Solar Orbiter
Spacecraft Instrument Interface Simulator
SO-SIIS

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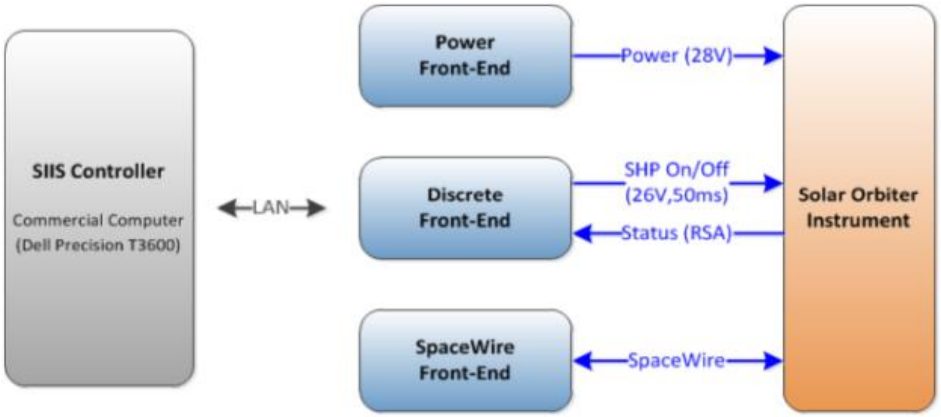
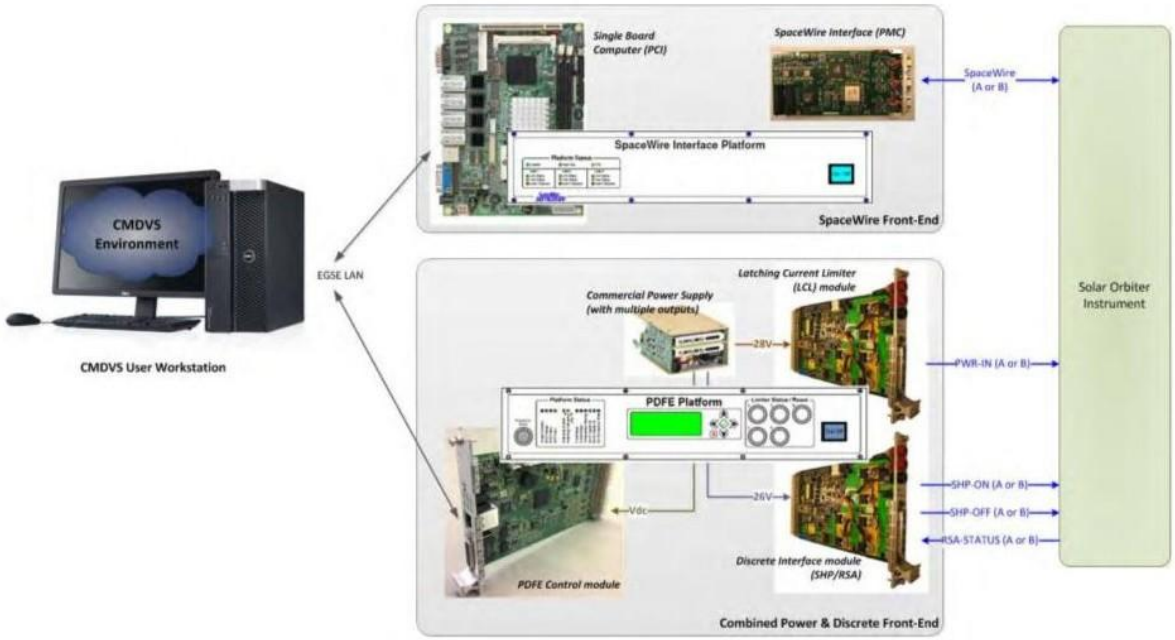
SO-SIIS environment

