# Spider SMS Satellite System V4.0

# User Guide

## Introduction

This User Guide describes operation **specific** to Spider SMS Satellite Systems. It does not cover topics common to all Spiders. Please refer to the standard Instruction Manual for all other information.

## Spider SMS Satellite System

The Spider SMS Satellite System is supplied as a kit containing the following items:

- Spider SMS unit
- Satellite Transceiver
- Satellite Transceiver Data Cable
- Antenna Connector Adapter
- Fixed Mast Satellite Antenna
- Galvanised Antenna Mounting Pipe
- Satellite Custom Cable Kit ( a 0.5m "jumper" lead, a 1.5m "jumper" lead and a Lightning Arrestor)
- 10m RF main cable

## Antenna Connection

Attach the supplied antenna connector adapter to the satellite transceiver antenna connector labeled "ANT". Do not use any tools, firm finger tight is sufficient.

Connect the antenna to the satellite transceiver as described in the attached document "Customized Cable Kit – Installation Guide".

HINT: to attach the 0.5m "jumper" lead to the antenna, first remove the 4 phillips screws on the bottom of the antenna. This will enable you to remove the antenna bottom cover and expose the cable connector. The connector is protected by a black cover which needs to be removed. You will need to thread the 0.5m "jumper lead through the galvanized pipe and the antenna bottom cover prior to connection.

## Connecting the Satellite Transceiver to the Spider SMS

Connect the Spider SMS main unit to the Satellite Transceiver using the provided ribbon Data Cable.



**IMPORTANT NOTES:**

- The Spider SMS supplies all necessary power to the Satellite Transceiver. The transceiver requires no additional power connections.

- The supplied ribbon data cable connects the satellite transceiver to the Spider. The two ends of the cable are marked "Spider" and "Transceiver". To insert the cable into a connector, "spread" the wings on the Spider/transceiver connector and push the cable connector into it. Please observe connector orientation – the "bump" on the cable connector must match with the cutout on the Spider/transceiver connector. The "wings" will latch onto the connector when proper connection is made.

  To disconnect the cable, use your thumbs to evenly spread the Spider/satellite transceiver "wings". This will eject the cable.

  **NOTE: ONLY USE THE SUPPLIED DATA CABLE.**

- Spider SMS **must be connected to a battery** to ensure reliable satellite communications. This is due to the fact that the Satellite Transceiver draws large currents over very short periods of time. Solar and Mains Chargers are not able to supply the required peak currents on their own.

  It is also important to keep the lead between the battery and the Spider SMS as short as possible

## Operational Differences and Hints

### POWER CONSUMPTION

Satellite modem power consumption is higher than that of CDMA/GSM modems. Hence you may require larger solar panels and/or batteries. You may also need external solar charger regulators. Alternatively, you can power manage the satellite modem by scheduling its operation for only certain periods of the day.

### REMOTE DIAL-IN:

Satellite units are not accessible by remote dial in. So you cannot download the data or re-configure a satellite unit remotely.

### SMS TRANSMISSION AND RECEPTION:

SMS to and from satellite units are handled as e-mails. For example, to send an SMS to a satellite Spider you actually send an e-mail to a particular address. The Spider receives the message and responds, but again, as an e-mail. The actual email address of each unit is

Iridium_subscriber_number@msg.iridium.com

e.g. 881621413622@msg.iridium.com

The Iridium website www.iridium.com provides a free facility to send SMS to Iridium phones. Alternatively, any e-mail program may be used to send the e-mails.

SMS messages, in general, are not delivered as quickly as in GSM/CDMA networks.

### ALARMS:



Every alarm can send the alarm e-mail message to a single e-mail recipient

Voice alarm dialing (if speech option installed) provides 3 destination phone numbers. The numbers **must be entered in the international dialing format** i.e. precede the number with a '+', followed by the country code, the area code without the leading '0' and finally the destination number.

As an example, to enter the Halytech main office number (02) 8814-5235 you would enter

+61288145235

**WIDE AREA NETWORK (WAN):**

In order to send e-mails and/or FTP reports, you must configure WAN settings.



Select "Dial-up Internet" setting.

You have two choices about which Telephone number to enter.

1. Iridium provide an Internet gateway for their subscribers.
   - Access number is 008816000025
   - User name is not required, but must not be blank – enter 'x'
   - Password is not required, but must not be blank – enter 'x'

   This gateway provides a public internet access point, enabling the Spider to connect to any public FTP, SMTP or other servers.

2. You can dial-in and connect to an Internet Service Provider of your choice – including private networks. The access telephone number, the user name and the password will be given to you by your ISP. Please note that the access telephone number must be entered in the **international dialing format** i.e. precede the number with a '+', followed by the country code, the area code without the leading '0' and finally the access number.

