

Core Flight Software System (cFS)

SCHEDULER (sCH) Application

Build: 2.2.1.0

FSW Version Description Document

Release Date: 7/5/2017

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 Scheduler (SCH) application product. This build provides the following revisions:

* Minor clean up to remove old history logs
* Minor clean up to the custom source code file to remove local definitions of PSP functions
* Fixes comment errors in the platform configuration file
* Fixes the table primary header to be CCSDS compliant
* Fixes CFE\_EVS\_SendEvent format warnings
* Adds new assert based unit tests.

This document serves as the notification of the Build 2.2.1.0 release of the cFS SCH application.

Checksum (SCH) version 2.2.1.0 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 | 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 |
| --- | --- | --- | --- |
| - | - | N/A | None |

1.3 MISSING Planned FEATURES AND KNOWN PROBLEMS

Table 1.3-1 identifies the functions and known discrepancies that are absent from SCH Build 2.2.1.0. 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 SCH 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 | #21 | SCH cmake table integration. The cFE 6.5 release adds better support for building table objects from CMakeLists files.  This ticket contains an update to the SCH app to use this feature to build its table files in addition to the normal SCH build. | Implementation is dependent on resource/staff availability | SCH Tables | N/A | Not Determined |
| 2 | #35 | SCH occasionally hangs when CFS is stopped. When the CFS process receives a SIGINT (ctrl-c), the SCH\_MinorFrameCallback is called by the pthread\_cancel. Often this will cause that callback to hang on a lock. | Implementation is dependent on resource/staff availability | SCH App | None | Not Determined |
| 3 | #45 | SCH: Remove dependencies on cfe\_platform\_cfg. | Implementation is dependent on CCB consensus | SCH App | None | Not Determined |
| 4 | #47 | Inaccuracies in Scheduler Minor Frame Slot Timing/Processing. | Implementation is dependent on resource/staff availability | SCH App | None | Not Determined |
| 5 | #84 | SCH Does Not Protect Scheduler Table Slots from Being Commanded. SCH currently allows any slot within the Scheduler Table to be commanded to an enable/disable state. | Implementation is dependent on customer needs. Community input is needed. | SCH App | None | Not Determined |
| 6 | #85 | SCH Minor Frame Interrupt Processed Before Receipt of Startup Sync. The default custom.c file includes the create timer function in the early initialization function. On NICER this caused the minor frame interrupt to be processed before the SCH application has received the startup sync. | Implementation is dependent on resource/staff availability | SCH App | None | Not Determined |
| 7 | #86 | Consider Moving Group Macro Definitions to a Header File. Moving these macro definitions to a header file would allow ground system command definitions to include the actual group definitions vs. redefining them which can be error prone. | Implementation is dependent on resource/staff availability | SCH App | None | Not Determined |
| 8 | #87 | Should the Scheduler Table's Types be Configurable? MMS Made the SCH table critical. The current CFS SCH options do not allow the Scheduler's table's types to be configurable. | Implementation is dependent on CCB consensus | SCH App | Update calls to CFE\_TBL\_Register() function to replace CFE\_TBL\_OPT\_DEFAULT with desired table options. | Not Determined |
| 9 | #88 | SCH Timer Configuration Issues. The SCH "Minor Frame MET Sync logic" is very dependent on the accuracy of the timer being used. There currently is no way for user's to configure the "Minor Frame MET Sync logic" to work with a variety of different timers. | Implementation is dependent on resource/staff availability | SCH App | None | Not Determined |
| 10 | 4121 | SCH - Add Trick Simulation Support (JSC Request) | Implementation is dependent on customer needs. Community input is needed. | Trick | 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 | 2.2.1.0 | Not applicable. 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 | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| 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 | No | N/A | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| Ground System Scripts developed by FSB | Yes | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| 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 | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| Unit Test Data | Yes | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| Unit Test Results | Yes | 2017/06/21 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| FSW Make Files | No | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| Linker & Compiler Configuration Files | No | 2.2.1.0 | gs580v-fsbmks10.ndc.nasa.gov. MKS label SCH-ALL-Build2.2.1.0\_JUL5-2017  babelfish.arc.nasa.gov (in git system sch\_app\_master branch)  and  <http://sourceforge.net/projects/cfs-sch> |
| Requirements version (from MKS) | No | 1.1 | MKS label – version 1.1 |

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

SCH Build 2.2.1.0 can be found on gs580v-fsbmks10.ndc.nasa.gov, sourceforge: <http://sourceforge.net/projects/cfs-sch>, and babelfish.arc.nasa.gov (in git system sch\_app\_master branch). Verification of the version can be done by sending a SCH 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

**Copyright © 2007-2014 United States Government** as represented by the Administrator of the National Aeronautics and Space Administration. All Other Rights Reserved.

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

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

SCH Scheduler Application

T&C Telemetry and Command

URL Universal Resource Locator

VDD Version Description Document

ATTACHMENT 1 – CFS scheduler build 2.2.1.0 DCRs/Trac Tickets

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

|  | | | |
| --- | --- | --- | --- |
| **No.** | **DCR/Trac Ticket #** | **Description** | **Type** | | **Priority** | **State** | **Date Reported** | **Build Target** |
| 1 | 4157 | Update commands in sch\_platform\_inc.h to fix comments. The comments for SCH\_MDT\_MIN\_MSG\_ID state maximum. The comments for SCH\_MDT\_MAX\_MSG\_ID state minimum. | defect | | minor | Test Complete | 05/15/2014 | 2.2.1.0 |
| 2 | 4174/#4 | SCH tables have CCSDS primary packet header that must be Big Endian on Little Endian platforms | defect | | moderate | Test Complete | 11/23/2014 | 2.2.1.0 |
| 3 | 4248 | SCH - Scheduler task source module sch\_custom.c has local definitions of PSP functions. Remove the locally defined PSP timer functions. | cosmetic | | minor | Test Complete | 06/10/2015 | 2.2.1.0 |
| 4 | 145925 | SCH - CFE\_EVS\_SentEvent Format Warnings | defect | | minor | Test Complete | 10/24/2016 | 2.2.1.0 |
| 5 | 145928 | Implement UT-Assert Unit Tests for the SCH Application | enhancement | | major | Test Complete | 10/24/2016 | 2.2.1.0 |
| 6 | 146058 | SCH: Move function prototypes from .c files to .h files. Unit tests need access to function definitions. | defect | | minor | Test Complete | 02/13/2017 | 2.2.1.0 |
| 7 | 146180 | SCH - Remove MKS Logs and change copyright symbol to ASCII | cosmetic | | minor | Test Complete | 05/26/2017 | 2.2.1.0 |