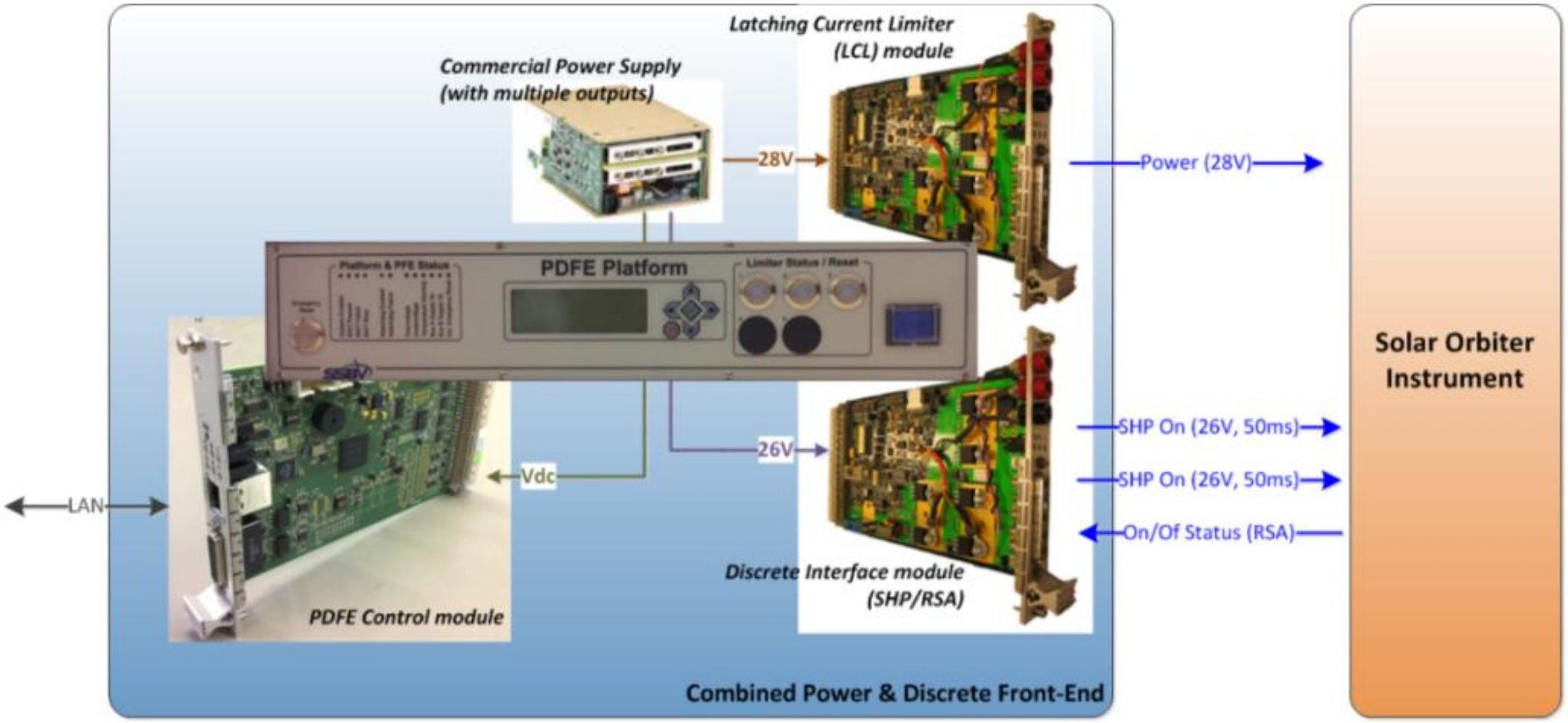
- Two hardware platforms:
  - SpaceWire
  - Power & Discrete
- CMDVS software

