.</p>

	<p>This corner case condition will only happen if the drive used to install the OS was previously part of an RSTe RAID0 volume and that drive was not properly cleaned prior to OS installation.</p> <p>Workaround: Ensure that all system installations are performed on a new drive. If that is not possible use the latest rcfgsata.exe (or.efi) utility to remove any RAID metadata that may exists on the drive before using.</p>
Resolution	Not plan to resolve this issue.

6.2 Known Issues Being Worked

The following issues are presented in numerical order

Title#	Hot-plug an Expander While IO is Running May Result in the Disks Going Offline
Reference	3235625
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows 2003 64-bit
Problem Description	Hot-plugging an expander while I/O is being performed may result in the disks not being rediscovered and going offline.
Resolution	Issue to be resolved in future release.

Title#	RSTe UI May Not Show Whole FW of HDD attached
Reference	3236733
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	When reviewing device Manufacturer and Model Number, the information displayed in the RSTe GUI may not match what is shown in the RSTe System Report.
Resolution	Issue to be resolved in future release.

Title#	RSTe Legacy RAID option ROMs May Conflict and Prevent Other option ROMs From Running Properly
Reference	4159230
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	When booting a system using RSTe Option ROMs a memory conflict may occur, causing problems with other vendor Option ROMs in the system and prevent them from running properly.
Resolution	Issue to be resolved in future release.

Title#	RSTe RAID Volume May Become Degraded with Multiple Bad Blocks
Reference	CCG0100466365/4160877
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	When running in a configuration where an RSTe RAID Volume resides on drives that have multiple Bad Blocks, the RAID Volume may become degraded.
Resolution	Issue to be resolved in a future release.

Title#	Bootting From a Degraded RAID Volume With Some 512e Drives May Take Several Minutes
Reference	4629096
Product	Intel® RSTe 3.0
Version	3.6.0.1093
Operating System	Windows*
Problem Description	When running in a configuration containing a bootable RAID volume (on 512e HDDs) if the RAID volume is degraded the system may take several minutes to boot.
Resolution	Issue to be resolved in a future release.

Title#	RSTe Running S4 Cycles May Encounter A System Crash With
---------------	---

	mSATA SSDs
Reference	4629999
Product	Intel® RSTe 3.0
Version	3.7.0.1093
Operating System	Windows*
Problem Description	When running in a configuration with mSATA SSDs, running S4 cycle testing may encounter a system crash with a 0x7A bug check code.
Resolution	Issue to be resolved in a future release.

Title#	SCU HDD Activity LED May Not Work Properly
Reference	4630000
Product	Intel® RSTe 3.0
Version	3.7.0.1093
Operating System	Windows*
Problem Description	The signal used to generate the general SCU HDD activity signal may not be properly activated during disk I/O.
Resolution	Issue to be resolved in a future release.

Title#	Installing/Upgrading to Windows* 8.1/Server 2012 R2 on the AHCI Controller in RAID Mode May Not Work Properly
Reference	CCG0100697083
Product	Intel® RSTe 3.0
Version	3.7.0.1093
Operating System	Windows* 8.1/Server 2012 R2
Problem Description	<p>When running in a configuration where the Intel® C600/C610 series chipset has its AHCI Controller in RAID Mode, installing (or upgrading to) Windows* 8.1/Server 2012 R2 may not install (or upgrade) properly.</p> <p>With the release of Windows* 8.1/Server 2012 R2, Microsoft has included a third party vendors inbox driver that includes support for the Device ID reserved for Intel's RSTe AHCI/SATA</p>

	<p>RAID mode driver.</p> <p>The inclusion of these reserved ID's within the (third party) inbox driver may prevent customer from being able to use the RSTe driver to install (or updated to) the latest Microsoft's OSes.</p> <p>For new installations, the attached devices will not show up, prompting the use of the F6 load driver option. During the loading of the RSTe driver, Windows will make the determination that the existing (third party) inbox drive is the better, more appropriate driver to use and will install that driver. Windows does not install the RSTe driver. This results in no drives showing up, so the OS cannot be installed.</p> <p>For upgrades on platforms that are running Windows* 8.0/Server 2012 with RSTe, running the OS upgrade process will result in the (third party) inbox driver over writing the RSTe driver, rendering the system unbootable and unrecoverable. The systems that are impacted will contain the following Subsystem IDs (as part of their Device ID identification):</p> <p>11B61734, 28228086, 72708086, 04811014, 04851014, 047D1014, 201019E5, 201219E5, 201319E5, 201519E5, 201619E5, 201B19E5, 201D19E5, 201F19E5, 306E1054</p>
Resolution	Issue to be resolved in a future release.

6.3 Issues Resolved in the Maintenance Release 3.8.0.1111

The following issues have been resolved with the release of the Intel® RSTe 3.0 PV driver version 3.8.0.1111 maintenance release package.

Title#	RSTe May Not Properly Handle TRIM On Win8/Server2012 Systems
Reference	4628968
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	When installing RSTe onto a system running Windows* 8 or Windows Server 2012, TRIM commands may not be processed properly to SSD attached to the system. One symptom would be that the SSD may not be properly reported to the Windows*

	device manager, which may show up as an HDD.
Resolution	Issue resolved in the 3.8.0.1111 release.

Title#	LUN Reset Request on System Time Change
Reference	100671322
Product	Intel® RSTe 3.0
Version	3.8.0.1106
Operating System	Windows*
Problem Description	If the system clock change occurs while an IO is in progress, the IO appears to exceed a timeout period and the SATA link is reset. Under heavy IO load, the disk appears to become unresponsive.
Resolution	Issue resolved in the 3.8.1111 release.

Title#	RSTe May Not Operate Properly When TRIM is Enabled
Reference	4629372
Product	Intel® RSTe 3.0
Version	3.8.0.1106/3.6.0.1086
Operating System	Windows* 7 (32 bit and 64 bit)
Problem Description	When operating in a system with SSDs, running heavy I/O to the drives while enabling TRIM may result in the system running out of memory.
Resolution	Issue resolved in the 3.8.0.1111 release.

Title#	After install RSTe v3.6, The System May Not Be Able To Install Other Drivers
Reference	4161418
Product	Intel® RSTe 3.0
Version	3.6.0.1086
Operating System	Windows*
Problem Description	When installing (or updating) a system using RSTe 3.6, the system may be able to install other drivers.

Resolution	Issue resolved in the 3.8.0.1111 release.
-------------------	---

Title#	RSTe GUI May Fail to Create a RAID Volume Using the System Disk
Reference	4628601
Product	Intel® RSTe 3.0
Version	3.7.0.1093
Operating System	Windows*
Problem Description	<p>When running in a system configured with the OS installed onto a GPT partition, creating a RAID volume that includes the system disk may encounter a condition where the RSTe GUI may not have a “Create” option. In some other cases, the “Create” option is available, but the RAID creation will fail with the following error message:</p> <p>An unknown error occurred during the volume creation process. Please try creating the volume again”</p> <p>This is because a GPT partition allows more of the disk space to be used by the OS than is utilized on MBR partition. As a result, RSTe may not have enough disk space to store the required RSTe metadata. When this happens, the RSTe GUI will not be able to create a RAID volume utilizing the system disk.</p>
Resolution	<p>When installing the OS, manually create the partition leaving at least 5MB of space unallocated.</p> <p>If the system is already operational a few extra manual steps are required to make “Create From Source Disk” available when creating a RAID volume. The strategy is simply to shrink the GPT partition of the Source Disk to approximately 5MB less than the capacity of the Source Disk itself. To shrink the GPT partition by 5MB there must be at least 5MB of unused capacity in the GPT partition and the GPT partition may need to be defragmented so that the 5MB of unused capacity can be neatly removed from the GPT partition. Therefore the user must take the following steps in Win7* to make Create From Source Disk available:</p> <p>Open the Windows* Disk Management Utility and view how much Unallocated Space is at the end of the disk. If the Unallocated Space is ≥ 4.209MBs then the Create From Source Disk option should be available. If not then continue to step 2</p>

	<p>Open the Windows* Disk Properties and in the General tab press the Disk Clean-up button. When the clean-up is completed then read the Free Space. If the Free Space is \geq ~8MB then go to step 4 Delete some files until the Free Space is ~8MB. Empty the Recycle Bin. Go back to step 2.</p> <p>In the Windows* Disk Properties Tools tab press the Defragment Now button.</p> <p>In the Windows* Disk Management Utility right-click on the partition closest to the end of the disk and choose Shrink Volume. Shrink the Volume. On the "Enter the amount of space to shrink in MBs" line, enter 5MBs. Go to step 1.</p>
--	--

6.4 Issues Resolved in the Maintenance Release 3.7.0.1093

The following issues have been resolved with the release of the Intel® RSTe 3.0 PV driver version 3.7.0.1093 maintenance release package.

