SkyWave

IDP 100 Modem Series

Developer Guide

T203, Version 04

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Contact Information

SkyWave Mobile Communications Inc.

Online:

- Website www.SkyWave.com

Online Documentation:

- Login at support.skywave.com and follow the link to the downloads section

Customer Support by Email:

- support@skywave.com

Customer Support by Telephone:

- +1.613.836.2222

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Preface

Note: ***Refer to the SkyWave Customer Support website for any updates or a possible Errata Sheet available after the release of this document. Always check the site for the most current documentation releases.***

What's New?

Changes since the last release of this document are listed below. The updates below include new functionality for the low power firmware release 1.1.0.

- Updated S50 Power Mode and S51 Wake-up Interval information to show that they are non-volatile (Sections 5.4.3, 5.4.7 and 5.4.8)

Updated for Low Power Release 1.1.0

- Added new S registers for low power: S50 Power Mode and S51 Wake-up Interval (Sections 5.4.3, 5.4.7 and 5.4.8)
- Added new to-mobile setSleepSchedule message (Table 5 and Appendix B.2)
- Added new from-mobile sleepSchedule message (Table 6 and Appendix C.3)
- Added low power to Trace Class and Subclass (Table 17)
- Added a new Low Power Trace Record table (Class 2, Subclass 2) (Table 20)
- Added low power to the modemRegistration message (Appendix C.1)

Additional Updates

- New %UTC command to display UTC date and time (Section 5.6.13)
- New Response Result Code added (Table 15)
- Added DSP RomDB Version to Class 2, Subclass 1 (Table 19)
- Minor updates throughout

Purpose

This document describes the behavior and interfaces of the IDP 100 series of modems. The primary modem serial interface is the AT command interface implemented in the modem.

Audience

This document is for technical readers. Familiarity with the Hayes command set is advantageous.

Notation

This document is associated with modem firmware version 3.3 or higher.

An OEM Integrator is a SkyWave customer who purchases an IDP 100 series modem for integration into their own enclosure. In order to become an OEM Integrator certain commercial criteria must be met. Contact your Account Executive for further details.

A forward message is a message sent to the mobile device from the gateway, while a return message is one sent from the mobile device.

Reference

The content of the following documents may be useful in conjunction with this guide. These SkyWave documents are available from the IDP Developer Toolkit or support.skywave.com.

[N200] IsatData Pro Network Services

[T201] IDP 100 Modem Series Hardware Guide

Other Third Party Reference Documents:

ITU[1]-T Recommendations V.250 – Serial asynchronous automatic dialing and control (07/2003)

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[1] http://www.itu.int

1 Introduction

The IDP 100 series are IsatData Pro satellite modems. Each provides satellite messaging for a host application. The modem's primary interface is the AT command. Using AT commands, a host can configure, control and exchange data with the IDP modems. The modems' AT commands are based on the ITU-T Recommendation V.250. In addition to an AT command interface, the modems provide a trace log interface for provisioning and diagnostics.

This document describes the IDP modem's serial command interfaces that allow developers to build host applications to send and receive IsatData Pro messages.

This document is also applicable to developers who are using the IDP 600 series terminals configured for pass-through mode. In pass-through mode, the modem's serial interface is available on the IDP 600 terminals' RS-232 interface.

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2 Modem Overview

2.1 Satellite Operation

The IDP modem must be registered on the IsatData Pro network to send and receive messages. On a power-up, the modem transmits a *modemRegistration* message to the IsatData Pro gateway. The modemRegistration message notifies the Gateway that the modem is active and which beam to use to send to-mobile messages. When the Gateway receives the modem registration message it transmits a *modemRegistrationConfirmed* message back to the modem that authorizes the modem to receive messages.

2.1.1 Traffic Channel Acquisition

On a wake up from sleep, the modem tunes directly to its previous traffic channel. It does not send a modemRegistration message.

2.1.2 Acquisition Times

On startup or reset, the modem must determine its operating satellite beam. The modem determines its beam by first getting a GPS fix to determine its current location. After determining its location, the modem calculates its beam by checking its current location against all beam definitions. All beam definitions are part of the broadcasted IsatData Pro network information which is stored in the terminal.

If the modem was previously operating in the current region, it also has the traffic channel information. In this case, the modem tunes directly to the traffic channel. If the modem had not been previously powered in the current region, it may first need to get information from the bulletin board channel. More information on the bulletin board and how it is used is found in [N200].

2.1.3 Modem Registration Message

On a power-up or reset, the modem transmits a modemRegistration message once it is on the traffic channel.

A modem registration message is not sent when the modem wakes up from a sleep mode. This is one of the advantages of using the modem's sleep mode instead of turning the modem's power off.

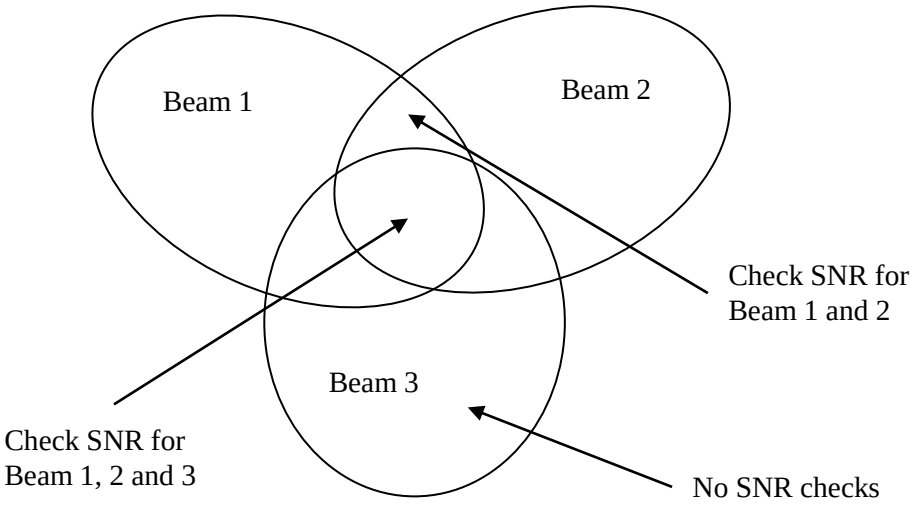
2.1.4 Beam Switch

An operating modem can roam between different satellite beams. When a modem roams it switches beams, transmits a *ReportBeamChange* message and operation continues transparent to the customer. The ReportBeamChange message lets the Gateway know the modem's new satellite beam.

A beam switch is transparent to the customer. Typically, the beam switch occurs within 10 seconds. The 10-second window provides time for the modem to transmit a ReportBeamChange and for the modem to receive a *ReportBeamChangeConfirmed* message. The modem suspends all from-mobile messages if a beam switch is pending. If either a from-mobile or a to-mobile message is in transmission prior to a beam switch, all subsequent retries are transmitted on the new beam.

The modem determines if it is roaming by monitoring the GPS and the signal strength of all adjacent traffic channels. As per Figure 1, if the modem is located in an overlapping region of three beams, it monitors the SNR of all the beams. If it is located in two regions, it monitors the SNR in two regions. The GPS location is monitored every 12 hours. SNR of adjacent traffic channels is measured every 20 minutes. Adjacent traffic channels are not always monitored; they are only monitored if the GPS fix indicates that the adjacent beam is overlapping the current operating beam.

Figure 1 Beam Switch



Adjacent channel SNR monitoring does not affect how the modem is sending or receiving. The modem only samples the adjacent beams when it knows it is not receiving a message and when it has no messages to transmit.

2.1.5 Blockage

When a modem can no longer acquire the traffic channel, it does not know if the traffic channel has changed or if the satellite signal is blocked.

