



Report on DPU to DAQ+IF test card interface check
B. Swinyard

0 Scope

This is a note on the preliminary interface test between the SPIRE DPU and the DRCU carried out using the CEA-SAp stand alone DCU interface card. The test was carried out over the period 27/28th August by Christophe Cara (SAp); Sunil Sidher and Asier Aramburu (both RAL).

1 Pretest Review

A short meeting was held to review the tests to be carried out and the equipment needed.

Equipment:

DCU interface test card from SAp (S/N 001) – built to v1.0 of the DPU/DRCU ICD (SPIRE-SAP-PRJ-001364 – *note that there is a typo on the front page of this document*). The fast interface line runs at 2.5 MHz on this card.

Connecting break out box from SAp

AVM DPU loaded with AVM version of On Board Software (see later) built to version 0.7 of the DPU/DRCU ICD

DRCU Simulator running software for either v0.7 or v1.0 of the on-board software.

Standard Oscilloscope

DVM

Power supply for DCU interface card (+9V; -9V; +5V)

Test Objectives:

To prove that the low level interface between the DPU and DRCU functions correctly – i.e.

1. The signals and voltages appear correctly on the interface
2. A command can be sent from the DPU to the DCU card
3. The command is received correctly and a response sent back
4. That data generated in the DCU interface card can be sent and received correctly at the DPU

Restrictions:

The timing synchronisation is not implemented on the DCU card

The housekeeping parameters are fixed in the DCU card

The DPU OBS has a known problem (SPR-0138) a new version was available with a fix implemented but this could not be loaded during the test. This problem manifested itself in the required configuration of the system – all three low speed lines had to be connected and working before the DPU was booted otherwise the OBS failed.

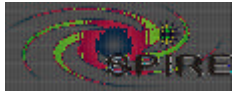
Outline Test Procedure:

This is what was actually followed in the end after the updated OBS did not load and therefore the DRCU simulator and DCU card had to be on and working.

Pre-requisite:

EGSE on and ready to execute commands and display

1. Check electrical isolation of DCU interface (Christophe to provide procedure followed see also SAP-SPIRE-FP-0067-02)
2. Connect DCU card to DPU via SAp breakout box
3. Connect DRCU Simulator to DPU
4. Switch on DRCU simulator and DCU card



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5. Switch on DPU and boot software and run the OBS
6. Stop nominal and critical HK requests
7. Check clock signals appear where expected on breakout box using oscilloscope
8. Start HK and inspect on SCOS 2000
9. Send commands to request continuous generation full photometer array data frames
 - 0x843c0000 (SetDataMode)
 - 0x843d0000(SetFrameConf)
 - 0x843e0001(SetStartFrame)
10. Check command appears where expected on breakout box using oscilloscope
11. Check data is returned on fast interface where expected on breakout box using oscilloscope
12. Check command received and acknowledged by DCU interface card
13. Carry out SPIRE functional test DCU-02 (see SPIRE-RAL-DOC-001652) and ensure correct number and length of frames received.

2 EGSE Configuration For Test

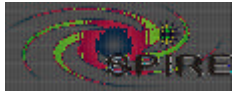
1. EGSE router and gateway running on Truro (running Linux)
2. SCOS 2000 running on Lincoln and displaying HK TM
3. Packet Display running on Truro
4. CDMS simulator running on Gordon
5. OBS version 1.0 running on AVM DPU

3 Test Results

1. Isolation correct (Christophe to provide data)
2. Connected o.k.
3. Connected o.k.
4. Simulator and DCU switched on following Christophe's procedure (o.k. - Christophe to comment?)
5. Version 1.0 of the OBS loaded and booted successfully
6. Stopped HK generation.
7. Clock signals appear on pins N and M as defined in drawing (Christophe)
8. Housekeeping generation o.k.
9. Commands for continuous generation full photometer array data frames:
 - Command 0x843c0000 sent : result → Event Packet (5,1) generated (Event_ID: 506 Wrong frame ID).
 - Command 0x843d0000 sent : received ok
 - Command 0x843e0001 sent : result → Event Packet (5,1) generated (Event_ID: 506 Wrong frame ID). Event packet (5,1) generated (Event_ID :507 Frame length error).

Commands for full photometer array Test Pattern:

- Command 0x843c0008 sent :received ok
- Command 0x843d0000 sent : received ok
- Command 0x843e0001 sent : result → Event Packet (5,1) generated (Event_ID: 507). Event packet (5,1) generated (Event_ID :506).



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Although this event packet is received the DCU is sending the correct echo of the command it received from the DPU – this was checked using Packet Display.

10. Command data seen on pin X (Christophe)
11. Frame data seen on pin Y (Christophe)
12. SCOS checked using TC history ok.
13. After C.Cara left repeated the sequence of commands for full photometer array data frames but with the command 0x843e0000 (SetStartFrame) at the beginning of the sequence. This time the commands were successful. Full photometer array data frames were generated for about 5 min. Then we received Event Packet (5,1) EVENT_ID:50c Subsystem Response Error ,50d DPU Pool Full Error.

Correct test sequence sent (Functional test DCU-02) to request 10 photometer frames. 10 frames of length 588 bytes (packet length 616 bytes) received.

4 Anomalies Observed During Test

When continuous data requested after a time an error occurs on the DPU (SPR-0219)
The updated OBS was eventually uploaded via the JTAG and worked as expected. Could not upload by command (SPR-0210)
Synchronisation command did not work quite as expected (SPR-0214)
Anomalous housekeeping values reported when DRCU Simulator switched off (SPR-020.)

Conclusion – low level interfaces are working correctly and all anomalies are due to on board software.