Title#	Parity Errors May be Encountered During the Verifying Process Following a Volume Expansion
Reference	3236922
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	Using the RSTe OROM to create a two drive RAID1 volume at 50% capacity and then using the RSTe GUI to increase the volume capacity, a parity error may be encountered during the verification process.
Resolution	Issue resolved in the 3.7.0.1093 release.

Title#	System May Not Properly Resume with the Boot Drive on AHCI Controller After RAID Failure on the SCU Controller
Reference	4159245
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem	When running in a configuration where the boot drive is on the AHCI Controller and there is a RAID volume on the SCU

Description	Controller; resuming from hibernation may fail if the RAID volume (on the SCU Controller) is in a failed state at the time of the system hibernation.
Resolution	Issue resolved as a third party issue, not with RSTe.

Title#	RSTe GUI May Not Provide a “change type” Option for Migrating a 4-Drive RAID10
Reference	4160488
Product	Intel® RSTe 3.0
Version	3.5.0.1096
Operating System	Windows*
Problem Description	When running in a configuration with the system OS installed onto a 4-drive RAID10, attempting to migrate the RAID10 system volume to another (supported) RAID volume by not be properly supported in the RSTe GUI. The option for “change type” may not be available.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	Intel RSTe GUI Mapping of Alphabet Characters in the Glossary to Sections in the Glossary May not Function Properly
Reference	4160499
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	Intel RSTe GUI Mapping of alphabet characters in the glossary to sections in the glossary may not function properly for non-English characters. For example clicking the Ø in a non-English alphabet at the top does not navigate to the Ø section.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	RSTe GUI May Not Be Able To Generate Test Email Messages
Reference	CCG0100460438

Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	When attempting to send a test email message, from the RSTe UI, may not complete and a pop up message indicating a failure may appear.
Resolution	Issue resolved as expected behavior.

Title#	System May Become Unresponsive With an Expander
Reference	CCG0100283502
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	SCU Legacy OROM
Problem Description	When running in a configuration with the boot drive directly attached to SCU0 and an expander attached to SCU1, the system may become unresponsive during boot.
Resolution	Issue resolved in the 3.7.0.1093 release.

Title#	Attempting to Create a RAID Volume on Disk with a SMART Event May Complete Successfully
Reference	CCG0100467974/4160878
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	When attempting to create a RAID Volume on a Disk with a SMART Event may complete successfully. Work around: The RSTe UI should be reporting the SMART event, so avoid creating a RAID Volume on a drive with a reported SMART event.
Resolution	Issue resolved as expected behavior.

Title#	System Crash May Occur with a RAID Volume Name Greater Than 16 Characters
Reference	CCG0100471412/4160881
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	When creating a RAID Volume and attempting to name that volume with more the 16 characters may result in a system failure with an error code of 0xD1. Work around: Please keep all RAID volume names less than 16 characters.
Resolution	Issue resolved in the 3.7.0.1093 release.

Title#	RSTe May Not Properly Support Performing a "Copy Disc" Function
Reference	4161481
Product	Intel® RSTe 3.0
Version	3.2.0.1134
Operating System	Windows*
Problem Description	When attempting to perform a "Copy Disc" function from one CD-RW to another CD-RW, the RSTe driver may not properly support this functionality.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	RSTe May Not Support Increasing a System Volume Beyond 2TB.
Reference	41628178
Product	Intel® RSTe 3.0
Version	3.5.0.1101
Operating System	Windows*
Problem	When running in a configuration where the system RAID volume needs to expand beyond 2TB (generally in a GPT partition), the

Description	RSTe GUI may not properly support that functionality.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	RSTe May Not Support Installing the OS on a >3TB Volume on the SCU Controller
Reference	CCG0100643146
Product	Intel® RSTe 3.0
Version	3.5.0.1101
Operating System	Windows*
Problem Description	When attempting to run in a configuration with RAID volumes greater than 3TB on the SCU Controller, rebooting may result in some of the drives not showing of or showing up as non-raid disks.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release (PreOS package).

Title#	RSTe May Not Properly support Migrating From a 2-Disk RAID1 to 3 or More Disk RAID0
Reference	4628173
Product	Intel® RSTe 3.0
Version	3.6.0.1093
Operating System	Windows*
Problem Description	When running in a configuration with 4 or more SAS drives attached to the SCU Controller, the RSTe GUI may not properly support migrating a 2-disk RAID 1 volume to a 3 or more driver RAID0 volume.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	RSTe GUI May Not Properly Support Expanding a System RAID Volume
Reference	4628175
Product	Intel® RSTe 3.0
Version	3.6.0.1093
Operating	Windows*

System	
Problem Description	When attempting to expand a system RAID volume, the RSTe GUI may not properly support this capability.
Resolution	Issue resolved in the RSTe 3.7.0.1093 release.

Title#	Events May Not Be Logged Into Event Log If a RAID Volume Is Degraded Before IASTorDataMgrSvc Service Starts
Reference	4627716
Product	Intel® RSTe 3.7
Version	3.6.0.1093
Operating System	Windows*
Problem Description	Create a RAID data volume. Power off the system and remove a drive as OS is loading before IASTorMgrSvc started. Notice that event about degraded volume is not logged into the Event log.
Resolution	Issue resolved in the 3.7.0.1093 release.

Title#	RSTe UI may crash when coming out of S4 and S3
Reference	4628499
Product	Intel® RSTe 3.6.0.1093
Version	3.7.0.1093
Operating System	Windows*
Problem Description	Create a RAID data volume. Boot into OS and open the RSTe UI. Put the system in S3 or S4. Wait until the system goes into power state completely. Wake up the system and repeat the cycle few times and you may see the UI crash and the event "Application Error" logged into event log.
Resolution	Issue resolved in the 3.7.0.1093 release.

Title#	Tray Icon State May Not Reflect the Current State Of the Raid Volume
Reference	4628661
Product	Intel® RSTe 3.0

Version	3.6.0.1093
Operating System	Windows*
Problem Description	Create an RAID volume in Pre-OS. Boot to OS and see that the tray icon shows a green check. Log off and remove a drive from the RAID volume and Log on. Observe that the tray Icon still shows green check until UI is launched.
Resolution	Issue resolved in the 3.7.0.1093 release.

6.5 Issues Resolved in Maintenance Release 3.6.0.1093

The following issues have been resolved with the release of the Intel® RSTe 3.0 PV driver version 3.6.0.1093 maintenance release package.