SO-SIIS hardware



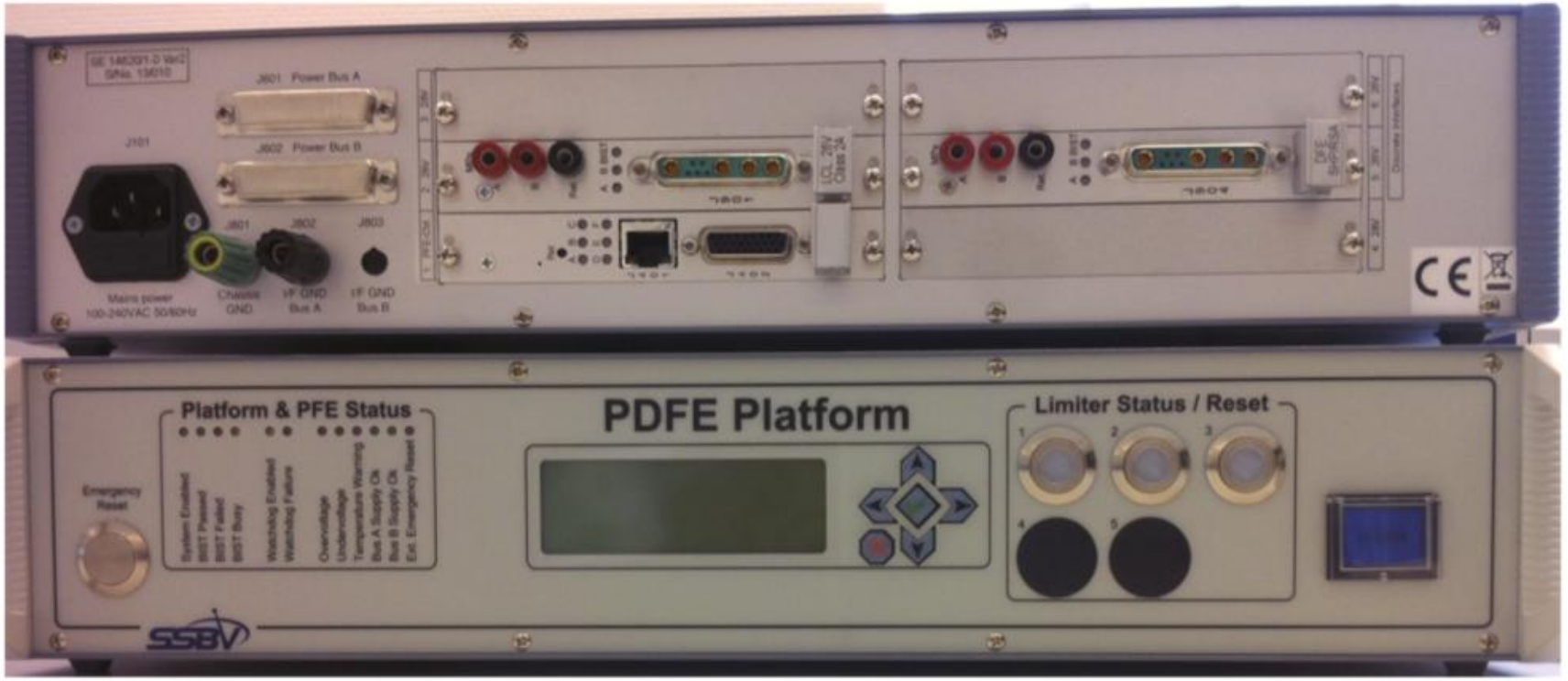


PDFE platform

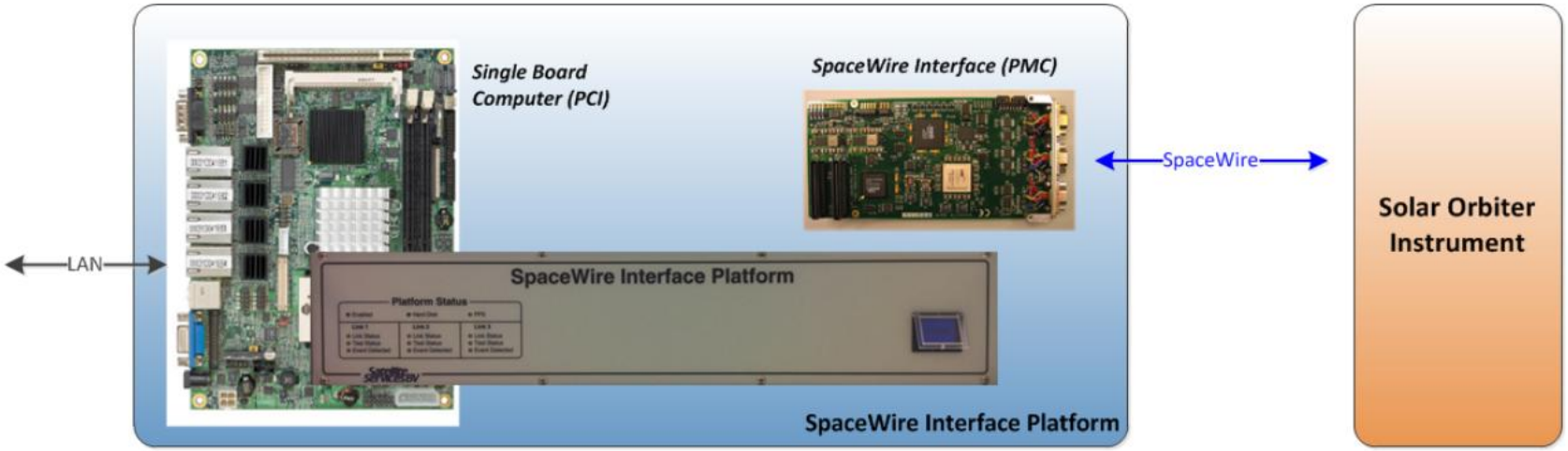


PDFE Front & Rear

- Rack 19”/2U

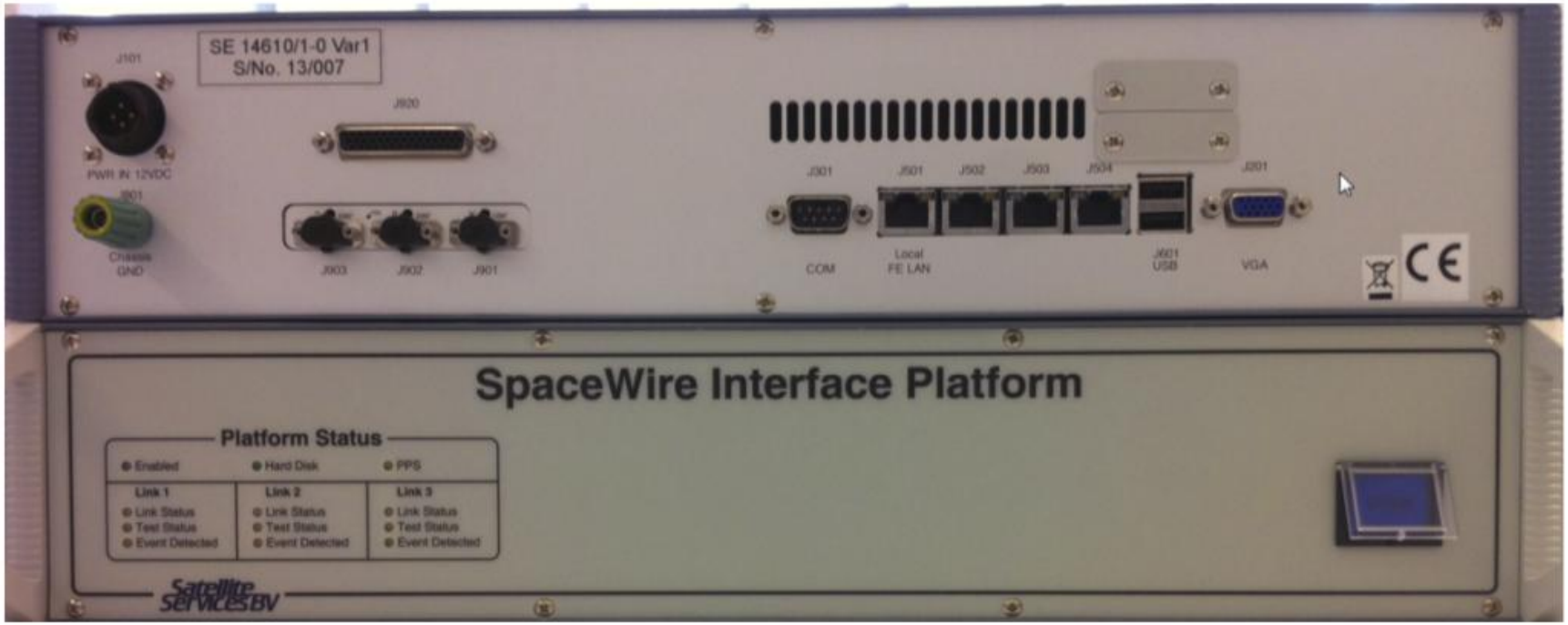


SpWFE platform

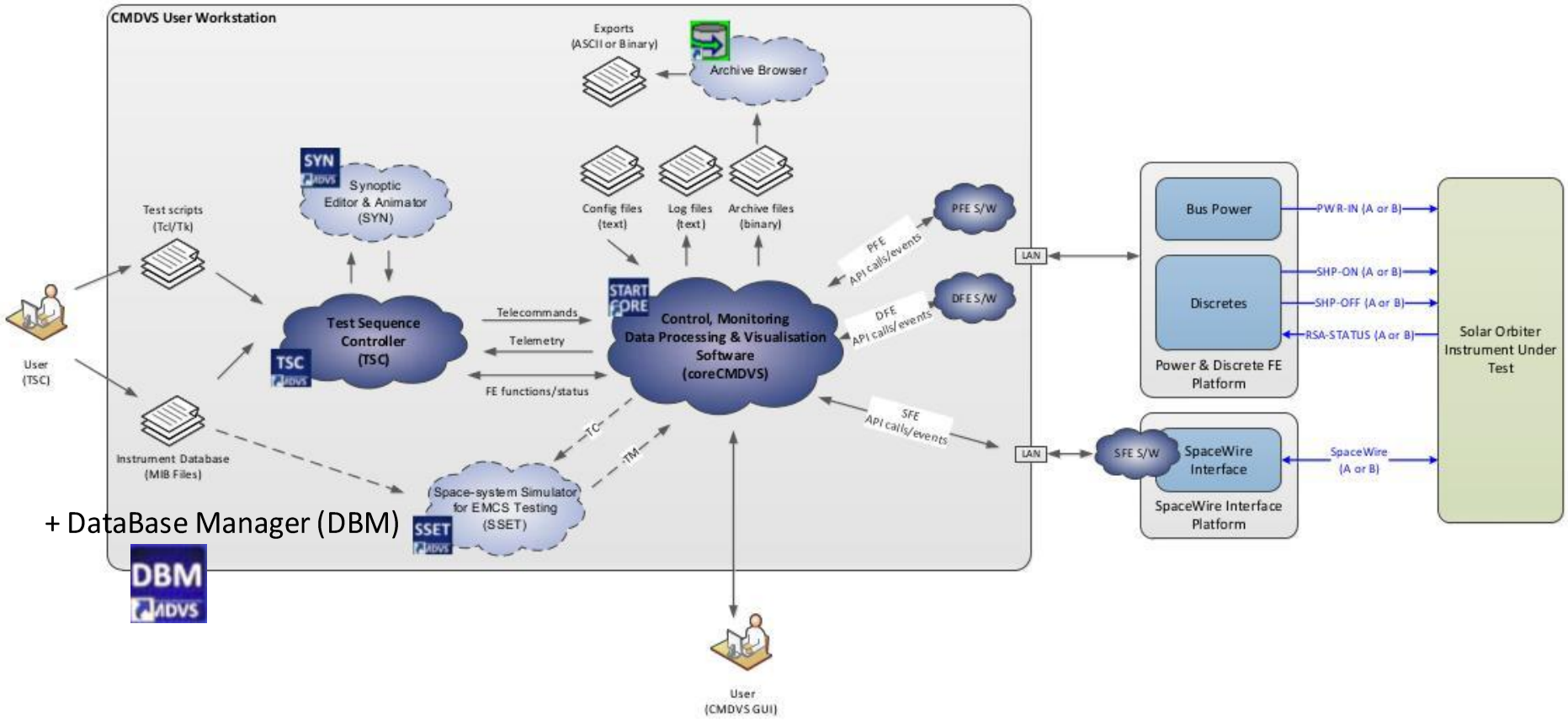


SpWFE Front & Rear

- standardowa obudowa Rack 19”/2U



SO-SIIS software



+ DataBase Manager (DBM)

DBM

The SIIS applications

1. **Instrument Short Functional Test (I-FFT) and Instrument Full Functional Test (I-SFT).**

I-SFT and I-FFT

- performed before delivery and then repeated in Astrium to support the acceptance of the payload as integral part of the Solar Orbiter spacecraft,

- preparation of test description has just started,

- the EGSE Team is responsible for delivery test procedures description (SOL.S.ASTR.TN.00235) and test scripts writing,

- automatic tests resuluts verification based on Service 5 – Event Report, monitoring tables will be not defined in IDB.

