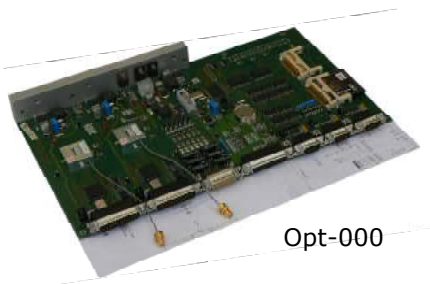
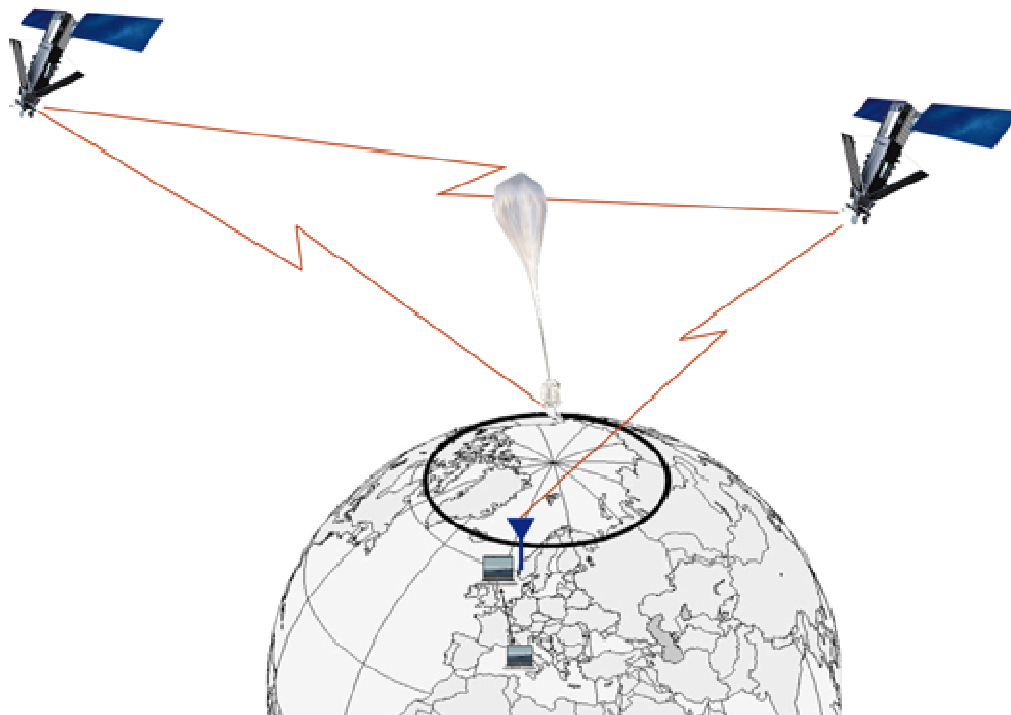


The *MSITel* module family

allows 4.8 kbps bi-directional real time link from your local ground console to your balloon experiment flown from everywhere



