

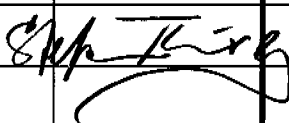
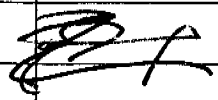
COMPTE RENDU DE REUNION / MINUTES OF MEETING

LIEU / PLACE : ASPI Cannes

OBJET / PURPOSE :

CLASSIFICATION :

Data Management Working Group 11
(ASPI Cannes)

| PARTICIPANTS ATTENDEES | SOCIETE FIRM | SIGNATURE SIGNATURE | PARTICIPANTS ATTENDEES | SOCIETE FIRM | SIGNATURE SIGNATURE |
|---|-----------------|---|---------------------------|-----------------|--|
| S.THÜREY | ESA |  | P.STASSI | IAS/HFI | |
| P.ESTARIA | ESA | | BENEY | IAS/HFI | |
| J.DODSWORTH | ESA | | F.RAME | ALS | |
| K.KING | SPIRE | | SFERLAZZA | ALS | |
| DUDELDAM | HIFI | | B.HIBBERD | ASPI | |
| O.BAUER | PACS | | P.COUZIN | ASPI |  |
| M.MICCOLIS | LABEN/LFI | | F.CAM (part) | ASPI | |
| REDACTEUR / WRITTEN BY : P.Couzin / B.Hibberd | | | F.CHATTE (part) | ASPI | |


CONCLUSION :

DISTRIBUTION :
PARTICIPANTS /
ATTENDEES

POUR ACTION :
FOR FURTHER ACTION

POUR INFORMATION :
FOR INFORMATION

APPROUVE PAR / APPROVED BY

| | | | | |
|--------------------------|---|--|--|--|
| NOM / NAME | P.COUZIN | | | |
| SIGNATURE / SIGNATURE |  | | | |

AGENDA - SEE ANNEX I

ACTION ITEM REVIEW - FROM WG 10

• INSTRUMENT SOFTWARE UPLOADING ON GROUND

SPIRE/PACS CLAIM THAT THE DPU CAN HANDLE UP TO 50 COMMANDS/SEC IF THE BUS PROFILE IS CHANGED FOR THIS.* HOWEVER ONCE THE INSTRUMENT IS INTEGRATED WITH THE SPACECRAFT, THE MAX TC RATE IS LIMITED TO 2 TC/SEC, DUE TO CDMU-operation.
* TO BE TESTED.

LFI REBA MAX. IS 20 TC/SEC

• NAMING CONVENTIONS

ALCATEL WOULD LIKE TO CHANGE THE PRESENT 16 BIT ^{ONBOARD} PARAMETER IDENTIFIER TO 32 BITS.

THIS WOULD MEAN A CHANGE TO THE PACKET-ICD.

This modification will have a negative impact: due to TC packet ^{max} length the number of on-board parameter which can be addressed in one TC packet will be decreased, which seems not be acceptable.

Final decision: - no PS-ICD modification.

- The data base will work in such a way that on-board identifier will be generated ^{etc} by the bridge file generator or by the HPSDB application.

- Alenia and ASPI to agree on HPSDB / Software ICD (normal work) and HPSDB specification.

ACTION

● IN FLIGHT NUMBER OF COMMANDS / SEC:

- ALCATEL HAVE REQUESTED TO KNOW THE LIMITATIONS OF THE INSTRUMENTS IN RECEIVING TC'S IN FLIGHT IN CASE FDIR SHOULD REQUIRE A HIGHER TC RATE THAN NORMAL.

SPIRE STATE THAT THIS WOULD DEPEND UPON THE TC WHICH WAS SENT AND HOW LONG IT WOULD TAKE TO EXECUTE THE COMMAND.

THE INSTRUMENTS WILL DESCRIBE HOW THE COMMANDS ARE HANDLED, TIMING, BUFFERING,

It was pointed out that any on-board user must enter a safe configuration at any time after receiving a single TC.

● MASS MEMORY MANAGEMENT (SEE ANNEX II):

SAAB (CDMU SUPPLIER) HAVE PROVIDED A NOTE EXPLAINING THE MASS MEMORY MANAGEMENT. A CONCLUSION OF THIS NOTE IS, THAT EACH VIRTUAL CHANNEL HAS TO BE ASSOCIATED WITH ONE OR A FEW (SPECIFIC PACKET STORES) MEANING THAT EACH INSTRUMENT WILL HAVE HOUSEKEEPING AND SCIENCE DATA STORES SEPARATELY.

IT IS ENVISAGED TO HAVE A SEPARATE STORE FOR EVENTS.

THE PACKET STORE SIZE WILL BE PROGRAMMED BASED UPON EXPECTED DATA FOR THE NEXT 24 HRS / 48 HRS.

AI 1
INSTRUMENTS
30th APRIL 2002

ACTION

• ISS3 ADDRESS ALLOCATION:

SEE ANNEX III FOR A PROPOSED ALLOCATION.
HERSCHEL INSTRUMENTS REQUIRE ADDRESSES WITH AN ODD NUMBER OF "1"s - ADDRESSES UPDATED DURING MEETING. ALL INSTRUMENTS EXCEPT LFI ACCEPTS THE USE OF 2 ISS3 ADDRESSES, LFI WILL STATE THEIR ACCEPTABILITY.

SPIRE WILL RE-EVALUATE THEIR NEED FOR A PROTECTED LCL (AS REQUESTED IN RECENT CR)

AI 2 LFI
30/4/2002.

USAGE OF PS ICD BY INSTRUMENTS

ANNEX IV GIVES AN APPLICABILITY OF PS ICD AS GIVEN BY SPIRE/PACS/HIFI
HERSCHEL INSTRUMENTS REQUEST THAT ESA/ALCATEL STATE THEIR ACCEPTANCE/APPROVAL OF THE

PACS PS-ICD USAGE, PACS-CR-TN-015.


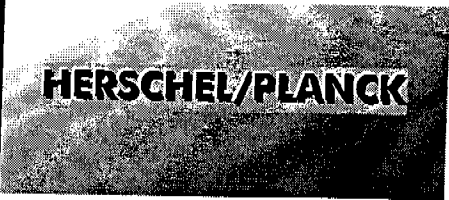
SPIRE PS-ICD USAGE, SPIRE-RAL-NOT-001190

HIFI PS-ICD USAGE,

ESA/ALCATEL WILL EVALUATE THESE NOTES AND PROVIDE COMMENTS.

PLANCK WILL PROVIDE DATA IN A SIMILAR FORMAT FOR EVALUATION.

AI 3 ESA/ALCATEL
22/5/2002

| | | | |
|---|--|----------------------|----------|
|  |  | REF.: H-P-ASPI-MN- | |
| | | DATE: 9/4/2002 | PAGE: 15 |
| COMpte RENDU DE REUNION / MINUTES OF MEETING | | LIEU / PLACE: CANNES | |

• NEED FOR HOUSEKEEPING PACKET (ESSENTIAL DATA)

- SEE ANNEX II FOR BACKGROUND ; NEED \neq ALCATEL PROPOSAL.

ALCATEL REQUEST THE INSTRUMENTS TO EVALUATE THIS PROPOSAL

ASPI points out that the proposal assumes:

- that the "quick look" packet is acquired "permanently" as part of the regular HK.
- A dedicated subframe can be allocated for this specific packet. Present assumption is 1 subframe / instrument (incl. SCE), or less.
- the "quick look" packet is the only one downlinked, when on LGA.

ACTION

AI 4
INSTRUMENTS

• AVM objectives and definition

See Annex II.

Two main comments:

- It is pointed out that the AVM, once the normal test activity is completed, is available for any validation task, including instrument SW change. The details of this are still undefined.

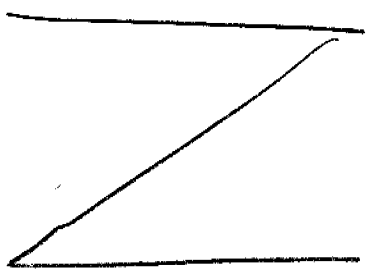
ACTION

- Data produced by instruments AVM can be
 - not requested to be representative in terms of science data content; only data rate shall be representative.
 - requested to be representative for those HK data which are used by the on-board system, if any, and which are monitored by the ground system during the time which is conducted.

ASPI shall organize a meeting dedicated, for each instrument, to the detailed definition of the AVM configuration of the instrument.

AOB

- 1- Next DMWG meeting is scheduled for the 3/7/02



- 2- Requested to be added via mail by SPIRE:
See Annex VII.

Answer shall be given by end 04/02.

LISTE D'ACTIONS / ACTION ITEM LIST

REF.: H-P-ASPI-MN-

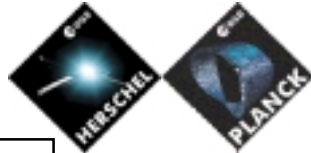
OBJET / PURPOSE :

HERSCHEL/PLANK

DATE: 9 / 4 / 2002

PAGE :

| | | ACTION | | DATE |
|----------|----|--|--|----------------|
| Origine | N° | Description | Responsible / Responsible | Echéance / Due |
| ALCATEL | 1 | INSTRUMENTS TO PROVIDE DESCRIPTION OF HOW TC COMMANDS ARE HANDLED | INSTRUMENTS | 30 APRIL 2002 |
| ALCATEL | 2 | LFI TO STATE ACCEPTABILITY OF 2x1553 ADDRESSES | LFI | 30 APRIL 2002 |
| ALCATEL | / | SPIRE TO CONFIRM NEED OF PROTECTED LCL (AS REQUESTED IN CHANGE REQUEST) CONSIDERING 2x1553 ADDRESSES | deleted, obsolete in context of this meeting | - |
| HERSCHEL | 3 | EVALUATE, COMMENT (APPROVE) TECH NOTES "PS-1CD USAGE" | ESA/ALCATEL | 22 MAY 2002 |
| ALCATEL | 4 | INSTRUMENTS TO EVALUATE IMPLEMENTATION OF CRITICAL HK PACKET | INSTRUMENTS | 29 MAY 2002 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |



ANNEX 1

AGENDA

- 1- DM WG10 Actions review/closure
- 2- Data Management
 - 2.1- Progress on Data Storage
 - 2.2- 1553 I/F : addresses allocation policy
 - 2.3- Usage of PS ICD by Instruments
- 3- TM/TC Modes
- 4- AVM
 - 4.1- Requirement
 - 4.2- Objectives
 - 4.3- Tests definition
 - 4.4- Design
 - 4.5- Schedule
- 5- AOB :
Satellite DataBase



ANNEX 2

▼ Status

- From CDMU supplier (SES) design each mass memory packet store is allocated to one single Virtual Channel
 - ➔ housekeeping and science data shall have to be stored in different packet stores. This was an option and becomes mandatory.
 - ➔ baseline packet stores organization is to have per observation period (typically 24h or 48h) , for each instrument, one store for housekeeping data and one store for science data.
 - ➔ proposal for operation is to set the size of each packet store (basically HK store size should not vary) as part of the programming of the observation phases, based on the foreseen data distribution.

SPA
ANNEX 3

▼ present status

- use of LCL's protected against permanent ON single failure (double switch) has drawbacks in terms of voltage drop, cost
 - this is not to be baselined for instruments DPU's
- 6 data handling 1553 bus subscribers have been identified for Herschel, 5 for Planck.
 - 1553 capacity is 31 dedicated addresses
- increase of mission robustness is achieved if one 1553 address is allocated per Remote Terminal

▼ Proposal

- Instruments shall consider the possibility to have one 1553 address for each RT



Usage of PS ICD by instruments

SPA
ANNEX 4

▼ Usage of PS ICD by instruments

To : Otto, Ken
From : Luc Dubbeldam
Date : 18 March 2002

Re : HIFI PS-ICD usage

The Packet Structure ICD (SCI-PT-ICD-07527) describes the packet services and low-level packet transfer protocol messages to be available on the Herschel spacecraft for the control and transfer of data between different subsystems. This note defines those services and messages that will be used by the HIFI instrument.