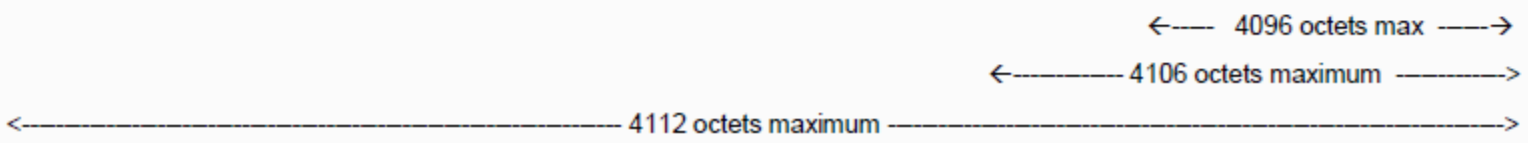
The SIIS applications

1. Instrument Short Functional Test (I-FFT) and Instrument Full Functional Test (I-SFT).

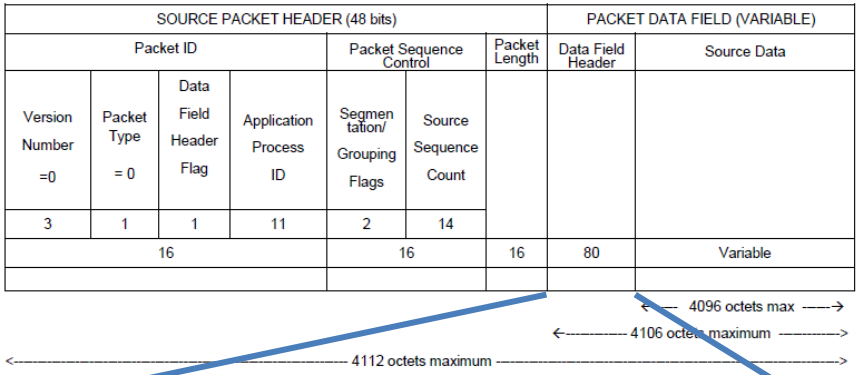
2. **TM data transfer to Scientific Software.**

TM packet arrangement (1)

SOURCE PACKET HEADER (48 bits)							PACKET DATA FIELD (VARIABLE)	
Packet ID				Packet Sequence Control		Packet Length	Data Field Header	Source Data
Version Number =0	Packet Type = 0	Data Field Header Flag	Application Process ID	Segmentation/ Grouping Flags	Source Sequence Count			
3	1	1	11	2	14			
16				16		16	80	Variable



TM packet arrangement (2)



Spare	PUS Version = 1	Spare = 0	Service Type	Service Subtype	Destination ID	S/C Time
1 bit	3 bits	4 bits	8 bits	8 bits	8 bits	48 bits
Fixed bit string	Enumerated	Fixed bit string	Enumerated	Enumerated	Enumerated	Enumerated CUC

SIIS TM packets → Scientific Software data transfer

- TM packets stored as binary file,
- detailed description in „Solar Orbiter TM-TC and Packet Structure ICD” and „STIX Flight Software TM/TC Interface Control Document”

Flexible Image Transport System (FITS) files

The SIIS applications

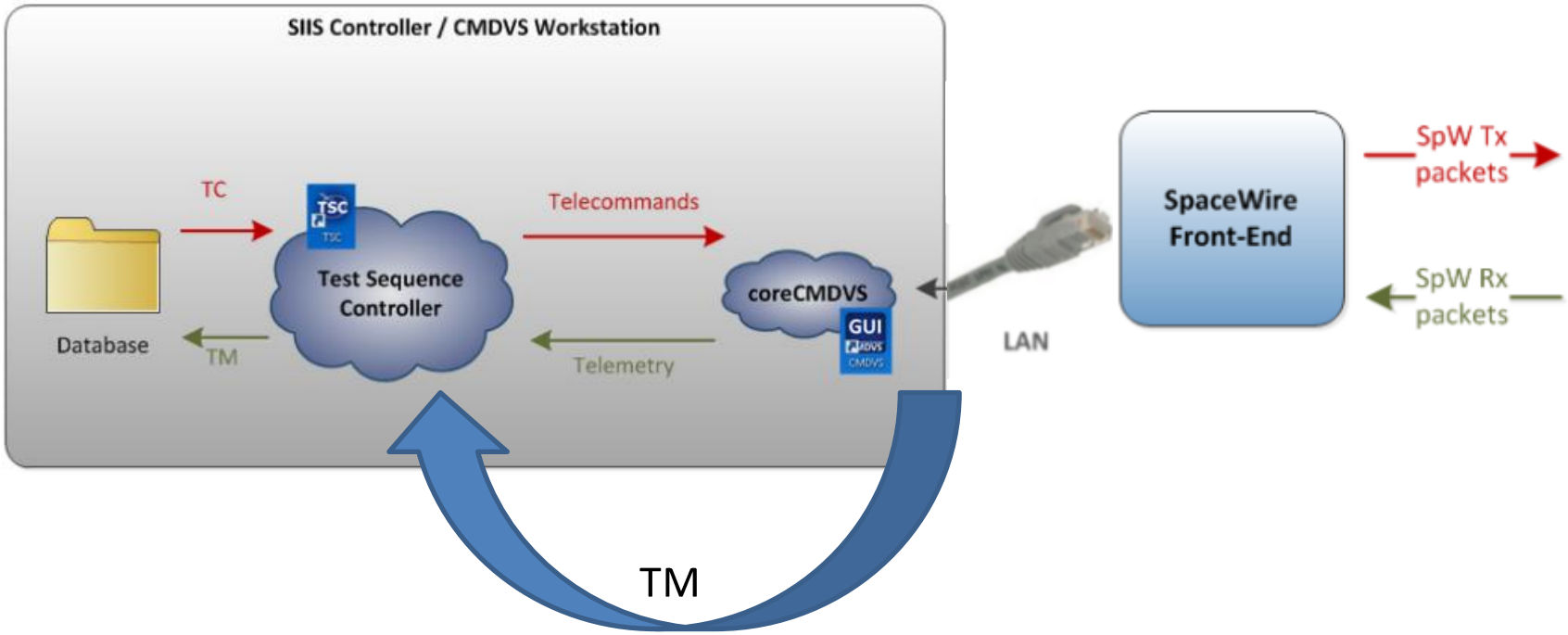
1. Instrument Short Functional Test (I-FFT) and Instrument Full Functional Test (I-SFT).