Title#	Manufacturer and Model Number May Not Match Between RSTe GUI and RSTe System Report
Reference	3236407
Product	Intel® RSTe 3.0
Version	3.0.0.3011
Operating System	Windows*
Problem Description	When reviewing device Manufacturer and Model Number, the information displayed in the RSTe GUI may not match what is shown in the RSTe System Report.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	Potential Data Loss When Using Solid State drives (SSDs) That Do Not Support Power Safe Write Cache
Reference	3237087
Product	Intel® RSTe 3.0
Version	All Prior Versions
Operating System	Windows*
Problem Description	A potential compatibility conflict exists between the Intel® Rapid Storage Technology enterprise (Intel® RSTe) driver (outlined in Table 1) and current production Solid State drives (SSDs) that

	do not have support for power safe write cache. The compatibility conflict can manifest itself in different ways and is exposed during either a platform Hibernation (S4) or a Safe Shutdown. The majority of the time the system is able to recover, but in the worst (corner) case scenario data loss can occur.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	System May not Restart Automatically When Prompted After Installation
Reference	4159208
Product	Intel® RSTe 3.0
Version	3.0.1.7039
Operating System	Windows*
Problem Description	When running setup to install the Intel RSTe package, once the installation is complete, the system may not properly restart after selecting "Yes, I want to restart this computer now".
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	RAID Volume May Be Degraded After an S3 Resume
Reference	4159130
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	In a system where a RAID volume consists of drives that are not identical, the volume may come up 'degraded' on S3 resume.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	The Number of Drives Shown and the Number of SATA Ports Reported in Intel RSTe GUI May Not Be Consistent
Reference	4160498
Product	Intel® RSTe 3.0
Version	3.5.0.1101

Operating System	Windows*
Problem Description	When running in a RAID configuration the RSTe GUI's report of SATA ports may vary and may not match the number of devices attached.
Resolution	Issue is not an RSTe issue but a 3 rd party vendor issue.

Title#	RSTe EFI Tools May Not Function Properly in a Secure Boot Environment
Reference	4160803
Product	Intel® RSTe 3.0
Version	All Prior Versions
Operating System	EFI Shell under Secure Boot
Problem Description	When running in a configuration where the system BIOS is configured with Secure Boot enabled, attempting to run the RSTe EFI tools may result in an error. The 3.6.0.1093 release package now includes a Microsoft* signed version of the RSTe EFI tools.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	RSTe Driver Copyright Date May Not Be Correct
Reference	CCG0100466367/4160874
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	After installing the RSTe package and the system rebooted; viewing the Controller properties through Device Manager may properly report Copyright 1994-2012.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	Attempting to Migrate a RAID Volume May Result in a System Failure with the Error Code of 0xD1
---------------	---

Reference	CCG0100532122/4160882
Product	Intel® RSTe 3.0
Version	3.5.0.1101
Operating System	Windows*
Problem Description	When attempting to use the RSTe 3.5 UI to migrate a RAID volume may result in a system failure with the error code of 0xD1.
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	SCU RAID Volume May Fail During a System Restart
Reference	4161046
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	<p>When running in a system configured to boot using the RSTe Legacy OROMs; with the system boot drive on the AHCI controller and RAID data volumes on drives connected to the SCU controller; performing a system restart may result in the RSTe SCU Legacy OROM reporting the SCU RAID data volume as failed.</p> <p>The condition where this error was encountered is most likely encountered if the drive being used take a bit longer to spin up then standard drives.</p>
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	RSTe GUI May Report an "Unknown error" After Deleting a Volume Following a ROHI Rebuild
Reference	CCG0100282658
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*

Problem Description	When running in a configuration with Rebuild on Hot Insert (ROHI) enabled, removing a data volume after a ROHI rebuild occurs and completes may result in the RSTe GUI reporting an "Unknown Error".
Resolution	Issue resolved in the 3.6.0.1093 release.

Title#	RSTe UI Copyright Date May Not Be Correct.
Reference	CCG0100476106
Product	Intel® RSTe 3.0
Version	3.2.0.1135
Operating System	Windows*
Problem Description	When selecting the 'Help' button in the RSTe UI and then selecting the 'About' button may not properly report Copyright 1994-2012 as the copyright information.
Resolution	Issue resolved in the 3.6.0.1093.

Title#	Serial Number of SATA Disk Connected to the SCU Controller May be Reported Incorrectly
Reference	CCG0100460461
Product	Intel® RSTe 3.0
Version	3.5.0.1101
Operating System	Windows*
Problem Description	When running in a system with Windows* 8 or Server 2012, the serial number for a SATA disk attached to the SCU controller may be incorrectly reported in Device Manager.
Resolution	Issue resolved in the 3.6.0.1093 release.

6.6 Issues Resolved in Maintenance Release 3.2.0.1135

The following issues have been resolved with the release of the Intel® RSTe 3.0 PV driver version 3.2.0.1135 release package.

Title#	An Empty Port in a Direct Attached Configuration May Not be Properly reported in the UI or System Report
---------------	---

Reference	3235080
Product	Intel® RSTe 3.0
Version	3.0.0.1111
Operating System	Windows*
Problem Description	RSTe 3.0 may not properly report the status of an empty port (in a direct attached configuration) for the AHCI controller or SCU controllers.
Resolution	Issue to be resolved in a future release.

Title#	RSTe 3.0 GUI May Not Allow the Size of a RAID Volume to be Modified if there is Data on One of the Disks
Reference	3235416
Product	Intel(R)RSTe 3.0
Version	3.0.0.3002
Operating System	Win7-64
Problem Description	When using the RSTe 3.0 GUI to create a RAID volume with one of the drives containing data to be maintained; after the disk has been selected (to keep the data) the size may no longer be allowed to change. This condition may impact RAID 0, 5 and 10.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	System Report May Show Too Many Ports
Reference	3235419
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Win7-64
Problem Description	When viewing the System Report on a platform running with RSTe 3.0 the report may display too many ports. (i.e. it may report 10 AHCI Controller ports when there are only 6)
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	RSTe 3.0 Driver May Not Support CSMI SCSI Pass Thru Calls to the SCU Controller on all Romley Based Platforms
Reference	3235582
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	When running on a Romley based platform with the RSTe 3.0 driver, CSMI SCSI Pass Thru calls may not function properly on all platforms.
Resolution	Issue to be resolved in a future release.

Title#	RSTe GUI Showing "Mode:RAID" for AHCI Controller when it is in "AHCI Mode"
Reference	3236822
Product	Intel® RSTe 3.0
Version	3.0.0.3011
Operating System	Windows*
Problem Description	When running with the AHCI Controller in AHCI Mode" the RSTe GUI may show that the controller is in "RAID" mode."
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	RSTe 3.0 may prevent the Intel SSD Toolbox from working properly
Reference	3236839
Product	Intel® RSTe 3.0
Version	3.0.0.1023
Operating System	Vista Windows XP-64
Problem Description	Installing RSTe3.0 may rename the storage devices present on the system, and as a result may block the functionality of Intel SSD Toolbox (official Intel user app for running TRIM maintaining health of SSD storage devices). This issue may also impact various PASSTHROUGH commands.

Resolution	Issue resolved in the 3.2.0.1135 release.
-------------------	---

Title#	SGPIO is not Enabled By Default in RSTe 3.0
Reference	3236877
Product	Intel® RSTe 3.0
Version	3.0.0.1023
Operating System	Windows Vista/2008R1
Problem Description	To support Hibernate on Vista and Windows 2008 R1 SGPIO was disabled by default. To enable SGPIO support the following registry key is required to be added to the registry: [HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\iaStorA\Parameters\Device] LED_Supported"=dword:00000001"
Resolution	Issue resolved in the 3.2 release.

