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1. About This Release
The development release described in this document includes firmware, OS drivers, tools, and host management software for the SmartRAID 3200 and SmartHBA 2200 solutions from Microchip.

1.1 Release Identification
The firmware, software, and driver versions for this release are shown in the following table.

Table 1-1. Release Summary

<table>
<thead>
<tr>
<th>Solutions release</th>
<th>3.1.6.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package release date</td>
<td>December 27, 2021</td>
</tr>
<tr>
<td>Firmware version</td>
<td>3.01.07.046</td>
</tr>
<tr>
<td>UEFI/Legacy BIOS</td>
<td>1.4.4.1/1.4.4.2</td>
</tr>
<tr>
<td>Driver versions</td>
<td>Windows Drivers:</td>
</tr>
<tr>
<td></td>
<td>• Windows 2022, 2019, 2016, Windows 10: 1010.12.0.1007</td>
</tr>
<tr>
<td></td>
<td>Linux SmartPQI:</td>
</tr>
<tr>
<td></td>
<td>• RHEL 7/8: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• SLES 12/15: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• Ubuntu 18/20/21: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• Oracle Linux 7/8: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• Citrix Xenserver 8: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• Debian 9/10: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>• CentOS 7/8: 2.1.14-035</td>
</tr>
<tr>
<td></td>
<td>VMware:</td>
</tr>
<tr>
<td></td>
<td>• VMware ESX 6/7: 4230.0.103</td>
</tr>
<tr>
<td></td>
<td>FreeBSD/Solaris:</td>
</tr>
<tr>
<td></td>
<td>• FreeBSD 11/12/13: 4170.0.1014</td>
</tr>
<tr>
<td></td>
<td>• Solaris: 11: 11.4120.0.1005</td>
</tr>
<tr>
<td>ARCCONF/maxView</td>
<td>B24713</td>
</tr>
</tbody>
</table>

1.2 Files Included in this Release
This section details the files included in this release.

Table 1-2. Firmware Files

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Pre-Assembly Use</th>
<th>Post-Assembly Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>SmartFWx200.bin</td>
<td>Production-signed programmable NOR Flash File. Use to program NOR Flash for boards that are already running firmware.</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
### Table 1-3. Firmware Programming Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Executable</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCCONF</td>
<td>ARCCONF CLI Utility</td>
<td>ARCCONF BXXXXX.zip</td>
</tr>
<tr>
<td>maxView</td>
<td>maxView Utility</td>
<td>MAXVIEW XXX BXXXXX.zip</td>
</tr>
</tbody>
</table>

### Driver Files

#### Table 1-4. Windows Drivers

<table>
<thead>
<tr>
<th>OS</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server 2022, 2019, 2016, Windows 10</td>
<td>x64</td>
</tr>
</tbody>
</table>

#### Table 1-5. Linux Drivers

<table>
<thead>
<tr>
<th>OS</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHEL 8.4, 8.3, 8.2, 8.1, 7.9, 7.8, 7.7</td>
<td>x64</td>
</tr>
<tr>
<td>CentOS 8.4, 8.3, 8.2, 8.1, 8.0, 7.9, 7.8, 7.7</td>
<td>x64</td>
</tr>
<tr>
<td>SLES 12 SP5, SP4</td>
<td>x64</td>
</tr>
<tr>
<td>SLES 15 SP3, SP2, SP1</td>
<td>x64</td>
</tr>
<tr>
<td>Ubuntu 20.04.2, 20.04.1, 20.04, 18.04.5, 18.04.4</td>
<td>x64</td>
</tr>
<tr>
<td>Ubuntu 21.04</td>
<td>x64</td>
</tr>
<tr>
<td>Oracle Linux 8.3, 8.2, 7.9, 7.8, UEK6U1 (5.4.17-2036)</td>
<td>x64</td>
</tr>
<tr>
<td>Oracle Linux 8.4 UEK6 (5.4.17-2102)</td>
<td>x64</td>
</tr>
<tr>
<td>Oracle Linux 8.2 UEK R6</td>
<td>x64</td>
</tr>
<tr>
<td>Debian 10.10, 9.13</td>
<td>x64</td>
</tr>
<tr>
<td>Fedora 34 (inbox)</td>
<td>x64</td>
</tr>
<tr>
<td>XenServer 8.2</td>
<td>x64</td>
</tr>
</tbody>
</table>

