

Chapter 9 : On board ground interface

CHANGE TRACEABILITY Chapter 9

Here below are listed the changes between issue N-2 and issue N-1:

N°§	PUID	Change Status	Reason of Change	Change Reference	Doc Issue
§9		New in	Useful TM data rate	PUM.6.1.CG.06	6.2

Here below are listed the changes from the previous issue N-1:

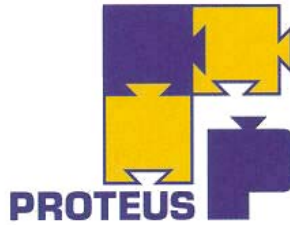


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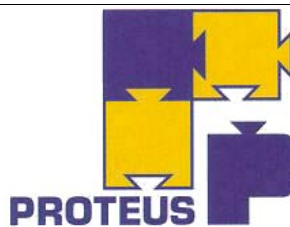
Table 9-1: Frequency couples reserved at UIT for PROTEUS 4

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LIST OF TBCs

LIST OF TBDs



Chapter 9: On board-ground interfaces

The on board-ground interfaces designate the communication links between the ground control/command station or stations and the platform. It includes the interface with the launch and tests facilities.

Trough this ground to satellite interfaces :

- communication can be established between the satellite and ground control station as well as the mission station(s) and can be maintained during visibility phases,
- communication can be protected against perturbations in order to achieve a minimum bit rate error,
- information can be transmitted from the platform and payload via the control station, thus ensuring that the status and functioning of the satellite can be monitored,
- commands can be transmitted from the ground to the platform and payload via the control station,
- data necessary to fix the satellite's orbit can be exchanged with the ground and with the on-board equipment,
- communication with the satellite subsystems is possible, thus ensuring commands to the subsystem and acquisition of test results during integration,
- information can be transmitted between the payload and the ground control station and/or the mission station(s) for transfer to the mission user.

If the User needs to have more information on the on board-ground interfaces, he can contact CNES or ALCATEL SPACE to get the interesting part or the whole of the document « Technical requirements specification : satellite-to-ground interface » (LDP-SB-LB/LS-12-CNES, issue 5).

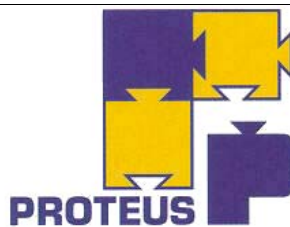
This document describes in details the on board-ground interfaces specifications for PROTEUS based missions. It deals with the following main subjects :

1. The information flows which include
 - the different telecommands types,
 - the telemetry divided in permanent housekeeping telemetry (HKTM-P), housekeeping telemetry historic (HKTM-R), the failure diagnostic telemetry (FDTM) giving an accurate telemetry over a short period preceding a platform failure, the payload telemetry (PLTM1 and PLTM2),
 - the separation flows and priorities,
 - the volumes of the data flows.

These aspects are already dealt in the PROTEUS User's Manual chapter 3.

2. The exchange format which explains in details:
 - the parameter number in a transmitted flow,
 - the telemetry flow structure compliant with the ESA packet telemetry standard, the packet structure, the frame structure, the exchange format at the parameters level,
 - the telecommand flow structure compliant with the ESA packets telecommand standard, the packet structure, the segment structure, the transfer frame structure, the transmission-units structure.
3. The exchange protocols; that means the TM and TC circuits, the establishment and maintenance of the satellite to station link.
4. The radioelectric interface

The main characteristics are summarised below, and more accurate information is contained in the document « Technical requirements specification : satellite-to-ground interface » (LDP-SB-LB/LS-12-CNES, issue 5).



The PROTEUS satellite - Ground link is ensured by a S band TM/TC link supporting CCSDS packet ESA standard data flow.

The source packet shall not exceed a 512*16 bits word size (1 kbyte).

The useful up link (TC) rate is equal to 4 kbit/s during all the satellite lifetime.

The down link (TM) rate corresponds to 85.966 kbit/s [useful bit rate before coding] during the emergency phase and to 722.116 kbit/s during the routine phase.

TM reception can be performed in both right and left circular polarisations.

In Earth pointing mode, left polarisation will be used for TC in normal mode.

For inertial, or solar pointing, the ground polarisation is modified depending on the current attitude during each visibility.

For each mission, the telecommunication frequencies are chosen among the following frequency couples presented hereafter. The frequency couple chosen for a satellite is determined by both the customer and the PROTEUS team depending on the orbit and frequencies already attributed. If needed, other frequencies can be requested.

	Up link frequency	Down link frequency	UIT publication
Couple 1	2040.34300 - 2040.64300 MHz	2214.920 - 2216.920 MHz	AR/11A/1828
Couple 2	2088.72819 - 2089.02819 MHz	2267.515 - 2269.415 MHz	AR/11A/1826
Couple 3	2101.56000 - 2101.86000 MHz	2281.400 - 2283.400 MHz	AR/11A/1827

Table 9-1: Frequency couples reserved at UIT for PROTEUS

5. the exchange constraints which shall be respected by the ground and by the on board software are listed.

END OF CHAPTER