Title#	Install Windows 2003 SP2 onto a Drive Connected to the SCU Controller May Fail
Reference	3237063
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	Attempting to install Windows 2003 SP2 on to a drive attached to the SCU Controller may stop at the "Setup is starting Windows" screen of the installation process.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	The RSTe GUI May Show an Error Message.
Reference	3237089
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	When installing an OS onto a system that contains multiple ODDs, after installing the RSTe package, the RSTe GUI may show an error

	message.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	Array Disk Write Cache State May Turn to Disable from Enable when Resuming from S4
Reference	3237184
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	When resuming from an S4 with the Array Disk Write Cache state "enabled", the Pre-OS environment may switch the state to "disabled" for all available arrays.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	RSTe GUI unable to open w/ RAID volumes w/ same names on each controller
Reference	4159105
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	When running in a configuration where the PreOS environment may have been used to create two RAID volumes with the same name, the RSTe GUI may not open properly.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	Attempting to boot into Safe Mode May Result in a System Failure
Reference	4159219
Product	Intel® RSTe 3.0
Version	3.1.0.1085
Operating System	Windows*
Problem Description	Attempting to boot a system with RSTe 3.0 by result in the system encountering a critical error condition.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	The CSMI_SAS_STP_PASSTHRU IOCTL May Fail on a RAID 5 Volume on The SCU Controller
Reference	4159464
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	When attempting to issue a CSMI_SAS_STP_PASSTHRU IOCTL call to a RAID5 Volume (attached to the Intel SCU controller) an error code 170 (Resource busy) may be encountered.
Resolution	Issue to be resolved in future release.

Title#	WD 6Gig SAS Drive fix implemented in 3.1 is adding up to 1 minute per drive delay during OROM post.
Reference	4159851
Product	Intel® RSTe 3.0
Version	3.0.0.3002
Operating System	Windows*
Problem Description	When attempting to use 6Gig SAS Western Digital hard disk drives, the system may encounter a 30-60 second delay (per drive) while booting. The screen may be blank during this time giving the impression that the system may be locked up.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	RSTe 3.1 GUI May Not Open with 2 RAID Volumes with the Same Name Present
Reference	CCG0100295956
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	When running in a configuration with two (or more) RAID volumes with the same name, the RSTe 3.1 GUI may not open properly. This issue may be seen with whether the two same named volumes are on a single controller or split between the AHCI and SCU controllers.

	Workaround: Avoid having the multiple RAID volumes with the same name.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	RSTe UI to support SES commands for LED's to Expanders
Reference	CCG0100334980
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	The RSTe UI did not send SES messages to control LED's on expanders.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	IOCTL_STORAGE_QUERY_PROPERTY with StorageDeviceSeekPenaltyProperty Descriptor returns error
Reference	CCG0100357733
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	The StorageDeviceSeekPenaltyProperty descriptor may not be properly supported.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	PreOS Intel C600 series chipset SCU Controller Recipe Update
Reference	CCG0100363055
Product	Intel® RSTe 3.0
Version	3.1.0.1068
Operating System	Windows*
Problem Description	<p>To improve the RX Performance on the Intel C600 series chipset SCU controller, a recipe update has been made to the RSTe PreOS Packages in the RSTe 3.2 release.</p> <p>It is highly recommended that the system BIOS be updated with the</p>

	PreOS images provided with this package.
Resolution	Issue resolve in the 3.2.0.1135 release

Title#	System May Fail during a Warm Start
Reference	CCG0100420738
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	While performing multiples/continuous warm starts, a system failure may be encountered with an error code of 0x9F.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	System May be Unable to Perform S4 Resume
Reference	CCG0100423325
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	The system may encounter a system failure during S4 resume.
Resolution	Issue resolved in the 3.2.0.1135 release.

Title#	System May Fail with Error Code 0x7A during a Sleep Cycle
Reference	CCG0100432073
Product	Intel® RSTe 3.0
Version	3.0.0.3020
Operating System	Windows*
Problem Description	While performing S3 cycle testing, the system may encounter a system failure with the error code of 0x7A.
Resolution	Issue resolved in the 3.2.0.1135 release.

7 Hardware Compatibility

7.1 External Hardware Compatibility

The embedded file indicates the current list of external hardware used in validation and is subject to change without notice. Please contact your factory representative for questions on any specific hardware item.

Enterprise SAS Drives

Vendor	Family	Model Name/Number
Fujitsu	AL9Se Series (2.5")	MAY2036RC
Fujitsu	AL9LX Series (3.5")	MAX3036RC,
Fujitsu	AL10Se Series (2.5")	MBB2 Series
Seagate	SAS	Barracuda ES.2 7.2k rpm
Seagate	SAS	Cheetah 15k.6 ((3.5"))
Seagate	SAS	Cheetah 15K.4 (3.5")
Seagate	SAS	Cheetah 15K.5 (3.5")
Seagate	SAS	Cheetah 15K.7
Seagate	SAS	Savvio 10K.1 (2.5")
Seagate	SAS	Savvio 10K.2 (2.5")
Seagate	SAS	Savvio 15K.1 (2.5")
Seagate	SAS	Cheetah NS
Hitachi	Ultrastar 15K147 3.5" (Viper A')	HUC101473CSS300,
Hitachi	Ultrastar 15K147 3.5" (Viper B)	HUS153014VLS300,HUS153073VLS300
Hitachi	Ultrastar C10K147 2.5" (Cobra B)	HUC101473CSS300,

Enterprise SATA Drives

Vendor	Family	Model Name/Number
Fujitsu	A160 (2.5") 7200 RPM FDE Option Extended Duty	MHZ2080BK
Hitachi	Ultrastar A7k1000 (3.5")	

	7.2rpm	
Seagate	Barracuda 7200.10 Serial ATA	
Seagate	Barracuda 7200.11 Serial ATA	
Seagate	Barracuda ES	
Western Digital		WD1002FAEX
Western Digital		WD6000HLHX

Expanders and Enclosures

Vendor	Model Number
LSI	LSISAS2x36
LSI	LSISAS2x28
LSI	LSISAS2x24
PMC Sierra	PM8005 SXP
PMC Sierra	PM8004 SXP
LSI/Engenio	LCA Dx ESM JBOD (2u enclosure)
Adaptec	ASE-335 (Miramar)
Adaptec	SANbloc S50 (Enzo)
Adaptec	EVO
AIC	XJ1100
AIC	XJ1100
AIC	EM16-53C-01A2
AIC	EM24-54C-01A1
Dell	PowerVault MD1000
Dell	PowerVault MD1200
Dell	PowerVault MD1220
Dell	PowerVault MD3200
Dell	PowerVault MD3220

IBM	DS3500
Xyratex	RS1603X
Supermicro	CSE-M28E1
Supermicro	CSE-M28E2
Supermicro	SC836E1-R800V
ICY Dock	MB453SPF
ICY Dock	MB454SPF-B
ICY Dock	MB455SPF-B
HP	BK765A
HP	BK766A
HP	BK782A
HP	AW522A
HP	AJ940A
HP	BK766A
HP	StorageWorks D2600
HP	StorageWorks D2700
HP	AJ940-63002
ROHS	ARC8026 VER B
ROHS	ARC8026 VER B
ROHS	ARC8026 VER B
Xtore	XJ SAS26-224R
Xtore	XJ SAS24-316R (3G)
Xtore	XJSA12-316R
Xtore	XJSA12-316R
Startdom	ST8
ICY Dock	
USI	DES2122-P
Promise	Vtrack J310sVtrak E-Class E310
Promise	Vtrack J310sVtrak J-Class (J630S)
Promise	Vtrack J310s

Promise	Vtrack J630
Promise	Vtrack J630
EPSD	Scotch Valley
EPSD	Coyote Valley
LSI	LSI630J
LSI	LSI620J

8 Intel® C600 series chipset OEM Parameters

The Storage Controller Unit (SCU) complies with the Serial Attached SCSI (SAS) Specification's Physical and Link Layer definitions. However, when it comes to actually implementing motherboard designs, OEMs often encounter challenges that pit high-frequency design best-practices against form factor and trace lengths. Therefore, SCU provides a mechanism for OEMs to tweak its PHY parameters to find the most optimal settings for a given platform. Once determined, the OEM can capture these settings to a binary file that is placed into the platform's Serial Peripheral Interconnect (SPI) flash. If the OEM has multiple motherboard platforms using the Intel® C600 series chipset, each platform could have its own unique PHY parameter settings if needed.

