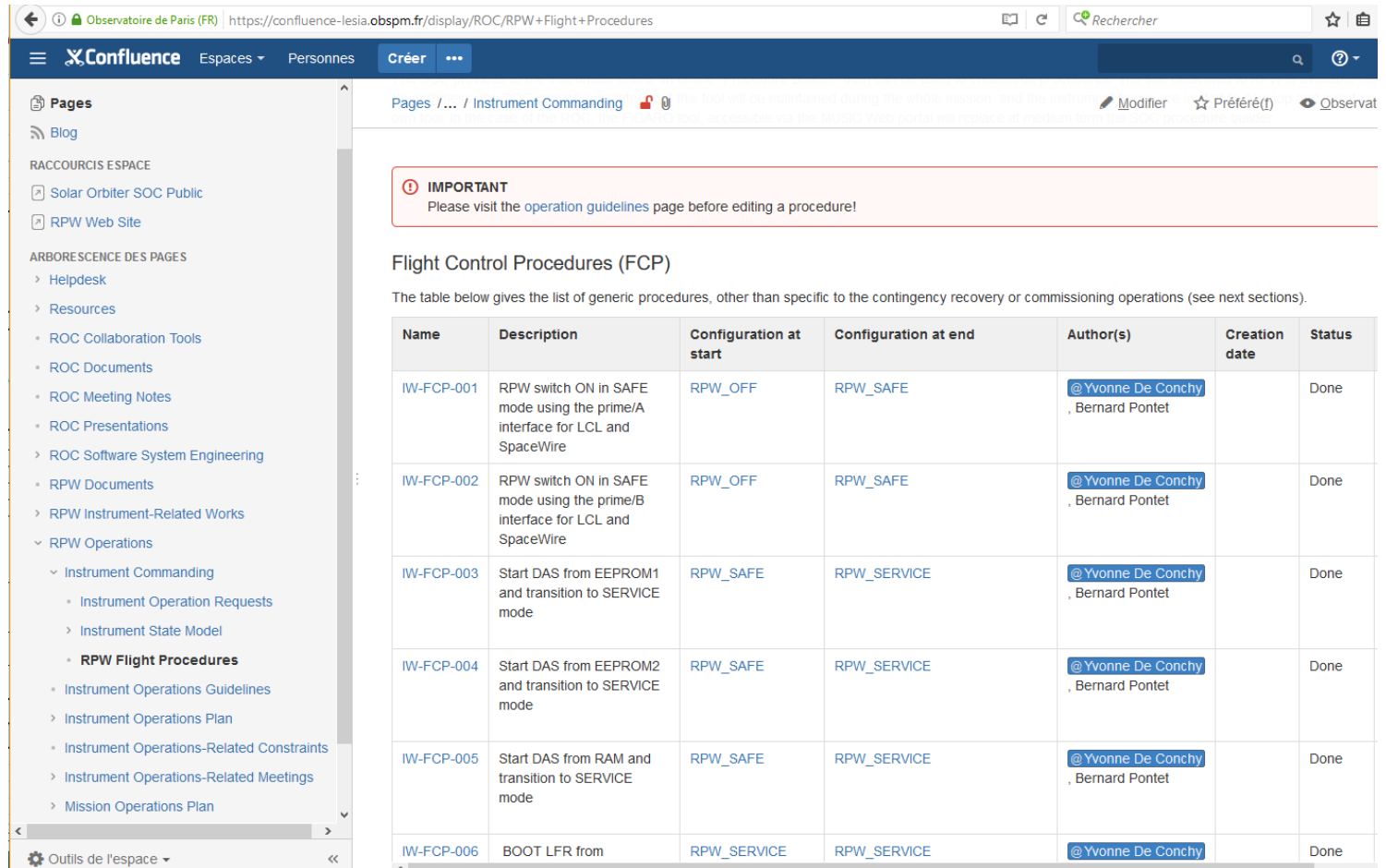# Science operations and flight procedures preparation

A. Vecchio – Y. de Conchy

1. Development of RPW TC procedures for the ESAC:

- RPW switch on
- RPW configuration
- Switch from normal to burst modes
- In-flight calibration
- Bias sweep
- RPW switch off

2. Procedure tested at CNES (Toulouse) in collaboration with the local staff.

A.Vecchio + Y.de Conchy (CM#19 Stockholm)

All the procedures are available in the ROC wiki site at the link
https://confluence-lesia.obspm.fr/display/ROC/RPW+Flight+Procedures

SAFE MODE

Power on or reset → SAFE mode

- DPU (Data Processing Unit) switch on.
- PDU (Power Distribution Unit) switch on.
- The Bias Unit, the three receivers (TNR-HFR, TDS, LFR), the ANT PA and the SCM PA are OFF.
- NO science telemetry.
- HK (status, currents of the RPW equipment's, temperatures).
- All the operations concerning the DPU application software maintenance (code upload, etc.) can be performed in this mode.
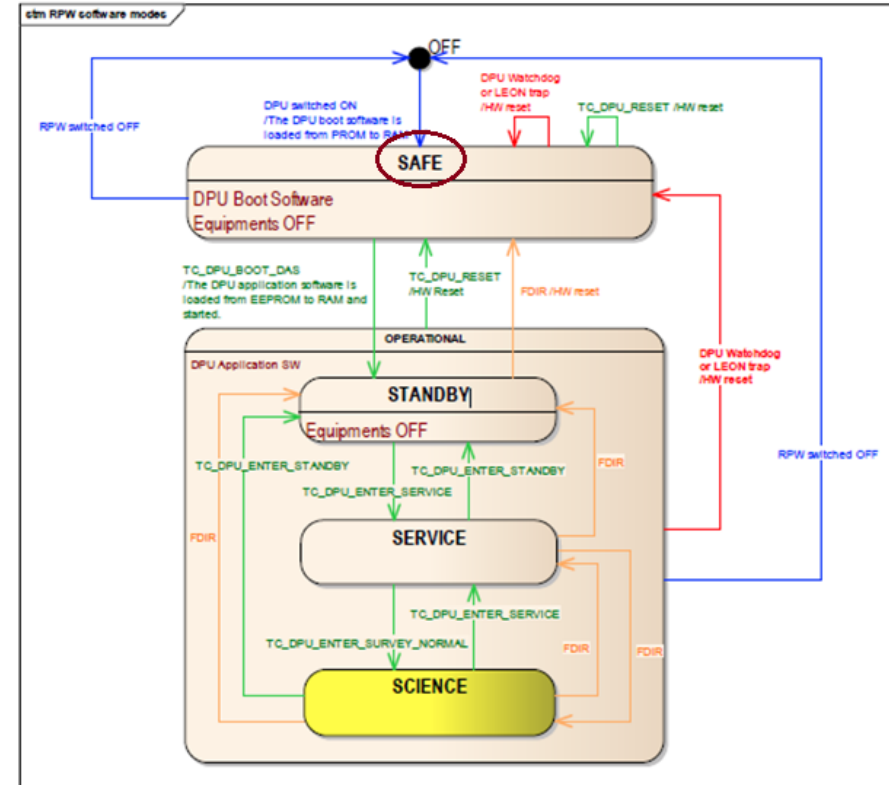
OPERATIONAL mode

