ÅAC Sirius OR1K Product Family Release Notes Rev. V

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	P. Brolin
P	2018-10-26	Correct NVRAM migration instructions in 1.3.0 Update for release 1.4.0	M. Werner
Q	2018-11-12	Update for release 1.4.1	P. Brolin
R	2018-11-30	Update for release 1.5.0	M. Werner
S	2019-02-01	Update for release 1.5.1	M. Werner
T	2019-03-28	Update for release 1.6.0	J. Hägglund
U	2019-04-23	Adapted to OR1K-specifc version	P. Brolin
V	2019-05-09	Update for release 1.5.2	D. Hennerström

Reference documents

Rev	Document ref	Document name
RD1	205065, rev N	Sirius Product User Manual
RD2	205056, rev M	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

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 transmision 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

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.

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

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

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

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	**MMDownloadStatus command is now available.**	Previously this command was unavailable due to an invalid command definition.	None	TCM-S core application
2511	**Ensure download handles telemetry being disabled, or simultaneous reconfiguration.**	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	**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.**	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 ÅAC-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-Celcius, 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

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	**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).** **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.**	Ensure consistency validation is possible for all data.	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. 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.	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

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

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.	The FPGA RTL image and the BSP for this release needs to be updated simultaneously in order for NVRAM access to function correctly. After updating to this release the following steps needs to be performed (in the following order): 1. The bad block table for the system flash needs to be migrated by running the nvram_move_bb_table application available in the “example” directory in the BSP. 2. The TCM-S core application NVRAM configuration will need to be rewritten. See [RD1] for detailed information.	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 (1/2^16 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

Ref #	What	Why	Action to be taken by user	Affects
#2671	**Limited direct mode partition block allocation recommended.** **NVRAM fallback configuration direct mode partition size decreased.**	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

Changes for 1.4.1

This release only included an updated SoC design for the TCM-S. The SoC design for the OBC-S, the BSPs and the TCM-S core application was not updated.

Ref #	What	Why	Action to be taken by user	Affects
#2669	**Bit error correction/detection of Telecommands amended.**	Ensure 1-bit errors in telecommands are corrected. In addition, 2-bit errors occurring in the same BCH code block of telecommands are detected resulting in rejection of telecommand. Multiple 1-bit errors occurring in separate BCH code blocks of telecommand is corrected. In previous versions bit error correction/detection was not handled correctly.	None	TCM-S, TCM-S core application
#2670	**Checking of TC frame checksum corrected.**	A TC with wrong frame error control field (frame CRC) shall be rejected, which was previously not handled correctly.	None	TCM-S, TCM-S core application

Changes for 1.5.0

This release only includes updates to the BSPs and TCM-S core application. The SoC designs for the OBC-S and TCM-S were not updated (OBC-S SoC design version remains at 1.4.0, TCM-S at 1.4.1).

Ref #	What	Why	Action to be taken by user	Affects
#2645	**Add possibility to remove all debug output from RTEMS drivers when compiling BSP.** **Remove all debug output during operation from the TCM core application.**	Debug output is unlikely to be relevant during flight. Avoids any potential performance decrease due to large amount or warnings/errors.	None	TCM-S, OBC-S, TCM-S core application
#2513	**UART RMAP commands are now verified before processing in the TCM core application.**	Previously invalid UART RMAP commands could cause the TCM core application to halt and reset.	None	TCM-S core application
#2733 **#2750** **#2751**	**TCM core application massmem handler updated to address edge cases around completely full partitions.**	Previously, freeing, reading or downloading from a completely full partition of maximum size (4GB) could result in the massmem handler becoming non-functional until a restart of the TCM core application was done.	None	TCM-S core application
#2749	**TCM core application partition configuration fall-back handling corrected.**	Previously, if inconsistencies in the partition configuration in NVRAM was detected, the TCM core application did not successfully initialise the fall-back configuration, which would result in a watchdog timeout reset.	None	TCM-S core application
#2651	**TCM core application CCSDS telecommand verification updated to always check MAPID for type BD frames.**	Previously, MAPID for type BD frames was not checked, but should be according to the CCSDS standard.	None	TCM-S core application

Changes for 1.5.1

This release only includes updates to the TCM-S core application.

Ref #	What	Why	Action to be taken by user	Affects
#2759	**Update mass memory handler to improve recovery from inconsistent metadata results when initialising partitions.**	Previously, specific occurrences of bit errors in mass memory metadata could cause continuous/circular partitions to either temporarily or persistently be rendered unusable.	None	TCM-S core application
#2815	**Update handling of mass memory free operations.**	Previously, some free operations that did not start on a block boundary could introduce temporary inconsistencies in continuous/circular partitions, which would then require a reset to become fully usable again.	None	TCM-S core application

Changes for 1.5.2

This release includes updates to the OBC-S BSP, the TCM-S BSP, and the TCM-S core application.

Ref #	What	Why	Action to be taken by user	Affects
#2832	**Correct RTEMS driver for the System Flash so that errno values for fault conditions follow the documentation.**	Previously, some fault conditions in the System Flash would not set the expected errno values. This caused the Software Upload service in the TCM core application to fail since it could not identify the fault.	Update the TCM-S software to a version built with the updated driver	OBC-S BSP v1.5.1 TCM-S BSP v1.5.2 (TCM-S core application)

Changes for 1.6.0

This release only includes updates to the SoC designs for the TCM-S and the OBC-S.

Ref #	What	Why	Action to be taken by user	Affects
#2785	**The CPU register file is now properly handled when performing read and write accesses in the same clock cycle.**	Previously, the error manager indicated sporadic CPU parity errors in high ambient temperature (60°C) and high supply voltage (16V). This was caused by a very specific corner case and only when the CPU register file was written to and read from in the same clock cycle.	None	TCM-S, OBC-S
#2443	**FPGA-internal supply rails now correctly wait for external supplies to be stable before ramping up.**	Previously, there was at high supply voltages (16V) a risk that the FPGA was not properly initialized because the supply voltages were not stable enough when the initialization sequence started.	None	TCM-S, OBC-S