SAS is a connection based protocol. Thus, the SCU requires that a valid SAS address be assigned to each of its controllers. The OEM registers these addresses through a proper naming authority. So, in addition to the PHY settings, SAS addresses are placed in the OEM parameter block as well.

SAS addresses are not unique to platforms as are the PHY settings. They are unique to each SCU controller in an individual Intel® C600 series chipset unit (i.e. SKU) similar to the way MAC addresses are unique to each LAN controller.

Since the OEM parameters are unique to platforms and chipset SKUs, they are set once at manufacturing time. OEM parameters will have been validated by OEMs with their respective platforms. Therefore, end users should not be allowed to change these settings for fear of system compatibility problems.

The remaining subsections discuss the details of the OEM parameter block and the requirements they place on the BIOS.

8.1 Structure of OEM Parameter Block

The OEM parameter block is 512 bytes total in size and an unpacked, unpadding binary block. It is partitioned into a header and up to two SCU controller element structures. Figure 1 shows this structure.

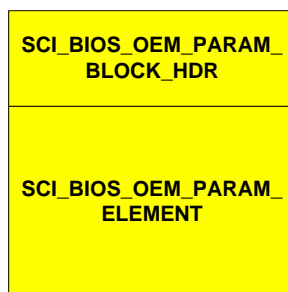


Figure 1: Structure of OEM Parameter Block

The following is the C programming language definition of the OEM parameter block. The comments give a full description of each field.

```
// For Intel Storage Controller Unit OEM Block
#define SCI_OEM_PARAM_SIGNATURE "ISCUOEMB"

#define SCI_PREBOOT_SOURCE_INIT (0x00)
#define SCI_PREBOOT_SOURCE_OROM (0x80)
#define SCI_PREBOOT_SOURCE_EFI (0x81)

#define SCI_OEM_PARAM_VER_1_0 (0x10)
#define SCI_OEM_PARAM_VER_1_1 (0x11)
#define SCI_OEM_PARAM_VER_1_4 (0x14)

// current version
#define SCI_OEM_PARAM_VER_CUR SCI_OEM_PARAM_VER_1_4

// port configuration mode
#define SCI_BIOS_MODE_MPC (0)
#define SCI_BIOS_MODE_APC (1)

#ifndef SCI_MAX_PHYS
#define SCI_MAX_PHYS (4)
#endif

#ifndef SCI_MAX_PORTS
#define SCI_MAX_PORTS (4)
#endif

/**
 * @struct SCI_BIOS_OEM_PARAM_BLOCK_HDR
 *
 * @brief This structure defines the OEM Parameter block header.
 */
typedef struct SCI_BIOS_OEM_PARAM_BLOCK_HDR
{
    /**
     * This field contains the OEM Parameter Block Signature which is
     * used by BIOS and driver software to identify that the memory location
     * contains valid OEM Parameter data. The value must be set to
     * SCI_OEM_PARAM_SIGNATURE which is the string "ISCUOEMB" which
     * stands for Intel Storage Controller Unit OEM Block.
     */
    U8 signature[8];
    /**
     * This field contains the size in bytes of the complete OEM

```

```
* Parameter Block, both header and payload hdr_length +
* (num_elements * element_length).
*/
U16 total_block_length;
/**
* This field contains the size in bytes of the
* SCI_BIOS_OEM_PARAM_BLOCK_HDR. It also indicates the offset from
* the beginning of this data structure to where the actual
* parameter data payload begins.
*/
U8 hdr_length;
/**
* This field contains the version info defining the structure
* of the OEM Parameter block.
*/
U8 version;
/**
* This field contains a value indicating the preboot initialization
* method (Option ROM or UEFI driver) so that after OS transition,
* the OS driver can know the preboot method. OEMs who build a single
* flash image where the preboot method is unknown at manufacturing
* time should set this field to SCI_PREBOOT_SOURCE_INIT. Then
* after the block is retrieved into host memory and under preboot
* driver control, the OROM or UEFI driver can set this field
* appropriately (SCI_PREBOOT_SOURCE_OROM and SCI_PREBOOT_SOURCE_EFI,
* respectively).
*/
U8 preboot_source;
/**
* This field contains the number of parameter descriptor elements
* (i.e. controller_elements) following this header. The number of
* elements corresponds to the number of SCU controller units contained
* in the platform:
* controller_element[0] = SCU0
* controller_element[1] = SCU1
*/
U8 num_elements;
/**
* This field contains the size in bytes of the descriptor element(s)
* in the block.
*/
U16 element_length;

/**
* This field contains the BIOS Controlled Feature Set and allows
* BIOS vendors to enable/disable specific RSTe product features.
*/
U8 BCFS;
```

NOTE: Please see the section 8.2 BCFS Bit Settings below for details on the allowed settings.

```
/**
 * Reserve fields for future use.
 */
U8 reserved[6];

} SCL_BIOS_OEM_PARAM_BLOCK_HDR_T;

/**
 * @struct SCIC_SDS_OEM_PARAMETERS
 *
 * @brief This structure delineates the various OEM parameters that must
 * be set for the Intel SAS Storage Controller Unit (SCU).
 */
typedef struct SCL_BIOS_OEM_PARAM_ELEMENT
{
    /**
     * Per SCU Controller Data
     */
    struct
    {
        /**
         * This field indicates the port configuration mode for
         * this controller:
         * Automatic Port Configuration(APC) or
         * Manual Port Configuration (MPC).
         *
         * APC means the Platform OEM expects SCL to configure
         * SAS Ports automatically according to the discovered SAS
         * Address pairs of the endpoints, wide and/or narrow.
         *
         * MPC means the Platform OEM manually defines wide or narrow
         * connectors by apriori assigning PHYs to SAS Ports.
         *
         * By default, the mode type is APC
         * in APC mode, if ANY of the phy mask is non-zero,
         * SCL_FAILURE_INVALID_PARAMETER_VALUE will be returned
         * from scic_oem_parameters_set AND the default oem
         * configuration will be applied
         * in MPC mode, if ALL of the phy masks are zero,
         * SCL_FAILURE_INVALID_PARAMETER_VALUE will be returned
         * from scic_oem_parameters_set AND the default oem
         * configuration will be applied
         */
        U8 mode_type;

        /**
         * This field specifies the maximum number of direct attached
         * devices the OEM will allow to have powered up simultaneously
         * on this controller. This allows the OEM to avoid exceeding
         * power supply limits for this platform. A value of zero
```

```

    * indicates there are no restrictions.
    */
    U8 max_number_concurrent_device_spin_up;

    /**
    * This bitfield indicates the OEM's desired default Tx
    * Spread Spectrum Clocking (SSC) settings for SATA and SAS.
    * NOTE: Default SSC Modulation Frequency is 31.5KHz.
    *-----*/
    /**
    * NOTE: Max spread for SATA is +0 / -5000 PPM.
    * Down-spreading SSC (only method allowed for SATA):
    * SATA SSC Tx Disabled          = 0x0
    * SATA SSC Tx at +0 / -1419 PPM Spread = 0x2
    * SATA SSC Tx at +0 / -2129 PPM Spread = 0x3
    * SATA SSC Tx at +0 / -4257 PPM Spread = 0x6
    * SATA SSC Tx at +0 / -4967 PPM Spread = 0x7
    */
    U8 ssc_sata_tx_spread_level : 4;

    /**
    * SAS SSC Tx Disabled          = 0x0
    *
    * NOTE: Max spread for SAS down-spreading +0 / -2300 PPM
    * Down-spreading SSC:
    * SAS SSC Tx at +0 / -1419 PPM Spread = 0x2
    * SAS SSC Tx at +0 / -2129 PPM Spread = 0x3
    *
    * NOTE: Max spread for SAS center-spreading +2300 / -2300 PPM
    * Center-spreading SSC:
    * SAS SSC Tx at +1064 / -1064 PPM Spread = 0x3
    * SAS SSC Tx at +2129 / -2129 PPM Spread = 0x6
    */
    U8 ssc_sas_tx_spread_level : 3;

    /**
    * NOTE: Refer to the SSC section of the SAS 2.x Specification
    * for proper setting of this field. For standard SAS Initiator
    * SAS PHY operation it should be 0 for Down-spreading.
    * SAS SSC Tx spread type:
    * Down-spreading SSC = 0
    * Center-spreading SSC = 1
    */
    U8 ssc_sas_tx_type : 1;
    /*-----*/

    U8 reserved;

} controller;

/**