2. TM data transfer to Scientific Software.

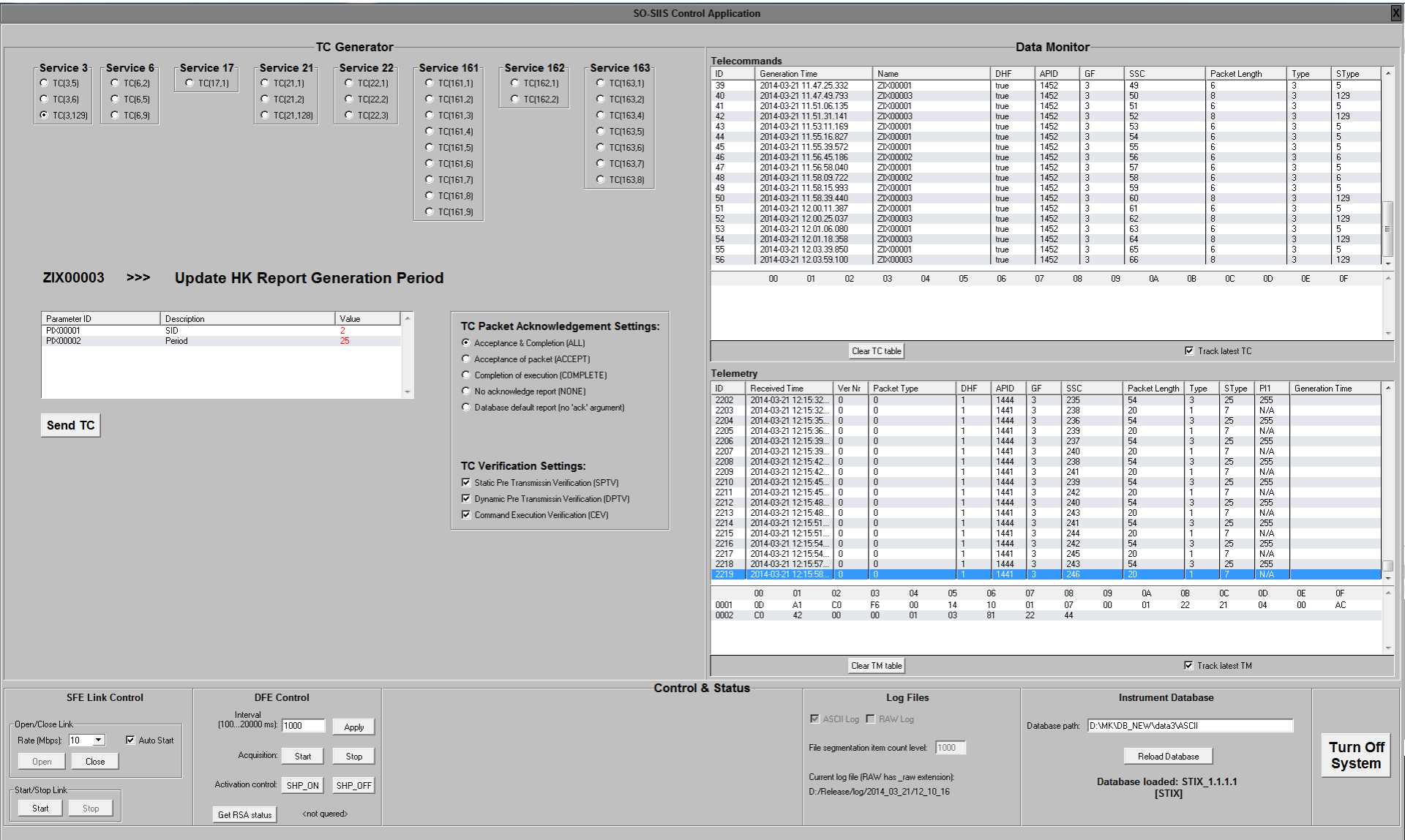
3. **Flight Software development support.**

Tcl/Tk + uTOPE script

- Tcl – Tool Command Language,
- Tk – Tcl basic library for building GUI ,
- uTOPE –„micro” version of TOPE (Test and Operations Procedures Executive), language.