The purpose of this note is only a comparison between PACS, SPIRE and HIFI. It is therefore for information only. It follows the structure of the technote SPIRE PS-ICD usage, SPIRE-RAL-NOT-001190.

1. APIDs

The Application ID is used to identify the source or destination of a telemetry packet. Herschel uses different APIDs for different types of packet (see AD1) as well as for different instruments. The APIDs to be used by SPIRE are given in the following table:

| ID | Telemetry types | APID (hex) |
|-------|---|------------|
| APID1 | HIFI Telecommands, Telecommand Verification and Events | 400 |
| APID2 | Periodic Housekeeping Parameter scans Memory management | 402 |
| APID3 | Nominal science from HRS-H | 404 |
| APID4 | Nominal science from HRS-V | 405 |
| APID5 | Nominal science from WBS-H | 406 |
| APID6 | Nominal science from WBS-V | 407 |

2. PACKET TRANSFER PROTOCOL

At the low-level the Packet Transfer Protocol provides a series of sub-address messages to control and transfer data between subsystems. Some of these implement the packet transfer itself, others provide alternative methods of transferring data and controlling the transfer. This section identifies the sub-addresses used/accepted by the SPIRE instrument.

| Description | Sub-address(es) | Comments |
|------------------------------------|-----------------------------|--|
| Mode Command | SA 0R | Used to identify the RT addressed in this subframe. The instrument responds only to its own address. |
| | SA 0T, 31T, 31R | Not Used |
| Unit Control | SA 1R, 1T | Not Used |
| Data Send | SA 2T, 3T, 4T, 7T, 9T, 29T | Not Used |
| Data Receive | SA 2R, 7R, 9R, 15R-26R, 29R | Not Used |
| Asynchronous Short Commands | SA 3R, 4R | Not used |
| Event Messages | SA 5R, 5T, 6R, 6T | Not Used |
| Time Messages | SA 8T | Not used |
| | SA 8R | Used to transfer spacecraft time from CDMU to instrument (in subframe 33) rather than use packet service (9,5) |
| Packet Transfer | | |
| TM Transfer Request | SA 10T | Used by instrument to indicate to CDMU that a TM packet is ready to transfer |
| TM Transfer Confirmation | SA 10R | Not Used – ignored by the instrument |
| TC Transfer Confirmation | SA 27T | Instrument sends a copy of TC Transfer Descriptor to indicate reception of TC |
| TC Transfer Descriptor | SA 27R | Used by the instrument to prepare for TC transfer |
| TM Data Send | SA 11T-26T | Used to transfer TM packets from instrument to CDMU |
| TC Data Receive | SA 11R-14R | Used to transfer TC packets from CDMU to instrument |
| Low-level Commands | SA 28T, 28R | Not Used |
| Data Wrap | SA 30T, 30R | Not Used, TBC |
| | | Note: This is mandatory according to the PS-ICD |

3. TELECOMMAND PACKET TYPES

The Packet Structure ICD defines many types of service that can be provided by an application. The following table shows the telecommand packet types that will be accepted by the HIFI instrument.

| Description | Service Type | Service Sub-Type | Comments | Diff wrt SPIRE |
|---|--------------|------------------|----------------|----------------|
| Telecommand Verification Service | 1 | | N/A | |
| Device Command Distribution | 2 | | Not Used | |
| Housekeeping and Diagnostic Data Reporting | | | Not Used | x |
| Event Reporting | 5 | | N/A | |
| Memory Management | | | | |
| Load Memory Using Absolute Addresses | 6 | 2 | | |
| Dump Memory Using Absolute Addresses | 6 | 5 | | |
| Check Memory Using Absolute Addresses | 6 | 9 | | |
| Function Management | | | | |
| Start Function | 8 | 1 | | |
| Stop Function | 8 | 2 | | |
| Perform Activity of Function | 8 | 4 | | |
| Report Function Status | 8 | 5 | Not Used | x |
| Time Management | | | | |
| Synchronise User | 9 | 3 | Not Used | |
| Enable Time Synchronisation | 9 | 4 | Not Used (TBC) | |
| Time Code | 9 | 5 | Not Used (TBC) | |
| Verify User Time | 9 | 6 | Not Used | |
| Enable Time Verification | 9 | 7 | | |
| Synchronise Central Time Reference | 9 | 10 | Not Used | |
| On-Board Scheduling | 11 | | Not Used | |
| On-Board Monitoring | | | | |
| Enable Monitoring of Parameters | 12 | 1 | | |
| Disable Monitoring of Parameters | 12 | 2 | | |
| Clear Monitoring List | 12 | 4 | | |
| Modify Monitoring List | 12 | 5 | | |
| Delete Parameters from Monitoring List | 12 | 6 | | |
| Report Current Monitoring List | 12 | 8 | | |
| Packet Transmission Control | | | | |
| Enable Generation of Telemetry Packets | 14 | 1 | | |
| Disable Generation of Telemetry Packets | 14 | 2 | | |
| Report Enabled Telemetry Packets | 14 | 3 | | |
| On-Board Storage and Retrieval | 15 | | Not Used | |
| On-Board Traffic Management | 16 | | Not Used | |
| Test Service | | | | |
| Perform Connection Test | 17 | 1 | | |
| On-Board Control procedures | 18 | | Not Used | |
| Action/Event Service | 19 | | Not Used | |
| Information Distribution Service | | | Not Used | x |
| Science Data | 21 | | N/A | |
| Context Saving Service | | | TBD | |
| Report Context | 22 | 1 (TBC) | Not Used | x |

4. TELEMETRY PACKET TYPES

The Packet Structure ICD defines many types of service that can be provided by an application. The following table shows the telemetry packet types that will be produced by the HIFI instrument.

| Description | Service Type | Service Sub-Type | Comments | Different wrt SPIRE |
|---|--------------|------------------|-------------------|---------------------|
| Telecommand Verification Service | | | | |
| Telecommand Acceptance Report - Success | 1 | 1 | | |
| Telecommand Acceptance Report - Failure | 1 | 2 | | |
| Telecommand Execution Report - Started | 1 | 3 | Not Used | x |
| Telecommand Execution Report - Progress | 1 | 5 | Not Used | x |
| Telecommand Execution Report - Completed | 1 | 7 | Not Used | x |
| Telecommand Execution Report - Failure | 1 | 8 | | |
| Telecommand Contents Report | 1 | 9 | Not Used | |
| Device Command Distribution | 2 | | N/A | |
| Housekeeping and Diagnostic Data Reporting | | | | |
| HK Parameter Report Definitions Report | 3 | 10 | Not Used | x |
| Diagnostic Parameter Definitions Report | 3 | 12 | Not Used | x |
| Housekeeping Parameter Report | 3 | 25 | | |
| Diagnostic Parameter Report | 3 | 26 | Not Used | x |
| Event Reporting | | | | |
| Event Report | 5 | 1 | | |
| Exception Report | 5 | 2 | | |
| Error/Alarm Report | 5 | 4 | | |
| Memory Management | | | | |
| Memory Dump, Absolute Addresses | 6 | 6 | | |
| Memory Check Report, Absolute Addresses | 6 | 10 | | |
| Function Management | | | | |
| Function Status Report | 8 | 6 | Not Used | x |
| Time Management | | | | |
| Central Time Reference | 9 | 8 | Not Used | |
| Time Verification Report | 9 | 9 | | |
| On-Board Scheduling | 11 | | Not Used | |
| On-Board Monitoring | | | | |
| Current Monitoring List Report | 12 | 9 | generated by CDMS | ? |
| Packet Transmission Control | | | | |
| Enabled Telemetry Packets Report | 14 | 4 | | |
| On-Board Storage and Retrieval | 15 | | Not Used | |
| Test Service | | | | |
| Connection Test Report | 17 | 2 | | |
| On-Board Control procedures | 18 | | Not Used (TBC) | |
| Action/Event Service | 19 | | Not Used | |
| Information Distribution Service | | | | |
| Distributed Information Packets Report | 20 | 5 | Not Used | x |
| Science Data | | | | |

| | | | | |
|--------------------------------|----|---------|----------|---|
| Nominal Science Data Report | 21 | 1 | | |
| Science Type B Data Report | 21 | 2 | Not Used | x |
| Diagnostic Science Data Report | 21 | 3 | | |
| Auxiliary Science Data Report | 21 | 4 | Not Used | x |
| Context Saving Service | 22 | | TBD | |
| Context Report | 22 | 2 (TBC) | Not Used | x |



**IFSI
CNR**

**Herschel PACS
PS-ICD Usage**

Ref.: PACS-CR-TN-015
Issue: 1
Date: 20th March 2002
Page: 1 of 6

Herschel PACS

PS-ICD Usage
Document Ref.: PACS-CR-TN-015

Issue: 1

Prepared by: Stefano Pezzuto

Date: 20th March 2002

Approved by: Renato Orfei



1 Introduction

The Packet Structure ICD (SCI-PT-ICD-07527, hereinafter PS-ICD) describes the packet services and low-level packet transfer protocol messages to be available on the Herschel spacecraft for the control and transfer of data between different subsystems. This note defines those services and messages that will be used by the PACS instrument.

2 APID allocation

The Application ID is used to identify the source or destination of a telemetry packet. Herschel uses different APIDs for different types of packet as well as for different instruments. The APIDs available to PACS are defined in the PS-ICD and reported in the following table:

| ID | Telemetry types | APID |
|--------|---|-------|
| APID 1 | PACS Telecommands, all telemetry packets (except housekeeping and science data) | 0x480 |
| APID 2 | PACS Periodic housekeeping | 482 |
| APID 3 | PACS Science data (blue SPU) | 484 |
| APID 4 | PACS Science data (red SPU) | 485 |
| APID 5 | PACS Diagnostic data | 486 |

3 Packet Transfer Protocol

At the low-level the Packet Transfer Protocol provides a series of sub-address messages to control and transfer data between subsystems. Some of these implement the packet transfer itself, others provide alternative methods of transferring data and controlling the transfer. This section identifies the sub-addresses used/accepted by the PACS instrument.

| Description | Sub-address(es) | Comments |
|-----------------------------|-----------------------------|--|
| Mode Command | SA 0R | Used to identify the RT addressed in this sub-frame. The instrument responds only to its own address |
| | SA 0T, 31T, 31R | Not Used |
| Unit Control | SA 1R | Not Used |
| Data Send | SA 1T | Used to transmit instrument status |
| | SA 2T, 3T, 4T, 7T, 9T, 29T | Not Used |
| Data Receive | SA 2R, 7R, 9R, 15R–26R, 29R | Not Used |
| Asynchronous Short Commands | SA 3R, 4R | Not Used |
| Event Messages | SA 5R, 5T, 6R, 6T | Not Used |
| Time Messages | SA 8T | Not Used |
| | SA 8R | Used to transfer spacecraft time from CDMU to instrument (in subframe 33) rather than use packet service (9,5) |
| Packet Transfer | | |



**IFSI
CNR**

**Herschel PACS
PS-ICD Usage**

Ref.: PACS-CR-TN-015
Issue: 1
Date: 20th March 2002
Page: 3 of 6

| | | |
|---------------------------|-------------|---|
| TM Transfer Request | SA 10T | Used by instrument to indicate to CDMU that a TM packet is ready to transfer |
| TM Transfer Confirmation | SA 10R | Not Used - ignored by the instrument |
| TC Transfer Confirmation | SA 27T | Instrument sends a copy of TC Transfer Descriptor to indicate reception of TC |
| TC Transfer Descriptor | SA 27R | Used by the instrument to prepare for TC transfer |
| TM Data Send | SA 11T-26T | Used to transfer TM packets from instrument to CDMU |
| TC Data Receive | SA 11R-14R | Used to transfer TC packets from CDMU to instrument |
| Low-level Commands | SA 28T, 28R | Not Used |
| Data Wrap | SA 30T, 30R | Not Used, TBC Note: This is mandatory according to the PS-ICD |