```



```

* Per SAS Port data.
*/
struct
{
    /**
     * This field specifies the phys to be contained inside a port.
     * The bit position in the mask specifies the index of the phy
     * to be contained in the port. Multiple bits (i.e. phys)
     * can be contained in a single port:
     *   Bit 0 = This controller's PHY index 0    (0x01)
     *   Bit 1 = This controller's PHY index 1    (0x02)
     *   Bit 2 = This controller's PHY index 2    (0x04)
     *   Bit 3 = This controller's PHY index 3    (0x08)
     *
     * Refer to the mode_type field for rules regarding APC and MPC mode.
     * General rule: For APC mode phy_mask = 0
     */
    U8 phy_mask;

} ports[SCL_MAX_PORTS]; // Up to 4 Ports per SCU controller unit

/**
 * Per PHY Parameter data.
 */
struct
{
    /**
     * This field indicates the SAS Address that will be transmitted on
     * this PHY index. The field is defined as a union, however, the
     * OEM should use the U8 array definition when encoding it to ensure
     * correct byte ordering.
     *
     * NOTE: If using APC MODE, along with phy_mask being set to ZERO, the
     * SAS Addresses for all PHYs within a controller group SHALL be the
     * same.
     */
    union
    {
        /**
         * The array should be stored in little endian order. For example,
         * if the desired SAS Address is 0x50010B90_0003538D, then it
         * should be stored in the following manner:
         *   array[0] = 0x90
         *   array[1] = 0x0B
         *   array[2] = 0x01
         *   array[3] = 0x50
         *   array[4] = 0x8D
         *   array[5] = 0x53
         *   array[6] = 0x03
         *   array[7] = 0x00
         */
    }

```

```
U8 array[8];
/**
 * This is the typedef'd version of the SAS Address used in
 * the SCI Library.
 */
SCI_SAS_ADDRESS_T sci_format;

} sas_address;

/**
 * These are the per PHY equalization settings associated with the the
 * AFE XCVR Tx Amplitude and Equalization Control Register Set
 * (0 thru 3).
 *
 * Operational Note: The following Look-Up-Table registers are engaged
 * by the AFE block after the following:
 * - Software programs the Link Layer AFE Look Up Table Control
 *   Registers (AFE_LUTCR).
 * - Software sets AFE XCVR Tx Control Register Tx Equalization
 *   Enable bit.
 */
/**
 * AFE_TX_AMP_CTRL0. This register is associated with AFE_LUTCR
 * LUTSel=00b. It contains the Tx Equalization settings that will be
 * used if a SATA 1.5Gbs or SATA 3.0Gbs device is direct-attached.
 */
U32 afe_tx_amp_control0;

/**
 * AFE_TX_AMP_CTRL1. This register is associated with AFE_LUTCR
 * LUTSel=01b. It contains the Tx Equalization settings that will
 * be used if a SATA 6.0Gbs device is direct-attached.
 */
U32 afe_tx_amp_control1;

/**
 * AFE_TX_AMP_CTRL2. This register is associated with AFE_LUTCR
 * LUTSel=10b. It contains the Tx Equalization settings that will
 * be used if a SAS 1.5Gbs or SAS 3.0Gbs device is direct-attached.
 */
U32 afe_tx_amp_control2;

/**
 * AFE_TX_AMP_CTRL3. This register is associated with AFE_LUTCR
 * LUTSel=11b. It contains the Tx Equalization settings that will
 * be used if a SAS 6.0Gbs device is direct-attached (which will only run
 * at SAS 3.0Gbs ).
 */
U32 afe_tx_amp_control3;

} phys[SCI_MAX_PHYS]; // 4 PHYs per SCU controller unit
```

```
} SCL_BIOS_OEM_PARAM_ELEMENT_T;
```

```
/**
 * @struct SCL_BIOS_OEM_PARAM_BLOCK
 *
 * @brief This structure defines the OEM Parameter block as it will be stored
 * in the last 512 bytes of the PDR region in the SPI flash. It must be
 * unpacked or pack(1).
 */
typedef struct SCL_BIOS_OEM_PARAM_BLOCK
{
    /**
     * OEM Parameter Block header.
     */
    SCL_BIOS_OEM_PARAM_BLOCK_HDR_T header;

    /**
     * Per controller element descriptor containing the controller's
     * parameter data. The prototype defines just one of these descriptors,
     * however, the actual runtime number is determined by the num_elements
     * field in the header.
     */
    SCL_BIOS_OEM_PARAM_ELEMENT_T controller_element[1];
} SCL_BIOS_OEM_PARAM_BLOCK_T;
```

8.2 BCFS Bit Settings

BCFS bit number	Bit meaning	Values		Additional info
0	Enable/disable Raid0	Raid type disabled 0x0	Raid type enabled 0x1	If you disable all raid levels – all BCFS settings will be set back to default and OROM UI delay will be set to 2seconds
1	Enable/disable Raid1	Raid type disabled 0x0	Raid type enabled 0x1	
2	Enable/disable Raid10	Raid type disabled 0x0	Raid type enabled 0x1	
3	Enable/disable Raid5	Raid type disabled 0x0	Raid type enabled 0x1	

		enabled		
4	RESERVED			
5	Enable/disable UI	Feature disabled Feature enabled	0x0 0x1	If you set it to 0 (disable) bits 10-14 are ignored
6	Enable/disable Allow unlock of HDD in OS	Feature disabled Feature enabled	0x0 0x1	Not used
7	Enable/disable Allow LED SGPIO	Feature disabled Feature enabled	0x0 0x1	Not used
8	Dnable/disable Only RRT volumes to span internal/external	Feature disabled Feature enabled	0x0 0x1	
9	Dnable/disable RSTe caching	Feature disabled Feature enabled	0x0 0x1	
10 11 12	Delay on UI splash screen	2 seconds 4 seconds 6 seconds 8 seconds 10 seconds 15 seconds 30 seconds 60 seconds	0x000 0x001 0x010 0x011 0x100 0x101 0x110 0x111	Default setting is 0x000: 2 seconds.
13 14	Mode of showing UI	Show if error or >=2 disks Show only if error Never show UI Show	0x00 0x01 0x10 0x11	Default setting 0x00: show if there are 2 or more disks connected or error occured

		always	
15	RESERVED		

8.3 Recommended Location in SPI Flash

Figure 2 shows the recommended location where the OEM parameter block should be placed in SPI flash. Intel reference images will be formatted this way, and the FITC tool supplied by Intel for constructing SPI flash images is configured to take a formatted OEM parameter block and place it appropriately in the Platform Data Region (PDR) as shown in the figure. The OEM Parameter Block should be placed in the last 512 bytes of the PDR region aligned on a 32-bit boundary. There will be more discussion on this in section 8.4 *OEM Parameter and SPI Flash Tools*.

Note: The recommended SPI flash format is descriptor mode.