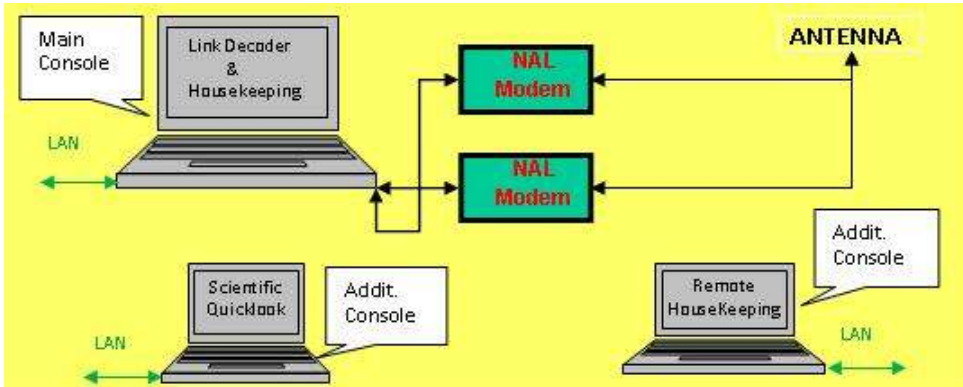
Opt-000



Opt-001



Opt-004

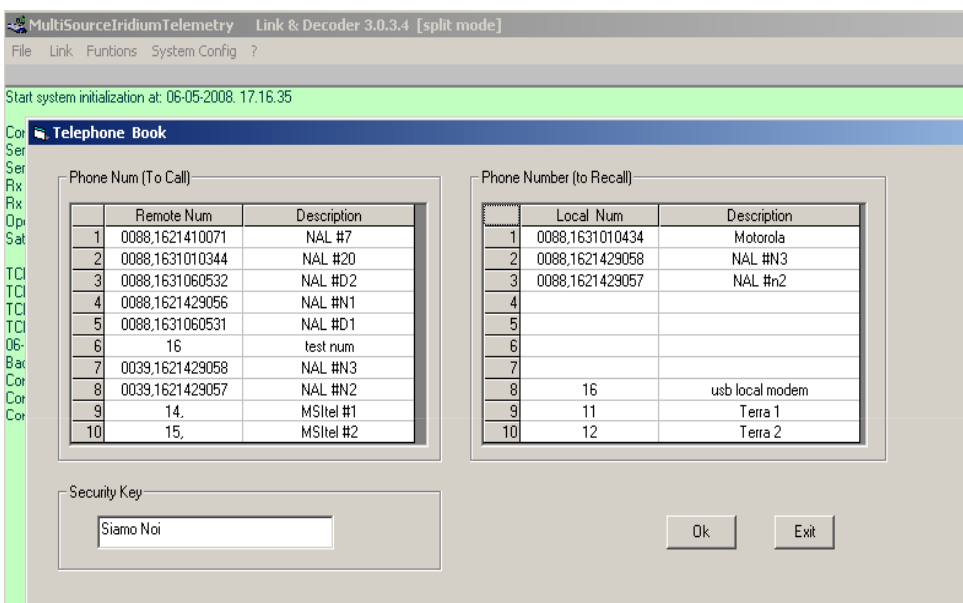


The Ground Station setup needs only one or more laptop PC and modem(s) Telemetry data can be shared via Ethernet link according to user's policy

MSITel/H_1.2 is a system to be used onboard stratospheric balloons. Its design allows interface with one or more intelligent I/O units, like those, as well as different (user provided) instrumentation.

MSITel provides the remote control through any available satellite system using a specific data modem. Because MSITel is easily adaptable to all modems that are AT command compatible up to bit-rate of 38400 bps, no H/W changes are needed but only appropriate modifications in the user's script.

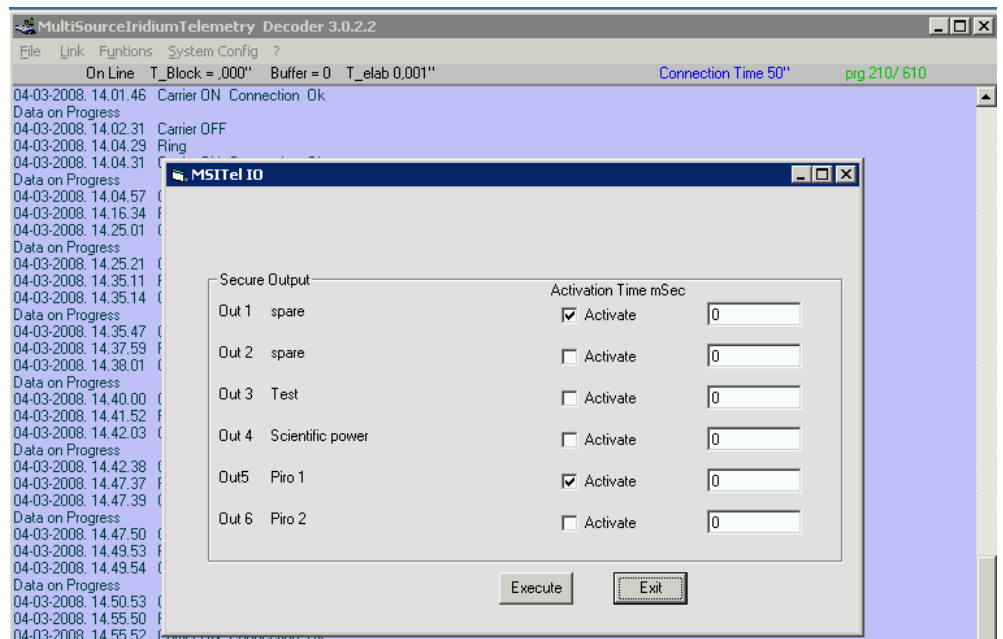
The present version has been optimized and tested for Iridium platform, which is the one able to guarantee full coverage all over the World. The Iridium® modems are by NAL Research (mod. A3LA-D). MSITel hardware H_1.2 unit has 2 GPS units integrated with external and several I/O, both analog and digital, for a direct control of external instrumentation. Control Telemetry Unit designed and tested to match the requirements