4 Telecommand Packet Types

The Packet Structure ICD defines many types of service that can be provided by an application. The following table shows the action taken by the PACS instrument according to the following conventions:

- Accepted: the command is accepted and executed;
- Rejected: the reception of such type/subtype causes DPU to reject the command (with a TM packet (1,2), TC Acceptance - Failure);
- Ignored: this command is accepted but not executed at all;
- Executed/Ignored: this command is accepted by DPU, but its execution depends on the status of the DPU and, in some case, can be ignored (for instance, a request to delete an On-Board Procedure which is running at the moment of reception of the command).

| Description | Service Type | Service Sub-Type | Action |
|---|--------------|------------------|----------|
| Telecommand Verification Service | 1 | Any | Rejected |
| Device Command Distribution | 2 | Any | Rejected |
| Housekeeping and Diagnostic Data Reporting | 3 | Any | Rejected |
| Not Used | 4 | Any | Rejected |
| Event Reporting | 5 | Any | Rejected |
| Memory Management | | | |
| Load Memory Using Absolute Addresses | 6 | 2 | Executed |
| Dump Memory Using Absolute Addresses | 6 | 5 | Executed |
| Check Memory Using Absolute Addresses | 6 | 9 | Executed |
| Not Used | 7 | Any | Rejected |
| Function Management | | | |
| Start Function | 8 | 1 | Ignored |
| Stop Function | 8 | 2 | Ignored |
| Perform Activity of Function | 8 | 4 | Executed |
| Report Function Status | 8 | 5 | Ignored |



**IFSI
CNR**

**Herschel PACS
PS-ICD Usage**

Ref.: PACS-CR-TN-015
Issue: 1
Date: 20th March 2002
Page: 4 of 6

| | | | |
|--|--------|-----|--|
| Time Management | | | |
| Synchronise User | 9 | 3 | Rejected |
| Enable Time Synchronisation | 9 | 4 | Rejected |
| Time Code | 9 | 5 | Rejected |
| Verify User Time | 9 | 6 | Rejected |
| Enable Time Verification | 9 | 7 | Executed |
| Synchronise Central Time Reference | 9 | 10 | Rejected |
| Not Used | 10 | Any | Rejected |
| On-Board Scheduling | 11 | Any | Rejected |
| On-Board Monitoring | 12 | Any | Rejected |
| Not Used | 13 | Any | Rejected |
| Packet Transmission Control | | | |
| Enable Generation of Telemetry Packets | 14 | 1 | Executed |
| Disable Generation of Telemetry Packets | 14 | 2 | Executed (Ignored for TM (1,1)–(1,2)) |
| Report Enabled Telemetry Packets | 14 | 3 | Executed |
| On-Board Storage and Retrieval | 15 | Any | Rejected |
| On-Board Traffic Management | 16 | Any | Rejected |
| Test Service | | | |
| Perform Connection Test | 17 | 1 | Executed |
| On-Board Control Procedure | | | |
| Load Procedure | 18 | 1 | Executed/Ignored |
| Delete Procedure | 18 | 2 | Executed/Ignored |
| Start Procedure | 18 | 3 | Executed/Ignored |
| Stop Procedure | 18 | 4 | Executed/Ignored |
| Suspend Procedure | 18 | 5 | Executed/Ignored |
| Resume Procedure | 18 | 6 | Executed/Ignored |
| Communicate Parameters to a Procedure | 18 | 7 | Executed/Ignored |
| Report List of On-board Control Procedures | 18 | 8 | Executed |
| Report List of Active On-board Control Procedure | 18 | 10 | Executed |
| Report OBCP Status | 18 | 12 | Executed |
| Event/Action Service | 19 | Any | Rejected |
| Information Distribution Service | | | |
| Enable Distribution of Information TC Packets | 20 | 1 | Rejected |
| Disable Distribution of Information TC Packets | 20 | 2 | Rejected |
| Report Distributed Information Packets | 20 | 3 | Rejected |
| Information Telecommand | 20 | 4 | Executed (Details are TBD) |
| Science Data | 21 | Any | Rejected |
| Context Saving Service | 22 | Any | Rejected |
| Undefined | Any>22 | Any | Rejected |



**IFSI
CNR**

**Herschel PACS
PS-ICD Usage**

Ref.: PACS-CR-TN-015
Issue: 1
Date: 20th March 2002
Page: 5 of 6

5 Telemetry Packet Types

The Packet Structure ICD defines many types of service that can be provided by an application. The following table shows the telemetry packet types that will be produced by the PACS instrument

| Description | Service Type | Service Sub-Type | Comments |
|---|--------------|------------------|----------|
| Telecommand Verification Service | | | |
| Telecommand Acceptance Report - Success | 1 | 1 | |
| Telecommand Acceptance Report - Failure | 1 | 2 | |
| Telecommand Execution Report - Started | 1 | 3 | |
| Telecommand Execution Report - Progress | 1 | 5 | Not Used |
| Telecommand Execution Report - Completed | 1 | 7 | |
| Telecommand Execution Report - Failure | 1 | 8 | |
| Telecommand Contents Report | 1 | 9 | Not Used |
| Device Command Distribution | 2 | | N/A |
| Housekeeping and Diagnostic Data Reporting | | | |
| HK Parameter Report Definitions Report | 3 | 10 | Not Used |
| Diagnostic Parameter Report Definitions Report | 3 | 12 | Not Used |
| HK Parameter Report | 3 | 25 | |
| Diagnostic Parameter Report | 3 | 26 | Not Used |
| Event Reporting | | | |
| Event Report | 5 | 1 | |
| Execution Report | 5 | 2 | |
| Error/Alarm Report | 5 | 4 | |
| Memory Management | | | |
| Memory Dump, Absolute Addresses | 6 | 6 | |
| Memory Check Report, Absolute Addresses | 6 | 10 | |
| Function Management | | | |
| Function Status Report | 8 | 6 | Not Used |
| Time Management | | | |
| Central Time Reference | 9 | 8 | Not Used |
| Time Verification Report | 9 | 9 | |
| On-Board Scheduling | 11 | | N/A |
| On-Board Monitoring | 12 | | Not Used |
| Packet Transmission Control | | | |
| Enabled Telemetry Packets Report | 14 | 4 | |
| On-Board Storage and Retrieval | 15 | | N/A |
| On-Board Traffic Management | 16 | | N/A |
| Test Service | | | |
| Connection Test Report | 17 | 2 | |
| On-Board Control Procedure | | | |
| On-board Control Procedures List Report | 18 | 9 | |
| Active On-board Control Procedures List Report | 18 | 11 | |
| OBCP Status Report | 18 | 13 | |
| Event/Action Service | 19 | | N/A |



**IFSI
CNR**

**Herschel PACS
PS-ICD Usage**

Ref.: PACS-CR-TN-015
Issue: 1
Date: 20th March 2002
Page: 6 of 6

| | | | |
|---|----|---|----------|
| Information Distribution Service | 20 | | Not Used |
| Science Data | | | |
| Nominal Science Data Report | 21 | 1 | |
| Science Type B Data Report | 21 | 2 | |
| Diagnostic Science Data Report | 21 | 3 | |
| Auxiliary Science Data Report | 21 | 4 | Not Used |
| Context Saving Service | 22 | | Not Used |

The Packet Structure ICD (SCI-PT-ICD-07527) describes the packet services and low-level packet transfer protocol messages to be available on the Herschel spacecraft for the control and transfer of data between different subsystems. This note defines those services and messages that will be used by the SPIRE instrument.

1. APIDS

The Application ID is used to identify the source or destination of a telemetry packet. Herschel uses different APIDs for different types of packet (see AD1) as well as for different instruments. The APIDs to be used by SPIRE are given in the following table:

| ID | Telemetry types | APID (hex) |
|-------|---|------------|
| APID1 | SPIRE Telecommands, Telecommand Verification and Events | 500 |
| APID2 | SPIRE Periodic Housekeeping | 502 |
| APID3 | SPIRE Photometer Science Data | 504 |
| APID4 | SPIRE Spectrometer Science Data | 505 |
| APID5 | SPIRE Mechanism Science Data | 506 |

2. PACKET TRANSFER PROTOCOL

At the low-level the Packet Transfer Protocol provides a series of sub-address messages to control and transfer data between subsystems. Some of these implement the packet transfer itself, others provide alternative methods of transferring data and controlling the transfer. This section identifies the sub-addresses used/accepted by the SPIRE instrument.

| Description | Sub-address(es) | Comments |
|------------------------------------|-----------------------------|--|
| Mode Command | SA 0R | Used to identify the RT addressed in this subframe. The instrument responds only to its own address. |
| | SA 0T, 31T, 31R | Not Used |
| Unit Control | SA 1R, 1T | Not Used |
| Data Send | SA 2T, 3T, 4T, 7T, 9T, 29T | Not Used |
| Data Receive | SA 2R, 7R, 9R, 15R-26R, 29R | Not Used |
| Asynchronous Short Commands | SA 3R, 4R | Not used |
| Event Messages | SA 5R, 5T, 6R, 6T | Not Used |
| Time Messages | SA 8T | Not used |
| | SA 8R | Used to transfer spacecraft time from CDMU to instrument (in subframe 33) rather than use packet service (9,5) |
| Packet Transfer | TM Transfer Request | SA 10T |
| | TM Transfer Confirmation | SA 10R |
| | TC Transfer Confirmation | SA 27T |
| | TC Transfer Descriptor | SA 27R |
| | | Used by instrument to indicate to CDMU that a TM packet is ready to transfer |
| | | Not Used – ignored by the instrument |
| | | Instrument sends a copy of TC Transfer Descriptor to indicate reception of TC |
| | | Used by the instrument to prepare for TC transfer |
| TM Data Send | SA 11T-26T | Used to transfer TM packets from instrument to CDMU |
| TC Data Receive | SA 11R-14R | Used to transfer TC packets from CDMU to instrument |
| Low-level Commands | SA 28T, 28R | Not Used |
| Data Wrap | SA 30T, 30R | Not Used, TBC |
| | | Note: This is mandatory according to the PS-ICD |

3. TELECOMMAND PACKET TYPES

The Packet Structure ICD (AD1) defines many types of service that can be provided by an application. The following table shows the telecommand packet types that will be accepted by the SPIRE instrument.