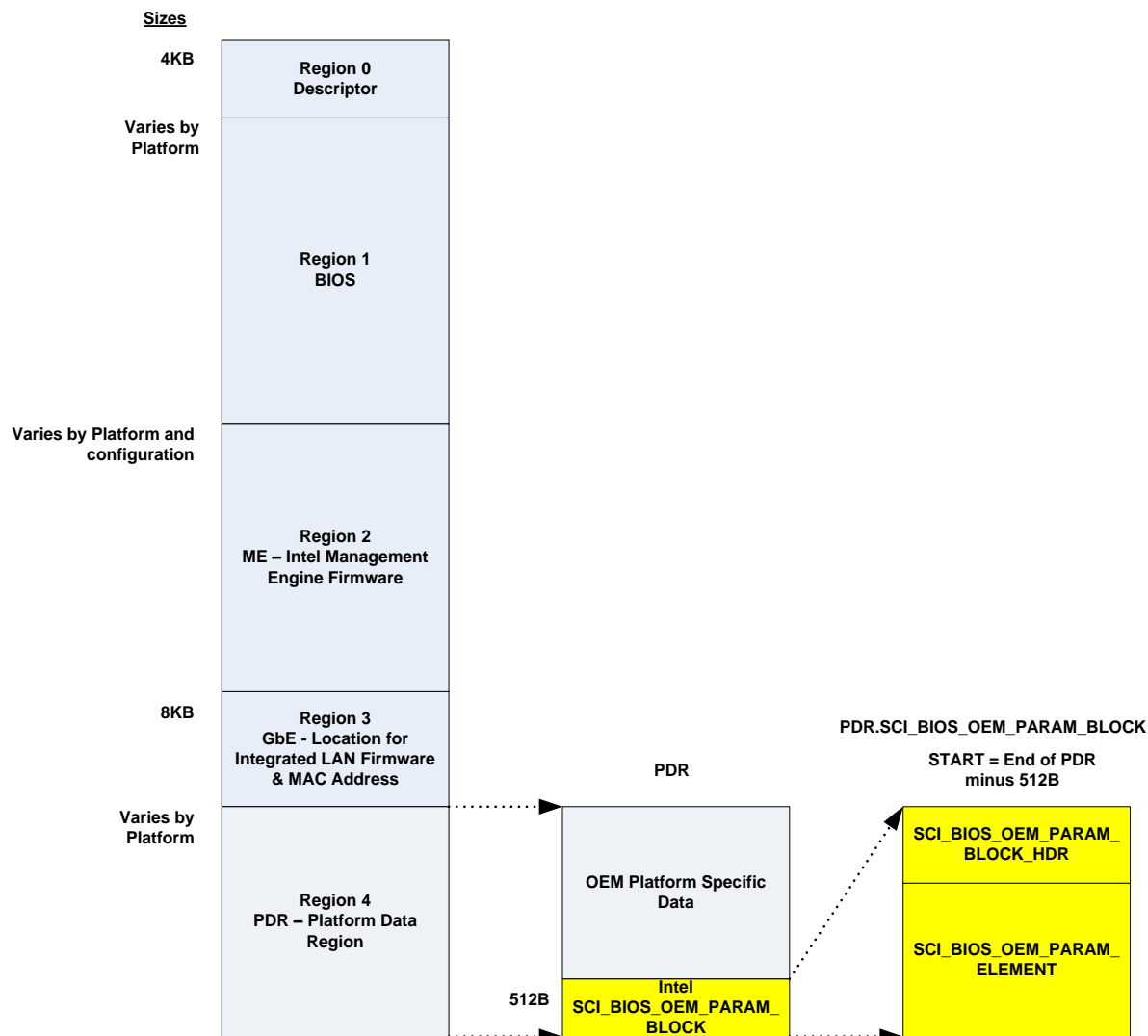


Figure 2 Recommended OEM Param Location in SPI Flash

As stated earlier, the above is the recommended layout for flash and OEM Parameter block placement. Third party BIOS vendors are not obligated to follow this recommendation. However, for the Romley platform if 3rd parties want Intel provided pre-OS drivers (legacy OROM and UEFI drivers) to boot their systems, they are required to provide a valid OEM Parameter block in flash somewhere. Further, they are required to implement the access services defined in section 8.5 *Required BIOS Services* so that legacy OROM and/or a UEFI driver can retrieve these parameters and configure the SCU. These BIOS services abstract the Intel provided pre-OS drivers from having to know where the parameters actually reside in flash.

8.4 OEM Parameter and SPI Flash Tools

As part of the SCU development kit, tools are provided to help Original Equipment Manufacturers (OEMs), System Integrators, and Value Added Resellers (VARs) tune SCU PHY parameters to a platform's motherboard design and mass produce SPI flash images for that platform. The names of the tools are as follows:

- PHY Tune Tool (part of SCU development kit)
- Sas Address Tool (part of SCU development kit)
- FITC Tool (part of SPI Flash Programming kit)

These tools can be found at by contacting your Intel FAE. Detailed user guides are provided in the respective kits. However, the following subsections do provide a brief overview of each tool.

Except for the PHY SAS Addresses, the OEM parameters are tuned and fixed for a given platform by the OEM. SAS Addresses, however, are unique to individual SCU SKUs similar to the MAC Address for LAN chips. The system OEM must provide valid SAS addresses that are registered to them. Refer back to section 8.1 *Structure of OEM Parameter Block* for a detailed description of the PHY parameters.

8.4.1 PHY Tune Tool

PHY Tune is a Windows .Net 4.0 application. It provides a GUI front-end to display SCU PHY information on the console. It provides a back-end protocol that communicates with a special debug version of the Windows SCU driver to set and retrieve SCU PHY settings in real time. The application/debug-driver pair runs on Windows Server 2008 R2.

Note: This debug driver comes with the development kit, but is not a production General Availability driver. It is NOT available in any OS inbox distribution either.

In addition, PHY Tune retrieves and displays special diagnostic information from the SCU. From this information, OEMs can determine which settings provide the most optimal PHY performance for that platform. Each individual PHY can have its own unique settings that best fit its situation. As indicated in section 8.1 *Structure of OEM Parameter Block*, the main areas available for OEM adjustment are Tx Equalization to compensate for chip-to-connector trace lengths and spread spectrum clocking parameters.

Once the OEM determines the appropriate parameter settings for the platform, they can use a PHY Tune menu option to capture these settings. PHY Tune also allows the OEM to set initial values for the other fields in the OEM parameter block including the header fields and the PHY SAS Addresses. PHY Tune provides another menu

option to export these settings to a properly formatted binary file. This block can then be loaded into the Intel FITC tool recognizes where to place this block in constructing a SPI flash image. If the OEM uses its own tools other than FITC to construct the flash image, then it just operates on the “raw” binary file.

Note: If FITC is used for flash image construction, it will place the block in the PDR region as described in section 8.3 Recommended Location in SPI Flash. OEM fields initialized by PHY Tune that need to change per SKU (e.g. SAS Addresses) can be modified later by other manufacturing tools.

8.4.2 SAS Address Tool (sasaddresses.efi)

The developer kit includes a UEFI application providing a command line interface that can be used by a manufacturing script to update per SKU SAS addresses. The name of the application is *sasaddresses.efi*. Based on input parameters, the application will either work directly on an OEM block already in the PDR of SPI flash or it will operate on a properly formatted binary input file. In the case of the binary input file, it will modify the SAS Addresses in the binary image according to the SAS addresses on the command line and then overwrite the OEM section of PDR with the binary image.

8.4.3 FITC Tool

The FITC tool is part of the SPI Flash Programming kit. It is used to construct flash images and modify data at manufacturing using XML schema. The Intel FITC tool constructs a SPI flash image in descriptor mode containing the follow regions:

- Descriptor Region indicating how the flash is partitioned and where other regions begin and end.
- BIOS Region
- Intel Manufacturing Engine Region
- Gigabit Ethernet Region
- Platform Data Region

When using the FITC tool to construct a SPI flash image, FITC will place the OEM parameter block in the last 512 bytes of the Platform Data Region as described in section 8.3 Recommended Location in SPI Flash.