Note: ***The modem attempts to acquire the most recent beam. Failing that, it periodically scans all possible beams until it is able to connect.***

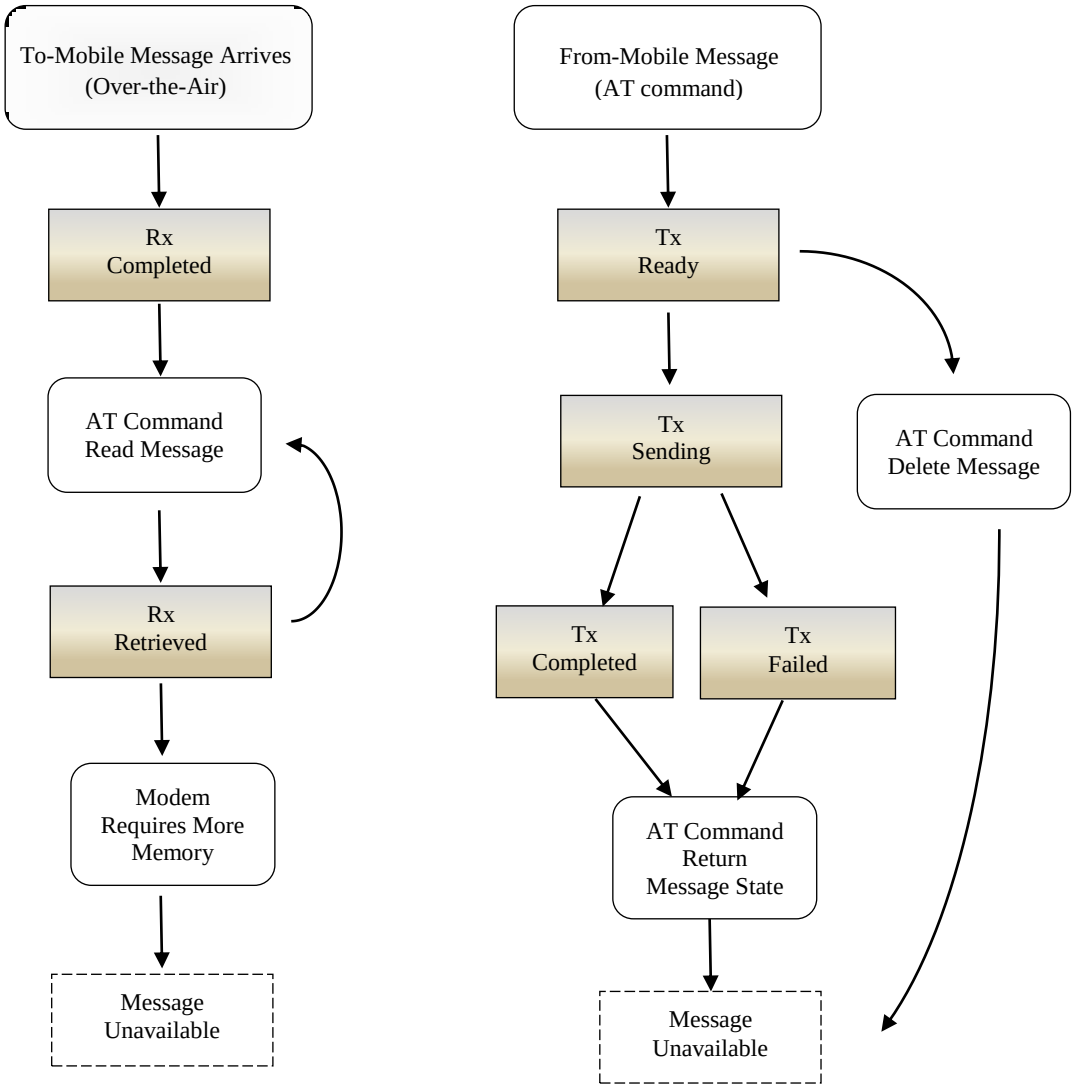
2.1.6 Muting

When a modem is deactivated it is muted so that it no longer can transmit messages. The modem supports a modem command that causes the modem to stop transmitting all user services messages. When muted, the modem may still transmit modem registration and beam notification messages.

2.2 Message States

Figure 2 illustrates the message states for both from-mobile and to-mobile messages.

Figure 2 Message States



2.2.1 To-Mobile States

When a to-mobile message is received, it is automatically stored and marked as Rx Completed. The state changes to Rx Retrieved once the to-mobile message has been retrieved. The to-mobile message remains in the partition (Figure 6) until the IDP modem requires the memory space for additional messages. At this point the message is deleted to make space for a new message. A to-mobile message can be repeatedly retrieved until it is overwritten.

2.2.1.1 Rx Completed

The host only knows about messages that have completed and gone to the Completed state. The host is not notified when a to-mobile message fails.

The Gateway breaks to-mobile messages into fragments for transmission. The modem acknowledges each fragment in a pre-assigned timeslot. If the Gateway does not receive an acknowledgement, it immediately submits the fragment for retransmission.

2.2.1.2 Rx Retrieved Messages

It is the host's responsibility to manage the from-mobile message buffer to ensure that messages are deleted so new messages can be added – the host cannot delete to-mobile messages. The IDP modem maintains the message for as long as it can so the message can be read again by the host. When the modem needs additional storage for either another incoming message or a newly submitted outgoing message, messages are deleted.

The file system that manages the message buffer selects the message to delete. The algorithm is not based on message age; instead it selects the message buffer that has been used the least in order to maximize the flash lifetime. Refer to Section 2.4.1 for more details.

2.2.2 From-Mobile States

The from-mobile message is added to non-volatile storage when received from the host or, by the modem. Initially, the from-mobile message's state is Tx Ready. The modem may not be ready to send the message either because it is not yet registered on the network, there are a number of messages already in progress (sending state) or the modem is not receiving a valid satellite signal.

Once the modem starts the transmission, the modem automatically changes the message's state to Tx Sending when it starts transmitting the message. When a message is in the Tx Sending state, it cannot be deleted. Once the message transmission is complete, the state changes to Tx Completed or Tx Failed. The from-mobile message is automatically deleted from the message partition when an AT command reads either the Tx Completed or Tx Failed state.

2.2.2.1.1 Transmit Failure

Before transmitting the message, the modem breaks the message into message fragments. Each message fragment must be acknowledged by the Gateway or else the fragment is retransmitted. If the modem does not receive an acknowledgement it immediately resubmits the message fragment for transmission.

When a message or the first fragment transmission starts, the modem starts a message completion timer. The timer is reset every time a message fragment is acknowledged. If the modem does not receive any message fragment acknowledgements in a 3 hour window, the modem declares the message failed.

2.2.2.2 Submit Before Registration

If a from-mobile message is received before the message registers on the network, the message is added to the transmit queue. The message stays in the queue indefinitely.

Once the modem receives a valid signal and registers, if required, it starts to transmit the message.

2.3 AT Message Commands

The AT commands are used to send from-mobile messages and receive to-mobile messages. Message records can be extracted from the message buffer using AT commands. Separate AT commands are provided for to-mobile and from-mobile messages.