Three sub-modes:
- **STANDBY**
- **SERVICE**
- **SCIENCE**

STANDBY MODE

"safe" mode of the DPU Application Software.
Only DPU and the PDU are ON.
After being initialized, the DAS (DPU application software) enters in STANDBY mode.
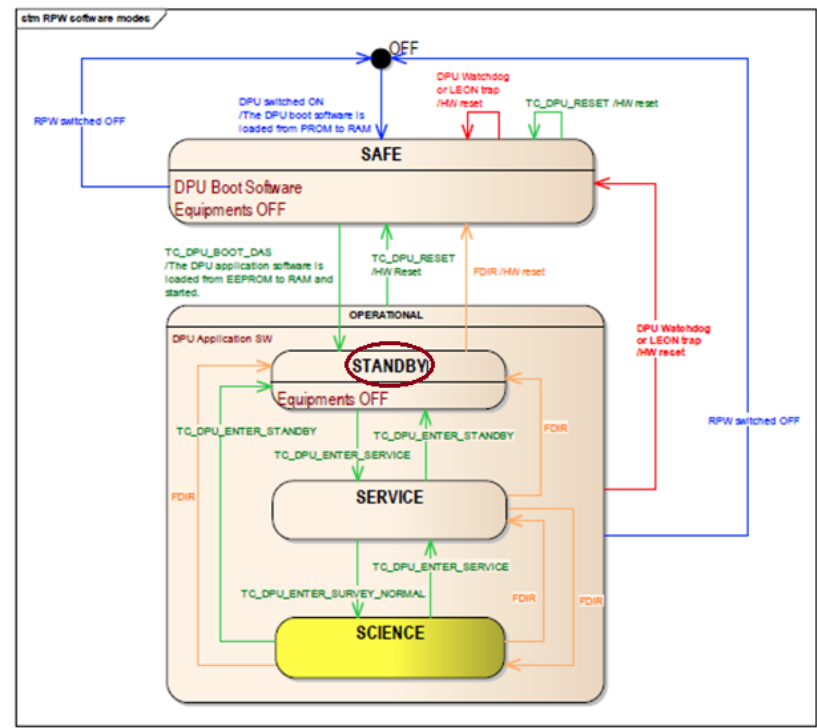
SERVICE MODE

In the SERVICE mode, the DAS can perform the following operations:

- Switch ON/OFF the RPW equipment (Bias Unit, the three analyzers, ANT1_PA, ANT2_PA, ANT3_PA, SCM_PA,BIA_PA) by commanding PDU.
- Boot the RPW equipment flight software from the DPU memory.
- Performing the RPW equipment flight software maintenance.
- Performing the RPW DPU flight software maintenance.
- Starting/stopping the RPW analyser transparent communication sub-mode.
- Starting/Stopping DPU test sub-modes.
- Configuring the RPW equipment (parameter setting, etc.).

NO SCIENTIFIC MEASUREMENTS can be performed in the SERVICE mode (except in the transparent communication sub-mode for test purposes).

SAFE MODE to SERVICE MODE

The transition to the OPERATIONAL mode is done by a RPW TC (TC_DPU_BOOT_DAS).

IW-FCP-003
(Start DAS and transition to SERVICE mode)

- **TC_DPU_OBC_UPDATE_HK_PERIOD**
- **TC_DPU_UPDATE_HK_PERIOD**
- **TC_DPU_BOOT_DAS**
- **TC_DPU_ENTER_SERVICE**
- **TC_DPU_DAS_DUMP_PAR**
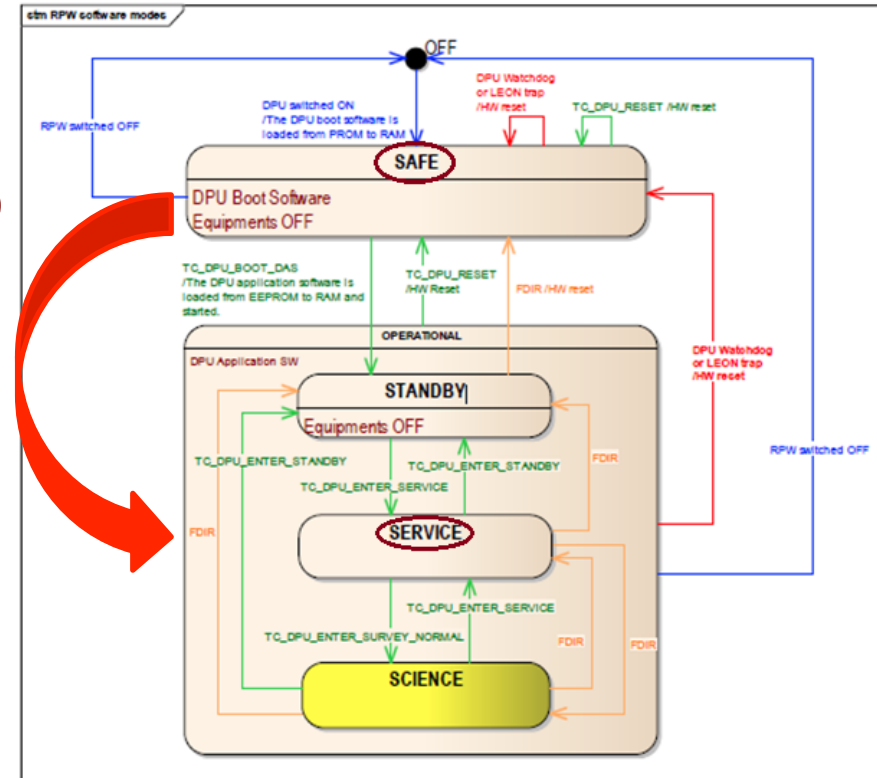
SCIENCE mode

main mode of the RPW instrument in which the measurements are active

SURVEY mode:

- **SURVEY_NORMAL** sub-mode (low cadence),
- **SURVEY_BURST** sub-mode (high cadence)
- **SURVEY_BACKUP** sub-mode (degraded mode in which TDS replaces LFR).

