

Core Flight Software System (cFS)

Data storage (ds) Application

Build: 2.5.1.0

FSW Version Description Document

Release Date: 2/15/2017

Signatures

Approved by:



1.0 FSW Version Description

1.1 purpose and summary

The purpose of this build is to continue to refine the cFS Data Storage (DS) application product. This build provides bug fixes and new assert based unit tests.

This document serves as the notification of the Build 2.5.1.0 release of the cFS DS application. The DS Build 2.5.1 release contains the changes associated with Builds 2.5.0.0 and 2.5.1.0. The 2.5.1.0 revision includes a minor bug fix found during DS Build 2.5.0.0 Build Verification Testing. Build 2.5.1.0 is the final release of the cFS DS application following BVT of Builds 2.5.0.0 and 2.5.1.0 of the cFS DS application. For more details on the issues encountered during testing, please refer to attachment 1 for a full listing of the DCRs and Trac Tickets included in this release and the DS 2.5.1.0 Test Report located in the /test\_and\_ground/results folder.

Data Storage (DS) version 2.5.1.0 is compatible with cFE builds 6.5.0 and above and OSAL builds 4.2.0 and above.

1.2 new 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.

**Table 1.2-1 – New Functionality in this Version**

| No. | FSB DCR # (or N/A ) | Requirements | Functionality or Change Description |
| --- | --- | --- | --- |
| N/A | N/A | N/A | None |

Table 1.2-2 identifies changes to FSW functionality from a previously delivered FSW version and the DCRs and Trac Ticket numbers associated with these changes. See attachment 1 for a full listing of the DCRs and Trac Tickets included in this release.

**Table 1.2-2 – Changes to Previously Delivered Functionality**

| No. | FSB DCR # (or N/A ) | Requirements | High Level Description of Functionality |
| --- | --- | --- | --- |
| 1 | 4126 | DS3000.1  DS3000.1.1 | Sequence Counter always rolled over to zero. The initial value of the counter is specified in the Destination File Table. The Sequence Counter has been updated to always rollover to the table specified initial value. |
| 2 | 145916 | N/A | Hash Table bug. The DS\_CmdAddMID command was not adding new Message IDs to the hash table. Other commands (DS\_SetFilterFIle, DS\_SetFilterType, DS\_SetFilterParms) call the DS\_TableFindMsgID function which uses the hash table to search for message IDs. Newly added Message IDs could not be found since they were not added to the hash table. The DS\_CmdAddMID command was updated to appropriately add the new Message IDs to the hash table. |

1.3 MISSING Planned FEATURES AND KNOWN PROBLEMS

Table 1.3-1 identifies the functions and known discrepancies that are absent from DS Build 2.5.1.0. Any workarounds that may apply are identified.

Information on currently open DCRs is available at:

<http://gs580v-fsbmks10.ndc.nasa.gov:7001/index.html>.

Information on currently open Trac tickets is available at:

<https://babelfish.arc.nasa.gov/trac/cfs_apps/report/1>.

Note that these are restricted websites that requires a server account. Additional DCRs and/or Trac Tickets may have been submitted after preparation of this VDD. A cFS DS DCR report containing a listing of open DCRs and Trac tickets is available on request for customers who do not have access to the restricted servers. Please contact Susanne Strege, [susie.strege@nasa.gov](mailto:susie.strege@nasa.gov).

