

# **AAC Sirius Product Family Release Notes**

## **Rev. P**

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## Introduction

### Purpose of document

This document details the user-visible changes in functionality that have been introduced in each release in relation to the previous release, and any actions that need to be taken by the user of the related functionality when moving from a previous release.

Known issues for existing functionality are documented in a separate errata document [RD2]. When errata items are solved, they are in general simply removed from the errata document and only noted in the release notes if the solution implies actions that need to be taken by the user.

### Revision log

Rev	Date	Change description	Prepared
A	2016-10-07	First official release	E. Zachrisson
B	2016-11-03	Update for release 0.7.0	M. Werner
C	2017-01-03	Update for release 0.8.0	M. Werner
D	2017-02-01	Update for release 0.9.0	M. Werner
E	2017-02-10	Update for release 0.9.1	M. Werner
F	2017-03-07	Update for release 0.10.0	M. Werner
G	2017-04-18	Update for release 0.11.0	M. Werner
H	2017-08-01	Update for release 0.11.1	M. Werner
I	2017-10-31	Update for release 1.0.0	M. Werner
J	2017-12-07	Update for release 1.0.1	M. Werner
K	2017-12-20	Update for release 1.0.2	M. Werner
L	2018-03-06	Update for release 1.1.0	J. Viketoft
M	2018-04-16	Update for release 1.2.0.	M. Werner
N	2018-06-25	Update for release 1.3.0. Correct NVRAM migration instructions in 1.3.0.	P. Brolin
P	2018-10-26	Update for release 1.4.0.	M. Werner

### Reference documents

Rev	Document ref	Document name
RD1	205065, rev J	Sirius Product User Manual
RD2	205056, rev J	Sirius Product Family Errata

## Changes for 0.6.2

Ref #	What	Why	Action to be taken by user	Affects
1598	RX FIFO Size increased to 128. Driver API updated	To prevent buffer overflows	Update IOCTL and symbols according to the manual	TCM-S, OBC-S
1734	TX output polarity changed on uart 3 and 4	Previous polarity was wrong	Harness polarity must be swapped	TCM-S
1644	Extended address for outgoing messages corrected to 0xFF	Previous address of 0x00 was wrong	Any workarounds must be removed	TCM-S application
1716	X-Band pin description added to manual	Missing before	None	TCM-S
1701	UART now closes the line driver upon closure	A line driver should be deactivated when not used	None	TCM-S, OBC-S
1704	TMConfig fields in manual corrected	Order differed between implementation and manual	None	TCM-S
1703	TMBRSet details in manual corrected	Old description and example was wrong	None	TCM-S

## Changes for 0.7.0

Ref #	What	Why	Action to be taken by user	Affects
1514	Version field extended from 1 byte to 4 bytes in GetHK RMAP reply and modified debug uart startup version printout format	Unification with internal versioning scheme	Update RMAP GetHK reply handling according to new format in manual	TCM-S application
1452	Debug UART no longer corrupts certain characters	Increased reliability of debug output, especially if machine-parsed.	None	TCM-S, OBC-S
1738	RTEMS updated to latest upstream prerelease version of 4.11	To benefit from continuous bugfixing done in RTEMS upstream.	None	TCM-S, OBC-S
1545	Applications utilising the board support package can now compile with C99 compiler standard set.	Allows more strict compilation checks.	None	TCM-S, OBC-S