| Description | Service Type | Service Sub-Type | Comments |
|---|--------------|------------------|----------------|
| Telecommand Verification Service | 1 | | N/A |
| Device Command Distribution | 2 | | Not Used |
| Housekeeping and Diagnostic Data Reporting | | | |
| Define New HK Parameter Report | 3 | 1 | |
| Define New Diagnostic Parameter Report | 3 | 2 | |
| Clear HK Parameter Report Definitions | 3 | 3 | |
| Clear Diagnostic Parameter Report Definitions | 3 | 4 | |
| Report HK Parameter Report Definitions | 3 | 9 | |
| Report Diagnostic Parameter Report Definitions | 3 | 11 | |
| Event Reporting | 5 | | N/A |
| Memory Management | | | |
| Load Memory Using Absolute Addresses | 6 | 2 | |
| Dump Memory Using Absolute Addresses | 6 | 5 | |
| Check Memory Using Absolute Addresses | 6 | 9 | |
| Function Management | | | |
| Start Function | 8 | 1 | |
| Stop Function | 8 | 2 | |
| Perform Activity of Function | 8 | 4 | |
| Report Function Status | 8 | 5 | |
| Time Management | | | |
| Synchronise User | 9 | 3 | Not Used |
| Enable Time Synchronisation | 9 | 4 | Not Used (TBC) |
| Time Code | 9 | 5 | Not Used (TBC) |
| Verify User Time | 9 | 6 | Not Used |
| Enable Time Verification | 9 | 7 | |
| Synchronise Central Time Reference | 9 | 10 | Not Used |
| On-Board Scheduling | 11 | | Not Used |
| On-Board Monitoring | | | |
| Enable Monitoring of Parameters | 12 | 1 | |
| Disable Monitoring of Parameters | 12 | 2 | |
| Clear Monitoring List | 12 | 4 | |
| Modify Monitoring List | 12 | 5 | |
| Delete Parameters from Monitoring List | 12 | 6 | |
| Report Current Monitoring List | 12 | 8 | |
| Packet Transmission Control | | | |
| Enable Generation of Telemetry Packets | 14 | 1 | |
| Disable Generation of Telemetry Packets | 14 | 2 | |
| Report Enabled Telemetry Packets | 14 | 3 | |
| On-Board Storage and Retrieval | 15 | | Not Used |
| On-Board Traffic Management | 16 | | Not Used |
| Test Service | | | |
| Perform Connection Test | 17 | 1 | |
| On-Board Control procedures | 18 | | Not Used |
| Action/Event Service | 19 | | Not Used |
| Information Distribution Service | | | |
| Enable Distribution of Information TC Packets | 20 | 1 | |

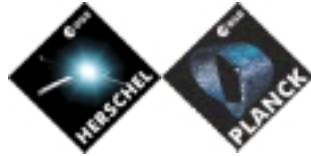
| | | | |
|--|----|---------|-----|
| Disable Distribution of Information TC Packets | 20 | 2 | |
| Report Distributed Information Packets | 20 | 3 | |
| Information Telecommand | 20 | 4 | |
| Science Data | 21 | | N/A |
| Context Saving Service | | | TBD |
| Report Context | 22 | 1 (TBC) | |

4. TELEMETRY PACKET TYPES

The Packet Structure ICD (AD1) defines many types of service that can be provided by an application. The following table shows the telemetry packet types that will be produced by the SPIRE instrument.

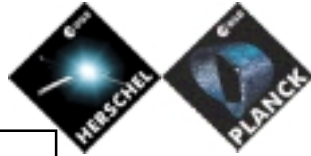
| Description | Service Type | Service Sub-Type | Comments |
|---|--------------|------------------|----------------|
| Telecommand Verification Service | | | |
| Telecommand Acceptance Report - Success | 1 | 1 | |
| Telecommand Acceptance Report - Failure | 1 | 2 | |
| Telecommand Execution Report - Started | 1 | 3 | |
| Telecommand Execution Report - Progress | 1 | 5 | |
| Telecommand Execution Report - Completed | 1 | 7 | |
| Telecommand Execution Report - Failure | 1 | 8 | |
| Telecommand Contents Report | 1 | 9 | Not Used |
| Device Command Distribution | 2 | | N/A |
| Housekeeping and Diagnostic Data Reporting | | | |
| HK Parameter Report Definitions Report | 3 | 10 | |
| Diagnostic Parameter Definitions Report | 3 | 12 | |
| Housekeeping Parameter Report | 3 | 25 | |
| Diagnostic Parameter Report | 3 | 26 | |
| Event Reporting | | | |
| Event Report | 5 | 1 | |
| Exception Report | 5 | 2 | |
| Error/Alarm Report | 5 | 4 | |
| Memory Management | | | |
| Memory Dump, Absolute Addresses | 6 | 6 | |
| Memory Check Report, Absolute Addresses | 6 | 10 | |
| Function Management | | | |
| Function Status Report | 8 | 6 | |
| Time Management | | | |
| Central Time Reference | 9 | 8 | Not Used |
| Time Verification Report | 9 | 9 | |
| On-Board Scheduling | 11 | | Not Used |
| On-Board Monitoring | | | |
| Current Monitoring List Report | 12 | 9 | |
| Packet Transmission Control | | | |
| Enabled Telemetry Packets Report | 14 | 4 | |
| On-Board Storage and Retrieval | 15 | | Not Used |
| Test Service | | | |
| Connection Test Report | 17 | 2 | |
| On-Board Control procedures | 18 | | Not Used (TBC) |
| Action/Event Service | 19 | | Not Used |
| Information Distribution Service | | | |
| Distributed Information Packets Report | 20 | 5 | |
| Science Data | | | |

| | | | |
|--------------------------------|----|---------|-----|
| Nominal Science Data Report | 21 | 1 | |
| Science Type B Data Report | 21 | 2 | |
| Diagnostic Science Data Report | 21 | 3 | |
| Auxiliary Science Data Report | 21 | 4 | |
| Context Saving Service | 22 | | TBD |
| Context Report | 22 | 2 (TBC) | |



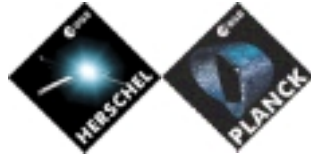
▼ Proposed Data Handling Bus Address assignment

| Engineering Unit | Address | Science Instrument | Address | acceptability | Inst Proposal |
|------------------|--------------|------------------------|---------|---------------|---------------|
| CDMU A | 1 (reserved) | HFI A/HIFI A | 16 | Ok | HIFI A |
| CDMU B | 2 (reserved) | HFI B/HIFI B | 17 | | |
| ACC A | 3 | LFI A/SPIRE A | 18 | | |
| ACC B | 4 | LFI B/SPIRE B | 19 | Ok | HIFI B |
| PCDU A | 5 | SCE A/PACS A | 20 | | |
| PCDU B | 6 | SCE B/PACS B | 21 | Ok | SPIRE A |
| CCU A | 7 | Spare | 22 | Ok | SPIRE B |
| CCU B | 8 | Spare | 23 | | |
| Spare | 9 | Spare | 24 | | |
| Spare | 10 | Spare | 25 | Ok | PACS A |
| Spare | 11 | Spare | 26 | Ok | PACS B |
| Spare | 12 | Spare | 27 | | |
| Spare | 13 | Spare | 28 | Ok | |
| Spare | 14 | Spare | 29 | | |
| Spare | 15 | Spare | 30 | | |
| | | reserved for broadcast | 31 | | |



▼ Currently :

- ❑ Instrument HK specification is 2kbps/instruments=6kbps in total
- ❑ spacecraft HK specification is 5kbps (present estimate is ~9kbps, attitude reconstruction requirement being the major contributor)
- ❑ the Low bit rate on LGA permits to download 5kbps on New Norcia and 500bps on Kourou
 - ➔ low bit rate is used in nominal after separation from the Launcher (HK1 satellite mode) and in safe mode
 - ➔ current defined instruments HK rates are not consistent with the available link performance on Low Gain Antennae
 - ➔ all real time housekeeping (S/C + science) is on Virtual Channel 0 (VC0)

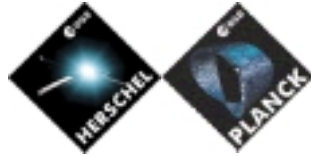


▼ Alternatives

- ① no instrument HK shall be transmitted when on Low Gain Antennae (not really acceptable...) *OR*
- ② a limited bandwidth shall be reserved for instruments HK when on LGA; ASPI proposal is 20%
 - ① instruments define dedicated «quick look» small HK packets consistent with 330bps and 33bps each. Polling rate could still be 1 packet/s; *AND/OR*
 - ② currently defined HK shall be subsampled in a random fashion in the downlink

▼ ASPI proposal

- each instrument defines a small «quick look» packet corresponding to 330bps max, in addition to the «normal» HK. 1 additional subframe/instrument is allocated for the collection of the «quick look» packet.



- Instruments real time HK is associated to VC4 with $\text{priority_VC0} > \text{priority_VC4} > \text{priority_VC1}$
- When on LGA with NN (5kbps), only the «quick look» packets are transmitted through VC4
- When on LGA with Kourou (500bps), the «quick look» packets are transmitted at a rate of 1 over 10
 - ★ the quick look packets shall be fully self consistent



AVM

objectives, design, test sequence & schedule

-
- ▼ Herchel/Planck Avionics Definition
 - ▼ AVM Requirements
 - ▼ AVM Objectives
 - ▼ AVM Tests
 - ▼ AVM Design
 - ▼ AVM Schedule



▼ The «extended» Avionics definition comprises :

- Command & Data Management Subsystem
 - Attitude & Control Measurement Subsystem
- and is also extended to
- Power Control Subsystem
 - Telemetry / Telecommand Subsystem
 - interconnecting harness

▼ Flight Avionics architecture similar between Herschel and Planck

- CDMS are identical
- ACMS are different but built around the same computer
- Power Control Subsystem are identical
- TTC are very similar (RFDN are different)



AVM Requirements

- ▼ **System AIV Requirements, SCI-PT-RS-07430; Issue 1.0:**
The AVM should be used to verify the electrical and functional interfaces of the SVM. This model should also provide a test bed for on-board software testing as well as for testing the Electrical Ground Support Equipment including its software. The AVM should be also used for operation procedures development and testing.
- ▼ **IID A Requirements**
 - verification of all electrical and Soft interfaces
 - verification of subsystem & functional performance within syst. Environment
 - verif. Of system performance
 - verif of operational procedures



AVM Objectives (1)

▼ Within the proposed model philosophy, AVM consists of a **SVM (Avionics and payload warm units) EM test bench** which allows to reach the following objectives :

- to verify electrical and functional interfaces and compatibility (electrical I/F between avionics units, compatibility between avionics and payload warm units)
- to validate Avionics spacecraft OBSW in system environment
- to validate EGSE
- to perform EMC pre-qualification (conducted tests only)
- to validate tests procedure for FM satellite AIT sequence
- to support the FM testing activity by being able to run testing and verification in parallel with FM AIT

▼ These activities will be conducted for the two satellites configurations : Herschel and Planck.



AVM Objective (2)

▼ In summary, the AVM is designed to minimize risk and save time in the overall spacecraft development process



▼ Tests sequence on AVM is organized as for FM tests

- ① Units Integration
- ② functional tests : UFT, SIT, IST, SFT
- ③ environmental tests : only EMC on AVM.

▼ UFT: Unit Function Test (SCI-PT-RS-07430, Issue 1.0)

- short low level functional test to verify the interfaces with the S/C / Module and to ensure the successful integration of the unit on the S/C / Module.



- ▼ **SIT: System Integration Test (SCI-PT-RS-07430, Issue 1.0)**
 - to verify the interaction of equipment and subsystems between themselves : subsystem levels tests in the system environment
 - The baseline adopted for the programme is to minimise the number and complexity of SITs
 - part of SITs are reused at IST level



▼ IST: Integrated Satellite Test (SCI-PT-RS-07430, Issue 1.0)

- to verify correct operation of the fully integrated satellite or module in a series of representative mission modes including autonomous (Mission Timeline, MTL and On-Board Control Procedures, OBCPs) and backup modes.
- IST = an automated test using a combination of test procedures developed from unit or subsystem level electrical test sequences (UFT's and SIT's).
- IST shall exercise all satellite modes in all mission phases, i.e.:
 - launch separation and post separation phases (launch and HK1 modes)
 - commissioning & transfer to L2 phases (HK2 mode)
 - operational phases (SCIENCE Aut, and SCI telecom modes)
- IST is THE reference test which shall be re-run several (2-3) times at FM level.