#### Table 1-6. FreeBSD, Solaris, and VMware Drivers

<table>
<thead>
<tr>
<th>OS</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESX6.5U3/U2</td>
<td>x64</td>
</tr>
<tr>
<td>ESX6.7U3/U2</td>
<td>x64</td>
</tr>
<tr>
<td>ESX7.0U3/U2</td>
<td>x64</td>
</tr>
<tr>
<td>FreeBSD 13, 12.2, 11.4</td>
<td>x64</td>
</tr>
<tr>
<td>Solaris 11.4</td>
<td>x64</td>
</tr>
</tbody>
</table>
### Table 1-7. maxView and ARCCONF Utilities

<table>
<thead>
<tr>
<th>Description</th>
<th>OS</th>
<th>Executable</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCCONF Command Line Utility</td>
<td>Windows x64</td>
<td>See the arconf_B#####.zip for the installation executables for the relevant OS.</td>
</tr>
<tr>
<td></td>
<td>Linux x64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VMware 6.5 and above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XenServer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UEFI support</td>
<td></td>
</tr>
<tr>
<td>maxView Storage Manager</td>
<td>Windows x64</td>
<td>See the maxview_linux_B#####.zip, maxview_win_B#####.zip, and the</td>
</tr>
<tr>
<td></td>
<td>Linux x64</td>
<td>maxview_vmware_B#####.zip for the installation executables.</td>
</tr>
<tr>
<td></td>
<td>VMware 6.5 and above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XenServer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UEFI support</td>
<td></td>
</tr>
<tr>
<td>maxView vSphere Plugin</td>
<td>VMware 6.5 and above</td>
<td>See the maxview_vmware_B#####.zip for the installation executables.</td>
</tr>
<tr>
<td>Boot USB ( offline or pre-boot) for ARCCONF and maxView Storage Manager</td>
<td>Linux x64</td>
<td>See the maxview_offline_bootusb_B#####.zip for the .iso file.</td>
</tr>
</tbody>
</table>
2. What's New?

This section shows what's new in this release.

**Important:** Updated maxView to address log4j vulnerabilities.

2.1 Features

The following table lists the features supported for this release.

<table>
<thead>
<tr>
<th>Features</th>
<th>Supported in this Release</th>
<th>Future Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>UEFI driver, boot support</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Legacy boot support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Dynamic power management</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Driver support</td>
<td>Windows X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Linux X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VMware X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FreeBSD X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solaris X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OS certification X</td>
<td></td>
</tr>
<tr>
<td>Flash support</td>
<td>ARCCONF utility X</td>
<td></td>
</tr>
<tr>
<td>maxView tool support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>ARCCONF tool support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>MCTP BMC management</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4Kn support in RAID and HBA</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Controller-based encryption (CBE) support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Out-of-band interface selection support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>VPP Backplane support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>PBSI support</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Configurable Expander SSU settings</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

1. Only available for encryption-enabled products.
2.2 **Fixes and Enhancements**

This section shows the fixes and enhancements for this release.

2.2.1 **Firmware Fixes**

This section shows the firmware fixes and enhancements for this release.

2.2.1.1 **Fixes and Enhancements for Firmware Release 3.01.07.046**

This release provides the following fixes and enhancements.

- Added workaround to work with AMI MG9100 UBM backplanes.
- Added workaround to rate-limit the attached SAS domain to 12 Gbps when a SAS-4 expander attached at 22.5 Gbps is present with at least one SATA drive attached.
- Increased the size of the host request object pool to account for a reduction in available request objects when the controller queue depth is at its maximum (1024). This should result in slightly better performance at that threshold.
- Improved request coalescing behaviors for non-parity HDD volumes as queue depth is scaled up.
- Added support for an off-board activity LED.
- Additional changes merged to modify various firmware error paths to avoid use of a predictive failure device.
- Added support for persistent log preservation through cold boot.
- Increased the maximum allowed RAID strip size for NVMe-based RAID sets from 128 KiB to 256 KiB.
- Added support for SCSI_UNMAP for NVMe drives.
- Fixed an issue where the file system may read incorrect data from a degraded parity logical drive.
  - **Root cause:** While processing a host request that spans multiple stripes in a degraded parity logical drive, firmware sets a RETRY and FATAL ERROR status flag when completing one stripe to cause the entire host request to be retried again. However, at the same time, another stripe within the same host request completes and the status flags are overwritten with a GOOD status. Due to the RETRY and FATAL ERROR status flags being overwritten, the host request is not retried and is completed with GOOD status leaving incorrect data on the drive.
  - **Fix:** Firmware will use an atomic update to modify the host request status flags.
  - **Risk:** Low
- Fixed an issue where rebuild did not start after multiple iterations of drive failures.
  - **Root cause:** Spare Activation state was set, but firmware was not acting upon it. First drive failure triggered spare activation as it should, but second drive removal event set state to spare activation needed. Firmware was still processing the first drive failure and treated the second drive failure as a duplicate of the first drive failure so did not process the second rebuild.
  - **Fix:** Firmware will remove the current task from its list when the task is started so that subsequent tasks will not be considered as duplicates.
  - **Risk:** Medium
- Fixed an issue where the filesystem or application may read incorrect data when a backup power source is discharged, and system power loss occurs during a transformation.
  - **Root cause:** When the backup power source goes into a discharge state, there is a case where the current transformation iteration is not protected in the controller cache. If system power loss happens at the same time, the transformation iteration is not completed, and future reads could return incorrect data for that stripe.
  - **Fix:** When the backup power source is discharged, firmware will complete the current transformation iteration and then stop the transformation process until the backup power source is charged.
  - **Risk:** Medium
- Fixed an issue where background thread hangs while running device handle swap test.
  - **Root cause:** With frequent volume state transitions, it was possible for background thread to get stuck waiting for last physical request to wake it up, but all physical requests had been completed.
  - **Fix:** Adjust physical request count properly when a failure is seen reading drive block size
  - **Risk:** Low
• Fixed an issue where NVME drives would be reset internally on all drive firmware updates.
  – **Root cause:** NVME translation layer would reset all drive internally on drive firmware updates. Per the NVME spec, some drives support online activation and for those drives reset is not needed.
  – **Fix:** If drive supports online activation, do not reset the drive on firmware update.
  – **Risk:** Low