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Ref #	What	Why	Action to be taken by user	Affects
1555	tcm core app, when partition is full ENOSPC should be returned	ENOSPC is returned when partition is full. If data to be written does not fit, ENOSPC will be returned and no data will be written.	Check status value of RMAP reply to see if write-access is successful	TCM-S application
1695	Clarified argument type as pointer to uint32_t for GPIO IOCTL calls in manual	Previously incorrect argument type	None	TCM-S, OBC-S
1712	Adjust CCSDS clock divisor to generate exactly 1 Mbps	Did not previously generate correct rate	None	TCM-S application
1737	RTEMS timecount function modified to use "simple" timecounter implementation instead	Reduces timecounter overhead.	None	TCM-S, OBC-S
1786	NVRAM configuration example now included in board support package	Allows customization of NVRAM configuration	None	TCM-S application
1460	ADC supported sample rate and clock divisor combinations documentation extended and clarified.	Previous limitation documentation was inaccurately conservative.	None	TCM-S, OBC-S
1926	Errno aliases are used in the manual without numerical translation	A table is added in user manual to clarify numerical translation.	None	TCM-S application
1785	Mass memory download does not work	Handling of partition pointers after power-cycle was not correct. Setting of write pointers for partitions was not correct.	User has to read errata so that first 3 blocks are not used when configuring partitions.	TCM-S application
1790	Spacewire mode handling corrected	Changing mode previously caused spacewire link error	None	TCM-S, OBC-S
1781	Error handling and status handling updated in spacewire RTEMS driver	Previously incorrect/incomplete status from spacewire transmission sequence	Update status and error handling according to manual	TCM-S, OBC-S
1505	Handling of read buffer overflow updated in spacewire	Spacewire driver previously triggering overflow reject if read size was insufficient for incoming packet	None	TCM-S, OBC-S
1864	Corrected transmission sequence in spacewire	Fixes spacewire lockup after failed transmission	None	TCM-S, OBC-S

## Changes for 0.8.0

Ref #	What	Why	Action to be taken by user	Affects
1360	Mass memory DMA added	Performance increase in conjunction with massmem read/write operations.	None	TCM-S
1497	O3 optimisation enabled by default	Increased performance.	None	TCM-S, OBC-S
1680	SCET now supports syncing subsecond to external PPS source	Old implementation did not meet requirements.	None	TCM-S, OBC-S
2034	SCET driver has an updated API	Old implementation did not meet requirements and had multiple ways of doing operations.	Check ioctl/read/write operations and ensure the application uses the updated API	TCM-S, OBC-S
1796	CLCW fields "NoRfAvailable" and "NoBitLock" now reports correct status	Previously these fields were constant.	None	TCM-S
1797	Missing RMAP message for TC_VALID and CA_LOCK	Requirement. Solved in conjunction with #1796	None	TCM-S application
1798	New TCM RMAP command for configuration and reading of VC0 timestamps	Requirement	None	TCM-S application
1900	TCM Core App tasks synchronised at initialisation	Avoids risk of passing data to a task not ready from init	None	TCM-S application
1953	TCM Core App stability when reading/writing to mass memory via SpW improved	Previously caused application lockup.	None	TCM-S application
1980	SpW communication no longer stops after packet to invalid logical address	Previously caused application lockup.	None	OBC-S, TCM-S
2017	TMTSControl RMAP command reply size changed from 6 to 1	Previous command reply size was incorrect, and included garbage data.	None	TCM-S application
2018	VC0 interrupt no longer prints debug output	Output was not intended for release build.	None	TMC-S application

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Ref #	What	Why	Action to be taken by user	Affects
2060	TM Pseudo Randomizer is now default enabled	Requirement. In previous release, the TM Pseudo Randomizer was disabled default.	Might affect settings/configuration in ground-station equipment	TCM-S application
2092	CCSDS detect signals must now be connected for proper operations of CCSDS interface	Hardware difference.	When using FM boards the UMBI/TRX1/TRX2 detect signals in the pigtail needs to be grounded for correct operation. E. g. if the TRX1 interface is to be used, the detect pin 24 must be grounded (active low)	TCM-S
1548	MMStatus RMAP command reply size and content corrected	Previous size and data was incorrect	None	TCM-S application

## Changes for 0.9.0

Ref #	What	Why	Action to be taken by user	Affects
1750	TCM FM UART3 is now connected to XBAND and UART4 to SBAND	Different hardware implementation between Bread board and FM board	nv_config configuration must be updated to swap UART 3 with UART 4	TCM-S
1774	The selected telecommand clock, data and enable signals are now forwarded through the mux to the BCH decoder, rejecting data and clock on inactive data paths	Old implementation did not allow for connecting both the umbilical and radio interface	None	TCM-S
2144	UART software queue overflow warning has been lowered in severity	Avoid excessive warnings on debug output	None	TCM-S, OBC-S

## Changes for 0.9.1

This release only included updated SoC designs, the BSP was not updated.