2.3.1 From-Mobile Messages

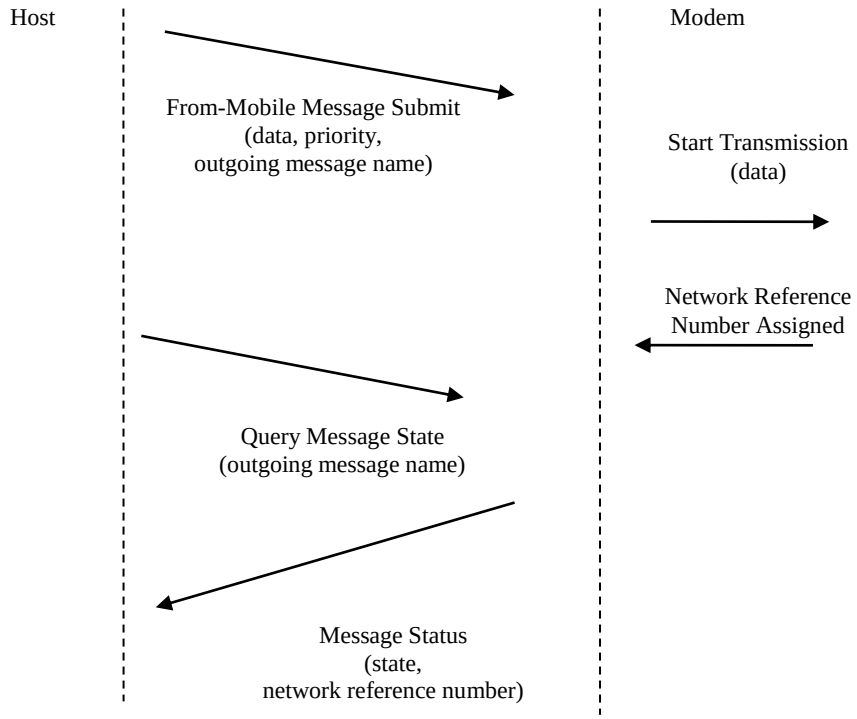
The from-mobile message is submitted via an AT command that contains a number of parameters. These parameters are shown in Figure 3.

As per Figure 3, the host must assign an *outgoing message name* to all from-mobile messages that are submitted for transmission. The outgoing message name is an eight character ASCII string. It is the host's responsibility to ensure that the outgoing message name is unique. If a new message is submitted with the same name as a stored message, the modem rejects the new message.

The host can use the outgoing message name to reference the message and either check the message status or delete the message before it starts transmission. The outgoing message name is not transmitted to the Gateway.

As per Figure 3, once the modem starts to send a message, the IsatData Pro network assigns a *network reference number*. The network reference number is in the form aa.ss, where aa is a message number and ss is a sequence number. For diagnostic purposes, the network reference number is also available on the Gateway so that numbers can be compared.

Figure 3 From-Mobile AT Command Parameters

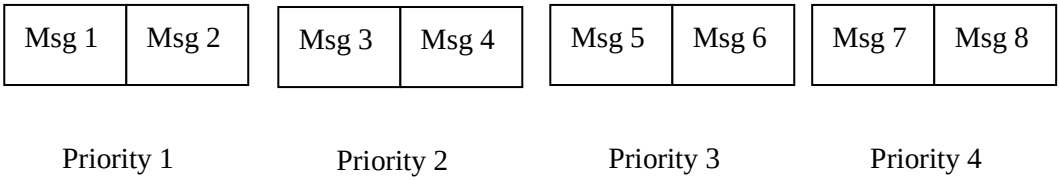


2.3.1.1 Priority

The host can specify up to four priorities when submitting a from-mobile message (Figure 3). The priority field is not transmitted to the Gateway. The modem selects the message with the highest priority from the message queue to transmit.

The modem can deliver up to eight messages (Figure 4), or two for each priority in the Tx Sending state. Once a message is in the Tx Sending state, it cannot be deleted, although a higher priority message can be submitted.

Figure 4 Priority Messages



The modem always gives priority to the high priority message when selecting the next message fragment to transmit. However, if there are network slots available for a lower priority message, the modem interleaves this message to maximize the network resources. The number of network slots available for low priority messages depends on message size, coding rate and the number of outstanding acknowledgements at any one time.

A high priority does not guarantee that the message is delivered before a lower priority message. As the modem can process up to eight messages at once time, a low priority message may arrive before a high priority message depending on its length and number of message retries.

If the host wants to ensure a priority message transmission, it is recommended to use priority levels appropriately.

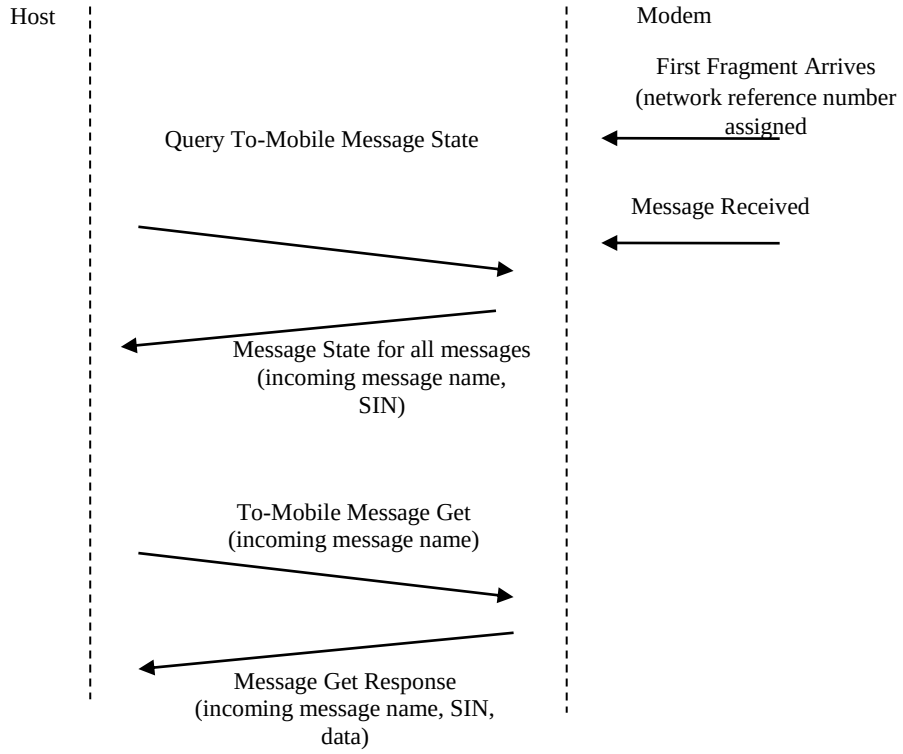
2.3.2 To-Mobile Messages

Figure 5 describes the message flow for a to-mobile message. Like the from-mobile messages, to-mobile messages are sent as a sequence of message fragments.

The IDP modem creates an *incoming message name* based on the network reference number. The modem receives the network reference number and the message length in the first packet. As the incoming message name is based on the network reference number, it is in the form FMaa.ss*n* where aa.ss is the network reference number and *n* is a number assigned by the modem. In most cases *n* is absent. However, if the message partition contains an older message with a matching network reference number, *n* is incremented.

The host does not send an unsolicited message when a to-mobile message is received. If the host does not use the hardware notification (Section 2.6), the host can poll the to-mobile message state (Figure 5) to determine if there are new un-retrieved messages. AT commands can be used to obtain a list of un-retrieved messages, or all messages stored in the message buffer. The number of messages in the list could be as large as the maximum number of messages stored in the message buffer.

Figure 5 To-Mobile Message AT Command Parameters



2.4 On-board Memory

The modem has internal volatile and non-volatile flash memory (4 MB) to store the following:

- Satellite Messages
- Network Configuration
- S Registers

Internally, the modem uses a file system that partitions the available storage into pre-allocated files of different sizes. All files are stored with a CRC to ensure that the integrity of all data stored in the flash. By pre-allocating files, the effect of a single corrupted file is isolated to that file only and does not propagate throughout the file system. The file system also ensures that single flash memory locations are not continually overwritten. The allocation of files from flash memory storage and the individual flash memory pages are written using a wear-leveling technique to maximize the 100,000 write cycle life of each flash memory page.