GUI script


SO-SIIS Control Application
TC Generator
Service 3
TC(3,5)
TC(3,6)
TC(3,129)
Service 6
TC(6,2)
TC(6,5)
TC(6,9)
Service 17
TC(17,1)
Service 21
TC(21,1)
TC(21,2)
TC(21,128)
Service 22
TC(22,1)
TC(22,2)
TC(22,3)
Service 161
TC(161,1)
TC(161,2)
TC(161,3)
TC(161,4)
TC(161,5)
TC(161,6)
TC(161,7)
TC(161,8)
TC(161,9)
Service 162
TC(162,1)
TC(162,2)
Service 163
TC(163,1)
TC(163,2)
TC(163,3)
TC(163,4)
TC(163,5)
TC(163,6)
TC(163,7)
TC(163,8)
ZIX00003 >>> Update HK Report Generation Period
Parameter ID
Description
Value
PIX00001
SID
2
PIX00002
Period
25
Send TC
TC Packet Acknowledgement Settings:
Acceptance & Completion (ALL)
Acceptance of packet (ACCEPT)
Completion of execution (COMPLETE)
No acknowledge report (NONE)
Database default report (no 'ack' argument)
TC Verification Settings:
Static Pre Transmissin Verification (SPTV)
Dynamic Pre Transmissin Verification (DPTV)
Command Execution Verification (CEV)
Data Monitor
Telecommands
ID
Generation Time
Name
DHF
APID
GF
SSC
Packet Length
Type
SType
39 2014-03-21 11.47.25.332 ZIX00001 true 1452 3 49 6 3 5
40 2014-03-21 11.47.49.793 ZIX00003 true 1452 3 50 8 3 129
41 2014-03-21 11.51.06.135 ZIX00001 true 1452 3 51 6 3 5
42 2014-03-21 11.51.31.141 ZIX00003 true 1452 3 52 8 3 129
43 2014-03-21 11.53.11.169 ZIX00001 true 1452 3 53 6 3 5
44 2014-03-21 11.55.16.827 ZIX00001 true 1452 3 54 6 3 5
45 2014-03-21 11.55.39.572 ZIX00001 true 1452 3 55 6 3 5
46 2014-03-21 11.56.45.186 ZIX00002 true 1452 3 56 6 3 6
47 2014-03-21 11.56.58.040 ZIX00001 true 1452 3 57 6 3 5
48 2014-03-21 11.58.09.722 ZIX00002 true 1452 3 58 6 3 6
49 2014-03-21 11.58.15.993 ZIX00001 true 1452 3 59 6 3 5
50 2014-03-21 11.58.39.440 ZIX00003 true 1452 3 60 8 3 129
51 2014-03-21 12.00.11.387 ZIX00001 true 1452 3 61 6 3 5
52 2014-03-21 12.00.25.037 ZIX00003 true 1452 3 62 8 3 129
53 2014-03-21 12.01.06.080 ZIX00001 true 1452 3 63 6 3 5
54 2014-03-21 12.01.18.358 ZIX00003 true 1452 3 64 8 3 129
55 2014-03-21 12.03.39.850 ZIX00001 true 1452 3 65 6 3 5
56 2014-03-21 12.03.59.100 ZIX00003 true 1452 3 66 8 3 129
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
Clear TC table
Track latest TC
Telemetry
ID
Received Time
Ver Nr
Packet Type
DHF
APID
GF
SSC
Packet Length
Type
SType
PI1
Generation Time
2202 2014-03-21 12:15:32... 0 0 1 1444 3 235 54 3 25 255
2203 2014-03-21 12:15:32... 0 0 1 1441 3 238 20 1 7 N/A
2204 2014-03-21 12:15:35... 0 0 1 1444 3 236 54 3 25 255
2205 2014-03-21 12:15:36... 0 0 1 1441 3 239 20 1 7 N/A
2206 2014-03-21 12:15:39... 0 0 1 1444 3 237 54 3 25 255
2207 2014-03-21 12:15:39... 0 0 1 1441 3 240 20 1 7 N/A
2208 2014-03-21 12:15:42... 0 0 1 1444 3 238 54 3 25 255
2209 2014-03-21 12:15:42... 0 0 1 1441 3 241 20 1 7 N/A
2210 2014-03-21 12:15:45... 0 0 1 1444 3 239 54 3 25 255
2211 2014-03-21 12:15:45... 0 0 1 1441 3 242 20 1 7 N/A
2212 2014-03-21 12:15:48... 0 0 1 1444 3 240 54 3 25 255
2213 2014-03-21 12:15:48... 0 0 1 1441 3 243 20 1 7 N/A
2214 2014-03-21 12:15:51... 0 0 1 1444 3 241 54 3 25 255
2215 2014-03-21 12:15:51... 0 0 1 1441 3 244 20 1 7 N/A
2216 2014-03-21 12:15:54... 0 0 1 1444 3 242 54 3 25 255
2217 2014-03-21 12:15:54... 0 0 1 1441 3 245 20 1 7 N/A
2218 2014-03-21 12:15:57... 0 0 1 1444 3 243 54 3 25 255
2219 2014-03-21 12:15:58... 0 0 1 1441 3 246 20 1 7 N/A
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
0001 0D A1 C0 F6 00 14 10 01 07 00 01 22 21 04 00 AC
0002 C0 42 00 00 01 03 81 22 44
Clear TM table
Track latest TM
Control & Status
SFE Link Control
Open/Close Link
Rate (Mbps): 10
Auto Start
Open
Close
Start/Stop Link
Start
Stop
DFE Control
Interval (100...20000 ms): 1000
Apply
Acquisition: Start Stop
Activation control: SHP_ON SHP_OFF
Get RSA status
<not quered>
Log Files
ASCII Log
RAW Log
File segmentation item count level: 1000
Current log file (RAW has _raw extension):
D:/Release/log/2014_03_21/12_10_16
Instrument Database
Database path: D:\MK\DB_NEW\data3\ASCII
Reload Database
Database loaded: STIX_1.1.1.1
[STIX]
Turn Off System