We recommend Option 1 as it provides the shortest communications path.

**E-MAIL SETTINGS:**



If you are accessing an SMTP server from public internet, you will need to enable SMTP authentication.

SMTP user name and password can be obtained from your ISP / e-mail service provider.

**AUTOMATIC REPORTING BY E-MAIL / FTP:**



In order to reduce satellite communications costs, the Report frequency is selectable from 1 to 7 days. The amount of data transferred is identical to the report frequency. So for example, reports sent every 4 days will contain 4 days' worth of data.

In case an automatic report fails, you can enable the 'Daily report recovery' option to 'fill in the holes' in data. An automatic report will be sent the next day and it will contain the data from the previous report. This process is repeated for up to 7 days in the past.

**AUTOMATIC REPORTING BY SHORT BURST DATA (SBD):**

Short burst data is a very economical way of sending data from satellite Spiders.

Spiders fitted with satellite software versions 1.37 and higher are capable of SBD operation. SBD reports are completely independent from e-mail/FTP reports.

Unlike e-mail and FTP reports which send logged historical data, SBD reports send **current** readings.

In order to start using SBD, contact your Iridium satellite service provider and request activation of an SBD service. The service typically requires a monthly fee.

### *Principle of operation*

When you request an SBD service, you will be asked to provide up to five (5) destination e-mail addresses. Once the Spider is set up for SBD, it will send specially coded messages in binary format at regular intervals. Messages will be delivered as e-mails to the five addresses. Messages must be decoded by the receiver using the method described in the section "Spider SBD Message Format".

The length of each message can be calculated from:

Length = (number of transmitted inputs) * 5 + 13

So for example, if you set up your Spider to send current values from 2 inputs, the message will be 2*5 +13 = 23 bytes.

SBD transmissions are charged per byte, with a minimum charge for up to 30 bytes.

Thus, if your message is less than 30 bytes long, you may want to transmit additional channels such as system battery voltage at no additional cost. So, in the previous example, including a 3$^{rd}$ channel in the SBD transmission would increase the message to 28 bytes but the transmission cost would not increase.

Messages longer than 30 bytes incur a proportionally higher charge – e.g. a 31 byte message will cost approximately 3% more than a 30 byte message.

### *Setting up a Spider for SBD*

The first step is to decide which Spider inputs will be transmitted. Any enabled user or system input can be included in the transmission list, regardless of whether it is being logged or not.

Every input in the SBD list must be identified with a number from 1 to 99. To disable the transmission of an input simply assign SBD ID **0** to it.

It is a good idea for your organisation to decide on an SBD identification standard.
So for example you may assign SBD ID codes for inputs on all your Spiders as follows:

1 – stage height 1
2 – stage height 2
7 – rainfall input 1
23 – conductivity etc.

SBD ID codes are entered on the Change Input Setup screen.



The second step is to enable SBD transmission at selected intervals. This is done in the Change Automatic Reports Settings screen. SBD reports can disabled or sent at 1, 3, 6, 12 and 24 hour intervals.
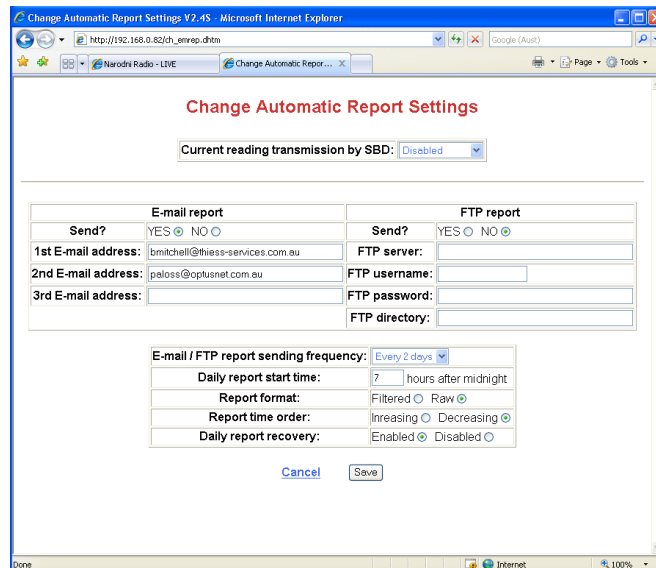


SBD transmissions are completely independent of e-mail/FTP reports. You **do not** need to set up WAN or e-mail settings in order for SBD to work.

### Spider SBD Message Format

SBD messages are sent in an efficient binary format. Each message is composed from a 13 byte header and a data section of 5 bytes per input.

The following information is relatively technical and intended for computer programmers or other personnel involved in processing of received SBD messages.

Each message not only provides the current input readings, but also extensive information about the Spider input configuration and the current state of all alarms and controls.