• Fixed an issue where both active and inactive image can be corrupted.
  – **Root cause:** Firmware was not checking status of redundant image and hence was allowing corruption of both active and inactive image components.
  – **Fix:** Changes were implemented in firmware to first check the redundant image status to disallow corrupting other image.
  – **Risk:** Low

• Fixed an issue where a controller crash dump is not recorded if the host issues PERST# during that process.
  – **Root cause:** Firmware reset was being invoked immediately on receipt of PERST#. If a crash dump was being generated at this time, then its contents would be lost.
  – **Fix:** Modified the crash handling routines to disable propagation of PERST# until the crash dump process is complete.
  – **Risk:** Low

• Fixed a potential controller lockup during NVMe drive firmware update.
  – **Root cause:** If the API call to "requery" a device for inventory purposes is sent at the same time the RAID metadata is being saved, there is a race condition exposure between the device info being cleared and the metadata update process in which a debug trap was being hit that is checking for valid drive parameters.
  – **Fix:** Instead of a lockup, modified the drive parameter checks to abort the current metadata update and retry later.
  – **Risk:** Low

• Fixed an issue where a URE is not captured in the 'known bad blocks' list after system reboot for configured HDDs.
  – **Root cause:** After a reboot, IOBypass gets enabled for cache disabled HDD logical drives. During boot time, PQI initialization triggers IOBypass to be enabled based on logical drive states and cache configured states, but does not factor in whether IOBypass is configured for the volume. Due to this reason, IOBypass is getting enabled for the logical drive when it is not configured. For IOBypass configured drives, URE logging will not happen.
  – **Fix:** Check that IOBypass is configured before it is allowed for any logical drive.
  – **Risk:** Low

• Fixed an issue where a replacement cable was not detected correctly after an external cable was discovered with error.
  – **Root cause:** The error status of the prior cable was not being cleared before the new cable was discovered. This led to an incorrect stale "failed" state.
  – **Fix:** Ensure prior cable information is cleared before processing the hot-add discovery for a new cable in that location.
  – **Risk:** Low

• Fixed an issue where occasionally all NVMe drives in a RAID volume are dropped at the end of the boot sequence.
  – **Root cause:** When the host sends a Max Payload Size (MPS) update during the server boot sequence, increasing MPS from the default of 128B to a higher value (256B or 512B) based on the Max Payload Size Supported (MPSS) advertised by the controller, the new MPS value must be propagated to all connected NVMe drives. The controller can already be sending IOs to these drives (to write RAID metadata information, for example). If the controller endpoint has been updated for a larger MPS value, but the drives still have a smaller MPS programmed due to the propagation not having completed, and there is a write IO during that time that causes the drive to issue a read to the controller endpoint, a completion that is returned to the drive can be a packet that is larger in size than the drive’s current MPS. This leads to the drive sending an ERR_FATAL message. With Downstream Port Containment (DPC) enabled, receiving the ERR_FATAL causes the drive link to be disabled, per the PCIe specification. The NVMe drive then drops.
  – **Fix:** Halt IO processing when the MPS update message is received until the new MPS value can be propagated to all of the connected drives.
- **Risk**: Medium