▼ SFT: Short Functional Test (SCI-PT-RS-07430; Issue 1.0)

- SFT is a subset of IST, typically comprising only nominal operating modes,
- SFT is run to verify system functional integrity after each key AIT events (environmental tests, satellites de-assembly re-assembly). It permits to keep track of the correct operation of the spacecraft all along the AIT phase with reduced cost and schedule impacts wrt IST
- no SFT is planned at AVM level



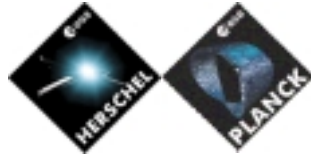
▼ Herschel/Planck instruments warm units tests

- The Herschel and Planck instruments warm units will be integrated within the AVM to verify the communication and functional compatibility with the spacecraft's avionics, limited :
 - to checking the 1553B bus and I/O communication with the CDMS
 - the power compatibility with the PCDU
- Payload will be exercised in functionally mission representative modes during IST :
 - data produced shall be representative in term of amount,
 - timings shall be representative
 - power loads shall be representative
- The warm units will be delivered with the related test equipment.



▼ Herschel/Planck EMC conducted test

- AVM configuration permits to perform preliminary check of the conducted electromagnetic compatibility of the satellite AVM units, power and signal lines.
- The conducted emission tests will demonstrate that levels measured in the most emissive modes do not exceed the specified limits, for which the units have been qualified
- The conducted susceptibility tests will demonstrate that the AVM units will perform within their specifications. During these tests the AVM will be demonstrated to exhibit no spurious or inadvertent response to any combination of operational modes and conditions that are tested.
- Spacecraft configuration during EMC tests shall be the one of the sizing IST subsets

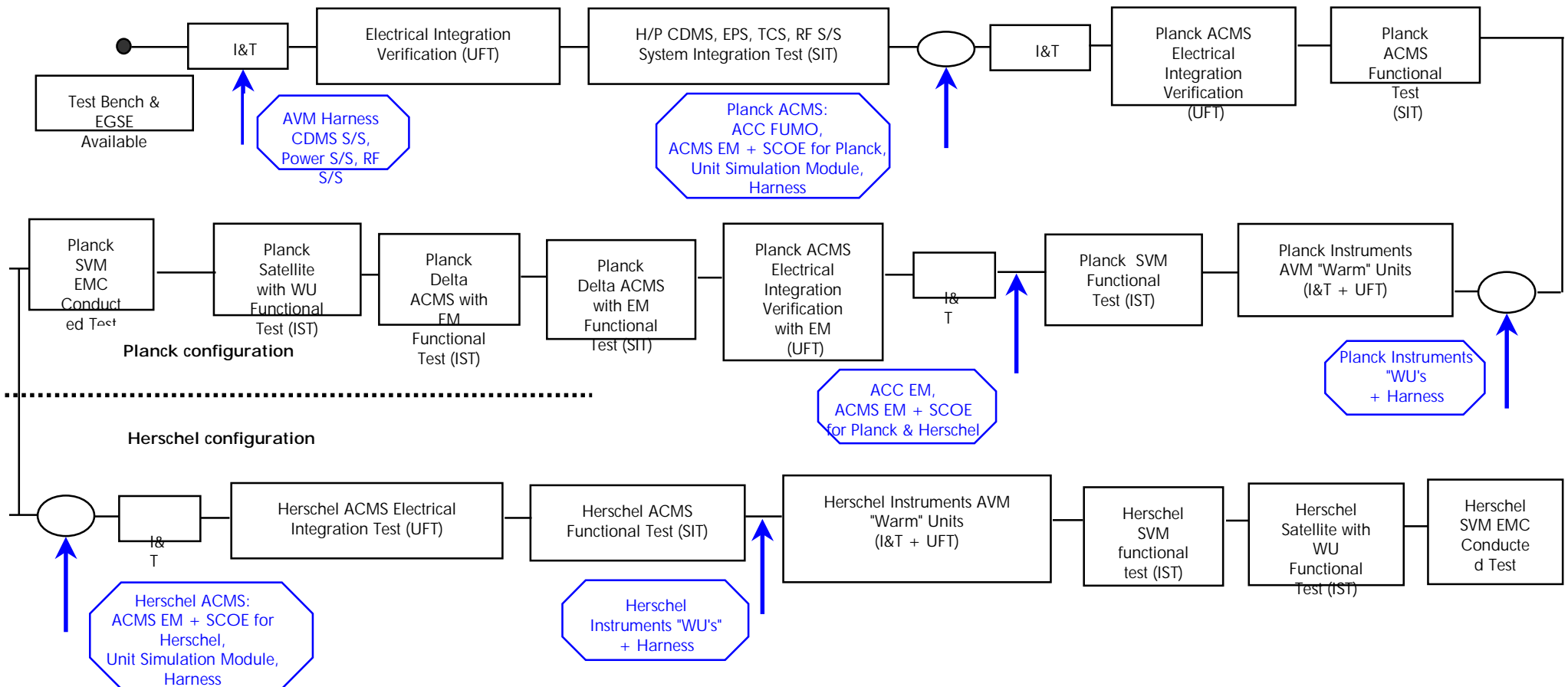


▼ Tests restrictions

- ❑ AVM IST will not test the redundancy of the Instruments (not available on AVM).
- ❑ AVM is not defined to test and to debug the Instruments software nor to perform any instrument internal testing
- ❑ Currently one single AVM test bench is planned
 - ➔ All tests specific to Herschel and Planck shall be performed in series :
 - ★ ACMS Int, UFT & SIT
 - ★ Warm units Int & UFT
 - ★ IST
 - ★ EMC tests



AVM Tests (8)





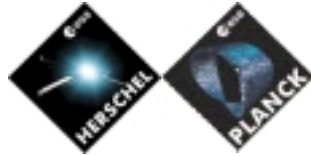
AVM Tests (9)

| TEST | Type | Duration (in days) |
|---|-----------|--------------------|
| Common Harness, CDMS, EPS, RF equipment | I&T + UFT | 45 |
| Herschel / Planck EPS | SIT | 10 |
| Herschel CDMS | SIT | 15 |
| Planck CDMS | SIT | 15 |
| Herschel / Planck RF | SIT | 10 |
| Planck ACMS (ACC FUMO + specific Planck EM units) | I&T + UFT | 7 |
| Planck ACMS | SIT | 40 |
| Planck Instrument Warm unit | I&T + UFT | 15 |
| Planck SVM | IST | 13 |
| Planck ACMS (ACC EM + common EM units) | I&T + UFT | 4 |
| Planck delta ACMS with EM | SIT + IST | 5 |
| Planck Satellite (with WU) TBC | IST | 15 |
| Planck EMC conducted Test | EMC | 5 |
| Herschel ACMS | I&T + UFT | 14 |
| Herschel ACMS | SIT | 40 |
| Herschel Instrument Warm unit | I&T + UFT | 17 |
| Herschel SVM | IST | 15 |
| Herschel Satellite (with WU) TBC | IST | 15 |
| Herschel EMC conducted Test | EMC | 5 |



▼ AVM Definition

- ❑ «SVM AVM» = Satellite avionics + harness for Satellite Avionics + SCOEs + CCS
- ❑ «Satellite AVM» = SVM AVM + interconnected harness for P/L warm units + P/L Warm Units with their SCOEs
- ❑ the defined test sequence imposes a form & fit representativity of the SVM equipment (including instruments connected to the spacecraft)
- ❑ the defined test sequence imposes a 100% functional representativity of the units and subsystems.



AVM Design (2)

| Herschel AVM HW MATRIX | | SW Test Bed | ACMS Test Bed | | | | AVM | | | |
|------------------------|----------------------------------|-------------------|------------------------|------|-----|------|------------------------|------|-----|------|
| | | | Unit Simulation Module | FUMO | EM | SCOE | Unit Simulation Module | FUMO | EM | SCOE |
| CDMS | CDMU | Core processor BB | N/A | N/A | N/A | SIS | N/A | N/A | 1 | 1 |
| ACMS | ACC | Core processor BB | N/A | 1 | 1 | 1 | N/A | 1 | 1 | 1 |
| | Units | N/A | TBD | TBD | TBD | TBD | TBD | TBD | TBD | TBD |
| | Dynamics Environment | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | 1 |
| PCS | PCS | N/A | N/A | N/A | N/A | SIS | N/A | N/A | N/A | N/A |
| | PCDU | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | Battery | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | 1 |
| | Solar Array | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| | SA illumination simulation (TBC) | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | 1 |
| RF | TTC-RF | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| | TRSP1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | TWTA | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | RFDN | N/A | 0 | N/A | 0 | N/A | N/A | N/A | 1 | N/A |
| PL (warm units) | HIFI | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| | PACS | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| | SPIRE | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| | CRYOSTAT CONTROL UNIT | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| HARNESS | HARNESS | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |

Herschel AVM hardware matrix

15/04/2002

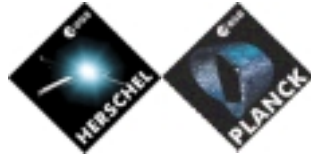
17



AVM Design (3)

| Planck AVM HW MATRIX | | SW Test Bed | ACMS Test Bed | | | | AVM | | | |
|----------------------|----------------------------------|-------------------|------------------------|------|------|------|------------------------|------|-----|------|
| | | | Unit Simulation Module | FUMO | EM | SCOE | Unit Simulation Module | FUMO | EM | SCOE |
| CDMS | CDMU | Core processor BB | N/A | N/A | N/A | SIS | N/A | N/A | 1 | 1 |
| ACMS | ACC | Core processor BB | N/A | N/A | FUMO | 1 | N/A | 1 | 1 | 1 |
| | Units | N/A | TBD | TBD | TBD | TBD | TBD | TBD | TDB | TDB |
| | Dynamics Environment | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | 1 |
| PCS | PCS | N/A | N/A | N/A | N/A | SIS | N/A | N/A | N/A | N/A |
| | PCDU | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | Battery | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | 1 |
| | Solar Array | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| | SA illumination simulation (TBC) | N/A | N/A | N/A | N/A | 1 | N/A | N/A | N/A | 1 |
| RF | TTC-RF | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 |
| | TRSP1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | TWTA | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| | RFDN | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |
| PL (warm units) | LFI | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| | HFI | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| | Sorption Cooler | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 * | 1 |
| HARNESS | HARNESS | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1 | N/A |