Six digital outputs are 0.5 A actuators, managed with a high security hardware and software logic and suitable for no-back operation such as balloon-payload detachment (flight termination), ballast release, etc....

All digital inputs are protected against extra voltages and integrated for a time of 10 msec (adjustable). All the external (onboard) instrumentation communicates with MSITel either through RS232 or RS485.

MSITel allows a high level of customization according to user's requirements.

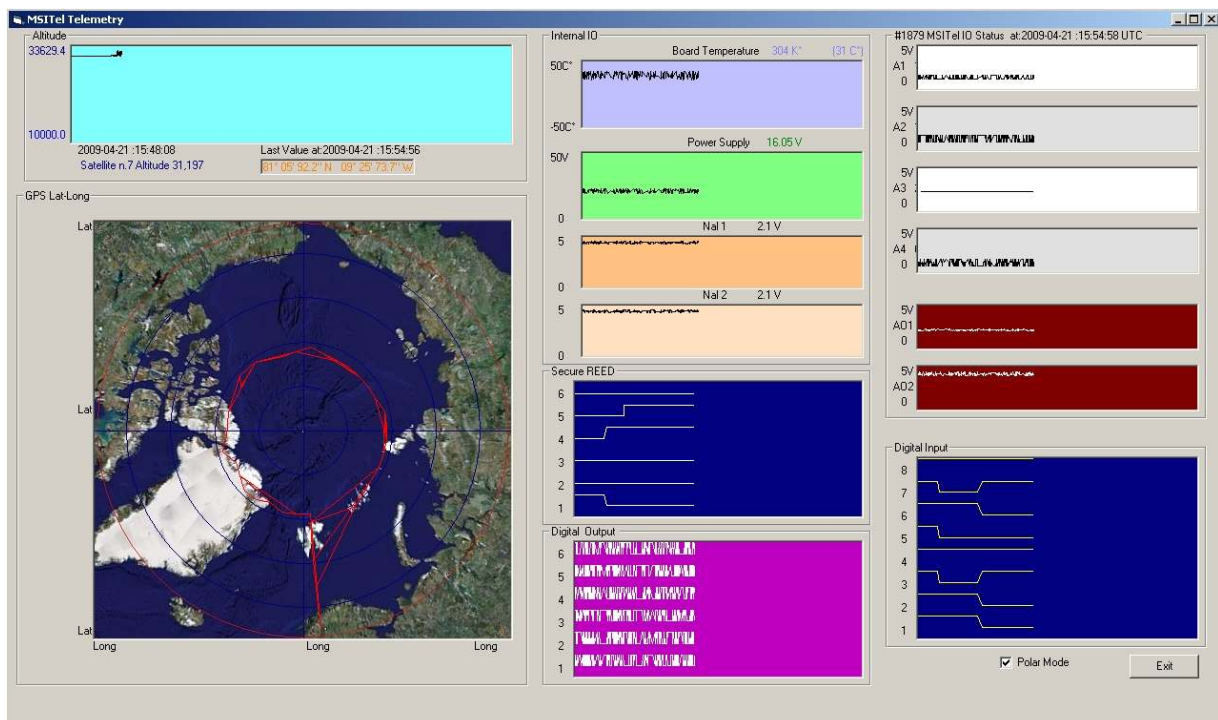




GROUND STATION GRAPHIC USER INTERFACE

The Ground Station S/W allows an easy monitoring of both housekeeping and scientific data. The *MSITel* allows extended function customization according to user defined instruction (by meta-language scripts)