  • Fixed an issue where the controller can fail to discover devices after a cable is hot-added
    - **Root cause**: The SFF-8449 specification lists a minimum setup time for the cable of 2 seconds before interrogating the cable to determine its interface type and setup details. The controller firmware was not providing this setup time and in some cases cables would not be ready for access and fail to be discovered.
    - **Fix**: Adjusted the cable insertion handler to provide the appropriate delay for standards compliance.
    - **Risk**: Low

  • Fixed a potential controller lockup when attached to a UBM backplane advertising bay count as zero
    - **Root cause**: A debug trap was encountered when a UBM backplane is attached advertising the bay count as zero that results in firmware attempting a memory allocation of size zero for the bay information.
    - **Fix**: Added error handling for this case.
    - **Risk**: Low

  • Fixed an issue where running 'abs_print_eye_capture' and 'cross_hair_enable' from ChipLink caused a firmware lockup.
    - **Root cause**: There was an issue in parsing the arguments for these commands that resulted in a firmware exception and lockup.
    - **Fix**: The logic that parses these commands is fixed to handle these commands with arguments.
    - **Risk**: Low

  • Fixed a potential problem of inability to delete a maxCache write-back logical drive.
    - **Root cause**: Errors in host write commands could put maxCache metadata in a state where outstanding I/O count for a cache line would not go back to zero, so if write policy was changed from write-back to write-thru, the flush would never complete. Since the flush never completes, the logical drive could not successfully move to write-thru, and the maxCache logical drive could not be deleted.
    - **Fix**: Adjusted the error handling in host writes to properly update maxCache metadata on retries.
    - **Risk**: Medium.

  • Fixed an issue where the Fault LED is not turned ON when firmware fails a bad HBA drive connected to an expander during device discovery or hot-plug.
    - **Root cause**: When firmware fails a HBA drive during device discovery or hot-plug, it does not set the “select” bit to 1 in the SES control page to turn on the Fault LED. The issue is that firmware still sees this failed HBA drive is exposed to host so firmware does not control the drive LED and the host must control the drive LED. This leads to the firmware not setting the “select” bit to 1 in the SES control page for the failed HBA drive when firmware is performing the LED update operation.
    - **Fix**: Firmware sets the “select” bit to 1 in SES control page for the failed HBA drive which is not exposed to host and turns ON the drive's Fault LED correctly.
    - **Risk**: Low

  • Fixed an issue of auto-rebuild not starting if two drives fail at the same time on a RAID10 or RAID6 logical drive having only one “Auto-Replace Drives” spare drive.
    - **Root cause**: When activating a roaming spare for rebuild, firmware overrides the spare selection if only one spare is available for the case where two members of a logical drive fail. This results in rebuild not starting because the firmware assumes no spare is available for rebuild.
    - **Fix**: Fixed by not overriding the selected spare for rebuild.
    - **Risk**: Low

  • Fixed a problem where physical drive firmware update will not succeed when initiated through Out-Of-Band MCTP host transport
    - **Root Cause**: Firmware was not setting the correct response back to host for the SCSI pass through OUT direction commands.
    - **Fix**: To adjust the response buffer properly for these SCSI pass through commands.
    - **Risk**: Medium

  • Fixed a problem where the I/O latency may be more for maxCache configured SATA drive volume, if there are non-remappable UREs/bad blocks.
    - **Root Cause**: When maxCache read request is failed due to bad block sense data, firmware is not logging bad blocks internally with required flags to invoke “short circuit logic” on bad blocks which sets the
respective error status without having to send it to the drives. Due to this reason subsequent reads to
known bad blocks are sent to the drive and leading to unwanted latency in logical volume read IOs.

– **Fix**: Update the logical request type to trigger execution of the short circuit bad block logic.
– **Risk**: Low

• Fixed an issue where failure of a logical drive in dual domain JBOD could also generate a warning about loss of a redundant path

– **Root Cause**: The warning message is observed when SAS drives within the logical drive in the dual domain configuration are hot removed until the logical drive goes to a FAILED state. The warning message is due to the firmware logic that updates the “Redundant Cabling Flags”. These flags are used by host management tools for displaying the warning message. The flags were not updated when the logical drive is in FAILED state that resulted in an incorrect flag setting that generated the warning message by the host management tool.

– **Fix**: Firmware will correctly set the “Redundant Cabling Flags” when the logical drive is in the FAILED state to avoid the incorrect warning message by the host management tool.

– **Risk**: Low

• Fixed an issue where the device 'serial number' field was being overloaded with failure reason information

– **Root cause**: For a device which fails very early in target discovery, the serial number field was being overloaded with more detailed failure reason information to indicate the nature of the very early device fault. The incorrect serial number information was then being displayed in various inventory displays which causes confusion even though the target is known to be failed.