DETECTION mode:
detection algorithms activated to perform measurements of interplanetary shocks (SBM1 events) and in-situ type III (SBM2 events).

- **SBM_DETECTION**
- **SBM1_DUMP**
- **SBM2_ACQUISITION**

SERVICE MODE to SCIENCE MODE

IW-FCP-018

(Enter in science survey normal mode)

- **TC_DPU_ENTER_SURVEY_NORMAL**

.
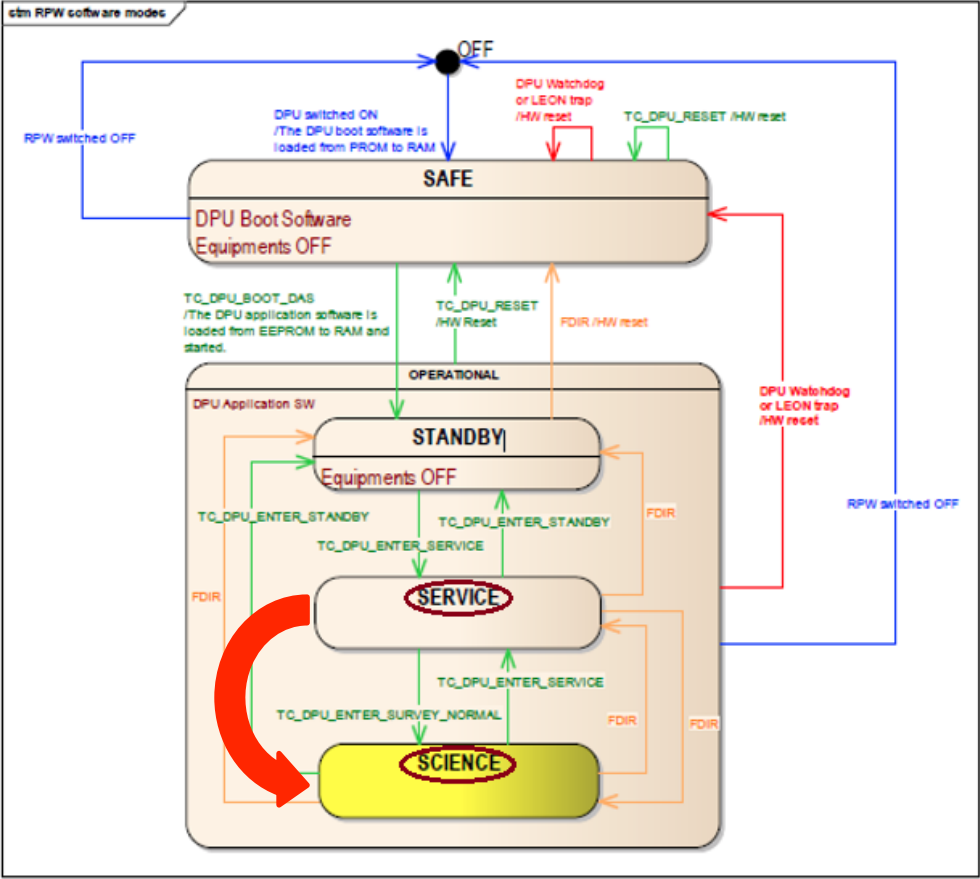
Configurations are performed in SERVICE MODE

IW-FCP-032

(Configure DPU and DAS + Configure HK Period)

- **TC_DPU_DAS_LOAD_COMMON_PAR**
- **TC_DPU_LOAD_POWER_PAR**
- **TC_DPU_LOAD_BHV_PAR**
- **TC_DPU_LOAD_BHV_PAR**
- **TC_DPU_LOAD_WAVEFORM_PAR**
- **TC_DPU_LOAD_SBM1_PAR**
- **TC_DPU_LOAD_SBM2_PAR**
- **TC_DPU_LOAD_VSC_PAR**
- **TC_DPU_UPDATE_HK_PERIOD**
- **TC_LFR_UPDATE_HK_PERIOD**
- **TC_TDS_UPDATE_HK_PERIOD**
- **TC_THR_UPDATE_HK_PERIOD**

In SERVICE MODE

IW-FCP-026 (ON converter)

- **TC_DPU_SWITCH_ON_EQUIPMENT**

IW-FCP-006 (BOOT LFR from EEPROM1)

- **TC_DPU_BOOT_LFR**

IW-FCP-007 (BOOT THR from EEPROM1)
- **TC_DPU_BOOT_THR**

IW-FCP-008 (BOOT TDS from EEPROM1)
- **TC_DPU_BOOT_TDS**

IW-FCP-015 (Switch ON BIAS)

- **TC_DPU_SWITCH_ON_EQUIPMENT**
- **TC_DPU_SET_BIAS_RELAY**
- **TC_DPU_SET_BIAS_MODE**
- **TC_DPU_SET_BIAS1**
- **TC_DPU_SET_BIAS2**
- **TC_DPU_SET_BIAS3**

In SERVICE MODE

IW-FCP-023 (PA Switch ON)

- **TC_DPU_SWITCH_ON_EQUIPMENT (ANT1)**
- **TC_DPU_SWITCH_ON_EQUIPMENT (ANT2)**
- **TC_DPU_SWITCH_ON_EQUIPMENT (ANT3)**

IW-FCP-033 (SCM Switch ON)

- **TC_DPU_SWITCH_ON_EQUIPMENT (SCM)**

IW-FCP-016-TS (Configure TDS, LFR and THR for the SCIENCE configurations)

TC_TDS_LOAD_COMMON_PAR

TC_TDS_LOAD_NORMAL_PAR

TC_TDS_LOAD_BURST_PAR

TC_TDS_LOAD_SBM1_PAR

TC_TDS_LOAD_SBM2_PAR

TC_TDS_LOAD_LFM_PAR

TC_LFR_LOAD_COMMON_PAR

TC_LFR_LOAD_NORMAL_PAR

TC_LFR_LOAD_BURST_PAR

TC_LFR_LOAD_SBM1_PAR

TC_LFR_LOAD_SBM2_PAR

TC_THR_LOAD_NORMAL_PAR_1

TC_THR_LOAD_CALIBRATION_PAR

TC_THR_LOAD_BURST_PAR_1

RPW SCIENCE_NORMAL default configuration:

1/ Default configuration for each sub-instrument
   (TDS, LFR, TNR-HFR)
   (Ex for LFR: time between 2 snapshots , measurement time for LFR basic
    parameters, …)

2/ Standard sequence for one day and for one week
   (Each day, 23h + 50 min normal mode - 10 minutes Burst mode; in-flight
    calibration and BIAS sweeping each week)

Default configuration for LFR

LFR Normal Mode		nb sensor or signals	frequency channels	measurement time (sec)	snapshots /day
LFR Waveforms	LF E(1V+2E) 16HZ	3	1	0,0625	
	LF E(1V+2E) + 3B 256Hz	6	1	300	288
	LF E(1V+2E) + 3B 4kHz	6	1	300	288
	LF E(1V+2E) + 3B 25kHz	6	1	300	288
LFR basic param					
	set 1 : B^2 & E^2	2	11 (F0), 13 (F1), 12 (F2)	4	
	set 1 : wave norm vector	1			
	set 1 : param ellipticity	1			
	set 1 : deg of polarization	1			
	set 1 : Poynting flux	1			
	set 1 : Phase speed	1			
	set 2 : spectral matrices Bi^2, Ei^2	5	11 (F0), 13(F1), 12 (F2)	20	
	set 2 : spectral matrices	20			
	LFR High res Full spec mat / Auto	5	88 (F0), 104 (F1), 96 (F3)	3600	
	LFR High res Full spec mat / Real	10			
	LFR High res Full spec mat / Im	10			

Default configuration for LFR

LFR BURST Mode		nb sensor or signals	frequency channels	measurement time (sec)
LFR Waveforms	LF E(1V+2E) +3B 256HZ	6	1	0,00390625
LFR basic param	set 1 : B^2 & E^2	2		
	set 1 : wave norm vector	1		
	set 1 : param ellipticity	1	22 (F0), 26 (F1)	5
	set 1 : deg of polarization	1		
	set 1 : Poynting flux	1		
	set 1 : Phase speed	1		
	set 2 : spectral matrices Bi^2, Ei^2	5	22(F0), 26(F1)	5
	set 2 : spectral matrices	20		

Default configuration for TDS

TDS Normal Mode	nb sensor or signals	frequency channels	measurement time (sec)	snapshots /day
TDS regular snpashots	4			288
TDS triggered snapshots	4			64
TDS statistics			10	8640
TDS histogram 1D	4	64	300	288
TDS histogram 2D	1	4096	1800	48

1D histo:

Xaxis: LOG_HIST_64

Yaxis: PEAK_W_AMP, RMS_W_AMP, RMS_S_AMP, MAXAMP_CH1

2D histo:

Xaxis: LOG_HIST_128

Yaxis: HISTA_32

Zaxis: DA_VS_RE

Default configuration for TDS

TDS BurstMode	nb sensor or signals	frequency channels	measurement time (sec)	snapshots /day
TDS Triggered snapshots	4			64
TDS MAMP	3		0,031250775	
TDS statistics			10	8640
TDS histogram 1D	4	64	300	288
TDS histogram 2D	1	4096	1800	48

- Same configuration as normal mode for Triggered snapshots, statistics and histograms
- Added TDS MAMP; decimation factor 4x

Default configuration for TNR-HFR

THR Normal Mode		
CH1/CH2	**Bands**	**Cross**
E1/E2	A,B,C,D/A,B,C,D	Yes
E2/E3	A,B,C,D/A,B,C,D	Yes
E1/E3	A,B,C,D/A,B,C,D	Yes
E1-E2/HF	A,B,C,D/HF	No

Measurement time = 12s

Direction findings

THR Burst Mode		
CH1/CH2	**Bands**	**Cross**
Bmf/E1	A,B,C,D/A,B,C,D	No
E1-E2 or E2/Bmf	A,B,C,D/A,B,C,D	No
Bmf/E3	A,B,C,D/A,B,C,D	No
E1-E2/HF	A,B,C,D/HF	No

Measurement time = 2s

Magnetic field measurements

RPW TELEMETRY

The average bit rate must be 5,5 Kbps (EID-A).

To calculate the bit rate, we evaluate the **size of telemetry packets** containing the **data to transmit** during a time.

Ex: For LFR, 1 **snapshot** of a waveform (256 Hz) measured during 8 s every 300s
for 6 sensors (1V+2E+3B) with 2 bytes for each measured point, gives 24576 bytes to be transmitted in packets comprising a header of 30 bytes and the data of 3648 bytes.
It will take 6 full packets + 1 incomplete packet