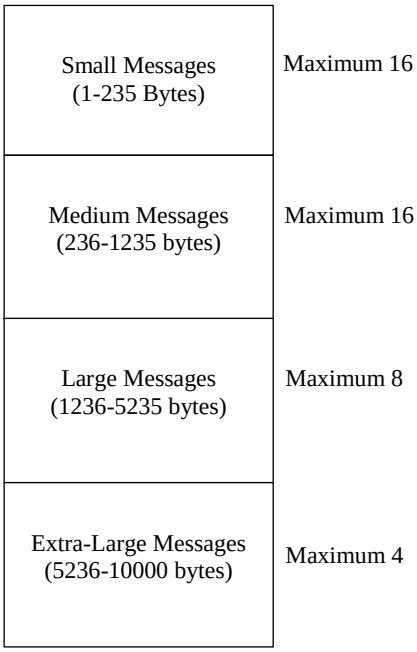
From the user perspective the file system is transparent – the modem does not provide file access commands. Instead, the modem provides specific AT commands to access customer data stored in flash.

2.4.1 Satellite Messages

The modem stores all non-modem messages in non-volatile storage. All non-modem messages survive power-up and reset. From-mobile messages are stored non-volatile memory; to-mobile messages are stored in non-volatile memory once they are full received.

In order to maximize the number of stored messages, satellite messages are stored in four separate partitions based on the message's size. There is a partition for small, medium, large and extra-large messages. Both to-mobile and from-mobile messages are stored in the same partition (Figure 6) based on their size.

Figure 6 Message Partitions



The message partitioning (Figure 6) ensures a conservative flash lifetime of 5 years (Table 1) when the modem sends or receives up to 1 MB of data a month. The number of writes is calculated from the maximum manufacturer's flash writes per sector (i.e., 100,000) times the number of message partitions.

Table 1 Maximum Flash Size

	Extra Large Message (5250 bytes)	Large Message (1250 bytes)	Medium Message (250 Bytes)
Number Writes	500,000	800,000	1,600,000
Writes per month (assume 5 year life)	8000	13,000	44,000
Data per month	4 MB	> 1.6 MB	> 1.1 MB

If the intended partition is full, the modem attempts to store the new message in a larger partition. The modem solely manages how it allocates messages to individual message partitions. As such, the modem does not report the partition where messages are stored, and it does not report the amount of available memory in any given partition.

If the larger partitions are not available for immediate reuse, the new message is discarded. The modem transmits a *protocolError* message that notifies the Gateway that the message was received but discarded. As the message is discarded, it is critical that the host application read to-mobile messages and not fill the partitions full of from-mobile messages in order to ensure that any incoming to-mobile message is not discarded.

On power-up, all stored from-mobile messages, regardless of age, are transmitted by the modem. This includes messages that may have been partially transmitted before a reset or power down occurred.

2.4.2 Network Configuration

The modem automatically updates its network configuration file when it receives new information on the IsatData Pro bulletin board. The contents of this file are for internal modem use.

2.4.3 S Registers

Some S registers are configuration settings that are persistent during power down and stored in non-volatile memory. These S registers are stored files in the serial flash memory.

On power-up and reset, the non-volatile S registers from the serial flash are automatically loaded into the modem. AT commands can be used to temporary modify the current active S registers. An AT command is provided that can copy the current active S registers into flash storage.

If an S register file is corrupted, or non-existent, the factory S register defaults are loaded into the current active S registers instead.

2.5 Trace Table

The modem stores a trace table in non-volatile memory. The trace table is a fixed length table that contains a row entry for each key event. When a key event occurs, the trace record is updated. The trace records are intended for advanced modem users to help them diagnose problems with the assistance of SkyWave Customer Support.

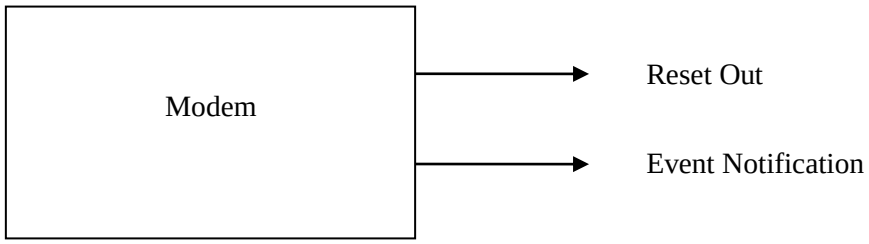
The trace records can be extracted from the trace table using either AT commands or by going into trace log mode.

Trace logs are described in more detail in Section 6.

2.6 Modem Outputs

As per Figure 7, the modem has two general purpose outputs that are under modem firmware control. The hardware characteristics of these two outputs are defined in [T201].

Figure 7 Modem General Purpose Outputs



2.6.1 Reset Out

Reset out can be asserted by sending an over-the-air modem message. Reset out is a pulsed signal with a fixed 1millisecond duration.

2.6.2 Event Notification

Event Notification is asserted by the modem depending on the status of a number of configurable conditions. These conditions are defined by an S register and stored in non-volatile memory. Table 2 defines the configurable condition and its trigger condition. The data fields for the reset conditions are defined in the S register definition.

All trigger conditions are automatically released when the event notification indicator [T201] status register is read. Once the event notification condition is read, a new trigger condition automatically asserts the event notification output. Once the condition is set, it is necessary to confirm that the trigger condition was not set directly prior. For example, if the event notification condition is set to trigger the output, the modem should first check if there is a new incoming message.

Table 2 Configurable Conditions

Condition	Trigger Condition
Event Notification	New incoming satellite messages, modem reset, new GPS position or transmit compete
GPS Position	A new GPS fix obtained
Modem Reset	Mobile has reset. A reset includes the power up
Modem Registered	Modem registered
Message Transmit Complete	A new message is complete. Complete includes both success and failure

2.7 GPS

The satellite modem and GPS share a common receiver.

The GPS may operate in different modes. Some applications may only request intermittent GPS fixes in order to operate with minimum power. Other applications may need continuous GPS fixes and not be concerned with minimizing power consumption.

2.7.1 GPS Request Sources

The modem, the host and a modem message can independently turn on the GPS and initiate a single GPS fix.

2.7.1.1 Satellite Modem

The IDP modem initiates a GPS fix in following cases

- On startup or reset to determine its operating beam
- At least every 12 hours to confirm any IsatData Pro transmit timing offsets due to the position of the satellite

If a GPS fix is obtained due to an AT command or other trigger, the satellite modem may delay its request for a GPS fix.

2.7.1.2 AT Command

An AT command for a GPS fix does not necessarily turn on the GPS. If the modem previously obtained a GPS fix within the specified stale time that GPS fix is used. If there is no previous fix with the stale time, the modem turns on the GPS and starts to get a GPS fix. The stale time is the maximum acceptable age for a GPS position. For example, if the stale time is 5 minutes, the modem uses a previous GPS fix if it was obtained within the last 5 minutes.

The AT command's wait time parameter specifies the time for the AT command to wait for a GPS fix - it does not specify the time the GPS stays on waiting for a fix. Once an AT command initiates a GPS fix, the AT command cannot turn off the GPS. The GPS remains on until one of the following occurs:

- The modem gets a GPS fix
- A 3-minute timeout (if the wait time is shorter than 3 minutes)
- The modem reaches the wait time as specified (if the wait time is longer than 3 minutes)

2.7.1.3 Over-the-Air Request

A GPS fix can be initiated by a modem message that requests a position report. When this modem message is received, the modem acknowledges the message. The modem turns on the GPS; attempts to get a GPS fix and transmit a modem message containing a GPS report. If a GPS fix is not obtained, the returned modem message contains an invalid GPS position.

