

FLIGHT SOFTWARE BRANCH

FSW VERSION DESCRIPTION DOCUMENT

CORE FLIGHT EXECUTIVE (CFE)

BUILD: 6.4.0

SEPTEMBER 30, 2014

SIGNATURES

Submitted by:



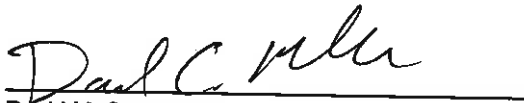
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9-30-2014

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1.0 FSW VERSION DESCRIPTION

1.1 PURPOSE AND SUMMARY

The purpose of this build is to continue to refine the cFE FSW product. This build provides various bug fixes to the Executive Services (ES), Software Bus Services (SB), Table Services (TBL), and Time Services (TIME), as well as, new features and tool additions and enhancements. Three requirements were updated for this build (requirements cES1702.3, cES1703.3, and cTBL6011) and two duplicate requirements were deleted. Some FSW updates resulted in ground database changes. There were no API changes or additions to this build. Therefore the transition from cFE 6.3.2 to 6.4.0 should require minor effort. cFE Build 6.4.0 implements the 81 DCRs listed in Attachment 1.

Unit testing has been completed and baselined on this build using the cFE test suite updates delivered by Johnson Space Center (JSC). This test suite was used by JSC's Advanced Exploration Systems (AES) Human Exploration & Operations Mission Directorate for Class A certification of CFS on the Orion platform. Regression testing was also performed on this build. Results are included in the release package under:

/test-and-ground/test-review-packages/Results

There are some outstanding issues being investigated. Resolutions to these issues may require a new release. The project CCB and community inputs will determine which FSW DCRs to include in the next release.

1.2 NEW/CHANGED FUNCTIONALITY IN THIS VERSION

Table 1.2-1 identifies new FSW functionality that has been implemented and is integrated into this FSW version. Requirement references are included where applicable.

Table 1.2-1 – New Functionality in this Version

No.	FSB DCR # (or N/A)	Requirements	High Level Description of Functionality
1	18463	N/A	In the port of the cFE to the Gaisler Aeroflex UT699R LEON3 FT processor, the SB code caused an alignment exception. SB was modified to support the LEON3 FT processor.
2	18464	N/A	In the port of the cFE to the Gaisler Aeroflex UT699R LEON3 FT processor, there was an alignment/padding issue with the CFE_TIME_TaskData_t structure in in the CFE TIME subsystem. TIME was modified to support the LEON3 FT processor.
3	18705	N/A	OS_fsBytesFree and OS_rewinddir stub functions were added to the UTF.
4	21211	N/A	A configuration parameter was added for updating the TIME_1HZ_TASK stack size to a user defined value.
5	22630	N/A	Command, Telemetry, and Scheduler lab applications have been added to the cFE tools directory.

No.	FSB DCR # (or N/A)	Requirements	High Level Description of Functionality
7	22709	cTBL6011	Added "Table Name of Last Table Load" to the Table Services housekeeping packet.

1.3 MISSING PLANNED FEATURES AND KNOWN PROBLEMS

Table 1.3-1 identifies the functions and known discrepancies that are absent from cFE Build 6.4.0. Any workarounds that may apply are identified.

Information on currently open DCRs is available at <http://tlserver3.gsfc.nasa.gov:7001/index.html>. Note that this is a restricted website that requires a server account. Additional DCRs may have been submitted after preparation of this VDD. A cFE DCR report containing a listing of open DCRs is available on request for customers who do not have access to tlserver3. Please contact Susanne Strege, susie.strege@nasa.gov.