8.5 Required BIOS Services

System BIOS shall provide services to extract the OEM parameter block from SPI Flash. As mentioned earlier, the recommended location for the OEM parameter block is in the last 512 bytes of the PDR region as described in section 8.3 Recommended Location in SPI Flash.

The following subsections describe the necessary services according to the type of pre-boot driver environment whether legacy Option ROM or native UEFI.

8.5.1 Legacy OROM

Under legacy BIOS / OROM mode, the BIOS must provide the following software interrupt services.

8.5.1.1 Get RSTe OROM SCU OEM Parameter Block: INT 15, Function=F300h, Sub-Function=0001h

INT 15 / AX=F300h / BX=0001h (Get RSTe OROM SCU OEM Parameter Block)

Description:

Through this function, BIOS provides to the RSTe legacy OROM driver the OEM Parameter Block needed to initialize the SCU controller.

Inputs:

AX = F300h (Function)
BX = 0001h (Sub Function)
EAX = 0000F300h
EBX = 4F450001h ('OE') + Sub Function
EDX = 20534355h ('SCU')
ECX = size of data buffer in bytes
(512 Bytes = OEM header + Descriptor Elements)
EDI = 0000xxxxh (Upper 16bits are zero, lower 16bits defined below)
ES:DI = address of data buffer (Real mode address)

Normal Outputs:

CF = clear if successful
EAX = 20534355h ('SCU')
ES:DI = data buffer filled
ECX = actual transfer size in bytes (512 Bytes)

Data Format:

= char oem_params[512];
(512 Bytes of data as encoded by OEM or system integrator)

Error Outputs:

CF = set on error
AH = error code
= 86h Function Not Supported
= 87h OEM Block Not Present

8.5.1.2 INT 15 / AX=F300h / BX=0002h (Get RSTe OROM Boot Info)

Description:

Through this function, BIOS provides user-settable RSTe boot information to the RSTe legacy OROM driver. These values are visible to the user through the BIOS Setup menus. The menu options should be linked to legacy OROM selections in the PCH-IO section.

Inputs:

AX = F300h (Function)
BX = 0002h (Sub Function)
EAX = 0000F300h
EBX = 4F450002h ('OE') + Sub Function
EDX = 424F4F54h ('BOOT')

Normal Outputs:

CF = clear if successful
EAX = 424F4F54h ('BOOT')
BL = legacy_orom_boot_controller_selection:
Due to limited shadow RAM and EBDA space, and the fact that a platform may require multiple OROMs be loaded for other functions, there might not be enough runtime space for both the RSTe SATA RAID controller OROM and the RSTe SCU RAID controller OROM to provide int13h support simultaneously. Even so, each RSTe OROM still needs to initialize so that it can configure each controller based on platform dependencies and store data needed by the OS drivers in the Shadow RAM area even if it does not provide full int13h runtime support. Thus, through this setup option BIOS can avoid the runtime space conflict by allowing the user to select the boot controller according to the following values:
0000h = No runtime space restrictions. BIOS indicates that both RSTe SATA and SCU runtime code should provide full int13h support for RSTe devices.

(NOTE: The BIOS should allow this option if it knows that there is room in shadow RAM for both OROMs' runtime code. If the BIOS can always guarantee this condition, then it does NOT need to make Legacy OROM boot controller selection visible to the user in BIOS setup.)

0001h = The SCU controller is selected as boot

controller. BIOS will load RSTe SATA OROM first, but the SATA OROM will only initialize and then leave pertinent RAID configuration information for the SATA OS RAID Driver in runtime space. The RSTe SCU OROM will initialize, relocate to runtime space, and provide full int13h support for SCU attached devices.

0002h = The SATA controller is selected as boot controller. BIOS will load RSTe SCU OROM first, but the SCU OROM will only initialize and then leave pertinent RAID configuration and SCU OEM parameter information for the SCU OS RAID Driver in runtime space. The RSTe SATA OROM will initialize, relocate to runtime space, and provide full int13h support for SATA controller attached devices.

0003h = Neither SATA nor SCU controller is selected as boot controller. Boot support is being provided by another device. BIOS will load both RSTe OROMs, but each will only initialize and leave pertinent RAID configuration and SCU OEM parameter information for the RSTe OS RAID Drivers in runtime space. There will NOT be int13h support for RSTe devices.

BH = scu_legacy_orm_max_disk_slots_enum:
For boot_controller_selection = {0000h or 0001h}, this option allows the user to set the maximum number of disk slots the SCU legacy OROM will enumerate. Its range will be between 1 and 8. The default value shall be 8.

For boot_controller_selection = {0002h or 0003h}, this field should not be settable by the user, and OROM will automatically assume a value of 0.

Error Outputs:

CF = set on error

AH = error code
= 86h Function Not Supported = (boot_controller_selection = 0000h assumed)

8.5.2 UEFI

Under native UEFI mode, the BIOS must provide the following protocol.

```
//  
// Define SCU Parameters protocol GUID  
//  
// EDK and EDKII have different GUID formats  
//  
#if defined(EDK_RELEASE_VERSION) || (EDK_RELEASE_VERSION < 0x00020000)  
#define EFI_PCH_SCU_PARAMETERS_PROTOCOL_GUID \  
{ \  
    0xe165e866, 0x6643, 0x40b3, 0xb4, 0x35, 0x52, 0x6b, 0x47, 0x3f, 0x75, 0xc2 \  
}  
  
#else  
#define EFI_PCH_SCU_PARAMETERS_PROTOCOL_GUID \  
{ \  
    0xe165e866, 0x6643, 0x40b3, \  
    {0xb4, 0x35, 0x52, 0x6b, 0x47, 0x3f, 0x75, 0xc2} \  
}  
#endif  
  
#define SCU_PARMS_SIZE 512  
//  
// Protocol definition  
//  
struct _PCH_SCU_PARAMETERS_PROTOCOL {  
    U8 SCUParameters[SCU_PARMS_SIZE];  
};
```

8.6 Reference Documentation

Please refer to the following documentation for additional information:

CDI / IBL #	Title/Location
Reference Documents	
441979	Intel® 6 Series Chipset/ Intel® C200 Series Chipset/ Patsburg Platform Controller Hub (PCH) BIOS Specification Update - NDA
475122	Intel Patsburg PhyTune Tool - RC Ver 2.0.0.3 Note: This package contains the PhyTune tool along with the SASAddress efi utility. Please refer to the documentation included in the package for additional information.
453321	Intel® Server Platform Services Manageability Engine Firmware for Patsburg Chipset Product Line Firmware Startup Guide
454672	Patsburg Chipset SPI Programming Guide
450911	Patsburg Chipset External Design Specification (EDS)
445721	Patsburg Chipset External Design Specification (EDS) Specification Update - NDA
458143	Sandy Bridge-E Processor External Design Specification (EDS) - Volume One of Two
458224	Intel® RSTe 3.0 Technical Product Spec
459924,	Sandy Bridge-E Processor External Design Specification - Volume Two of Two
30051	RS - Intel® 6 Series Chipset/ Intel® C200 Series Chipset/ Patsburg Platform Controller Hub (PCH) BIOS Spec <i>Contact you Intel FAE to get access to this document through Anacapa</i>
Kit 33272	Intel® Server Platform Services Alpha SPS_02.01.01.009.0 Note: This package is the Intel® Server Platform Services Manageability Engine Firmware for Patsburg Product Line - Alpha Full Release and contains key tools such as FITc and fpt for the Intel® C600 series chipset This document can be downloaded from ARMS/VIP

9 Copyright Notice

Copyright © 2013, Intel Corporation. All rights reserved.

These Release Notes as well as the software described in it is furnished under license and may only be used or copied in accordance with the terms of the license. The information in this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Intel Corporation. Intel Corporation assumes no responsibility or liability for any errors or inaccuracies that may appear in this document or any software that may be provided in association with this document.

Except as permitted by such license, no part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the express written consent of Intel Corporation.