RPW TELEMETRY

TM NM Uncompressed
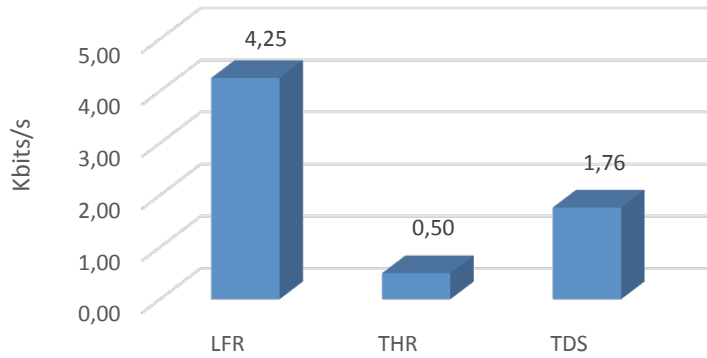
TM NM Compression factor 2 (WIND)
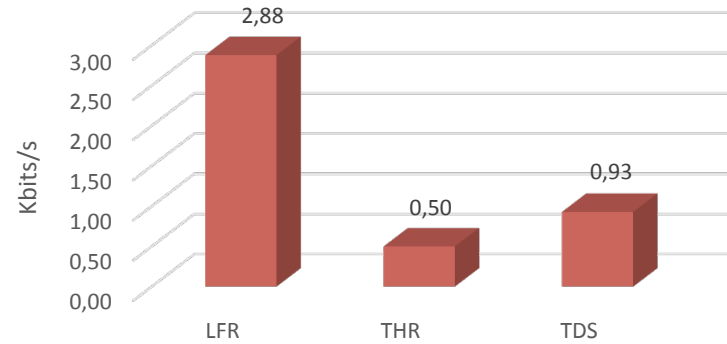
TM BM Uncompressed
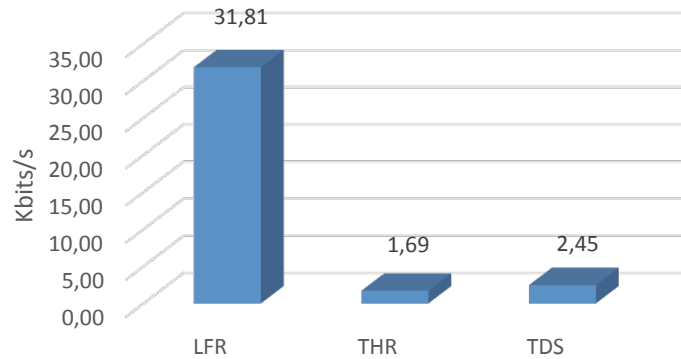
TM BM Compression factor 2
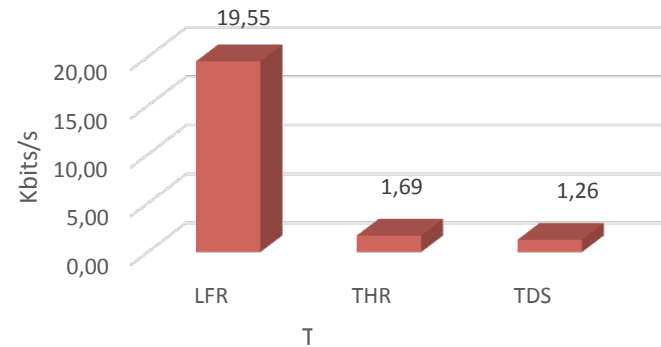
Weekly RPW TELEMETRY

Weekly RPW data
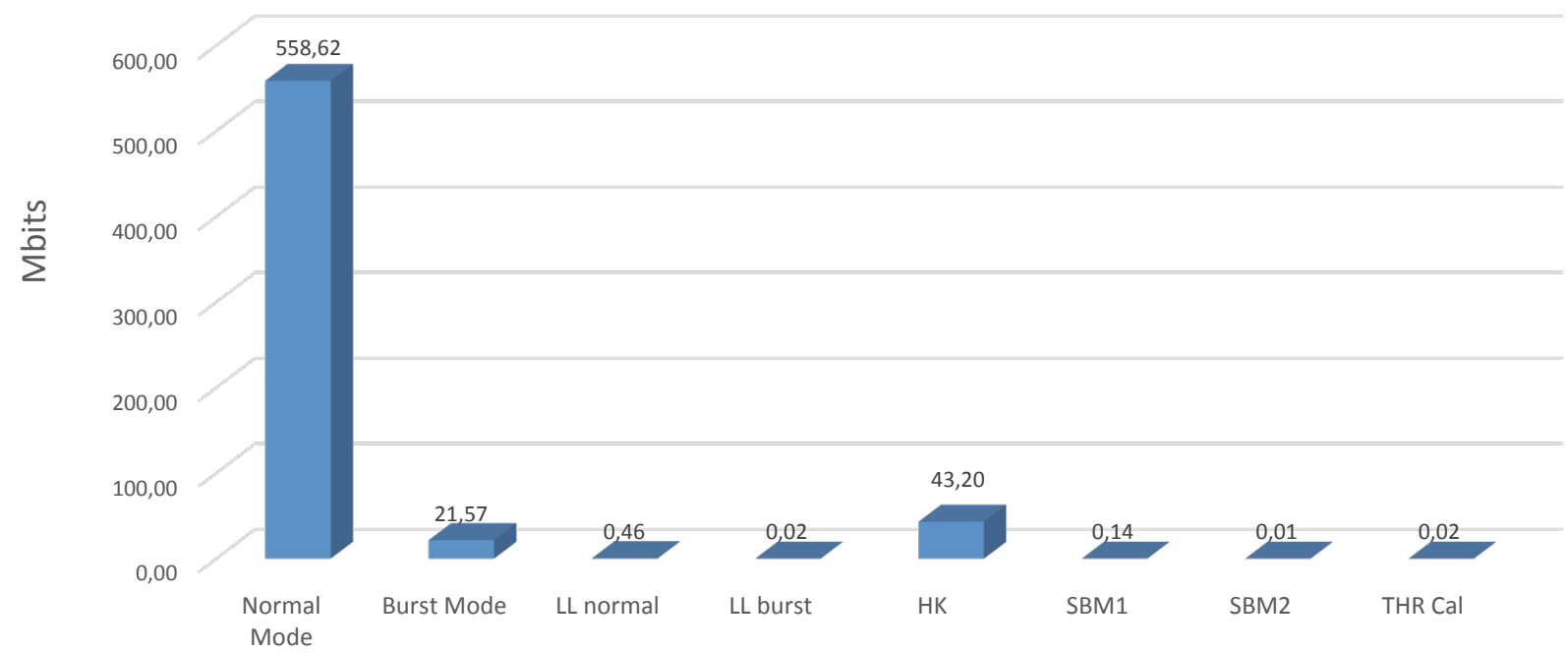
Total weekly telemetry
LFR+THR+TDS+CAL+LL+HK

- 7.22 kbits/s uncompressed
- 4.94 kbits/s compressed (compression factor 2)