If needed, the users can create their own Ground Station S/W and Quick-Look by following instructions into the Technical Manual.



MSITel main features

- Management of two Iridium (or Hayes compatible) modem devices, operating either in *backup* mode (2400 bps) or in *split mode* (4800 bps)
- Management of the 2 integrated GPS units
- Polling of the external instrumentation both by direct user commands and by user-defined instructions (by meta-language).
All communications are carried out through serial line connection (RS232 or RS485 standard)
- One 115 kbps serial port, dedicated to scientific data, operating either in burst mode or *on-demand* mode
- Two serial channels, dedicated to housekeeping data from external instrumentation, operating in on-demand mode
- Data acquisition of the local I/O according to the meta-language instructions
- 6 digital outputs, reed relays buffered, max 0.5A
- 8 digital inputs (0-5 V)
- 6 digital output, buffered, max 100 mA @50V
- 2 analog outputs 10mA @6 V max
- 4 analog inputs, 5 V fr
- Storage of the acquired data into non-volatile support (Compact Flash)
- Sending of the acquired data, through the satellite line, to the Ground Station with a special protocol, according to the meta-language instructions (down-link telemetry).
- Execution of commands received by the Ground Station (up-link telemetry)
- Low power consumption, 250 mA @12V in standby mode

Additional technical details

All data acquired by the unit, even if not transmitted according to priority rules (user defined) are stored in Compact flash cards (up to 8 Gbytes). *MSITel* unit makes use of a real time clock, synchronized with onboard GPS, to provide absolute timing for the data storage. This assures a safe time correlation for all stored events

The connection with the modems is provided by a 9-wire RS-232 serial line (H/W handshake). The power supply to each modem unit is provided separately.

The bandwidth (bit-rate) can be doubled by using both the onboard modem units (split mode), simultaneously. More than one *MSITel module*, up to 8, can be used to have *higher* (up to 38400 bps) telemetry bit-rate by using an additional unit (available by LEN).

The *MSITel* board unit has also additional sensors for monitoring Power Supply Voltage, internal VDC and the unit actual temperature.

MSITel H_1.2 module S/W package

All the *MSITel* units are delivered together with *complete* documentation (user and technical manuals) and Ground Station S/W package performing the following tasks:

- *MSITel_Compiler*: Parser, Compiler and CF image generator of Meta-language script
- *MSITel_DCF*: Decoder of data stored into CF during operations
- *MSITel_Link_Decoder*: S/W for connection to remote MSITel, decoder of real-time telemetry-down data, encoder of tele-commands for telemetry-up, LAN and Ethernet data sharing and data storage
- *MSITelHK*: decoder for housekeeping channel, LAN and Ethernet data sharing or local data
- *MSITelScd*: decoder for scientific channel, LAN and Ethernet data sharing or local data

The supplied S/W works on Windows® Operating System (Windows® 98 / 2000/ 2003 server /XP)

MSITel main specifications:

Power Supply: 9 ÷ 40VDC

Operating Temperature: -40°C to +50°C

Operating pressure: 1000 mBar down to ≤1mBar

Unit size: 323mm x 189mm x 35mm (main-board);

410 mm x 315 mm x 155 mm (MSITel Opt-004)

Weight: opt 001- 3.4 kg

opt 004 - 8.6 kg (the IP66 box which includes 2 x Iridium modem and backup LI-Ion batteries)

MSITel is available in many versions: stand-alone and main-board (to be integrated into a cabinet unit with other control units). This feature allows users to build their own specific Telemetry system around *MSITel*.

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