– **Fix**: Added additional device failure reason codes to describe each of these scenario’s instead of lumping them all under a single generic reason.

– **Risk**: Low

### 2.2.2 UEFI/Legacy BIOS Fixes

This section shows the UEFI/Legacy BIOS fixes and enhancements for this release.

#### 2.2.2.1 Fixes and Enhancements for UEFI Build 1.4.4.1/Legacy BIOS Build 1.4.4.2

This release provides the following fixes and enhancements.

• Updated driver branding from Microsemi to Microchip.


• Fixed an issue where eligible drives are not listing while performing Heal Array on a failed array which requires multiple drives to fix.

– **Root cause**: Incorrect drive eligibility validation when heal array operation requires multiple drives.

– **Fix**: Consider multiple drive requirement while performing eligibility validation for heal array operation.

– **Risk**: Low

• Fixed an issue where the version field of Firmware Management Protocol is not populated with 32 bit version.

– **Root cause**: Version field of Firmware Management Protocol is not populated with 32 bit version instead it is assigned with truncated long version.

– **Fix**: Version field of Firmware Management Protocol assigned with 32 bit version format.

– **Risk**: Low

• Fixed an issue where HII and health messages displayed incorrect translations for Chinese and Japanese strings.

– **Root cause**: Incorrect translation for few HII options and driver health messages.

– **Fix**: Corrected language translations for Unicode strings.

– **Risk**: Low

• Fixed an issue where the driver health error code 0x1945 was not observed when parity initialization had not yet completed while logical drive rebuilding was in progress.

– **Root cause**: Degraded logical drive case for error code 0x1945 does not consider logical drive state of rebuilding.

– **Fix**: Add the logical drive with state rebuilding to degraded list for the case 0x1945 error.

– **Risk**: Low
• Fixed an issue where creating a volume on an NVMe array used a default strip size of 256 KiB instead of 128 KiB.
  – Root cause: SA_GetEditableLogicalDriveStripSizeRange had no logic in place to set a default strip size specific to NVMe arrays.
  – Fix: Updated the default strip size calculation to be set to either 128 KiB or the max strip size supported by the controller for NVMe arrays or the desired RAID level, whichever is smallest.
  – Risk: Low

• Fixed an issue where the system would experience a Bootup Hang with Insyde Legacy BIOS on AMD ROME platform.
  – Root cause: The Legacy OpROM was not checking if the Keyboard buffer is empty before reading and writing to ports 60h and 64h.
  – Fix: Check if the keyboard buffer is clear before reading and writing to the Ports 60h and 64h. If not, clear the buffer by reading the data from Port 60h.
  – Risk: Medium

2.2.3 Driver Fixes
This section shows the driver fixes and enhancements for this release.

2.2.3.1 Windows Driver Fixes
This section shows the Windows driver fixes and enhancements for this release.

2.2.3.1.1 Fixes and Enhancements for Windows Driver Build 1010.12.0.1007
There are no fixes and enhancements for this version.

2.2.3.2 Linux Driver Fixes
This section shows the Linux driver fixes and enhancements for this release.

2.2.3.2.1 Fixes and Enhancements for Linux Driver Build 2.1.14-035
This release provides the following fixes and enhancements.

• Fixed an issue of driver spin down when system transitions to the Suspend (S3) state in certain systems.
  – Root cause: In certain system (based on PCI IDs), when the OS transitions the system into the Suspend (S3) state, the flush cache command indicates a system RESTART instead of SUSPEND. This avoids drive spin-down.
  – Fix: Avoid drive spin-down when system transitions to the Suspend state.
  – Risk: Medium

• Added enable SATA NCQ priority support to sysfs. The driver needed device attribute sas_ncc_prio_enable for I/O utility to enable SATA NCQ priority support and to recognize I/O priority in SCSI command and pass priority information to controller firmware. This device attribute works only when device has NCQ priority support and the controller firmware can handle I/O with NCQ priority attribute.

• Fixed an issue where logical drive size is not reflecting after expansion. After modifying the logical drive size, lsblk command still shows previous size of the logical volume.
  – Root cause: When the driver gets any event from firmware, the driver schedules a rescan worker with a delay of 10 seconds. If the array expansion completes too quickly (in a second), the driver does not catch the logical drive expansion due to worker delay. Since the driver doesn’t detect logical drive expansion, it does not call rescan device to update the new size of the logical drive to the OS. This causes lsblk to report the original size.
  – Fix: For every logical device event notification, driver rescans the logical drive.
  – Risk: Low

• Fixed an issue where during kdump OS is dropping into a shell if the controller is in locked-up state.
  – Root cause: Driver issues SIS soft reset to restore the controller to SIS mode when OS boots into kdump mode. If the controller is in Locked-up state, the SIS soft reset does not work. Since the controller lookup code has not been cleared, the driver considers firmware is no longer up and running. In this case, the driver returns an error code to OS and kdump fails. After kdump failure, some OS distributions do not reboot cleanly which leads to the OS dropping into a recovery shell.
Fix: During kdump, driver will reboot the system if the controller is in Locked-up state.