uncompressed

Kbit/s

Config	Value
A	7,22
B	7,12
C	6,74
D	6,08

Compressed

Kbits/s

Config	Value
A	4,94
B	4,87
C	4,46
D	4,37
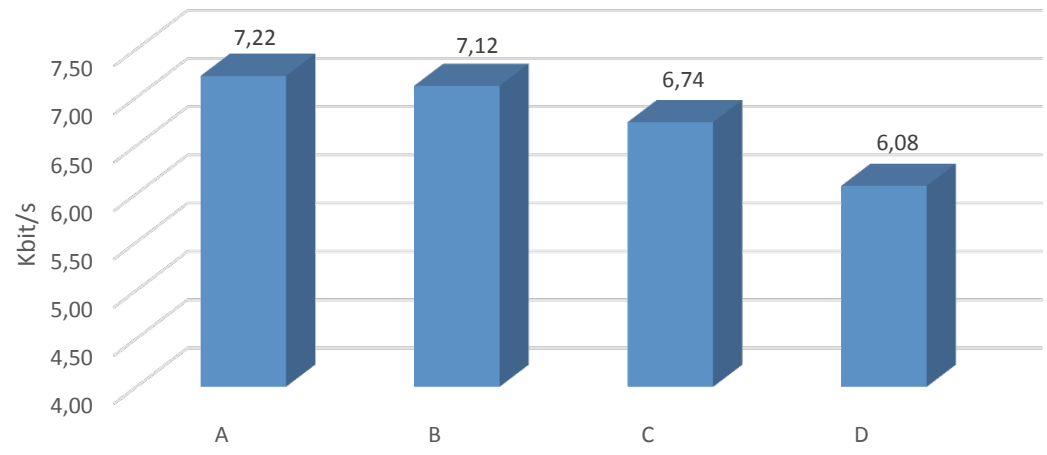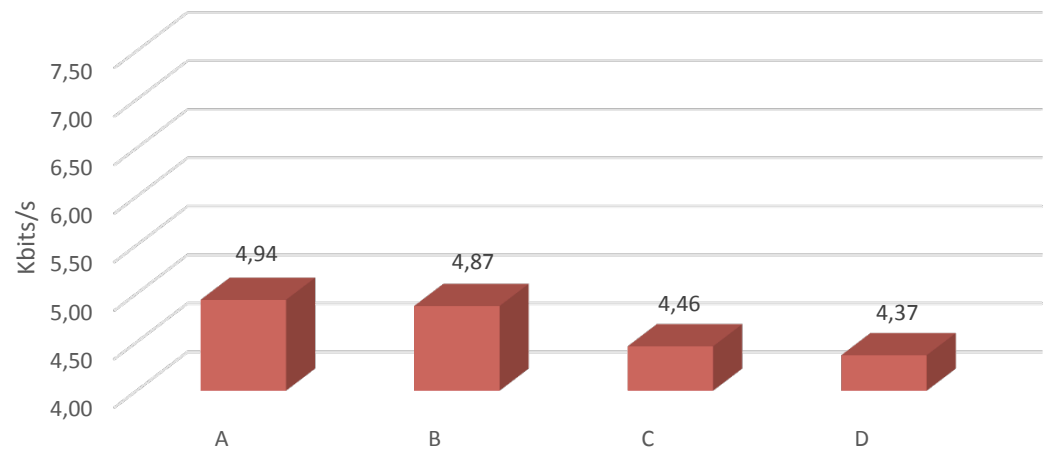
A	
Duration of burst Mode	10 min
Time between 2 snapshots LFR&TDS	300 s
Measurement time LFR Basic Parameter	4 s
Compression rate	2
B	
Duration of burst Mode	**5 min**
Time between 2 snapshots LFR&TDS	300 s
Measurement time LFR Basic Parameter	4 s
Compression rate	2
C	
Duration of burst Mode	10 min
Time between 2 snapshots LFR&TDS	300 s
Measurement time LFR Basic Parameter	**8 s**
Compression rate	2
D	
Duration of burst Mode	10 min
Time between 2 snapshots LFR&TDS	**500 s**
Measurement time LFR Basic Parameter	4 s
Compression rate	2

RPW TELEMETRY Compression

Weekly TM

Kbits/s

- Uncompressed: 7,22
- Compressed 1,8: 5,61
- Compressed 2: 4,94
- Compressed 2,2: 4,77
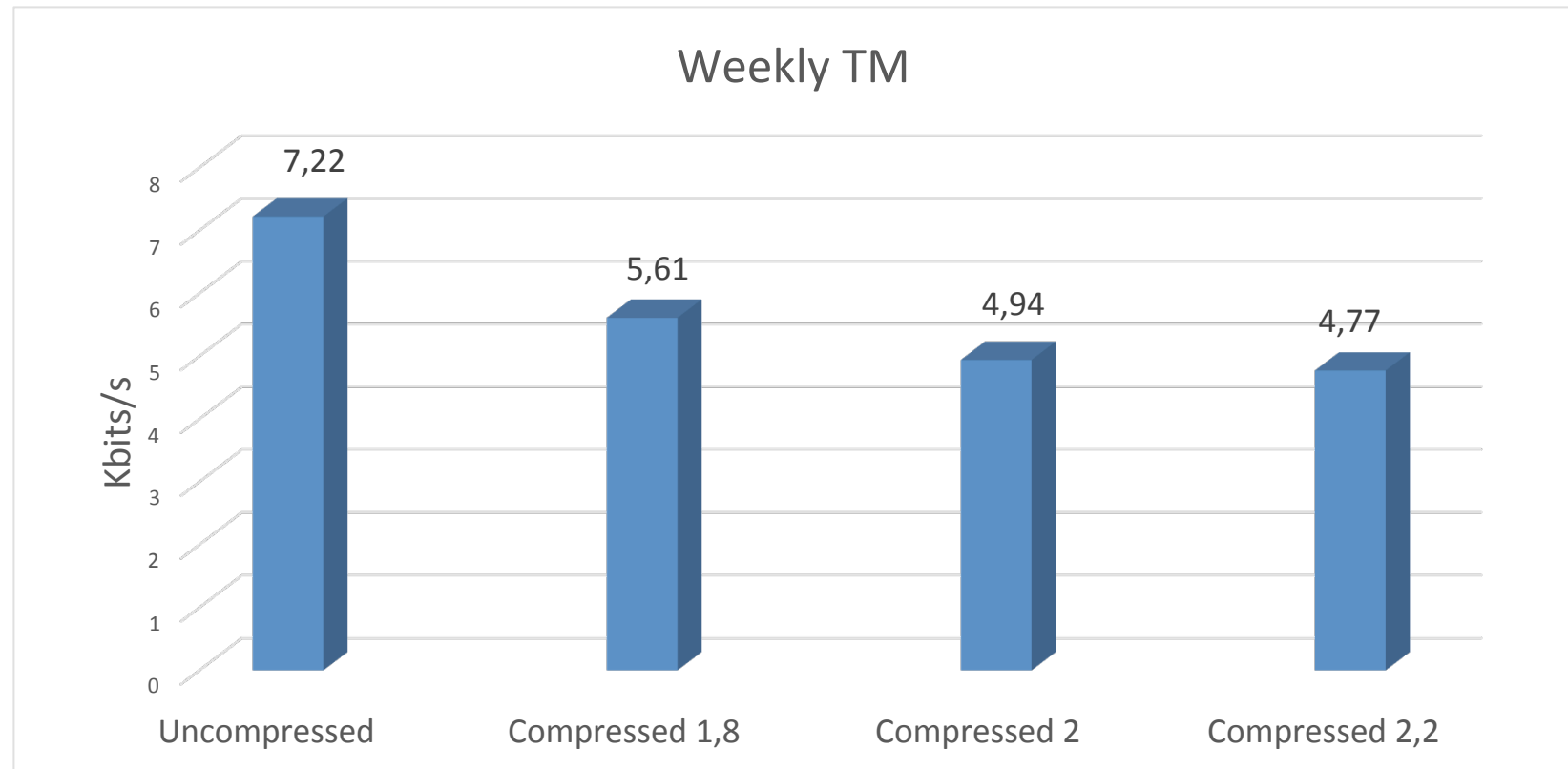
- data are not degraded with the compression
- Test of recovering compressed data

Telemetry Source Packets

The figure below gives the structure of the Telemetry Source Packets. The maximum size of the packets is given for the DPU.