Table 1.3-1 – Functions absent from this Release

No.	FSB DCR #	Description	Reason for Absence	Affected Requirement or Component	Workaround	Planned Delivery
1	7641	cFE Executive Services User's Guide has holes	Lower priority than other 6.4 issues	N/A	None	Not Determined
3	9821	cFE Table Validation Request Queue becomes full	Lower priority than other 6.4 issues	ES	None	Not Determined
4	12031	Standardize use of event types (ARC suggestion)	On Hold until event standard and cFE Event code walkthrough has been completed with community members	ES	None	Not Determined
5	12298	Update ES performance functions to communicate w/logic analyzer (MMS request)	It is unknown if a generic solution exists for the cFE. More research is needed.	ES	None	Not Determined

No.	FSB DCR #	Description	Reason for Absence	Affected Requirement or Component	Workaround	Planned Delivery
11	21087	cFE Application Developers Guide is Outdated	Lower priority than other 6.4 issues	N/A	None	Not Determined
12	21293	cFE: Executive Services always creates tasks with floating point enabled	Implementation is dependent on customer needs. Community input is needed.	ES	None	Not Determined
13	21552	cFE Multicore Support: Modify cFE ES to support multicore cpus/operating systems	Lower priority than other 6.4 issues	ES	None	Not Determined
14	21554	cFE ES: Add a mechanism to serialize the initialization of the cFE Core apps	OSAL 4.1 updates may have fixed this issue. Further analysis is needed.	ES	None	Not Determined
15	21557	cFE Core: Make ccsds.h endian neutral	Long term issue. Violates CCSDS standard. Resolution requires executive/community decision.	cFE	None	Not Determined
16	21558	cFE Core SB: Prevent message looping in applications such as SBN	This has been fixed in the SBN prototype code.	SB	None	Not Determined
17	21594	ES - Add Ability to Recreate the RAM Disk via Command	Nice to have feature. RAM disk can be recreated via shell commanding. Not many applications require use of the RAM disk (only CF).	ES	None	Not Determined

No.	FSB DCR #	Description	Reason for Absence	Affected Requirement or Component	Workaround	Planned Delivery
22	22081	SB - Add Last Pipe ID and Message ID to Routine Telemetry for Diagnosing Message Limit Error and Buffer Overrun Errors	Needs more discussion. What problem are we trying to solve? Event filtering may solve this issue. Implementation is dependent on customer needs. Community input is needed.	SB	None	Not Determined
23	22150	TIME Services Complexity Requires Extra User Guide Documentation	Lower priority than other 6.4 issues	N/A	None	Not Determined
24	22242	TABLE load may not work if file read is fragmented (affects PikeOS)	Analysis is needed to determine if the solution requires a cFE change or OSAL. Insufficient time to complete analysis for 6.4	TBL	None	Not Determined
25	22313	CFE ES: Check exception handling code for potential exception conditions and ISR safety	Insufficient time to complete analysis for 6.4	ES	None	Not Determined
26	22622	TBL - Update Table Services to Send Messages to Notify Applications of Pending Table Updates	Update will require an additional message ID for each application using a table. Implementation is costly. Implementation is dependent on customer needs. Community input is needed.	TBL	None	Not Determined

No.	FSB DCR #	Description	Reason for Absence	Affected Requirement or Component	Workaround	Planned Delivery
33	22742	SB - Sequence Count Reset Issue (APL found)	Analysis is needed to determine if this is an issue that should be fixed in the Software Bus or worked around as was done by the RBSP FSW team. Insufficient time to complete analysis for 6.4	SB	Create a library routine that will manage the sequence counters so that when the message is sent on the software bus, the packet is complete. Replace the calls to CFE_SB_MsgSend with CFE_SB_ZeroCopySend, which is the API that does not increment and update the sequence counter.	
34	22767	Update String Functions to Use "strn" Version (ARC wish list)	Lower priority than other 6.4 issues	cFE	None	
35	22768	cFE ES: Do not create syslog entries for each ER log entry	Lower priority than other 6.4 issues	ES	None	
36	22780	cFE ES : Fix ES AppCreate Command parameter validation	Lower priority than other 6.4 issues	ES	None	
37	22789	Edit SB Unit test to cover zero copy functions	Lower priority than other 6.4 issues	N/A	None	

2.0 DELIVERED PRODUCTS

Table 2-1 identifies the locations of FSW products relevant to this FSW Build. The version or date of the Build and where the product can be located are provided. Changes from a previous VDD are identified.