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Ref #	What	Why	Action to be taken by user	Affects
2250	System-on-Chip asynchronous FIFO implementation updated	Previously caused stability issues for high-throughput spacewire and mass memory read/write operations	None	TCM-S, OBC-S

## Changes for 0.10.0

Ref #	What	Why	Action to be taken by user	Affects
2103	Bootrom now correctly utilises all available software images	Previous bug caused bootrom to skip all remaining images except the last safe image if an error was found	None	TCM-S, OBC-S

## Changes for 0.11.0

Ref #	What	Why	Action to be taken by user	Affects
1873	CCSDS TM performance is greatly improved	Previous performance did not meet requirements.	PUS packets sent to the TCM-S for storage and subsequent download must follow certain rules. Download RMAP command has an updated API. See RD1 for detailed information.	TCM-S core application
2102	Removed from RD2 errata	Root cause has been fixed	None	TCM-S core application
2153	MM Download is now able to read more data while TM is sending	Increased downlink performance.	PUS packets sent to the TCM-S for storage and subsequent download must follow certain rules. Download RMAP command has an updated API. See RD1 for detailed information.	TCM-S core application

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Ref #	What	Why	Action to be taken by user	Affects
2176	Time synchronisation support added. SCET time is no longer possible to set directly	In order to support time synchronization against a time master.  Current slave-only configuration for time sync does not allow syncing time without qualified PPS.	Time synchronisation needs PPS input and SCETTime messages, see RD1 for detailed information.	TCM-S core application
2291	Added to RD2 errata	Issue has been detected	None	TCM-S core application
2292	Removed from RD2 errata	Root cause has been fixed	None	TCM-S core application
2334	UART RS422/RS485 driver circuits are now enabled for a longer time after a transmission. Erratum has been removed.	The last bytes of an UART transmission in RS485 mode may get truncated due to premature disabling.	None	TCM-S FM, OBC-S FM
2345	Download command implementation changed to use 4-byte length (from previous 8).	Previous implementation did not match API design.	Download commands needs to be changed to use 4-byte length.	TCM-S core application
2361	Watchdog is now disabled during system image programming	If the watchdog was enabled there was a risk of failing the flash procedure due to a watchdog reboot	None	TCM-S, OBC-S
2364	Watchdog is now disabled during NVRAM programming	If the watchdog was enabled there was a risk of failing the NVRAM update due to a watchdog reboot	None	TCM-S, OBC-S
2365	Telecommand and telemetry configuration from NVRAM	Previously many configurations were hard coded in the TCM-S core application, now they are configurable in the NVRAM	Updated NVRAM configuration must be reviewed and flashed onto the TCM-S FM board.	TCM-S core application
2370	Memory scrubber is now enabled after error manager driver initialization	Previously the error manager initialization function disabled the memory scrubber.	None	TCM-S, OBC-S

## Changes for 0.11.1

This release only included updated BSPs; the SoC designs were not updated.

