

# Satellite services and products for Automatic Weather Stations

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CLS, a subsidiary of the French Space Agency CNES, is a satellite services provider involved in the main global ocean observation (GOOS) programs, under the umbrella of the World Meteorological Organization (WMO) and the International Oceanographic Commission (IOC).

Since 30 years, CLS is the exclusive operator of the Argos system, delivering all around the world scientific in situ measurements data collection and processing services for environmental applications (oceanography, meteorology, hydrology, wildlife tracking, fisheries monitoring, etc.)

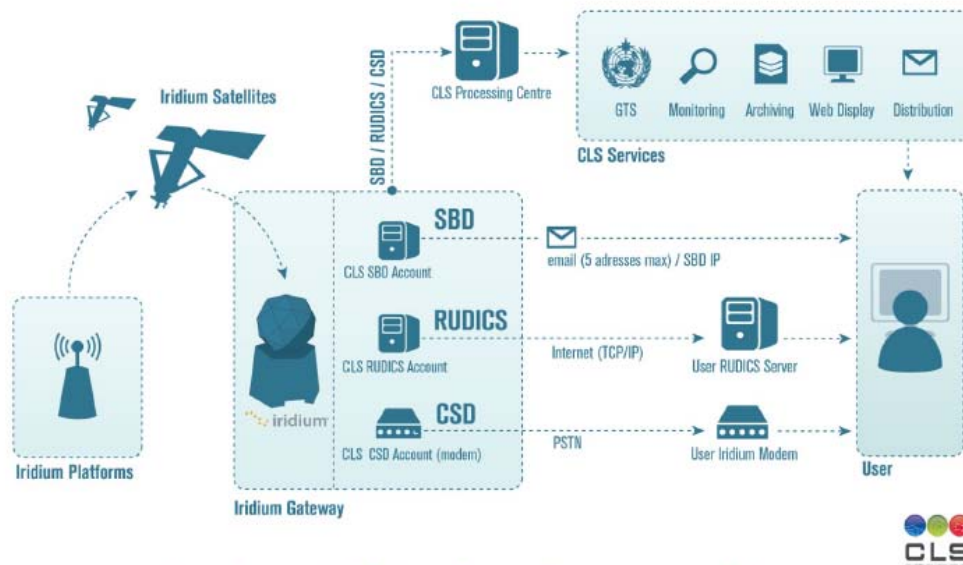
In order to satisfy increasing needs in real-time short-latency delivery and increasing needs in data transmission rates and volumes, CLS is providing Iridium satellites to the meteo-oceanographic community.

Iridium satellite link might be typically used by Automatic Weather Stations to transmit measured meteorological data in real time to the meteorological centers.

The system, owned by the Iridium Communication Inc. Company (McLean, VA, United States), is a satellite-based, wireless communication network providing a robust suite of data services to virtually any destination anywhere on earth. It comprises three principal components: the satellite network, the ground network and the Iridium subscriber products including platforms fitted with Iridium modems.

The design of the Iridium network allows data calls to be relayed from one satellite to another until they reach the satellite above the Iridium Subscriber Unit and the signal is relayed back to Earth. The Iridium network offers a pole-to-pole global coverage.

Three main Iridium services for data communication are used by the meteo-oceanographic community: SBD, RUDICS, and CSD.



## Overview of Iridium Data Services at CLS

### SBD

Short Burst Data (SBD) is the service which is implemented in the shipborne European common Automatic Weather Station (EUCAWS) being deployed in Europe in the framework of the EUMETNET/ESURFMAR project (Cf. full paper by Meteo France, in these proceedings and the poster by Sterela).

SBD Service is an efficient network protocol designed for short sized data messages. SBD uses a proprietary network protocol to transfer data messages to and from the remote terminal. It is possible to send Mobile Originated (MO-SBD) and Mobile Terminated (MT-SBD) messages.

According the modem (SIM-less), maximum MO (mobile-originated) message size is 1960 Bytes, while the maximum MT (mobile-terminated) message size is 1890 Bytes. Data are received by email or FTP/SFTP in attached file - 5 recipients maximum. The average transmission power is 1W. The Service is billed according to volume of data exchanged. Global network transmit latency for delivery of messages ranges from approximately 5 seconds for short messages to approximately 20 seconds for maximum length messages. This latency is the elapsed time before the Iridium SBD system sends the SBD message to its email destination. Additional latency could be introduced by the Internet or the customer's host system.

### RUDICS

The Iridium Router-based Unrestricted Digital Interworking Connectivity Solution (RUDICS) is an enhanced gateway termination/origination capability for circuit-switched data calls across the Iridium satellite network. RUDICS is a data service designed to be incorporated into an integrated data solution such as remote asset monitoring, control and data file transfer.

RUDICS is typically best suited for applications that deploy a large number of units which report to a central host application. Some Iridium RUDICS applications switch automatically on CSD protocol

when the RUDICS service is not accessible. RUDICS offers a Bi-directional continuous communication (dial-up). The average transmission power is 4W. The Real data rate are 6 to 10 Kbytes / min. Data are transferred by a phone call between an Iridium modem (9522B or 9523) to another, then relayed to the host RUDICS server through the Internet (TCP/IP) protocol. The RUDICS service is billed according to the call duration. It Requires a SIM card (to be activated).

### CSD

The Circuit Switched Data (CSD) Service supports the transfer of relatively large data volumes (tens of kilobytes) using the Iridium dial-up capability. The Iridium Data Module (IDM) places a call to the Public Switched Telephone Network (PSTN) or to another IDM then exchanges the data through that open circuit at approximately 2400 bits per second. CSD is best suited for the transmission of large data sets, for applications with a small number of deployed platforms. The service is billed according to call duration which is in direct proportion to the volume of data being transferred. This sets up a Bi-directional continuous communication (dial-up). The Average transmission power is 4W. Real data rate from 6 to 10 Kbytes / min. Data are transferred by a phone call between an Iridium modem (9522B or 9523) to another modem, relayed through the PSTN. As for RUDICS, the Service is billed according to the call duration and requires a SIM card (to be activated).

### Added value services

As a partner of several national meteorological agencies and global ocean observation programs under the umbrella of the World Meteorological Organization and the International Oceanographic Commission, CLS has been developed Iridium added value services specifically dedicated to meteorological and oceanographic applications: SBD data decoding, GTS processing & insertion with Quality checks and prime and backup GTS insertion points (at Météo-France and at NOAA NWS) to deliver BUFR encoded data to be inserted onto the GTS, GPS decoding & positions display, data distribution, archiving, 24h access to web-portal and web-mapping tool, monitoring & customized alerts system, data volume and call duration per platform consumption monitoring.