**Table 1.3-1 – Functions absent from this Release**

Trac ticket references are proceeded with a ‘#’ character.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **FSB DCR or Trac #** | **Description** | **Reason for Absence** | **Affected Requirement or Component** | **Workaround** | **Planned Delivery** |
| 1 | #73 | DS file header values should be big-endian. As with CCSDS, which is standardizing on big-endian for message headers, the fields in the DS file header (close time, FileTableIndex, FileNameType) should be stored in big-endian order. | Implementation is dependent on customer needs. Community input is needed. | DS App | Commit 05bc36c | Not Determined |
| 2 | #63 | DS file header should include additional metadata. DS currently stores a number of fields in the DS file header (DS\_FileHeader\_t), namely the time the file was closed, the file name, the file table index, and the file name type.  When reading DS-created files on other platforms with other configurations, it is possible to tease apart platform/mission-specific information but it would be easier to store the configuration in the header for easier analysis of DS files. | Implementation is dependent on customer needs. Community input is needed. | DS App | Commit 386aa5b | Not Determined |
| 3 | #71 | DS should (optionally) add a timestamp for each packet stored. CCSDS telemetry packets include a timestamp in the CCSDS headers. Command packets, on the other hand, do not. Also, if CCSDS timestamps are generated by something other than the local CPU, the timestamp may reflect when the packet was generated but not when the packet was received/stored by DS. Thirdly, if the CCSDS timestamp is generated using a different clock that is not in sync, the timestamps may not coincide. This is particularly important in multi-CPU environments, such as when cFS busses are connected via SBN.  This will particularly help with replay using the ds\_replay application as the timestamps will accurately reflect when DS received the packets and will be in the correct order. | Implementation is dependent on customer needs. Community input is needed. | DS App | Commit d9f0061 | Not Determined |
| 4 | 4113 | DS - Add Trick Simulation Support (JSC Request) | Implementation is dependent on customer needs. Community input is needed. | N/A | None | Not Determined |
| 2 | 4123 | Unsubscribing to Filter Messages May Cause Flooding of SB No Subscribers Event. When a new filter table is loaded, DS unsubscribes to all packets in the old table and then subscribes to all packets in the new table. This is true even if the message IDs in question are present in both the old and new filter tables. If packets are being generated at the time DS is unsubscribing and DS is the only application that has subscribed to a packet, the system could be flooded with SB no subscriber events. | The new data structure required to keep track of previously loaded MIDs will cause a significant performance hit.  If a hashing table is used to perform the MID lookup, then there could be a significant memory hit (depending on the number of MIDs in the system).  This issue is more than likely a FSW systems issue rather than an application issue.  The issue and its solution will require more thought and customer/team input. | DS App | None | Not Determined |
| 3 | 4193 | When using a DS configuration with Critical Tables, the Filter Table Filename is cleared when DS is restarted after a Processor and Application Reset AND the table is restored from the CDS. This was not expected. Dumping the Table Registry after such a restart confirmed that the Last Loaded file is cleared from the Table Registry which could be the cause of this problem. | Implementation is dependent on customer needs. | DS8000 | None | Not Determined |
| 4 | 145950 | Add Global Tables and Initialize Tables In Unit Test setup function.  In the current unit test implementation, the tables are created in each unit test as local variables. Global pointers are set to point to the local tables however, the table data is not initialized to 0. The tables may contain old data or junk data, which may lead to incorrect results depending what has been run prior to a particular test.  The new variables should be global rather than local, in order to allow them to be initialized in the Setup function without the memory being de-allocated at the end of the function, which would allow the possibility of being overwritten by other local variables in the test function. | Enhancement. Unit tests function as written. | Unit Tests | None | Not Determined |

1.4 Development Tool Versions Associated with this FSW Version

Table 1.4-1 identifies the versions of development tools used to generate this FSW version:

**Table 1.4-1 – Development Tool Versions Associated with this FSW Version**

| Tool Type. | Tool Name | Version Used |
| --- | --- | --- |
| RTOS | BVTed with VxWorks 6.9, however, OSAL provides ability to use multiple OSes | 6.9 |
| Compiler | GNU | 3.3.2 |
| cFE | Core Flight Executive | 6.5.0.0 |
| OSAL | Operating System Abstraction Layer | 4.2.0.0 |

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 | 2.5.1.0 | Not application. Executables must be created for the specific mission/platform |
| Installation Procedures & Special Instructions **(See Section 3.0)** | No | 3.1 | See cFS Deployment Guide    babelfish.arc.nasa.gov (in git system TOOLS master branch)  and  <http://sourceforge.net/projects/coreflightexec> |
| Source Code of this FSW Build | Yes | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| FSW Build Plan | N/A | N/A | None |
| Annotated S/W Detailed Design Docs | No | N/A | fsb.gsfc.nasa.gov/cFS |
| Ground System T&C Database | Yes | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Ground System Scripts developed by FSB | Yes | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Simulator and Test Data Generator Software | No | N/A | None |
| Executable - Ground Tools associated with FSW (tools to build stored command loads, etc.) | No | N/A | None |
| Source Code - Ground Tools associated with FSW (tools to build stored command loads, etc.) | No | N/A | Perl scripts to generate ground database and build verification procedures from templates (see cFS Deployment Guide) |
| Unit Test Procedures | Yes | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Unit Test Data | Yes | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Unit Test Results | Yes | 2016/10/28 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| FSW Make Files | No | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Linker & Compiler Configuration Files | No | 2.5.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label DS-ALL-Build2.5.1.0\_FEB15-2017  babelfish.arc.nasa.gov (in git system ds\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-ds> |
| Requirements version (from MKS) | No | 1.3 | MKS label – version 1.3 |

3.0 INSTALLATION PROCEDURES

Table 3-1 identifies the nominal FSW Installation Procedure(s) for this FSW Build onto the intended target system (including the commercial applications used and the configuration settings). The procedure version identifier, the date of the procedure and where it can be located are also provided.