Ref #	What	Why	Action to be taken by user	Affects
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Ref #	What	Why	Action to be taken by user	Affects
2396	UART driver write synchronisation improved	Previous implementation could result in undefined behaviour in case of frequent and/or erroneous input traffic in combination with output.	None	TCM-S, OBC-S

## Changes for 1.0.0

Ref #	What	Why	Action to be taken by user	Affects
2346	Mass memory driver now exposes functionality for writing mass memory page spare areas.	Functionality is needed to allow metadata writing in new TCM core app massmem handler implementation.	None.	TCM-S
1591	Mass memory handler in TCM core app has been redesigned.	New implementation handles discovered bad blocks during operation, implements direct and circular mode partitions.	Storage to, download from, and partition configuration of the mass memory on the TCM core app needs to be updated to follow new API and behaviour. See RD1 for detailed information.	TCM-S core application
1763	Telemetry user interface robustness improved.	In previous implementation, no check was done if TM was enabled prior to sending which could lead to hanging application.	None	TCM-S core application
2416	RMAP write reply address handling corrected.	Previous implementation could cause RMAP reply messages with certain path lengths to be invalid and therefore not sent correctly.	None	TCM-S core application
2471	Spacewire pass-through traffic is now always propagated.	Previous implementation blocked pass-through spacewire traffic through the spacewire router unless the spacewire driver was opened by software.	None	TCM-S, OBC-S
2426	System flash driver has been redesigned.	Harmonized driver API for system flash with the mass memory flash driver, including better support for application bad block management.	Application code using the system flash driver needs to be updated to follow the new API. See RD1 for detailed information.	TCM-S, OBC-S

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Ref #	What	Why	Action to be taken by user	Affects
1788 1589 1816 1839 2143 2288 2294 2382 1889	Removed from RD2 errata.	Root causes have been fixed.	None	TCM-S core application
2431 2488 2493 2495	Added to RD2 errata	Issue has been detected	See RD2.	TCM-S core application
1529 2295 2383 2343 2363 2398 2406 2408 2409 2411	Stability of CCSDS telecommands and telemetry handling improved.	Previous implementation exhibited several stability and consistency problems in various telecommand and telemetry scenarios.	None	TCM-S, TCM-S core application
1447 1543 2356	Cleanup/corrections of CCSDS driver.	Removal of duplicate definitions in bare-metal and RTEMS-driver. Adaptions to new RTL.	Application code using the CCSDS driver needs to be updated to follow the new API. See RD1 for detailed information.	TCM-S

## Changes for 1.0.1

This release only included an updated TCM-S core application. The SoC designs and the BSPs was not updated.

Ref #	What	Why	Action to be taken by user	Affects
2514	<b>MMDownloadStatus command is now available.</b>	Previously this command was unavailable due to an invalid command definition.	None	TCM-S core application
2511	<b>Ensure download handles telemetry being disabled, or simultaneous reconfiguration.</b>	Previously, a lockup could be triggered either when download was attempted when telemetry was disabled, or when a reconfiguration was initiated during on-going download.	None	TCM-S core application

## Changes for 1.0.2

This release only included an updated TCM-S core application. The SoC designs and the BSPs was not updated.

Ref #	What	Why	Action to be taken by user	Affects
2519	<b>A workaround has been added in the TCM-S core application which sets the RMAP data CRC byte of received command to zero after it has been checked.</b>	An issue has been discovered in the CCSDS IP where a 0xF5 idle padding byte after the PUS telemetry packet would cause telemetry inconsistencies and software lockups. This provides a workaround for this issue.	None	TCM-S core application

## Changes for 1.1.0

SoC info in this release incorrectly contains the 1.0.0 version number, the SoC info timestamps, 0x5a8ed6ca for OBC, 0x5a9947ea for TCM, may be used instead to uniquely distinguish them.