**HEADER:**

| FIELD | SIZE (in bytes) | CODING | COMMENT |
|---|---|---|---|
| Message version | 1 | none | Set to 01 in this version |
| Spider ID | 2 | none | First 2 characters of Spider Location |
| Date / time | 4 | long int | Time in seconds since 00:00:00 1/1/1970 |
| Input configuration | 4 | long int | 4 bits per Spider user input |
| Alarm status | 1 | 1 bit per alarm | LS bit first, set if alarm active |
| Control status | 1 | 1 bit per status | LS bit first, set if control currently on |

**DATA SECTION – repeated for each input:**

| FIELD | SIZE (in bytes) | CODING | COMMENT |
|---|---|---|---|
| Input SBD ID | 1 | none | As set by user |
| Input value | 4 | float | 32-bit IEEE format |

*NOTE: All multi-byte formats use the Intel convention of storing the lowest significant byte (LSB) first.*

The header input configuration field gives the setup information for all eight Spider native inputs. Each input takes 4 bits. Configuration of the 1$^{st}$ input is in the lowest 4 bits of the least significant byte progressing in the logical manner to the top 4 bits of the most significant byte holding the configuration of the 8$^{th}$ input.

The coding for each of the 4 bits is as follows:

    0       DISABLED
    1       SWITCH (DIGITAL)
    2       COUNTER
    3       ANALOGUE
    4       EVENT
    5       DAILY RAIN
    6       SDI-12
    7       UTILITY METER
    8       WIRELESS COUNTER
    9       WIRELESS UTILITY

### Example SBD e-mail
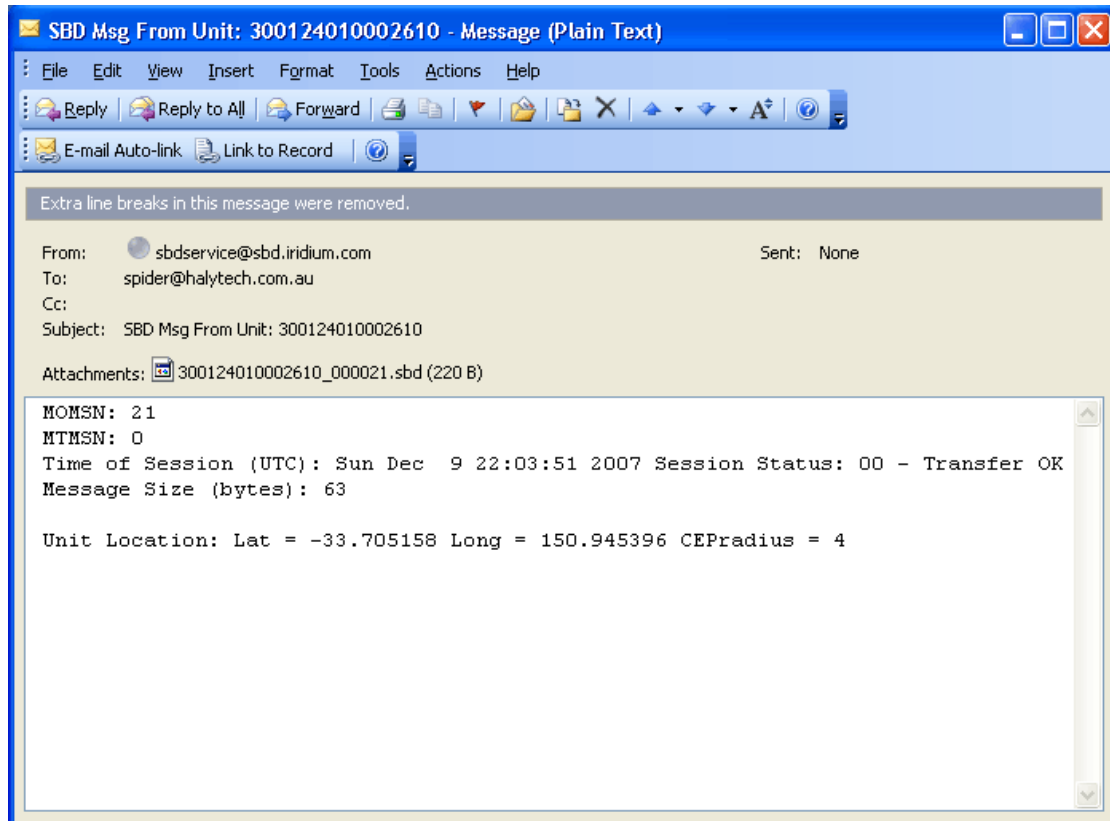


The message body shows the approximate latitude and longitude of the Spider which sent the message.

The data message itself is 63 bytes long and is attached to the e-mail.