Table 2-1 – Delivered Products and their Locations

Software Element	Changed with this Version?	New Version or Date	Location
Executable for this build	Yes	6.4.0	N/A. Executables are not delivered for the cFE
Installation Procedures & Special Instructions	No	N/A	See Deployment Guide .Tlserver3.gsfc.nasa.gov (in MKS CM system)
Source Code of this FSW Build	Yes	6.4.0	Tlserver3.gsfc.nasa.gov (in MKS CM system)
FSW Build Plan	No	N/A	None
Annotated S/W Detailed Design Docs	No	N/A	cFE Application Developer's Guide
Ground System T&C Database	Yes	6.4.0	Tlserver3.gsfc.nasa.gov (in MKS CM system under test-and-ground/asist)
Ground System Scripts developed by FSB	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system under test-and-ground/asist)
Simulator and Test Data Generator Software	N/A	N/A	None
Executable - Ground Tools associated with FSW (tools to build stored command loads, etc.)	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)
Source Code - Ground Tools associated with FSW (tools to build stored command loads, etc.)	Yes	N/A	\$WORK Perl scripts to generate ground database and build verification procedures from templates
Unit Test Procedures	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)
Unit Test Data	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)
Unit Test Results	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)
FSW Make Files	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)
Linker & Compiler Configuration Files	No	N/A	Tlserver3.gsfc.nasa.gov (in MKS CM system)

4.0 CONFIGURATION SUMMARY AND VERSION IDENTIFICATION

cFE Build 6.4.0 can be found on t1server3.gsfc.nasa.gov and is provided as open source on sourceforge.net:

<http://sourceforge.net/projects/coreflightexec/>

Telemetry is available to indicate cFE Build 6.4.0 and is documented in the following source file:
`/fsw/cfe/core/src/inc/cfe_version.h`.

ATTACHMENT 1 – 6.4 DCRS**cFE DCRs Build 6.4.0****Sep 26, 2014**

ID	DCR_Type	DCR_Title	State	DCR_Build Found	DCR_Build Target
7095		ES Memory Pool may inhibit SB transaction	Test Completed	CFE-5.2.0	CFE-6.4.0.0
8316	Change Request	use of unsigned types when possible for for loops (ARC wish list)	Test Completed	CFE-5.2.0	CFE-6.4.0.0
8374	Change Request	A compiled version of the elf2cfetbl utility is not present when a new sandbox is created (relates to GPM DCR 7112)	Test Completed	CFE-5.2.0	CFE-6.4.0.0
9772	Defect	ccsds.h and cfe_sb_util.h do not properly handle a little endian machine (found by APL)	Test Completed	CFE-5.2.0	CFE-6.4.0.0
9860	Change Request	Table services does not send an event msg if a table is not restored	Test Completed		CFE-6.4.0.0
10525	Defect	SB does not respond correctly when the maximum message size is set to 64k (65536)	Test Completed	CFE-6.0.0	CFE-6.4.0.0
12326	Change Request	Consider removing earlier build test results from cFE repository	Ready For Closure	CFE-6.0.0	CFE-6.4.0.0
12871	Change Request	Update elf2cfetbl tool to use constants defined by other apps (GPM request)	Test Completed		CFE-6.4.0.0
13179	Defect	Correct conflicting requirements for event log preservation on processor reset	Ready For Closure	CFE-5.0.0	CFE-6.4.0.0
13328	Defect	UTF needs updates	Ready For Closure		CFE-6.4.0.0
14611	Change Request	Improvement to SB GetAppTskName (APL Suggestion)	Test Completed	CFE-5.1.0	CFE-6.4.0.0
14807	Defect	CFE ES WaitForStartupSync never flushes waiting semaphore (GPM found)	Test Completed		CFE-6.4.0.0
18257	Defect	UTF cfe_psp_memrange function needs update	Ready For Closure		CFE-6.4.0.0
18370	Change Request	Remove relative path references to header files in cFE source code	Test Completed		CFE-6.4.0.0
18463	Change Request	Modify SB to support LEON3 FT processor (Alignment issue with cfs_sb_util.c)	Ready For Closure	CFE-6.0.0	CFE-6.4.0.0