2.7.2 GPS Fix Type

If the modem requests a GPS fix to get a position for system purposes, the GPS fix must be a 3D fix.

If a user requests a GPS fix using an AT command, the GPS normally waits for the first 3D fix. However, if the modem only has a partial view of the sky, only a 2D fix may be possible. In this case, a 2D fix report is used if a 3D fix is not available after the wait time expires. The wait time is the time specified by the AT command to wait for a GPS fix.

2.7.3 GPS Fix Times

The GPS can perform both warm and cold start GPS. A warm fix is always attempted.

2.7.4 Satellite Transmit Effects

The GPS shares the antenna with the satellite modem. When the modem transmits long bursts as when it sends from-mobile message, a GPS fix cannot be obtained. However, it can obtain a GPS fix when it is transmitting acknowledgements for to-mobile messages.

Note: ***The modem allows simultaneous GPS and message transmission providing the GPS is able to update its ephemeris data at least every four hours.***

2.8 Broadcast Messages

A broadcast message is a message that is sent to a *broadcast ID* that is programmed into multiple modems. Each modem can have up to 16 different broadcast IDs. The OEM Integrator is responsible to configure the set of beams where the broadcast message is transmitted.

Note: ***The OEM Integrator cannot configure the broadcast IDs on the modem. The broadcast IDs must be configured by SkyWave at either the factory or over-the-air.***

3 Over-the-Air Interface

The Gateway can either send messages to individual modems or can broadcast to multiple modems.

3.1 Message Lengths

All messages, both to-mobile and from-mobile, consist of a data block and a length. Maximum message sizes are given in Table 3. The lengths shown include the Service Identification Number (SIN) and the Message Identification Number (MIN), if a MIN was specified.

Table 3 Message Lengths

Description	Length (bytes)
From-Mobile	1- 6400
To-Mobile	1-10,000

3.2 Message Types

The first byte of both to-mobile and from-mobile messages defines the message type. The first byte is the SIN. The SIN identifies the message type. There are three message types as defined in Table 4.

Table 4 Message Types

Description	SIN (Hex)	SIN (Decimal)
Modem	0x00 – 0x0F	0 – 15
Terminal Core Services	0x10 – 0x7F	16 – 127
User Services	0x80 – 0xFF	128 – 255

The second byte of a message is the MIN. The MIN is defined based on the SIN. Only MIN for the modem message is relevant as the modem passes through the terminal core services and user services messages.

3.2.1 Modem Messages

The modem directly initiates and responds to all incoming modem messages. Modem messages do not require any interaction from an external host application. Consequently, all to-mobile modem messages are not delivered to the host.

Some modem messages are available to the customer at the Gateway others are reserved for system use. The reserved messages are used to update IsatData Pro parameters such as bulletin board frequencies and beam regions definitions. A list of the user visible modem messages are listed in Table 5 and Table 6. Refer to APPENDIX B and APPENDIX C for further details.

Incoming modem messages allow the IsatData Pro network to update the modem and retrieve diagnostic information.

Table 5 To-Mobile Modem Messages

Modem Message	SIN	MIN	Description
reset	0	68	Message data in message indicates type of reset. Modem can reset the host using a dedicated output
setSleepSchedule	0	70	Sets a low power modem's wake up interval
setTxMute	0	71	Disables modem transmissions but modem still sends registration messages
getPosition	0	72	Polls for a position report
getConfiguration	0	97	Same data as the modem registration message
pingRequest	0	112	Echo of the message
pingResponse	0	113	Echo of the message
getBroadcastIDs	0	115	Request for a list of broadcast IDs

Table 6 From-Mobile Modem Messages

Modem Message	SIN	MIN	Description
modemRegistration	0	0	Response include the modem's configuration and reset cause
protocolError	0	2	Modem error cause
sleepSchedule	0	70	Sent in response to change in sleep schedule
position	0	72	Sent in response to a position request
configuration	0	97	Same data as the modem registration message
pingResponse	0	112	Echo of the response
pingRequest	0	113	Echo of the response
testMessage	0	114	The network requires a quality test, no payload delivery
broadcastIDs	0	115	Sent in response to a request for broadcast IDs

3.2.2 Terminal Core Services

Terminal core service messages are passed through the modem to the host application. These messages are reserved for SkyWave IDP terminals.

3.2.3 User Services

User service messages are passed through the modem to the host application. These are message types host applications can use to send and receive data over the IsatData Pro network.

4 Serial Modes

On startup the modem can optionally enter a boot loader mode. The boot loader mode supports modem firmware updates.

After startup, the modem supports the following operational modes

- AT Command Mode
- Trace Log Mode

4.1 Mode Switches

The boot loader mode is a special startup mode. It can only be entered after reset if a special command sequence (<Ctrl>B<Ctrl>B) is received.

After reset, the modem enters one of the configured operating modes. By default the modem enters AT command mode. However, the user can configure the startup mode to use any startup mode.

Trace mode exits to AT command mode when <Enter> is pressed.

4.1.1 Baud Rate

On reset, the modem defaults to following serial port settings

Rate: 9600 bits/s
Data bits: 8
Stop bits: 1
Parity: none
Flow control: none

In AT command mode the baud rate can be configured and saved.

On exit from AT command mode to another mode, the modem does not change baud rates. It continues to use the baud rate as defined by the AT command.

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5 AT Command Mode

In AT command mode, data is interpreted as commands to the modem. While in AT command mode, the modem receives, processes, and responds to AT commands.

This section describes the AT command syntax and the AT commands and responses. For convenience the AT commands are split into the following groups

- Basic command set (non-S register commands)
- S register command set
- Extended command set
- SkyWave-proprietary command set

A complete list of all AT commands is found in APPENDIX A.

5.1 Syntax Definition

5.1.1 Conventions

The following definitions apply:

<cr> Command line termination character. Its value is specified in register S3.

<lf> Response formatting character. Its value is specified in register S4.

<…> Items enclosed in angle brackets indicate a syntactical element. The actual element appears on the command line rather than the angle brackets.

[...] Indicates optional items. Brackets themselves do not appear in the command line.

| Indicates *or*. E.g., <data>|<length> indicates that one of data or length must be specified.

The examples in this document intentionally omit <cr> and <lf>.

5.1.2 Command Rules

The IDP 100 series modems follow the basic AT command rules below:

- At commands must begin with either AT or at, although the rest of the command can be a mix of upper and lowercase.
- Several commands can be combined in a single command line using ";" to delimit extended commands and SkyWave-proprietary extended commands. It is not mandatory to delimit basic commands.
- If a numerical parameter in a basic command is not entered, it is assumed to be zero.
- Whitespace in commands is ignored.

5.1.3 AT Command General Format

A command line is a string of characters sent from a host to the IDP modem while the mode is in a command state. A command line has three elements: the *prefix*, the *body*, and the *termination character*.

Commands to the modem are *prefixed* with `AT` or `at`.

The *body* is made up of individual commands and their optional parameters, specified later in this document, and terminated by the command line *termination character* (defined in register S3, default = 13 (ASCII carriage return)).

Multiple commands can be included in one command line, extended commands and SkyWave-proprietary extended commands must be delimited by ";". It is not mandatory to delimit basic commands.

Examples:

- Disable Echo:

  `ATE0` or

  `atE0` or

  `ate` or

  `ATE000` or

  `AT E 0` or

  `at e`

- Request identification information, model information, and revision information:

  `ATI+GMM;+GMR` or

  `ati0;+GMM;+gmr;` or

  `at I +gmm; +gmr`

5.1.3.1 Command Line Editing

A command line can be edited with the command line editing character (defined in register S5, default = 8 (ASCII backspace)).

