The Installation of Satellite Modems on SEIS-UK Supported Remote Seismic Deployments

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Introduction
SEIS-UK, the NERC funded UK seismic equipment facility, supplies a full range of seismic equipment for short-term projects directed by UK-based academics, deploying anywhere in the world. The latest extension to the facility’s capabilities is a venture into the satellite transmission of status information from remote sites. The aim is to improve station recording times by regularly monitoring the state-of-health information and by having the ability to remotely reset parameters if needed. This should reduce unnecessary service runs, allow for better scheduling of necessary trips and generally improve data recovery rates.

CMG-DCM and Modem Configuration
• The system will use standard DCMs (see Fig. 1) but with the MiChroSat 2400 Modem installed internally - this saves space when shipping and provides a more secure system when deployed.
• The DCM is a low-powered linux-based data-logger with a removable USB/firewire storage disk (40Gb+).
• DCM units can be configured to record all data and status streams to the disk as well as to autonomously transmit the status information at a user-defined time interval.
• There will also be the capability to contact the unit from SEIS-UK to initialise changes to the setup and potentially download small event files.

MiChroSat 2400 Specification
• The modems can operate at temperatures ranging from -30°C to +60 °C.
• Power consumption varies but the peak when initializing a transmission is around 11W (for a few microseconds) falling to bursts of around 4W during transmission. The power management will be controlled by the DCM unit.
• Transmission will be at 2400kbits per second.
• Transmission will be via the Iridium Satellite network.

Why the MiChroSat 2400?
• The MiChroSat 2400 transmits using the Iridium Satellite Network – this is a Low Earth Orbit facility of 66 satellites that gives total global coverage.
• Initial set-up is low-cost in comparison to the large dishes required for High Earth Orbit constellations such as VSAT.
• The power consumption is low due to the minimal hardware required – this is essential for remote solar-powered sites.
• Bandwidth is smaller than that for VSAT (which is generally used for data transmission) but for state-of-health communications it is ideal.
• The system is economical to run since air-time is on a pre-paid pay-as-you-go basis and by running a modem at SEIS-UK transmissions will be Iridium to Iridium thus avoiding the large fees for calling across networks.

Types of Status Message
The CMG-DCM records extensive log-files to its removable disk as it is running. These will not be transmitted in their entirety but will be condensed to provide us with an essential status check-list. This will include:
• the up-time of the instrument
• the time of the last re-boot
• the latest data files written to the disk
• the total disk usage
• the sensor mass positions
• the GPS state including offset and drift information

This will provide all the information required to ensure that the station is performing satisfactorily.

First Deployment – Hudson Bay
The first deployment of these systems will be in the Northern Hudson Bay region as part of the HuBLE project (see Poster S41A-1312). The UK contribution to this project, headed by J-M Kendall at Bristol University, is funded by NERC and supported by SEIS-UK. The exact locations of the deployment sites are still to be determined but it is likely that there will be at least one modem site on Southampton Island and possibly two sites North of the Hudson Strait. With weather conditions as they are in this region these sites will need to run autonomously for most of the year so the modems will be the only link with the sites between annual service trips.

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