Risk: Low

• Fixed an issue where the logical drive creation takes a longer time to expose logical drive.
  
  Root cause: HZ is defined as the number of times jiffies is to be incremented per second. If HZ=100, then it would take 0.01s to increment a jiffy by one. If HZ=1000, then it would take 0.001 s (1ms) to increment a jiffy by one. Delay of n seconds can be achieved by simply multiplying n with HZ.
  
PQI_HZ macro is set to 1000 when HZ value is less than 1000. By default, PQI_HZ will result into a delay of 10 s (for kernel, which has HZ=100). In this case, when firmware raises an event, rescan worker will be scheduled after a delay of (10 x PQI_HZ) = 100 s instead of 10 s.
  
  Additionally, driver uses PQI_HZ at many instances, which might result in some other issues with respect to delay.
  
  Fix: Use macro HZ for delay calculation and remove PQI_HZ.
  
  Risk: Low

• Fixed an issue where when one of the path fails during I/O and IOBypass path gets disabled for a multipath device, the I/O is again retried in the RAID path. These requests were submitted to non-existent devices in the RAID path and firmware responded to those requests with Illegal request and 'Invalid field in parameter list' sense data.
  
  Root cause: Even when the device path has gone, the driver continued submitting requests in RAID path and they are returned from firmware as Illegal requests.
  
  Fix: When one of the paths is removed in dual domain, return DID_NO_CONNECT to SCSI mid-layer of the OS. The DID_NO_CONNECT return helps multipath to stop issuing Test Unit Ready and other media access commands before failing the path. Failing the path quickly helps routing I/O to the opposite path faster.
  
  Risk: Low

• Fixed an issue where the controller spins down drives during a warm boot on Linux.
  
  Root cause: The Linux SmartPQI driver has a callback function that the OS calls when the system is being shut down or being rebooted. This callback function calls the Flush Cache command. The command has a parameter that allows the driver to indicate to the firmware the reason for the flush cache (shutdown, hibernate, suspend, or restart). The OS callback function does not indicate to the driver whether it is being called for shutdown or warm boot, so the driver indicates to the firmware that the reason for the flush cache is a system shutdown. The firmware always spins down drives in this case.
  
  Fix: The SmartPQI driver uses a Linux kernel global variable to distinguish between a system shutdown and a warm boot and sets the Flush Cache command parameter accordingly.
  
  Risk: Low

• Fixed an issue where duplicate device nodes for Ultrium tape drive and medium changer are being created.
  
  Root cause: The Ultrium tape drive is a multi-LUN SCSI target. It presents a LUN for the tape drive and a second LUN for the medium changer. The controller firmware lists both LUNs in the report logical LUNS results, so the SmartPQI driver exposes both devices to the OS. Then the OS does its normal device discovery through the SCSI REPORT LUNS command, which causes it to re-discover both devices a second time, resulting in duplicate device nodes.
  
  Fix: When the OS re-discovers the two LUNs for the tape drive and medium changer, the driver recognizes that they have already been reported and blocks the OS from adding them a second time.
  
  Risk: Low

2.2.3.3 VMware Driver Fixes

This section shows the VMware driver fixes and enhancements for this release.

2.2.3.3.1 Fixes and Enhancements for VMware Driver Build 4230.0.103

This release provides the following fixes and enhancements.

• Fixed an issue where possibility of a null device pointer needs to be prevented in one of the functions where it waits for the outstanding commands to get completed.
  
  Root cause: Device may have been removed.
  
  Fix: Check for a null device pointer before starting the wait loop.
  
  Risk: Low
• Fixed an issue where logical drive displays state Ejected while logical drive is queued for expansion.
  – Root cause: A missing break statement in switch case that handles state QUEUED_FOR_EXPANSION allows execution to fall through to subsequent case for LV_EJECTED.
  – Fix: Add the missing break statement to prevent fall through.
  – Risk: Low
• Fixed an issue where a failed lookup results in an array out of bounds condition.
  – Root cause: A device lookup function returns INVALID_ELEM (0xffff) when device is not found, but calling function does not check for error, and unconditionally uses lookup’s return as index into the device list.
  – Fix: Print message and do not continue device addition or deletion if lookup function returns INVALID_ELEM.
  – Risk: Low

2.2.3.4 FreeBSD/Solaris Driver Fixes
This section shows the FreeBSD/Solaris driver fixes and enhancements for this release.