The IDP modem first checks characters from the host to see if they match the termination character (register S3) and then the editing character (register S5) before checking for other characters. This ensures that these characters are properly recognized even if they are set to values that the IDP modem uses for other purposes. If registers S3 and S5 are set to the same value, a matching character is treated as matching register S3.

5.1.3.2 Command Line Echo

The IDP modem may echo characters received from the host during command state back to the host depending on the setting of the E command.

5.1.3.3 Repeating a Command Line

The IDP modem immediately executes the command when it receives the prefix `A/` or `a/`.

5.1.3.4 AT Response Format

The format of the response is dependent upon the current quiet setting (Q command) and the verbose setting (V command).

The syntax of information responses and result codes for the different verbose settings is as follows (where <cr> and <lf> represent the ASCII characters configured in registers S3 and S4 respectively):

Table 7 Effect of V Parameter on Response Formats

	V0	V1
Information Responses	<text><cr><lf>	<cr><lf><text><cr><lf>
Result Codes	<numeric code><cr>	<cr><lf><verbose code><cr><lf>

When the quiet setting is enabled (via Q1), the result code is suppressed. No portion of any result code (header, result text, line terminator, or trailer) is transmitted.

When using the quiet and verbose setting defaults (Q0 & V1), and register S3 and S4 defaults, the response to an AT command line comprised of multiple commands is:

```
<cr><lf><command 1 Information Response><cr><lf>
…
<cr><lf><command n Information Response><cr><lf>
<cr><lf><Verbose Result Code><cr><lf>
```

Example:

Command	AT i +GMM
Response	<cr><lf>SkyWave Mobile Communications<cr><lf><cr><lf>+GMM:IsatData Pro - Modem
	<cr><lf><cr><lf>OK<cr><lf>

On a serial interface, the dialogue would appear as follows:

```
AT i +GMM
SkyWave Mobile Communications

+GMM: IsatData Pro - Modem

OK
```

5.1.3.5 Error Detection

The integrity of AT command lines and responses can be ensured via Cyclic Redundancy Checks (CRC).

When error detection is enabled, the IDP modem requires a CRC sequence at the end of each AT command line to allow verification of the command line data before the command line is executed. When error detection is enabled, a CRC sequence follows AT responses to allow verification of the response data by the host.

The AT command line CRC sequence is comprised of the CRC prefix character (stored in register S64), default character is "*", followed by four ASCII-Hex digits. The value of the command line CRC includes all command line characters starting with A or a (of the leading AT or at) up to the character that precedes the CRC prefix character, including any spaces or delimiters (;). E.g. for ATS5?*2FBD, 2FBD is the CRC of ATS5?.

The AT response CRC sequence is comprised of the CRC prefix character (stored in register S64), followed by four ASCII-Hex digits, and <cr> and <lf> (where <cr> is

the register S3 value, and <lf> is the register S4 value). The value of the response CRC, includes the characters of all information responses, and result code, including their formatting (<cr> and <lf>) characters. E.g., in verbose (V1), the response with CRC sequence to ATS5?*2FBD<cr> is:

<cr><lf>008<cr><lf><cr> <lf>OK<cr><lf>*DC04<cr><lf>

The CRC used is the CRC-16-CCITT with initial value 0xFFFF.

Error detection is enabled or disabled via the %CRC command.

The following exemplifies CRC sequences associated with AT command lines (denoted by bold) and corresponding responses (using the default value * as the CRC prefix character):

```
ATI*FD97
SkyWave Mobile Communications

OK
*A293
```

```
ATS5?*2FBD
008

OK
*DC04
```

```
ATIS5?*1A3D
SkyWave Mobile Communications

008

OK
*8E41
```


5.2 Transfer Mode

While in transfer mode, the IDP modem transfers data via the XMODEM–CRC protocol using block sizes of 128 bytes.

Entry into transfer mode may occur via the %MGFG and %MGRT commands.

Exit from transfer mode occurs once the XMODEM transfer is complete or times out.

The information exchange of an AT command that supports transfer mode is structured as in Table 8.

Table 8 AT Command Information Exchange

Order	Host Sends	IDP Modem Sends
1	AT Command	-
2	-	Information response
3	XMODEM blocks	XMODEM ACKs/NAKs
4	-	Result code

5.3 Basic Command Set

The format of the basic command set is either a single character or the & character followed by an optional single character. The basic AT commands supported are described in Table 9.

Table 9 Basic Commands Supported

Command	Description	Parameter
E	Echo	[<value>]
I	Request Identification Information	[<value>]
Q	Quiet	[<value>]
S	S Registers	-
V	Verbose	[<value>]
Z	Load Current Configuration with NVM Stored Values	[<value>]
&F	Load Current Configuration with Factory Default Values	[<value>]
&V	Display Current and Stored Configuration	[<value>]
&W	Store Current Configuration to NVM	[<value>]
Null	Null Command	-
A/	Repeat Last Command (no leading AT or trailing <cr>)	-

5.3.1 E – Echo

Description	Echo The echo command defines if the IDP modems echo characters received from the host in command state. As the parameter is stored in an S register, this setting can be made non-volatile if the S registers are saved.
Parameters	None|0 – Disabled 1 – Enabled
Information Response	-

5.3.2 I – Request ID

Description	Request identification information
Parameters	None(0)|0 – Manufacturer name 3 – Modem firmware revision 4 – Product description 5 – AT protocol version 6 – Modem hardware revision 8 – Modem firmware build timestamp
Information Response	None(0)|0 – SkyWave Mobile Communications 3 – E.g., 3.2 4 – E.g., IDP-180 5 – E.g., 1 6 – E.g., 2.0 8 – E.g., Mar 4 2011 10:21:45

5.3.3 Q – Quiet

Description	Quiet [2] mode (suppress Result Codes)
Parameters	None|0 – Disabled 1 – Enabled
Information Response	-

5.3.4 V – Verbose

Description	Verbose[2] setting (ResultCode:numeric|textual)
Parameters	None|0 – Disabled 1 – Enabled
Information Response	-

5.3.5 Z – Load Saved Values

Description	Load current configuration with stored values
Parameters	None(0)|0

5.3.6 &F – Load with Factory Default Values

Description	Load current configuration with factory default values
Parameters	None(0)|0 (factory defaults)
Information Response	-

[2] Setting is stored in an S register so any change becomes non-volatile (persist reset or power cycle) when S registers are stored via the &W command.

5.3.7 &V – Display Configurations

Description	Display current and stored configurations
Parameters	None(0)|0
Information Response	Current and stored S register values

5.3.8 &W – Save Configuration

Description	Store the current configuration. Configuration includes all the modem's S registers
Parameters	None(0)|0
Information Response	-

5.3.9 Null Command

Description	Null command
Parameters	None
Information Response	-

5.3.10 A/ – Repeat Last Command

Description	Repeat last command The modem immediately executes the body of the preceding command line when it receives the prefix `A/` or `a/`.This command is issued without the leading `AT` or trailing <cr>, no CRC required when error detection is enabled.
Parameters	None
Information Response	-

5.4 S Register Commands

5.4.1 Command Format

S register commands are described in Table 10.

Table 10 S Register Command Format

Command[3]	Description	Parameter
ATSn	Direct S register reference (e.g., ATS4). Sets the current register for subsequent operations until another S register is referenced, read, or written.	Sn
ATSn?	Direct S register read. Reads the value of the register (e.g., ATS4?)	Sn?
ATSn=<value>	Direct S register write. Sets the value of the register where the new value is a decimal value in the range of the minimum value and maximum value (Table 11) (e.g., ATS4=8).	Sn=<value>
AT?	Referenced S register read. A question mark (?) is used to read the value of the current S register. The current register is the one that was most recently acted upon by a direct reference, write or read command (e.g., AT?).	?
AT=<value>	Referenced S register write. An equal sign (=) is used to write a value to the current S register. The current register is the one that was most recently acted upon by a direct reference, write or read command (e.g., AT=8).	=<value>

S registers are used to configure various AT command related values, and other (non AT command related) values.