cFE DCRs Build 6.4.0

Sep 26, 2014

ID	DCR_Type	DCR_Title	State	DCR_Build Found	DCR_Build Target
18932	Defect	MMS-IVV-OBS-1629 - SCFSW Build 3.5 Static Code Analysis: Pointer Dereferenced Before Use in cfe_tbl_api.c	Test Completed	CFE-6.3.1.0	CFE-6.4.0.0
18962	Defect	ES Reset Subtype can be incorrect on a commanded processor reset.	Test Completed	CFE-6.2.2	CFE-6.4.0.0
19080	Change Request	SB Memory Utilization	Test Completed	CFE-6.1.0	CFE-6.4.0.0
19141	Defect	CFE ES Shell command "ES_ListTasks" does not work	Test Completed	CFE-6.2.2	CFE-6.4.0.0
19413	Defect	Memory leak when SB zero-copy-send fails to send the message	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
19487	Change Request	Remove 'Size' argument in CFE_SB_GetBufferFromCaller	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
19498	Defect	SB buffers-in-use count goes negative for zero copy transfers	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
19511	Defect	Table Services File Header Definition Does Not Match RDL Definition	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
19578	Defect	SB Zero Copy Descripto Buffer release keeps SB locked on error	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
21030	Defect	ES: missing open parenthesis	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
21072	Change Request	Add table name to telemetry for table load command (proposed improvement requested by MMS FOT)	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
21203	Change Request	FS - Decompression Algorithm Should Delete Files When Decompression Error is Detected	Test Completed	CFE-6.1.0	CFE-6.4.0.0
21211	Change Request	Add Configuration Parameter to Update TIME_1HZ_TASK Stack Size	Test Completed	CFE-6.1.0	CFE-6.4.0.0
21218	Defect	ES - Mempoool Info Command Does Not Work on Unaligned Memory Pool	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
21231	Defect	SB - "Peak in Use" Exceeds the Software Bus Pipe Depth	Test Completed	CFE-6.1.0	CFE-6.4.0.0
21553	Change	cFE ES: Add check to make sure ES system	Test	CFE-6.1.0	CFE-6.4.0.0



cFE DCRs Build 6.4.0

Sep 26, 2014

ID	DCR_Type	DCR_Title	State	DCR_Build Found	DCR_Build Target
	Request		Completed		
22677	Defect	ES - Application Startup Priority Inversion	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22678	Change Request	cFE 6.4.0 Unit Testing	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22679	Change Request	cFE 6.4.0 Unit Testing	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22680	Change Request	cFE 6.4.0 Unit Testing	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22696	Change Request	ES - Allow User Defined Response When an Exception is Caused by the OS or cFE	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22706	Change Request	Setvars Script Enhancement and windows line-endings fix	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22709	Change Request	TBL - Update Requirements to Add Additional Housekeeping Telemetry	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22713	Defect	The /mission/build/Makefile Contains Tabs and is Missing History Tags	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22715	Change Request	Update TO_LAB to use a subscription table header file	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22716	Change Request	Modify SCH_LAB to put schedule table in a header file	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22738	Defect	CFE ES: Duplicate Error ID in cfe_es_events.h	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22743	Change Request	Table Services Decoupling	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22751	Change Request	Remove Duplicate Doxygen Documentation	Test Completed	CFE-6.3.2.0	CFE-6.4.0.0
22764	Change Request	Add JSC Scheduler Table Builder Tool	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22771	Change Request	Baseline cFE Unit Tests	Ready For Closure	CFE-6.3.2.0	CFE-6.4.0.0
22772	Change Request	Tag cFE 6.4 for Test	Ready For Closure		CFE-6.4.0.0