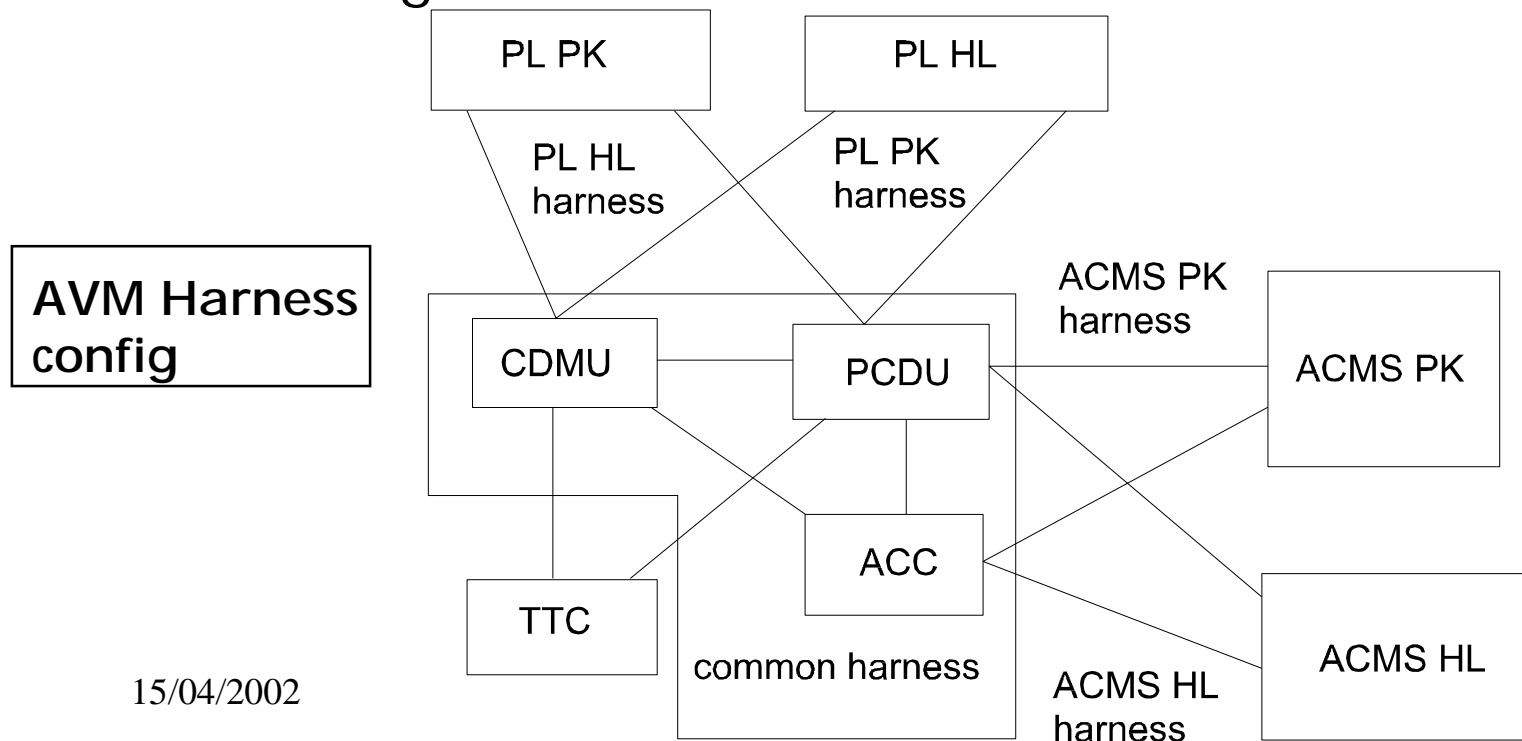
Planck AVM hardware matrix



AVM Design (4)

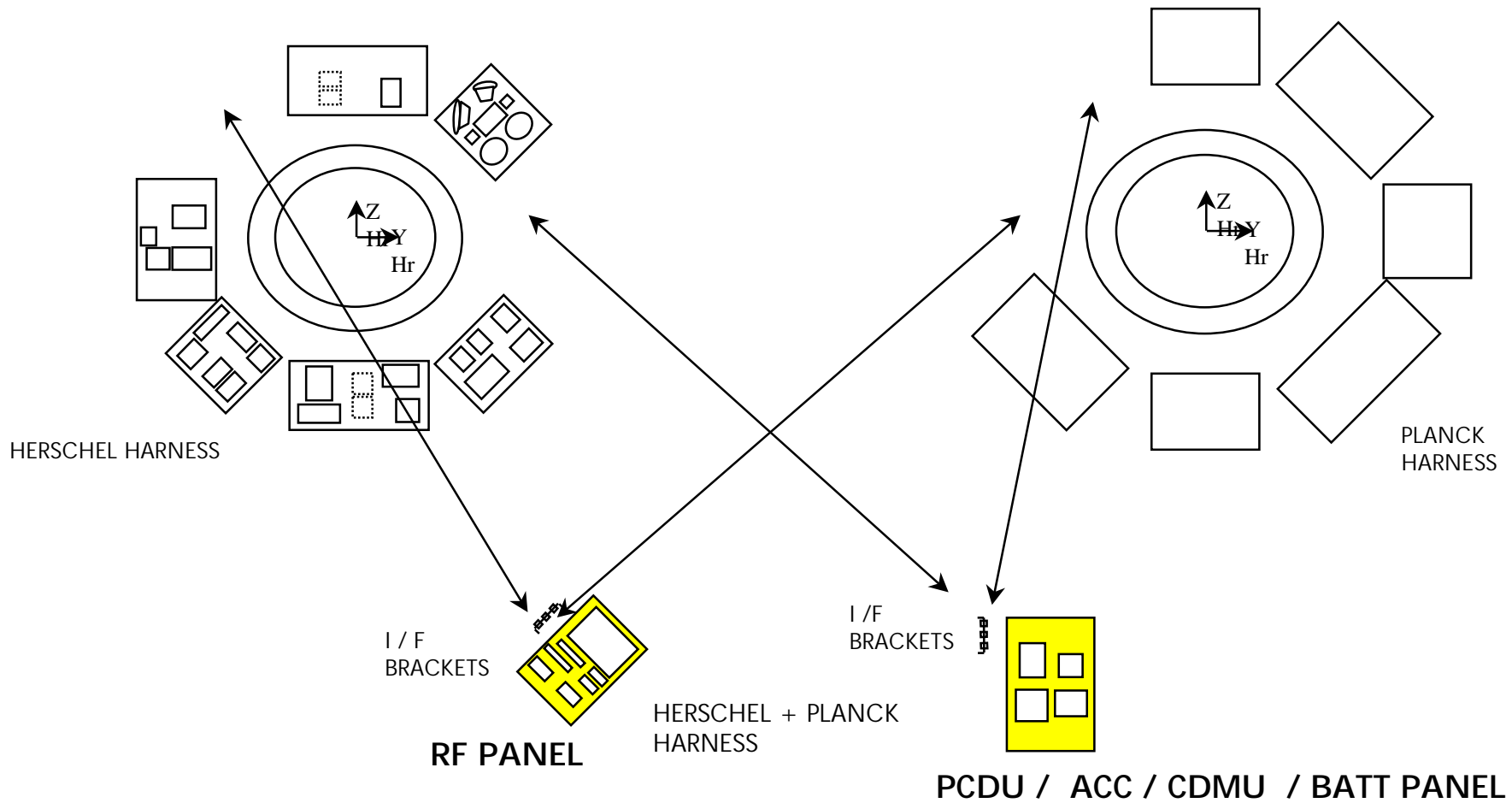
Switching between PK and HL configurations consists in

- to connect the HL/PK ACMS equipments to CDMU and PCDU
- to connect the HL/PK warm units to CDMU and PCDU
- to use the dedicated TTC harness if different HL / PK
- to change the CCS configuration
- to change the software ASW code on ACC and CDMU





AVM Design (5)

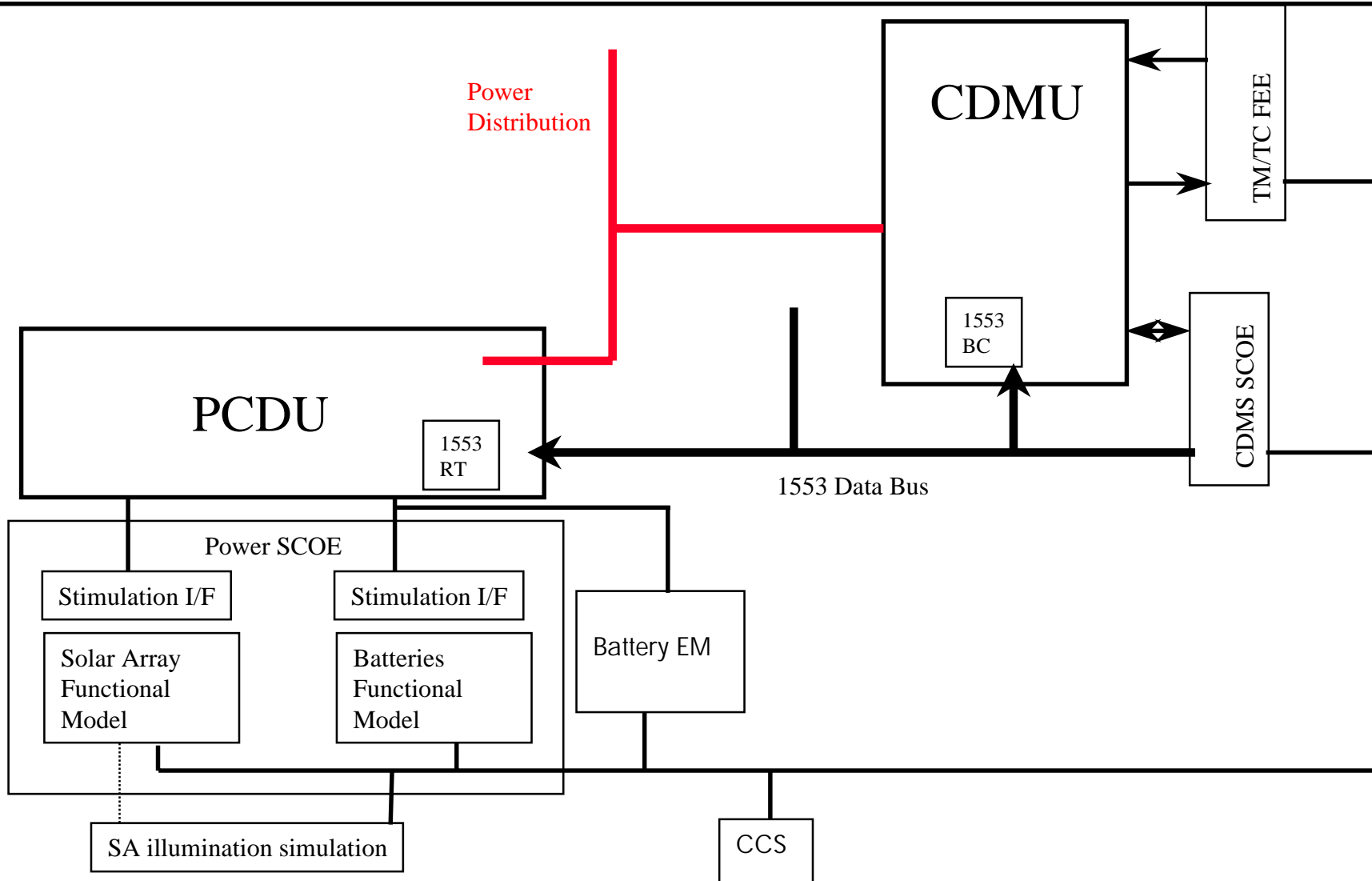


AVM Physical configuration



AVM Design (6)