2.2.3.4.1 Fixes and Enhancements for FreeBSD Driver Build 4170.0.1014
This release provides the following fixes and enhancements.
• Fixed an issue where debug log messages were flooding the kernel logs.
  – Root cause: There are a lot of DBG_INFO prints which are logged by SmartPQI and one DBG_ERR print causing log contention which should not be considered an error.
  – Fix: Disable the DBG_INFO prints from logging and change DBG_ERR to DBG_INFO for a message not considered an error.
  – Risk: Low

2.2.3.4.2 Fixes and Enhancements for Solaris Driver Build 11.4120.0.1005
There are no fixes and enhancements for this version.

2.2.4 Management Software Fixes
This section shows the management software fixes and enhancements for this release.

2.2.4.1 maxView Storage Manager/ARCCONF Fixes
This section shows the maxView Storage Manager/ARCCONF fixes and enhancements for this release.

2.2.4.1.1 Fixes and Enhancements for maxView Storage Manager/ARCCONF Version 4.00.00 Build B24713
This release provides the following fixes and enhancements.
• Upgraded the log4j version in maxView and vSphere plugin to 2.16.0, which has the fix for CVE-2021-44228 and CVE-2021-45046 vulnerabilities.

2.3 Limitations
This section shows the limitations for this release.

2.3.1 Firmware Limitations
This section shows the firmware limitations for this release.

2.3.1.1 Limitations for Firmware Release 3.01.07.046
This release includes the following limitation:
• This release has a limitation with SAS-4 (SXP24G) Expander-Attached SATA drives when the Controller-Expander operates at 24G. If a SATA device is connected to SXP24G, link between SmartRAID 3200/SmartHBA 2200 and SXP24G will not operate at 24G rate. Please refer to SmartROC 3200/SmartIOC 2200 Device Errata for more details on root cause and impact due to this issue.
  – Workaround: Firmware will rate-limit the attached SAS domain to 12 Gbps when SAS-4 Expander attached at 22.5 Gbps is present with at least one SATA drive attached in the topology.

2.3.2 UEFI/Legacy BIOS Limitations
This section shows the UEFI/Legacy BIOS limitations for this release.
2.3.2.1 Limitations for UEFI Build 1.4.4.1/Legacy BIOS Build 1.4.4.2
There are no known limitations for this release.

2.3.3 Driver Limitations
This section shows the driver limitations for this release.

2.3.3.1 Windows Driver Limitations
This section shows the Windows driver limitations for this release.

2.3.3.1.1 Limitations for Windows Driver Build 1010.12.0.1007
This release includes the following limitations.
• The Windows driver issues an internal flush cache command for flushing the controller cache to the drives before changing the power state of the system (during shutdown/reboot/hibernate). Due to many factors (e.g., speed of drives, size of cache, type of data in cache), the time taken by the controller to flush the cached data can exceed the operating system’s specified timeout values. A system crash can be expected in those scenarios.
  In general, it is advised not to do heavy write operations on logical drives composed of slow drives while initiating a system shutdown in Windows 10 environments.

2.3.3.2 Linux Driver Limitations
This section shows the Linux driver limitations for this release.

2.3.3.2.1 Limitations for Linux Driver Build 2.1.14-035
This release includes the following limitations.
• An issue can occur when doing a driver injection (DUD) install. On some distributions (RHEL7.9, RHEL8.2, RHEL8.3, SLES15SP2, SLES15SP3), the DUD install will hang if a drive in HBA mode has the Drive Write Cache enabled.
  - **Workaround:** There are two workarounds for this issue:
    i. Make sure the Drive Write Cache is disabled for any drive in HBA mode.
    ii. For RHEL7.9/8.2/8.3, add rd.driver.blacklist=smartpqi to the grub entry along with inst.dd.
• Due to a change in the SCSI mid-layer, some Linux distributions may take a long time to come up if the system is rebooted while a hard disk(s) is being sanitized. This has currently been observed with inbox smartpqi drivers on RHEL 7.9/RHEL8.3 and SLES 15SP2.
  - **Workaround:** Do not reboot the system while a hard disk is being sanitized, or update to the smartpqi 2.1.12-055 or later driver release.
• On AMD/RHEL 7.9 systems, the system might panic due to the a bug in the IOMMU module. For details, refer to lore.kernel.org/linux-iommu/20191018093830.GA26328@suse.de/t/
  - **Workaround:** Disable the IOMMU setting option in BIOS.
• On AMD/UEK6 systems, the system might hang during kdump if IOMMU is enabled.
  - **Workaround:** Disable the IOMMU setting option in BIOS.
• Depending on hardware configurations, the smartpqi expose_ld_first parameter may not always work consistently.
  - **Workaround:** None
• Hibernating Linux system using `pm-hibernate` command causes system to hang.
  - **Workaround:** None
• When multiple controllers are in a system, udev(systemd) can timeout during kdump/kexec resulting in an incomplete kdump operation. The usual indication of the timeout is the console log entry: "scsi_hostX: error handler thread failed to spawn, error = -4".
  - **Workaround:** Extend the udev(systemd) timeout during a kdump operation. Use the following to increase the timeout for udev(systemd):

```bash
vi /etc/sysconfig/kdump
add udev.event-timeout=300 to KDUMP_COMMANDLINE_APPEND
systemctl restart kdump
systemctl status kdump
```
2.3.3 VMware Driver Limitations
This section shows VMware driver limitations for this release.