Ref #	What	Why	Action to be taken by user	Affects
2477	BSP example code updated.	Now includes more examples for AAC-specific BSP drivers.	None.	TCM-S, OBC-S
2519	CCSDS telemetry handling of padding bytes improved, workaround from 1.0.2 removed.	Previous implementation could cause issues when padding bytes (0xF5) appeared at certain locations in telemetry,	None.	TCM-S, TCM-S core application
2510	Documentation for TMConfig, TMBRControl RMAP reply format updated.	Previous documentation specified incorrect size for bitrate (was 1 octet, should be 2), and incorrect location for OCF flag.	Make sure reply handling for TMConfig, TMBRControl expects correct format.	TCM-S core application
2553	Documentation for partition config format updated.	Previous documentation specified incorrect numeric values for partition types.	Make sure reply handling for MMPartitionConfig RMAP command expects correct format.	TCM-S core application
2521	Mass memory handling for MMFree commands has been updated.	Previous implementation caused free operations in unused data which was supposed to do nothing to report failures or potentially mark some previously freed data as used.	None.	TCM-S core application
2520	Telemetry handling updated.	Previous implementation could block the MMStopDownloadData reply from being sent, and telemetry reconfiguration from being initiated, if incoming telemetry fully saturated the telemetry handler.	None.	TCM-S core application
2217	Unlocking write protection of the protected area in the SPI RAM "NVRAM" is now done when the debugger is connected, instead of via an ioctl() call.	Ensure strict protection during flight.	Adapt non-flight code to avoid issuing unlock memory ioctl() calls.	TCM-S, OBC-S, TCM-S core application
2243	ADC driver temperature conversion helper functions updated to use 32bit type.	Previous implementation used a 16bit signed type to store temperature in milli-Celsius, which limited the range to circa -33 to +33 C,	Update code using the ADC driver temperature conversion helper to follow the new API.	TCM-S, OBC_S

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Ref #	What	Why	Action to be taken by user	Affects
2243	HKData RMAP reply format changed.	Type extension of the ADC temperature value (see above), and reordering to ensure type alignment.	Update replay handling for HKData RMAP commands to expect new format.	TCM-S core application

## Changes for 1.2.0

This release did not include any SoC design updates for the OBC.

Ref #	What	Why	Action to be taken by user	Affects
2195	Software upload support added to core application.	Allow software update during flight.	None.	TCM-S core application
2195	Software upload support library added to BSP.	Facilitate customer integration of software upload.	None	OBC-S
2586	Software upload example application added to OBC-S BSP.	Facilitate customer integration of software upload.	None.	OBC-S
1893	NVRAM RTEMS driver read() and EDAC error reporting API modified.	Add support for multi-threaded use of NVRAM driver with multiple open file descriptors.	Application code using the NVRAM/SPI RAM driver needs to be updated to follow the new API. See RD1 for detailed information.	TCM-S, OBC-S

## Changes for 1.3.0

Ref #	What	Why	Action to be taken by user	Affects
#2405	<p>The data CRC of Incoming RMAP write commands to the TCM-S core application is now verified by default. The VerifyDataBeforeWrite bit can be cleared to disable verification (this is a custom non-standard feature).</p> <p>Outgoing RMAP write commands from the TCM-S core application (TCCommand and UARTData) now contains a valid data CRC. and has the VerifyDataBeforeWrite bit set.</p>	Ensure consistency validation is possible for all data.	<p>If sending RMAP write commands to the TCM-S core application without calculating a valid data CRC (for example if the data already contains a checksum), the VerifyDataBeforeWrite bit must be cleared, otherwise the command will be rejected.</p> <p>A data CRC of 0x00 in outgoing RMAP write commands from the TCM-S core application should now be treated as a valid CRC and verified.</p>	TCM-S core application
#1879	Only one reader and writer per UART device is now allowed.	Avoiding potential issues with communication consistency.	Multiple read or multiple write users of a UART device must be multiplexed via use of a single UART handler or similar.	TCM-S, OBC-S
#1898	SCET driver now allows multiple opens for reading	Allow multiple users of the SCET without the need for a coordinating handler.	None	TCM-S, OBC-S
#2216	SW crash and lookup detection for the TCM-S core application improved to also provide watchdog monitoring and reset for individual subsystem lockups.	A SW crash or lookup in an isolated subsystem was previously ignored.	None	TCM-S core application
#2462	A default fall-back solution has been added if access to NVRAM configuration parameters fails during initialisation of the TCM-S core application.	Ensure that degradation of the NVRAM is not fatal, and still allows limited operation.	Implement handling of the fall-back configuration if continued operation with degraded NVRAM is desired.	TCM-S core application