CCSDS Telemetry Source Packet

Packet Header (48 bits)						Packet Data Field (variable)	
Packet ID				Packet Sequence Control		Packet Length	Data Field Header	Source Data

Version number	Packet Type	Data Field Header Flag	APID	Segment-ation/ Grouping Flags	Se-quence Count			
3	1	1	11	2	14			
16				16		16	80	variable

4096 bytes max
4106 bytes max

4112 bytes max

Process ID	Packet Category
Enumerated	Enumerated
7 bits	4 bits

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

Figure 32 – Format of the Telemetry Source Packets

Default configuration

Parameters to define	Duration of Burst Mode		10
	Time between 2 snapshots	LFR Waveforms	300
	Measurement time (sec)	LFR basic param	4
	Compression rate		2

RPW operation mode	bit rate (uncompressed) kbit/s	bit rate (compressed) kbit/s	duty cycle min/day	occurrence per day	occurrence per week	# of events	duration of event (min)	% of time (with respect to the day)	Mbits (uncompressed)	Bit rate (uncompressed) kbit/s	Mbits (compressed)	Bit rate (compressed) kbit/s
Normal Mode	6,51	4,30	1 430,00					99,31%	558,62		369,34	
Burst Mode	33,73	21,47	10,00					0,69%	20,24		12,88	
Low Latency normal	0,01		1 430,00					99,31%	0,46		0,01	
Low Latency burst	0,03		10,00					0,69%	0,02		0,03	
Housekeeping	0,50		1 440,00					100,00%	43,20		0,50	
Selected Burst Mode SBM1-Shocks	0,89	0,47	2,60	0,2000		1 every 5 days 360 in 5 years	13	0,18%	0,14	7,21	0,07	4,43
Selected Burst Mode SBM2-In-Situ Type III & LW (to verify)	0,12		0,82	0,0274		100 events in 10 years	30	0,06%	0,01		0,01	
THR Calibration	0,35		1		1	1 event per week	7	0,07%	0,02		0,02	
TDS/LFR Calibration	included in normal mode		1		1	1 event per week		0,07%				
Mbits									622,71		382,86	
Bit rate corridor										7,21		4,43

Several cases to help for choosing the default mode

				Mode duration	Data size	Science NM+BM	LL	HK	Bit rate	Compression rate
			bits/sec	Minutes per day	Mbits/day	Mbits/day	Mbits/day	Mbits/day	Kbits/sec (Science NM+BM +LL+HK)	
Default configuration (Compression rate=2)	Normal Mode LFR+TDS+THR	Uncompressed	6510,77	1430,00	558,62	578,86	0,48	43,20	7,21	2,00
		Compressed	4304,70	1430,00	369,34					
	Burst Mode LFR+TDS+THR	Uncompressed	33732,66	10,00	20,24					
		Compressed	21469,04	10,00	12,88	382,23	0,48	43,20	4,93	
Default configuration (Compression rate = 2,2)	Normal Mode LFR+TDS+THR	Uncompressed	6510,77	1430,00	558,62	578,86	0,48	43,20	7,21	2,20
		Compressed	4136,45	1430,00	354,91					
	Burst Mode LFR+TDS+THR	Uncompressed	33732,66	10,00	20,24					
		Compressed	21488,55	10,00	12,89	367,80	0,48	43,20	4,76	
1/BM : 5' instead of 10'	Normal Mode LFR+TDS+THR	Uncompressed	6510,77	1435,00	560,58	570,70	0,47	43,20	7,11	2,00
		Compressed	4136,45	1435,00	356,15					
	Burst Mode LFR+TDS+THR	Uncompressed	33732,66	5,00	10,12					
		Compressed	21488,55	5,00	6,45	362,60	0,47	43,20	4,70	
2/ T measure LFR BP set1 8" instead of 4" & 1/	Normal Mode LFR+TDS+THR	Uncompressed	6028,77	1435,00	519,08	529,20	0,47	43,20	6,63	2,00
		Compressed	3654,45	1435,00	314,65					
	Burst Mode LFR+TDS+THR	Uncompressed	33732,66	5,00	10,12					
		Compressed	21488,55	5,00	6,45	321,10	0,47	43,20	4,22	
3/T_LFR Waveform: 500" Time between 2 snapshots & 1/ & 2/	Normal Mode LFR+TDS+THR	Uncompressed	4881,87	1435,00	420,33	430,45	0,47	43,20	5,49	2,00
		Compressed	3132,88	1435,00	269,74					
	Burst Mode LFR+TDS+THR	Uncompressed	33732,66	5,00	10,12					
		Compressed	21488,55	5,00	6,45	276,19	0,47	43,20	3,70	

Several cases to help for choosing the default mode

Duration of burst Mode	Time between 2 snapshots LFR&TDS	Measurement time LFR Basic Parameter	Compression rate	Bit rate (uncompressed)	Bit rate (compressed)
10	300	4	2	7,22	4,94
10	300	4	2,2	7,22	4,77
5	300	4	2	7,12	4,87
10	300	8	2	6,74	4,46
10	500	4	2	6,08	4,37