2.3.3.1 Limitations for VMware Driver Build 4230.0.103
There are no known limitations for this release.

2.3.4 FreeBSD/Solaris Driver Limitations
This section shows FreeBSD/Solaris driver limitations for this release.

2.3.4.1 Limitations for FreeBSD Driver Build 4170.0.1014
This release includes the following limitations.

• Under heavy I/O with transfer size more than 128k, controller may go offline. This happens in FreeBSD 13.
  – Workaround: Reduce the I/O transfer size of the application to less than 128k.

2.3.4.2 Limitations for Solaris Driver Build 11.4120.0.1005
There are no known limitations for this release.

2.3.4 Management Software Limitations
This section shows management software limitations for this release.

2.3.4.1 maxView Storage Manager/ARCCONF Limitations
This section shows the maxView Storage Manager/ARCCONF limitations for this release.

2.3.4.1.1 Limitations for maxView Storage Manager/ARCCONF Version 4.00.00 Build B24713
This release includes the following limitations.

• Advanced statistics will no longer be available in maxView/ARCCONF.
• ADU report in support archive will no longer be available in zip format. The relevant logs are captured under Controller_X_Debug_Log.txt
• SSD report in support archive will not be available.
• OS partition information is not available in FreeBSD and Solaris OS in maxView/ARCCONF.
• Remote ARCCONF (CIM client) is not support for ESXi 7.x onwards.
• Due to data type mismatch between maxView and redfish server, eccRecoveredReadErrors and serviceHours properties in the drive error counter tab will not be reflecting the current value.
  – Workaround: User needs to use arcconf CLI GETCONFIG command to refer the current value for these error counter properties.
• In ESXi 7.x, maxView GUI may not update the latest configuration automatically when the operations are performed through the ESXi host ARCCONF.
  – Workaround: User needs to refresh the configuration using the refresh link provided in the top right corner in the maxView GUI before performing any operations.
• When user tries to access the maxView main.xhtml page directly when the previous session was still active, user may end up with a warning page mentioning “XML Parsing Error: no root element found”.
  – Workaround: User needs to use the login page to get authenticated and create a new session to access the main.xhtml page.
• When the SED drive is in locked state, the hard drive level refresh SED security status operation is not available in the maxView GUI.
  – Workaround: Use the controller level refresh SED security status operation or use ARCCONF command to refresh the SED security status.
• In Linux OS, the redfish server may get terminated when Delete Array operation is performed on an array with 64 logical devices.
  – Workaround: The user shall restart the redfish server or use ARCCONF CLI for configuration.
3. Updating the Controller Firmware
   This section describes how to update the controller firmware to the latest release.

3.1 Updating Controllers to Latest Firmware
   If running firmware is 3.01.00.006 or lower, please contact Adaptec Apps team at ask.adaptec.com.

3.1.1 Upgrading to 3.01.07.046 Firmware
   1. For controllers running 3.01.02.042 or higher firmware, flash with 3.01.07.046 version of firmware
      "SmartFWx200.bin" provided in this package using maxview or ARCCONF utility.
   2. Power cycle the server.
## Revision History

Table 4-1. Revision History

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<th>Date</th>
<th>Description</th>
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<td>D</td>
<td>12/2021</td>
<td>Updated for SR 3.1.6.1 release. Updated Fixes and Enhancements for maxView Storage Manager/ARCCONF section for log4j vulnerabilities.</td>
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<td>C</td>
<td>11/2021</td>
<td>Updated for SR 3.1.6 release.</td>
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<td>B</td>
<td>08/2021</td>
<td>Updated for SR 3.1.4 release.</td>
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<td>A</td>
<td>06/2021</td>
<td>Document created.</td>
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<th>EUROPE</th>
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