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Ref #	What	Why	Action to be taken by user	Affects
#2569	Automatic padding of segments when writing to Mass Memory is available for continuous and circular partitions.	Allow use of mass memory without the need to manually handle segmentation.	None.	TCM-S core application
#2598	CCSDS telemetry handling of padding with multiple simultaneous virtual channels improved.	Previous implementation could cause telemetry inconsistencies and software lockups when multiple virtual channels was used simultaneously, and when at least one channel had a high throughput, for example when downloading stored telemetry.	None	TCM-S, TCM-S core application
#2598	CCSDS driver telemetry handling synchronisation improved.	Previously, the CCSDS driver (when used in non-blocking mode) could occasionally loose sync with the CCSDS RTL module, and report an incorrect amount of finished transfers.	None.	TCM-S, TCM-S core application
#2582	Additional UART5 made available on the OBC-S.	Allow connection of additional UART devices.	None.	OBC-S

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Ref #	What	Why	Action to be taken by user	Affects
#2500 #2595	The configuration/metadata format structure in the NVRAM has been changed.	Allow use of separate dedicated configurations/metadata for the “updated” and “safe” software images, with full debug-detect protection of the “safe” area.	<p>The FPGA RTL image and the BSP for this release needs to be updated simultaneously in order for NVRAM access to function correctly.</p> <p>After updating to this release the following steps needs to be performed (in the following order):</p> <ol style="list-style-type: none"> <li>1. The bad block table for the system flash needs to be migrated by running the <code>nvrmove_bb_table</code> application available in the “example” directory in the BSP.</li> <li>2. The TCM-S core application NVRAM configuration will need to be rewritten. See [RD1] for detailed information.</li> </ol>	TCM-S, OBC-S, TCM-S core application



## Changes for 1.4.0

Ref #	What	Why	Action to be taken by user	Affects
#2533 #2620 #2621	Support for different system flash and mass memory chip type added.	Previous chip types no longer available in stock, new board production uses different chip types.	The FPGA RTL image and the BSP/software for this release needs to be updated simultaneously in order for system flash and mass memory access to function correctly.	TCM-S, OBC-S
#2648	CCSDS driver blocking mode corrected.	Ensure blocking mode blocks until send is complete, which was previously not done correctly.	None.	TCM-S
#2638	GPIO differential mode disabling corrected.	Allow differential mode to be disabled, which was previously not possible.	None.	TCM-S, OBC-S
#2623	New nvram_clear utility included in BSP.	Allow manual clearing and re-initialising of the whole NVRAM. See RD1 for detailed information.	None.	TCM-S, OBC-S
#2525	Software upload example timestamp handling modified to use SCET.	Ensure time code (CUC) second fractions uses subseconds (1/2 <sup>16</sup> second fractions) instead of milliseconds.	None.	OBC-S
#2644 #2589	Added support for PUS 2.2 “Register load” and PUS 2.128 “Device configure” services.  A TC APID parameter has been added to the NVRAM configuration.	Allow writing directly to TCM-S UARTs by means of telecommands without an intermediary OBC-S.	The NVRAM configuration needs to be rewritten; the TC APID parameter must be set to a unique/reserved value, even if PUS services on the TCM core application are unused.	TCM-S core application
#2683	nv_config utility modified.	Ensure configuration is always written both to safe and update area, previously the configuration was only written to one area at a time based on the currently active boot image.	None.	TCM-S core application

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Ref #	What	Why	Action to be taken by user	Affects
#2671	<b>Limited direct mode partition block allocation recommended.</b>  <b>NVRAM fallback configuration direct mode partition size decreased.</b>	Large direct partition block allocation takes longer time to initialise, and may cause watchdog timeout at initialisation if very large. See RD1 for detailed information.	Reduce direct mode partition allocation below recommended maximum limit (if currently above).	TCM-S core application