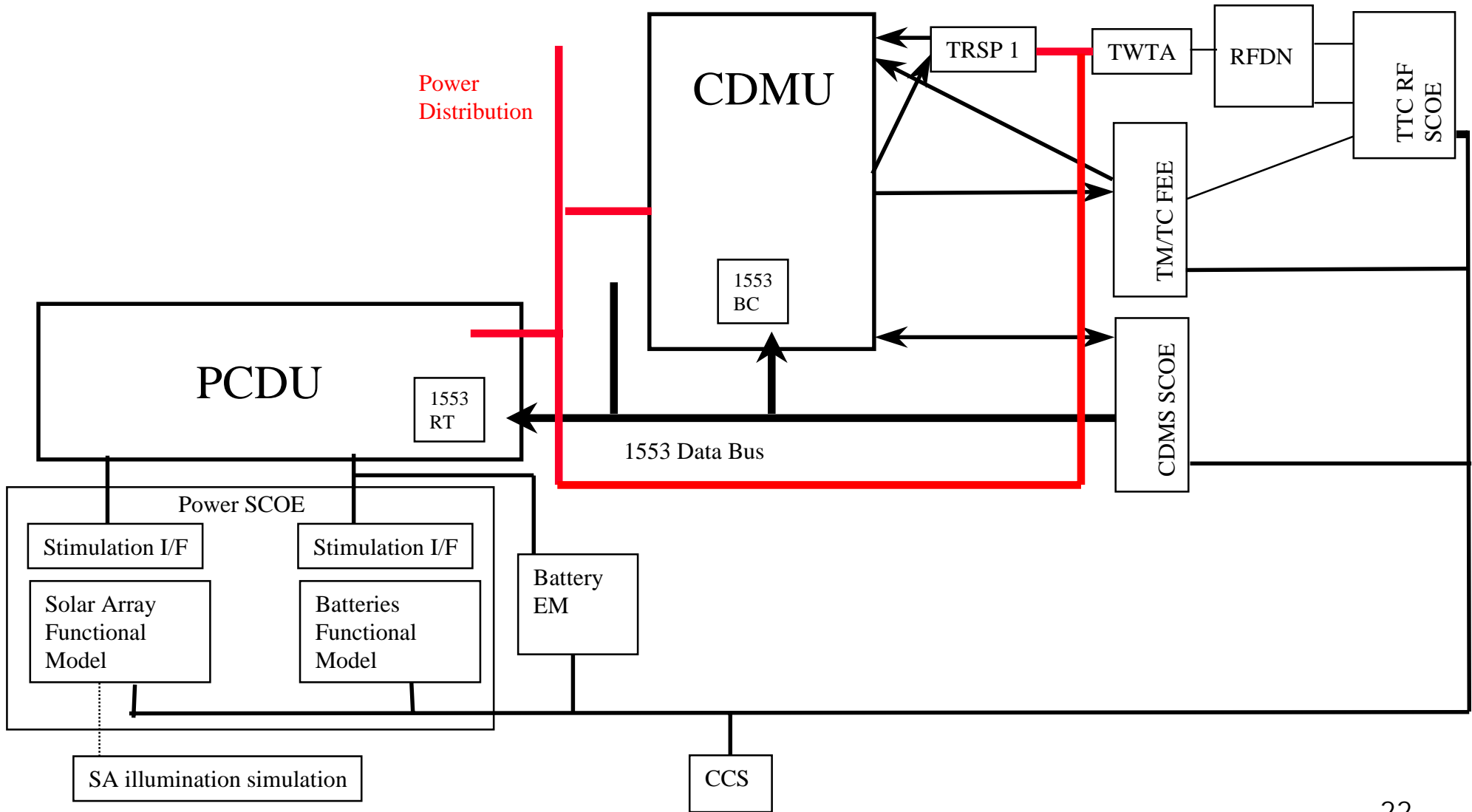
Common H/P set-up step 1



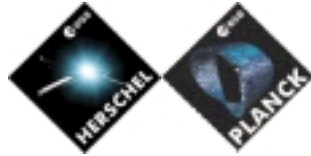


AVM Design (7)

Common H/P set-up step 2

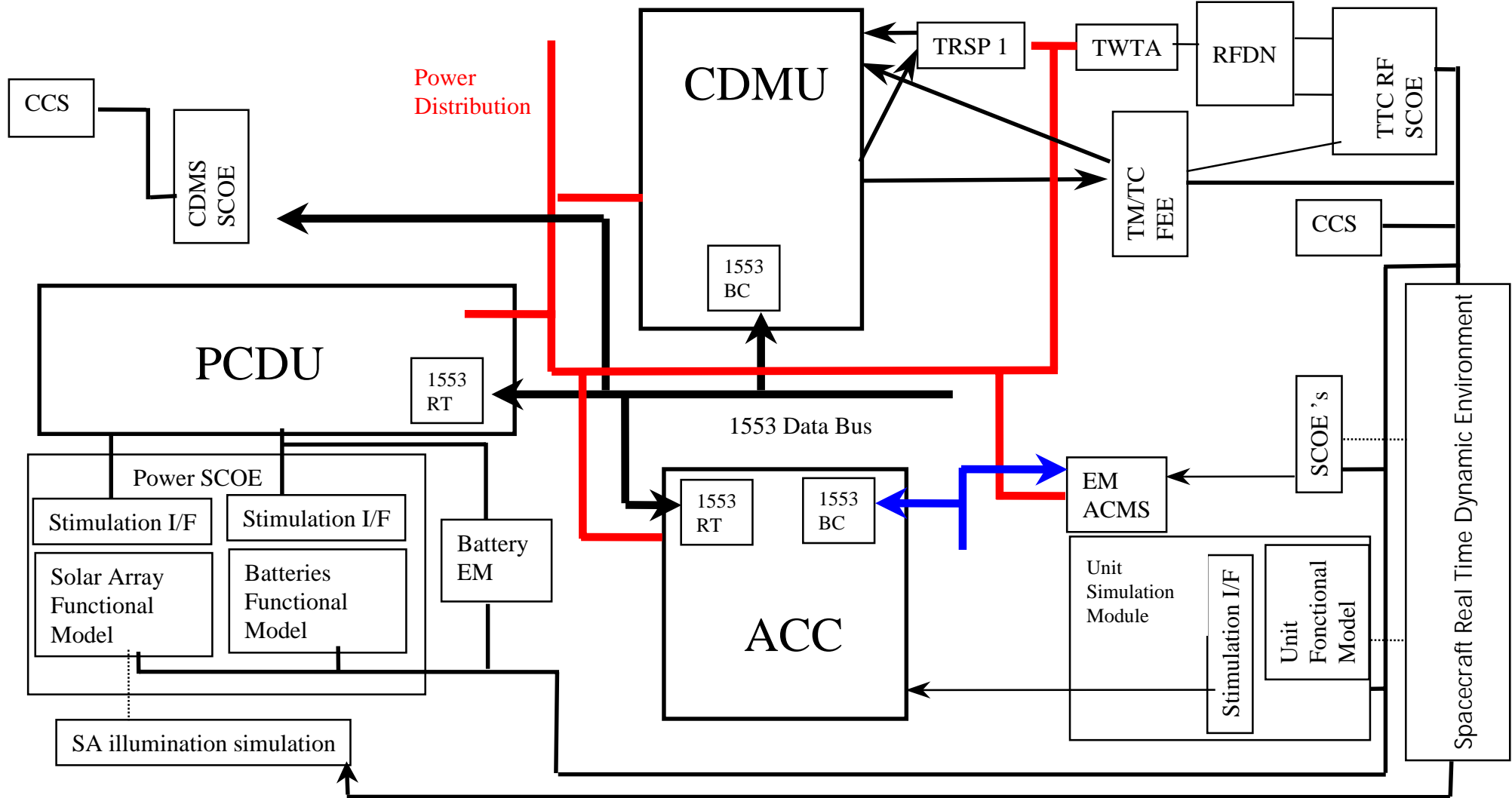


15/04/2002



AVM Design (8)

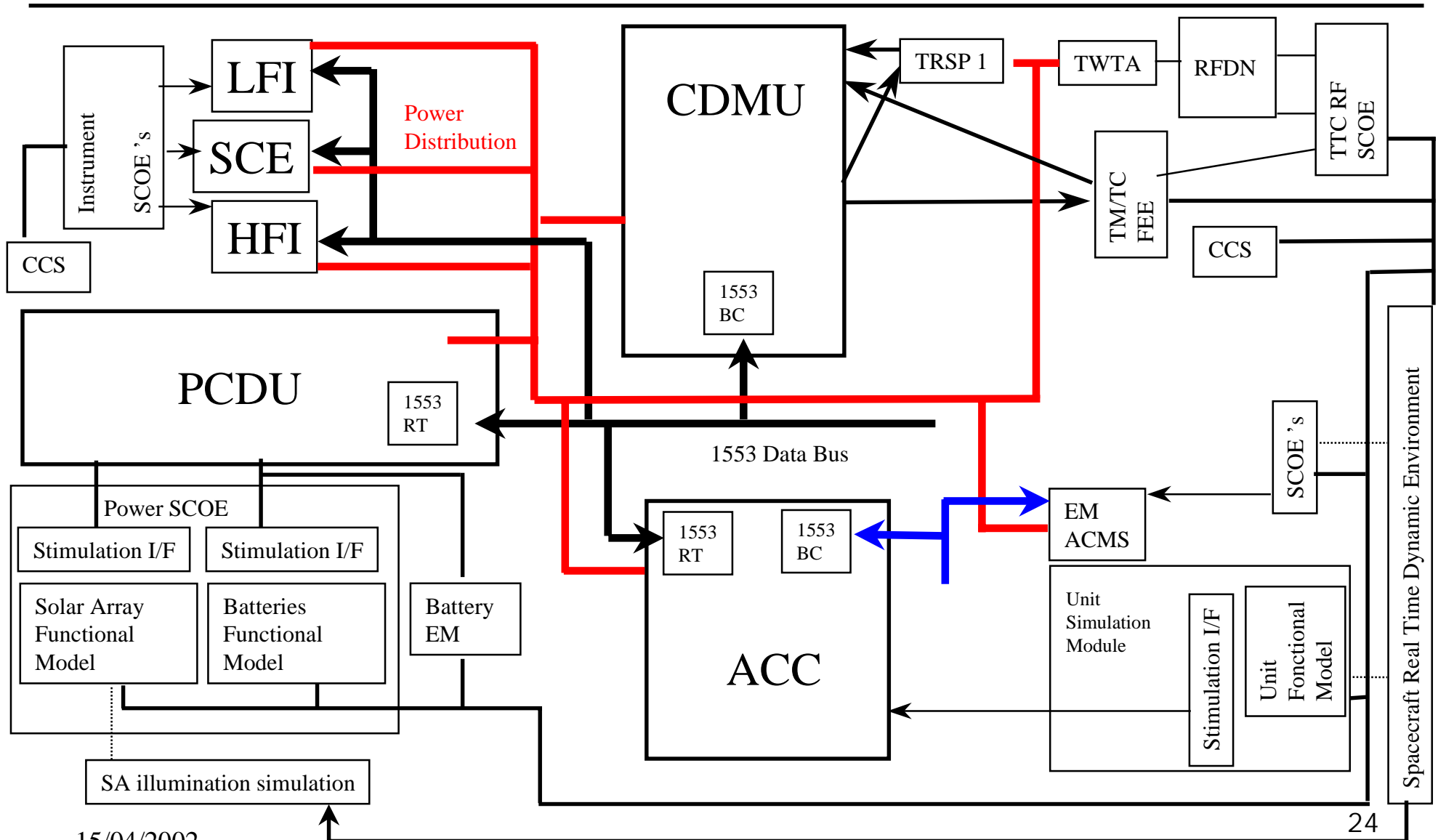
Planck set-up step 1





AVM Design (9)