5.4.2 S Register Types

Different sizes of S registers exist. S registers can be 1, 8, 16, or 32 bits in size and can contain unsigned or signed values. S registers can be read/write or read-only.

There are two types of S registers. They are used to

- Store configuration parameters
- Provide modem status and configuration parameters

All S registers that map to configuration parameters have factory default values. The modem allows users to change and save the factory defaults. Once configuration data is changed, the settings are only temporary (i.e., do not survive power down) until all new settings are explicitly saved to nonvolatile memory. The saved S registers from non-volatile memory are loaded on every reset.

The factory default values of S registers can be loaded by the user to restore the modem to its factory configuration. The factory default values are also used by the modem if the stored configuration parameters cannot be read from non-volatile memory (e.g., are corrupted).

5.4.3 S Register Definitions

Table 11 lists the S register definitions.

[3] n represents the number of the S register.

Table 11 S Registers

S Register	Description	Size (bits)	Read Only	Non-Volatile	Min. Value	Max. Value	Default Value
S04	*Auto answer (on number of rings) 0 –Disabled*	*8*	*N*	*Y*	*0*	*255*	*0*
S3	Command line termination character	8	N	Y	1	127	13 (<cr>)
S4	Response formatting character	8	N	Y	0	127	10 (<lf>)
S5	Command line editing character	8	*N*	Y	0	127	8 (<BS>)
S6[4]	Pause before blind dialing	8	N	Y	0	255	0
S7[4]	*Connection completion timeout*	*8*	*N*	Y	*0*	*255*	*0*
S8[4]	*Comma dial modifier time*	*8*	*N*	Y	*0*	*255*	*0*
S10[4]	*Automatic disconnect delay*	*8*	*N*	Y	*0*	*255*	*0*
S50	Power Mode	8	N	Y	0	9	0
S51	Wake-up Interval	8	N	Y	0	6	0
S60	Echo	1	Y	Y	0	1	1
S61	Quiet	1	Y	Y	0	1	0
S62	Verbose	1	Y	Y	0	1	1
S63	CRC	1	Y	Y	0	1	0
S64	Prefix character of CRC sequence	8	N	Y	-	255	42 ("*")
S80	Last error code	8	Y	N	-	-	0
S81	Most recent result code	8	Y	N	-	-	0
S85	Temperature (signed)	16	Y	N	-	-	-
S88	Event Notification Control	8	N	Y	0	255	0
S89	Event Notification Status	8	N	N	-	-	-
S90	Capture Trace Define - Class	8	N	Y	0	7	0
S91	Capture Trace Define - Subclass	8	N	Y	0	31	0
S92	Capture Trace Define - Initiate	1	N	N	-	-	-
S93	Captured Trace Property - Data Size	32	Y	N	-	-	-
S94	Captured Trace Property - Signed Indicator	32	Y	N	-	-	-
S95	Captured Trace Property - Mobile ID	32	Y	N	-	-	-
S96	Captured Trace Property - Timestamp	32	Y	N	-	-	-
S97	Captured Trace Property - Class	32	Y	N	-	-	-
S98	Captured Trace Property - Subclass	32	Y	N	-	-	-
S99	Captured Trace Property - Severity	32	Y	N	-	-	-
S100	Captured Trace Data 0	32	Y	N	-	-	-
S101	Captured Trace Data 1	32	Y	N	-	-	-
…	…	…	…	…	…	…	…
S123	Captured Trace Data 23	32	Y	N	-	-	-

[4] S registers S0, S6, S7, S8 and S10 are supported for V.250 compatibility only. Their values can be read and written, but no actions are taken.

5.4.4 S3 – Command Line Terminator

Description

Configure the command line termination character.

Syntax

`ATS3=<terminator>`

See Table 10 for other command formats

Parameters

A decimal number ranging from 1 to 127

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.5 S4 – Response Formatting Character

Description

Configure the response formatting character.

Syntax

`ATS4=<formattingchar>`

See Table 10 for other command formats

Parameters

A decimal number ranging from 0 to 127

Note: When set to 0, no response formatting characters are generated

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.6 S5 – Command Line Editing Character

Description

Configure the command line editing character.

Syntax

`ATS5=<editingchar>`

See Table 10 for other command formats

Parameters

A decimal number ranging from 0 to 127

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.7 S50 – Power Mode

Description

Configure the power mode setting.

Syntax

`ATS50=<powermodesetting>`

See Table 10 for other command formats

Parameters

0	Mobile powered terminal
1	Fixed position powered terminal
2	Mobile battery operated terminal
3	Fixed position battery operated terminal
4-9	Reserved

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.8 S51 – Wake-up Interval

Description

Set the wake-up interval for a terminal.

Syntax

`ATS51=<wakeupinterval>`

See Table 10 for other command formats

Parameters

0	5 second receives
1-2	Reserved
3	3 minute receives
4	10 minute receives
5	30 minute receives
6	60 minute receives

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.9 S60 – Echo Setting (S60)

Description

Echo setting as configured by the ATE command.

Syntax

```
ATS60?
```

Information Response Syntax

```
<echoSetting>
```

0 Disabled
1 Enabled

Result Codes

OK

Success

5.4.10 S61 – Quiet Setting

Description

Quiet setting as configured by the ATQ command.

Syntax

```
ATS61?
```

Information Response Syntax

```
<quietSetting>
```

0 Disabled
1 Enabled

Result Codes

OK

Success

5.4.11 S62 – Verbose Setting

Description

Verbose setting as configured by the ATV command.

Syntax

```
ATS62?
```

Information Response Syntax

```
<verboseSetting>
```

0 Disabled
1 Enabled

Result Codes

OK

Success

5.4.12 S63 – CRC Setting

Description

Cyclic Redundancy Check setting as configured by the %CRC command.

Syntax

```
ATS63?
```

Information Response Syntax

```
<crcSetting>
```

0 Disabled
1 Enabled

Result Codes

OK

Success

5.4.13 S64 – Prefix Character of CRC Sequence

Description

Prefix character of CRC sequence, used when error detection is enabled via the %CRC command.

Syntax

`ATS64=<crcPrefix>`

See Table 10 for other command formats

Parameters

A decimal number ranging from 0 to 255

Information Response Syntax

None

Result Codes

OK

Success

ERROR

5.4.14 S80 – Last Error Code

Description

Returns the last error code.

Syntax

`ATS80?`

Information Response Syntax

Returns the last error code (refer to Table 15) that was generated by an AT command

Result Codes

OK

Success

ERROR

5.4.15 S81 – Most Recent Result Code

Description

Configure the recent result code.

Syntax

```
ATS81?
```

Information Response Syntax

Returns the code for the last AT command (refer to Table 15). The code is either OK or an error reason.

Result Codes

OK

Success

ERROR

5.4.16 S85 – Internal Temperature

Description

This command reports the modem's internal temperature.

Syntax

```
ATS85?
```

Information Response Syntax

```
<temp>
```

Parameters

A signed decimal number in tenths of degrees Celsius

Result Codes

OK

Success

ERROR

Example

Value returned corresponding to a temperature of 20.5 degrees C

```
ATS85?
205
```


5.4.17 S88 – Event Notification Control

Description

This command sets and returns the conditions that cause the assertion of the Event Notification hardware signal [T201].