Default configuration for LFR

Normal Mode / compressed

compressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day	header size (bytes)	packet data size (bytes)
LFR Waveforms	LF E(1V+2E) 16HZ	3	16	1	16	0,0625	2016,00	N/A	32	4080
	LF 3B 16Hz	3	16		16	0,0625				
	LF E(1V+2E) + 3B 256Hz	6	16	1	256	300	12288,00	288	34	4078,00
	LF E(1V+2E) + 3B 4kHz	6	16	1	4096	300	12288,00	288	34	4078,00
	LF E(1V+2E) + 3B 25kHz	6	16	1	24576	300	12288,00	288	34	4078,00
LFR basic param										
F0	set 1: B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	11	0,25	4	121		29	121
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F1	set 1: B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	13	0,25	4	143		29	143
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F2	set 1: B^2 & E^3	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	12	0,25	4	132		28	132
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16				-			
F0	**TM_LFR_SCIENCE_NORMAL_BP2_F0 Packet**									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	11	0,05	20	330		28	330
	set 2 : spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F0 Packet									
	LFR High res Full spec mat / Auto	5	32							
	LFR High res Full spec mat / Real	10	32	88	0,000277778	3600	8800		30	3200
	LFR High res Full spec mat / Im	10	32							
F1	**TM_LFR_SCIENCE_NORMAL_BP2_F1 Packet**									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	13	0,05	20	390		28	390
	set 2 : spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F1 Packet									
	LFR High res Full spec mat / Auto	5	32							
	LFR High res Full spec mat / Real	10	32	104	0,000277778	3600	10400		30	3600
	LFR High res Full spec mat / Im	10	32							
F2	**TM_LFR_SCIENCE_NORMAL_BP2_F2 Packet**									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	12	0,05	20	360		28	360
	set 2 : spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F2 Packet									
	LFR High res Full spec mat / Auto	5	32							
	LFR High res Full spec mat / Real	10	32	96	0,000277778	3600	9600		30	3200
	LFR High res Full spec mat / Im	10	32							

Default configuration for LFR

Burst Mode / Uncompressed

Uncompressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day	header size (bytes)	packet data size (bytes)
LFR Waveforms	LF E(1V+2E) + 3B 256Hz	6	16	1	256	0,00390625	4032		28	4032
LFR basic param										
F0	set 1 : B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	22	1	1	242		28	242
	set 1 : deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F1	set 1: B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	26	1	1	286		28	286
	set 1 : deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F0	TM_LFR_SCIENCE_BURST_BP2_F0 Packet									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	22	0,2	5	660		28	660
	set 2 : spectral matrices	20	8							
F1	TM_LFR_SCIENCE_BURST_BP2_F1 Packet									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	26	0,2	5	780		28	780
	set 2 : spectral matrices	20	8							

Burst Mode / Compressed

Compressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day	header size (bytes)	packet data size (bytes)
LFR Waveforms	LF E(1V+2E) + 3B 256Hz	6	16	1	256	0,00390625	2016,00		32	4080
LFR basic param										
F0	set 1: B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	22	1	1	242		28	242
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F1	set 1: B^2 & E^2	2	16							
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4	26	1	1	286		28	286
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F0	TM_LFR_SCIENCE_BURST_BP2_F0 Packet									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	22	0,2	5	660		28	660
	set 2 : spectral matrices	20	8							
F1	TM_LFR_SCIENCE_BURST_BP2_F1 Packet									
	set 2 : spectral matrices Bi^2, Ei^2	5	16	26	0,2	5	780		28	780
	set 2 : spectral matrices	20	8							

Default configuration for THR

Normal Mode

uncompressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	bits/s
TNR-HFR	TNR AGC	2	12	4	0,083333333	12	
	TNR auto	2	12	128	0,083333333	12	446,25
	TNR cross	2	12	128	0,083333333	12	
	HFR1 AGC	1	12	96	0,083333333	12	52,69
	HFR2 AGC	1	12	96	0,083333333	12	

Burst Mode

uncompressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	bits/s
TNR-HFR	TNR AGC	2	12	4	0,5	2	
	TNR auto	2	12	128	0,5	2	1517,56
	TNR cross	2	12	128	0,5	2	
	HFR1 AGC	1	12	96	0,5	2	177,13
	HFR2 AGC	1	12	96	0,5	2	

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Default configuration for LFR

Normal Mode / Uncompressed

uncompressed		nb sensor or signals	bits ADC	frequency channels	SPS	measurement time (sec)	data size (byte)	snapshots /day	header size (bytes)	packet data size (bytes)
LFR Waveforms	LF E(1V+2E) 16HZ	3	16	1	16	0,0625	4032	N/A	28	4032
	LF 3B 16Hz	3	16		16	0,0625				
	LF E(1V+2E) + 3B 256Hz	6	16	1	256	300	24576	288	30	3648
	LF E(1V+2E) + 3B 4kHz	6	16	1	4096	300	24576	288	30	3648
	LF E(1V+2E) + 3B 25kHz	6	16	1	24576	300	24576	288	30	3648
LFR basic param										
F0	set 1: B^2 & E^2	2	16	11	0,25	4	121		29	121
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4							
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F1	set 1: B^2 & E^2	2	16	13	0,25	4	143		29	143
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4							
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F2	set 1: B^2 & E^3	2	16	12	0,25	4	132		28	132
	set 1: wave norm vector	1	17							
	set 1: param ellipticity	1	4							
	set 1: deg of polarization	1	3							
	set 1: Poynting flux	1	16							
	set 1: Phase speed	1	16							
F0	**TM_LFR_SCIENCE_NORMAL_BP2_F0 Packet**									
	set 2: spectral matrices Bi^2, Ei^2	5	16	11	0,05	20	330		28	330
	set 2: spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F0 Packet									
	LFR High res Full spec mat / Auto	5	32	88	0,000277778	3600	8800		30	3200
	LFR High res Full spec mat / Real	10	32							
	LFR High res Full spec mat / Im	10	32							
F1	**TM_LFR_SCIENCE_NORMAL_BP2_F1 Packet**									
	set 2: spectral matrices Bi^2, Ei^2	5	16	13	0,05	20	390		28	390
	set 2: spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F1 Packet									
	LFR High res Full spec mat / Auto	5	32	104	0,000277778	3600	10400		30	3600
	LFR High res Full spec mat / Real	10	32							
	LFR High res Full spec mat / Im	10	32							
F2	**TM_LFR_SCIENCE_NORMAL_BP2_F2 Packet**									
	set 2: spectral matrices Bi^2, Ei^2	5	16	12	0,05	20	360		28	360
	set 2: spectral matrices	20	8							
	TM_LFR_SCIENCE_NORMAL_ASM_F2 Packet									
	LFR High res Full spec mat / Auto	5	32	96	0,000277778	3600	9600		30	3200
	LFR High res Full spec mat / Real	10	32							
	LFR High res Full spec mat / Im	10	32							

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