**Table 3-1 FSW Installation Procedure(s)**

| Destination  (Target System) | Filename | Version and Date | Location |
| --- | --- | --- | --- |
| N/A | See cFS Deployment Guide | Version 3.1 | Available with cFE open source release:  <http://sourceforge.net/projects/coreflightexec/>  babelfish.arc.nasa.gov (in git system TOOLS master branch)  and on gs580v-fsbmks10.ndc.nasa.gov |

4.0 Configuration summary and version identification

DS Build 2.5.1.0 can be found on gs580v-fsbmks10.ndc.nasa.gov, sourceforge: <http://sourceforge.net/projects/cfs-ds>, and babelfish.arc.nasa.gov (in git system ds\_app\_master branch). Verification of the version can be done by sending a DS NOOP command which produces an event message containing the version information. In addition, the initialization event message generated during the application startup provides the version information.

5.0 Software CopyRight Notice

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Acronyms

ACS Attitude Control System

C&DH Command and Data Handling

cFE…………………………………………………………………………………………..……core Flight Executive

cFS………………………………………………………………………………………core Flight Software System

CM Configuration Management

COTS Commercial Off-The-Shelf

DCR Discrepancy/Change Request

DS…………………………………………………………………………………………….Data Storage Application

ETU Engineering Test Unit

FSB Flight Software Branch

FSW Flight Software

I&T Integration & Test

OSAL……………………………………………………………………………Operating System Abstraction Layer

RTOS Real-Time Operating System

T&C Telemetry and Command

URL Universal Resource Locator

VDD Version Description Document

ATTACHMENT 1 – CFS Data Storage build 2.5.0.0 DCRs/Trac Tickets

Trac ticket references are proceeded with a ‘#’ character.

|  | | | |
| --- | --- | --- | --- |
| **No.** | **DCR/Trac Ticket #** | **Description** | **Type** | | **Priority** | **State** | **Date Reported** | **Build Target** |
| 1 | #29 | DS: Fix compiler error using with the latest build scripts | defect | | minor | Test Complete | 06/29/2015 | 2.5.0.0 |
| 2 | #39 | Allow C99 code in APPS | defect | | minor | Test Complete | 01/28/2016 | 2.5.0.0 |
| 3 | #64 | DS: inconsistent type for FileTableIndex in command structures | defect | | minor | Test Complete | 06/09/2016 | 2.5.0.0 |
| 4 | 4126 | Sequence Counter Will Always Roll Over to Zero. The initial value of the counter however, is specified in the Destination File Table. The Sequence Counter has been updated to always rollover to the table specified initial value. | defect | | minor | Test Complete | 06/26/2013 | 2.5.0.0 |
| 5 | 141398 | Remove redundant lines of code from ds\_cmds.c | defect | | minor | Test Complete | 01/27/2016 | 2.5.0.0 |
| 6 | 141537 | Move function prototype from .c file to .h file. Unit tests need access to function definitions. | defect | | minor | Test Complete | 02/05/2016 | 2.5.0.0 |
| 7 | 141542 | Missing #include statement. Need to add #include "ds\_appdefs.h" to ds\_app.h so the constant "DS\_FILE\_HEADER\_GPM" will be defined when used in the file. | defect | | minor | Test Complete | 02/08/2016 | 2.5.0.0 |
| 8 | 145916 | Hash Table bug. The DS\_CmdAddMID command was not adding new Message IDs to the hash table. Other commands (DS\_SetFilterFIle, DS\_SetFilterType, DS\_SetFilterParms) call the DS\_TableFindMsgID function which uses the hash table to search for message IDs. Newly added Message IDs could not be found since they were not added to the hash table. The DS\_CmdAddMID command was updated to appropriately add the new Message IDs to the hash table. | defect | | major | Test Complete | 10/23/2016 | 2.5.0.0 |
| 9 | 145921 | DS - CFE\_EVS\_SendEvent Format Warnings | defect | | minor | Test Complete | 10/24/2016 | 2.5.0.0 |
| 10 | 146041 | Updated commands are no longer 32-bit alighned. May cause incompatibility with ground system. All commands should explicitly pad to 32-bit aligned to avoid unexpected compiler induced padding. | defect | | minor | Test Complete | 01/31/2017 | 2.5.1.0 |