The SIIS applications

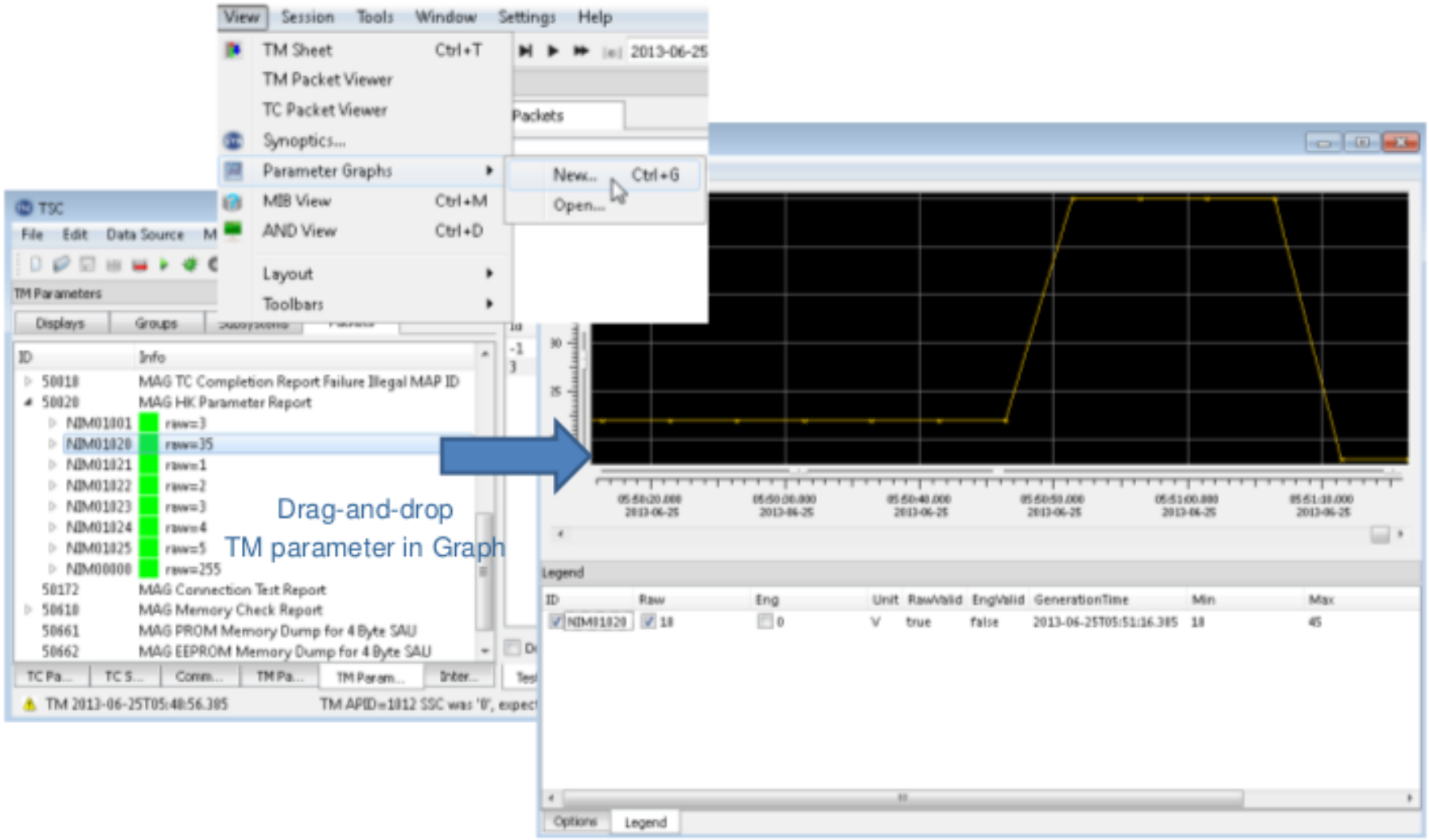
1. Instrument Short Functional Test (I-FFT) and Instrument Full Functional Test (I-SFT).

2. TM data transfer to Scientific Software.

3. Flight Software development support.

4. **Other Verification, Functional, Performance, Environmental tests.**

On-line parameters monitoring and visualization



The SIIS applications

1. Instrument Short Functional Test (I-FFT) and Instrument Full Functional Test (I-SFT).

2. TM data transfer to Scientific Software.

3. Flight Software development support.

4. Other Verification, Functional, Performance, Environmental tests.

+ Instrument Database (IDB) verification

Current IDB

- latest IDB version: 1.13
- 

Defined services:
- Service 1 – telecommand verification,
- Service 3 – housekeeping data,
- Service 5 – event reporting,
- Service 6 – memory management,
- Service 8 – application functions management,
- Service 9 – time management,
- Service 17 – connection test,
- Service 21 – science data transfer
- Service 22 – context saving,
- Service U1 (236) – STIX configuration,
- Service U2 (237) – parameters management,
- Service U3 (238) – STIX archive memory management,

incorrectly implemented

Thank you