Planck set-up step 2

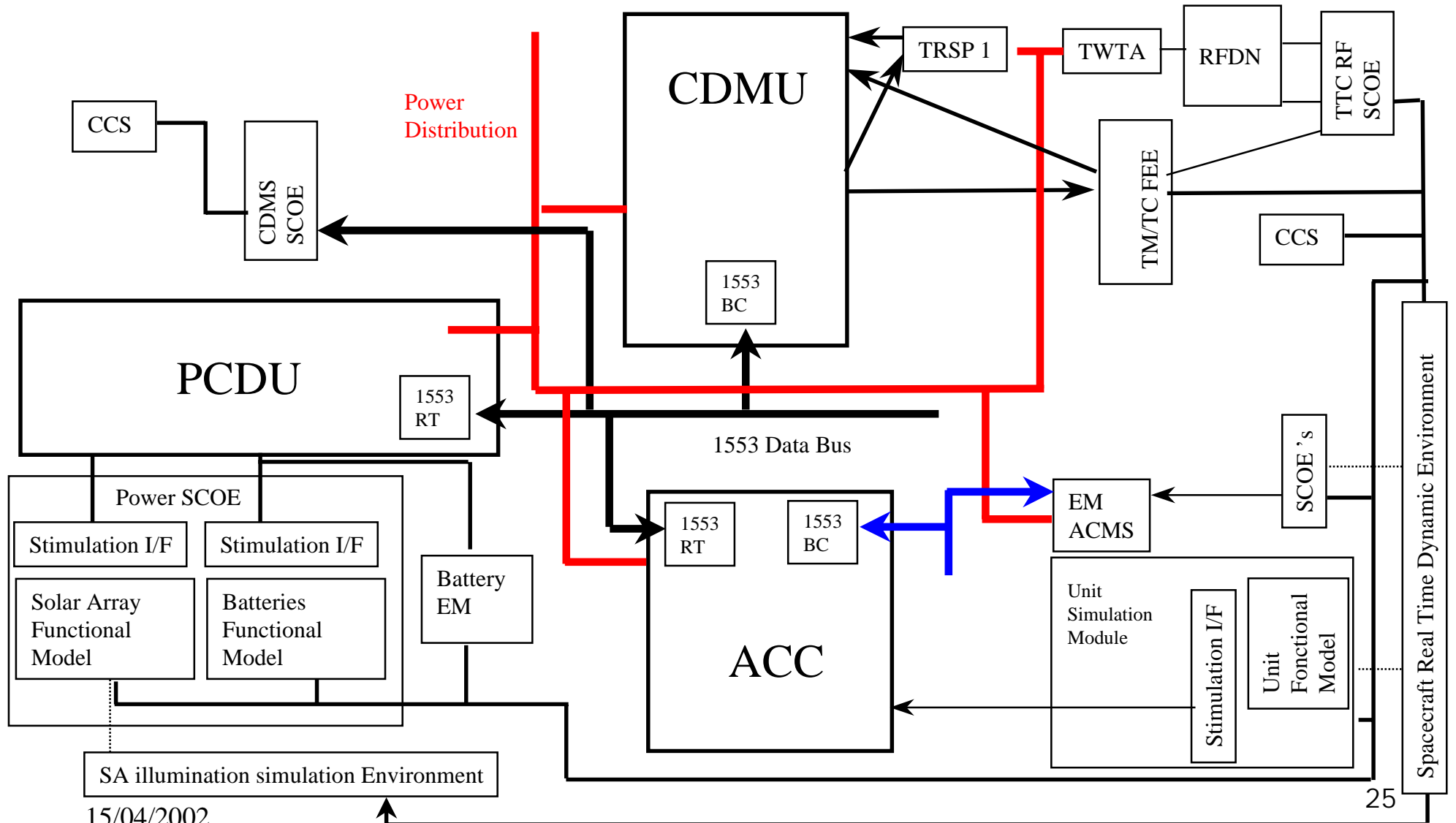


15/04/2002



AVM Design (10)

Herschel set-up step 1

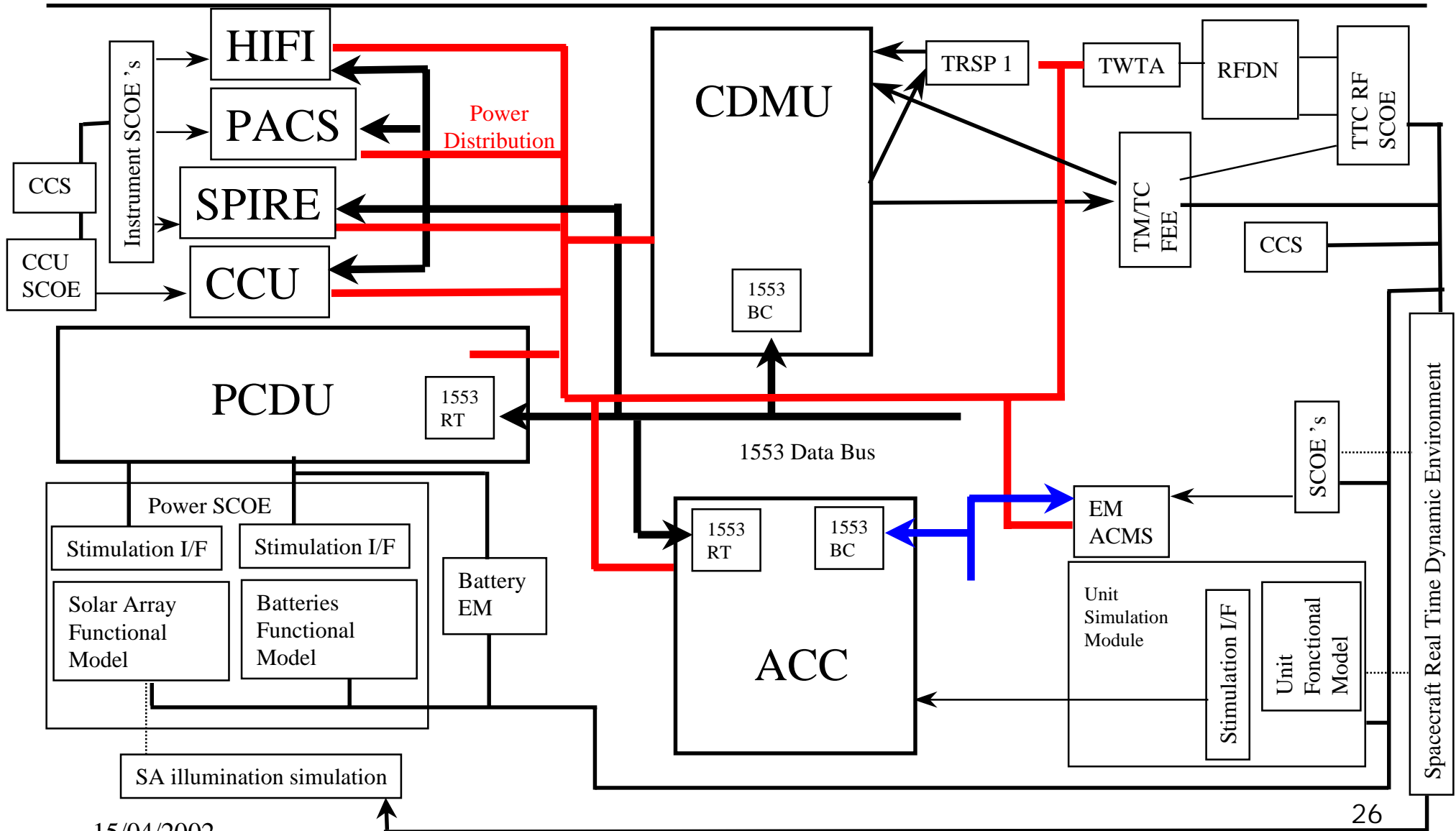


15/04/2002



AVM Design (11)

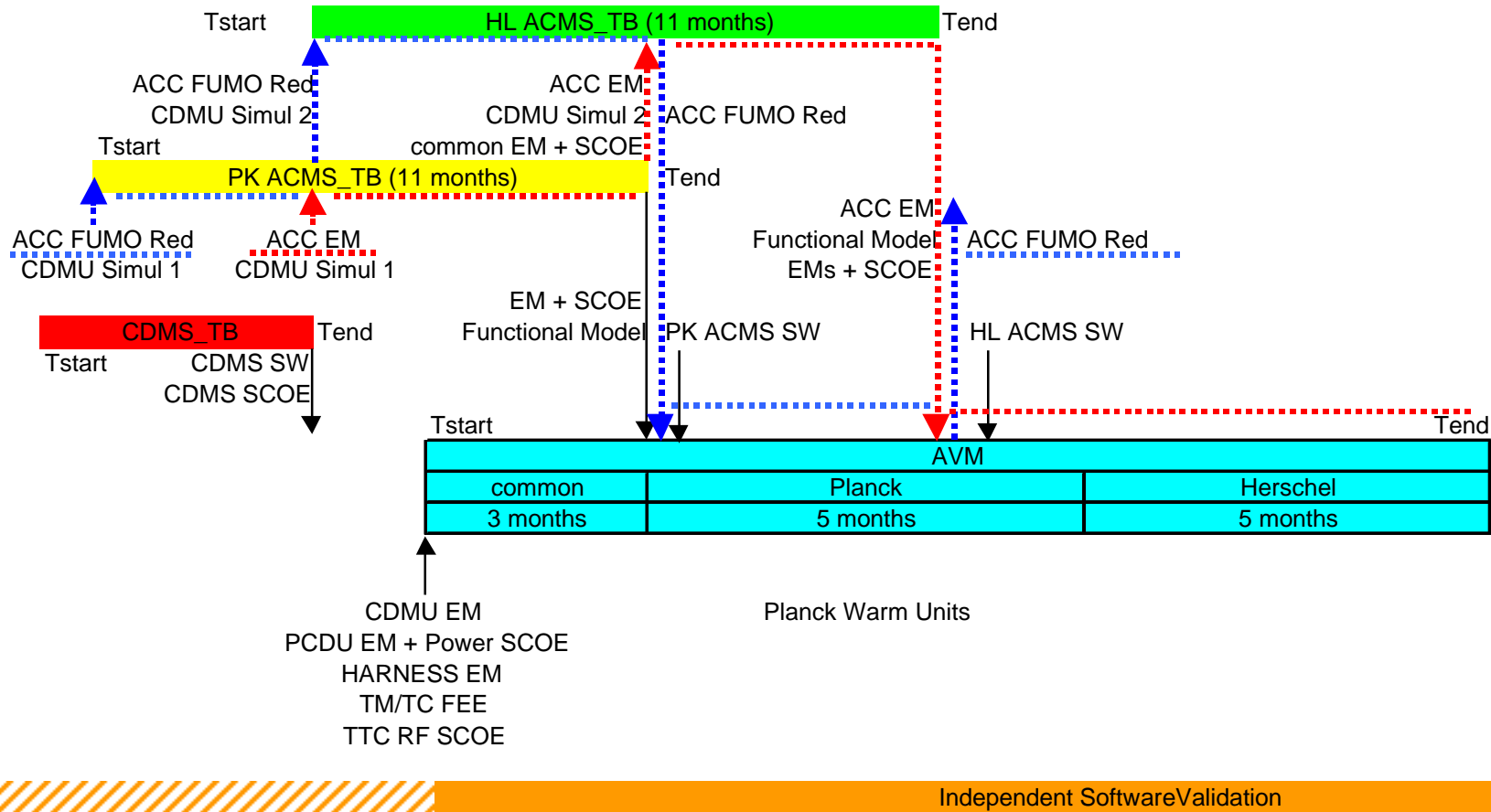
Herschel set-up step 2



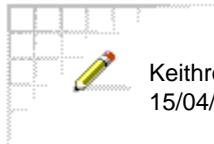
15/04/2002



AVM preliminary Schedule



ANNEX 7



Keithrobert Hibberd
15/04/2002 12:36

Pour : Patrice Couzin/ALCATEL-SPACE@ALCATEL-SPACE
cc :
Objet : FW: Burst mode protocol

----- Envoyé par Keithrobert Hibberd/ALCATEL-SPACE le 15/04/2002 12:36 -----



"King, KJ (Ken)" <K.J.King@rl.ac.uk> on 11/04/2002 10:04:27

Pour : Keithrobert Hibberd/ALCATEL-SPACE@ALCATEL-SPACE
cc :
Objet : FW: Burst mode protocol

Hi Bob,

At the Data Management meeting this week I mentioned that, in addition to the instrument's 'PS-ICD Usage' documents, I had two questions from the CDMS Simulator builders that I would also like to be considered by ESA and yourself. Can you please add them (see below) to the minutes of the meeting and circulate them for answer on the same timeframe as for the documents (unless you can answer them earlier, of course!)

Thanks

Ken

PS John is away until tomorrow so I cannot answer your question until then.

> -----Original Message-----

> From: Parker, DJ (Dave) - SSTD

> Sent: 02 April 2002 16:47

> To: King, KJ (Ken)

> Subject: Burst mode protocol

>

> Ken,

>

> I talked to Sergio this afternoon.

> We need to have two points clarified by Alcatel:

>

> 1) In the Subframe Sync Message, RT field: we assume that the RT value is

> set to '00000'B if no packet transfer has been requested (even though it

> may be allocated to a specific RT). See PS-ICS appendix 9 section 4.2.

>

> 2) We do not expect that the Burst Mode flag in a TM Request (PS-ICD

> section 4.6.1.1) will be used. We expect that the CDMU will schedule the

> use of burst mode by first changing the buslist used for instrument data

> transfer, then commanding the instruments to the appropriate mode.

>

> Can this be written into the relevant CDMU spec?

>

> Dave