

# MUGS – MARSIS UTILISATION GROUND SEGMENT

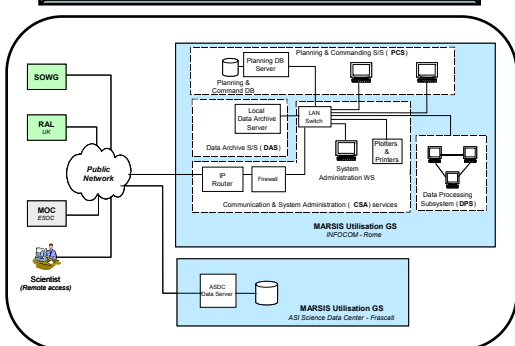
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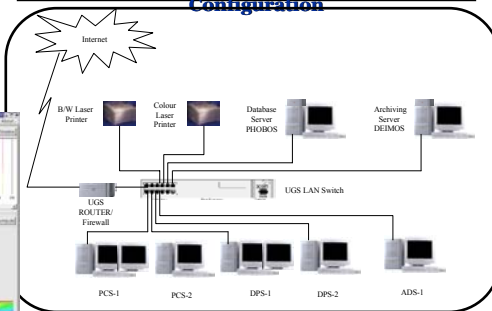
Mars Express is the first flexible mission of the revised long-term ESA Science Programme Horizons 2000. The mission is dedicated to the orbital and in-situ study of the interior, subsurface, surface and atmosphere of the planet. MARSIS is one of the seven instruments aboard ESA's Mars Express mission. MARSIS is a low-frequency nadir looking, pulse limited radar sounder and altimeter with ground penetration capabilities, which uses synthetic aperture techniques and a secondary receiving antenna to isolate subsurface reflections. MARSIS Primary Science Objective is to map the distribution of H<sub>2</sub>O (solid and/or liquid) in the upper portions of the crust of Mars. Secondary objectives are: subsurface geologic probing, surface characterisation, ionosphere sounding. The MARSIS instrument can operate as Subsurface Sounder at an altitude below 800km and as an ionosphere sounder at an altitude below 1200km. The MARSIS Utilisation Ground Segment designates the set of facilities that supports the Principal Investigator (PI) experiment teams in:

- Providing PI inputs (instrument timelines) to the Master Science Plan (MSP) and receiving a consolidated MSP from ESA's Science Operations Center
- Planning and generating Payload Operations Requests (POR's), and forwarding them to Payload Operations Support
- Requesting and receiving instrument and S/C raw telemetry data and S/C ancillary data from ESA/ESOC Mission Operations Centre
- Processing housekeeping telemetries in order to assess the status and health of the instrument
- Processing science data to generate different levels of data products
- Managing data archiving in coordination with ASI's ASDC

## MARSIS Utilization GS architecture

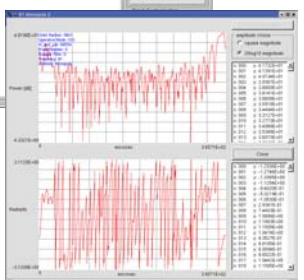
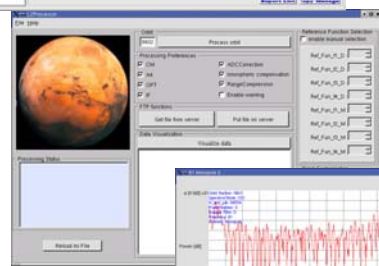
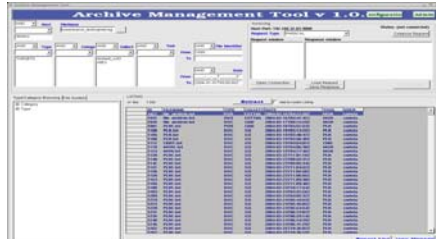
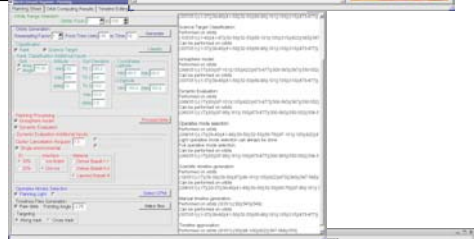
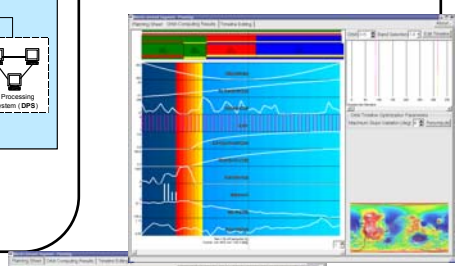


## MARSIS Utilization GS HW/SW Configuration



• **PCS: Planning & Commanding Subsystem**  
dedicated to generate, compute, and verify inputs to the long term and short-term planning process, and to define instrument commanding data to support both nominal and commissioning/contingency operations.  
PCS consists of the following items:

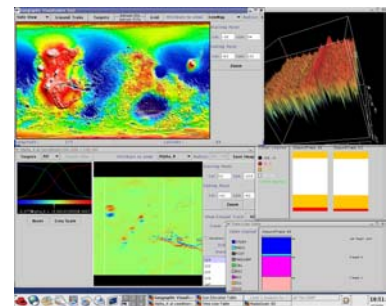
- **Application SW Items**
  - Long-Term Planning Tool
  - Commanding Tool
  - Geographical Visualisation Tool
- **HW Items**
  - Planning Workstation, used for the long-term planning and geographical visualisation
  - Commanding Workstation, used for short-term planning and manual commanding of the instrument



- **HW COTS**
- WS IBM INTELLISTATION Z-PRO XEON (5)
  - Server IBM – X-SERIES X345 (2)
  - Printers (2)
  - Router
  - LAN Switch

- **SW COTS**
- Linux Red Hat A.S. 2.1
  - Linux Red Hat 9
  - Linux Red Hat 7.2
  - Oracle 9i
  - Kylix 3 Enterprise
  - Windows XP
  - Office XP
  - Java J2ee

- **Application SW Tools**
- **Planning** allows timeline sequence of MARSIS operative modes to be evaluated
  - **Commanding** permits to accomplish all MARSIS commanding needs
  - **Monitoring** performs data retrieval and verifies instrument health status
  - **De-formatting & Level 1b** performs level 1b data processing and generates L1b data products in PDS-labelled format
  - **Level 2** performs level 2 data processing and generates L2 data products in PDS-labelled format
  - **Quick Look** verifies instrument performances
  - **Geographic Visualisation** performs visualisation of geographic data, Mars surface attributes, target topography, ground tracks analysis, level 2 data display
  - **Archive Management** performs search and visualisation of Local Archive Server files, files exporting in human readable format, copy file in a local environment, archive structure management



• **DPS: Data Processing Subsystem**  
dedicated to organize, analyze, process and archive all data received from the instrument and refer them to commanding data which produced them.  
DPS consists of the following items:

- **Application SW Items**
  - Deformatting & Level 1b Generation Tool
  - TM/TC Monitoring Tool
  - Quick Look Tool
  - Level 2 Data Generation Tool
- **HW & Basic SW Items**
  - Monitoring and De-formatting workstation
  - Level 2 and Quick Look processing workstation

• **DAS: Data Archiving Subsystem**  
dedicated to manage both raw and processed science data files. It also acts as a backup filing system for overall MUGS operations.  
DAS consists of the following items:

- **Application SW Items**
  - Archive Management Tool
- **HW & Basic SW Items**
  - single server, the Local Archive, with fault-tolerant (RAID) storage for the required amount of data

• **CSA: Communication and System Administration services**  
provides a reliable and secure Internet connections to the overall computing equipment of MUGS, and provides generic common services like printing and plotting services. In addition, being a system-wide component, CSA contains Planning, Commanding and Archiving Database functions and its hardware.