Syntax

```
ATS88?
```

See Table 10 for other command formats

Information Response Syntax

```
<eventBitMap>
```

Parameters

An unsigned number of Boolean flags (0=false, 1= true) if condition

Bit 00 – New GPS fix
Bit 01 – New message received
Bit 02 – Transmit completed (either success or failure)
Bit 03 – Modem registered on network
Bit 04 – Modem reset
Bits [05…07] – Reserved

Result Codes

OK

Success

ERROR

Example

Enable assertion of Event Notification on a new GPS fix, new incoming message and modem reset.

```
ATS88=19
OK
```

5.4.18 S89 – Event Notification Assert Status

Description

This command returns a bit map of status conditions that result in the assertion of Event Notification hardware signal [T201]. A status condition must be both enabled and active to report as true.

When the register is read or written, all status conditions are automatically cleared.

Syntax

```
ATS89?
```

See Table 10 for other command formats

Parameters

None

Information Response Syntax

<eventBitMap>

Parameters

Bit 00 – New GPS fix
Bit 01 – New Message Received
Bit 02 – Transmit completed (either success or failure)
Bit 03 – Modem registered on network
Bit 04 – Modem reset
Bits [05…07] – Reserved

Result Codes

OK

Success

ERROR

Example

Modem status indicates that a new to-mobile message has been received and that this event is asserting the hardware Event Notification signal.

```
ATS89?
2
OK
```


5.4.19 S90, S91, S92 – Capture Trace Define

Description

This command set configures a trace class and subclass. Once class and subclass are configured, the trace tables are searched for the most recent match trace record. If a match is found, the trace record is copied to the captured report.

The captured report can then be obtained by reading S93…S123 (when the Result Code is OK).

Syntax

`ATS90=n S91=m S92=p`

See Table 10 for other command formats

Parameters

`n` – Trace record class (Table 17)
`m` – Trace record subclass (Table 17)
`p` – 1 to trigger a trace record capture

Information Response Syntax

None

Result Codes

OK

Success

ERROR

Example

The trace tables are searched for a satellite status general event (Class 3, Subclass 1). The OK response indicates that a trace record was found and moved to the capture record.

```
ATS90=3 S91=1 S92=1
OK
```

The following command attempts to capture a trace record for a satellite event. The ERROR response indicates that there is no matching trace record in the logs.

```
ATS90=3 S91=1 S92=1
ERROR
```

Trace log information can also be obtained via %EVNT. When the value 1 is written to S92, the most recent trace log information corresponding to the class specified in S90 and subclass specified in S91, is captured in S93...S123. The AT command result code is *OK* if the trace log information was successfully captured (i.e., trace log information corresponding to the specified class and subclass existed), or *ERROR* otherwise.

5.4.20 S93 – Captured Record Properties - Length

Description

This command returns the number of valid data fields in the capture trace record. The size identifies the number of valid S registers used to hold the capture record data.

Syntax

```
ATS93?
```

Information Response Syntax

```
<size>
```

Parameters

A decimal number of size 0 to 24

Result Codes

OK

Success

ERROR

5.4.21 S94 – Captured Record Properties - Data Sign

Description

This command returns a 32 bit value that contains a bitmap to identify if each data record in the capture record is signed or unsigned. S93 reports the data size and the number of valid bits reported by S94. The first bit (bit 00) corresponds to the first capture record data longword located in S100.

Syntax

```
ATS94?
```

Information Response Syntax

```
<signedBitMap>
```

Result Codes

OK

Success

ERROR

5.4.22 S95 – Captured Record Properties - Network ID

Description

This command returns the modem's network ID.

Syntax

```
ATS95?
```

Information Response Syntax

```
<NetworkID>
```

Parameters

24 bit decimal value

Result Codes

OK

Success

ERROR

5.4.23 S96 – Captured Record Properties - Timestamp

Description

This command returns the timestamp for the event. The timestamp does not include the day, month, or year.

Syntax

```
ATS96?
```

Information Response Syntax

```
<timestamp>
```

Parameters

A decimal number containing UTC hour, minute and second

Bits [00…07] – Seconds (0…59)
Bits [08…15] – Minute (0…59)
Bits [16…22] – Hour (0…23)
Bits [23…31] – Reserved

Result Codes

OK

Success

ERROR

5.4.24 S97, S98 – Captured Trace Properties - Class/Subclass

Description

This command set returns the class and subclass for the trace record captured in the capture trace.

Syntax

```
ATS97? ATS98?
```

Information Response Syntax

<class>

A decimal number identifying the class of the trace record captured. It is same as value defined by S90.

<subclass>

A decimal number identifying the subclass trace record captured. It is same value as defined by S91.

Result Codes

OK

Success

ERROR

5.4.25 S99 – Captured Trace Properties - Severity Level

Description

This command returns the severity level assigned to the captured trace record.

Syntax

```
ATS99?
```

Response Syntax

<severity>

1 Critical
2 Major
3 Minor
4 Information

Result Codes

OK

Success

ERROR

5.4.26 S100, S101, …S123 – Captured Trace Data - Index

Description

This command set returns the data for the captured trace record. A trace record contains a maximum of 24 data values. S register 93 defines how many data values in the command set are valid. The first data value is in S register 100. Some of the data register can be signed values. The bitmap in S register 94 must be queried to determine the sign of a particular data index.

Syntax

```
ATS100? S101? S102?…S123?
```

Response Syntax

<dataValue100>

A decimal number. It can be signed or unsigned

<dataValue101>

A decimal number. It can be signed or unsigned

……

<dataValue123>

A decimal number. It can be signed or unsigned

Result Codes

OK

Success

ERROR

5.4.26.1 Trace Log Information Retrieval via S Registers Example

The number of messages currently being transmitted and the total number of transmit messages (active + waiting) can be obtained by

Writing class = 3 to S90
Writing subclass = 1 to S91
Triggering the event capture by writing 1 to S92
Reading S109 to obtain the number of messages currently being transmitted, and
Reading S110 to obtain the total number of transmit messages as follows:

```
at s90=3 s91=1 s92=1 s109? s110?
0000000002

0000000002

OK
```

To repeat this command, the class and subclass S registers are already configured and can be omitted from the AT command:

```
at s92=1 s109? s110?
0000000001

0000000001

OK
```

Repeat the previous command:

```
a/
0000000000

0000000000

OK
```

5.5 Extended Commands

Extended commands are prefixed by a plus sign (+). The supported formats of extended AT commands are shown in Table 12.

Table 12 Extended Command Formats

Extended Command Format	Syntax	Description
Execution	+<name> or +<name>=[<value|compared_value>]	Execute command that has no parameters or optional parameters. Execute command that has parameters.
Read	+<name>?	Determine current value(s) of parameter(s)
Test	+<name>=?	Determine command support and parameter range(s).

Table 13 Extended AT Commands

Command	Description	Parameters	Information Response
+GCAP	Request complete capabilities list	None	+GCAP:
+GMI	Request manufacturer identification (e.g., SkyWave Mobile Communications)	None	+GMI: SkyWave Mobile Communications
+GMM	Request model identification (e.g., IsatData Pro - Modem)	None	+GMI: IsatData Pro – Modem
+GMR	Request revision identification (e.g., 1.000)	None	+GMR: <firmware revision>, <hardwareRevision>, <ATprotocolRevision>
+GSN	Request product serial number identification (also referred to as Mobile ID) (e.g., 00000032SKY6EDD)	None	+GSN: <serNo>
+IPR	Baud Rate	1200|2400|4800| 9600|19200	+IPR: <baudRate>

5.6 SkyWave-Proprietary Extended Commands

SkyWave-proprietary extended commands are prefixed with *%*.

The various formats of SkyWave-proprietary extended commands are similar to the extended command formats listed in Table 12.

Note that in addition to the command syntax shown below, the *Test* syntax of %<command>=? can be used to query the support of the command and its parameter ranges.

Table 14 SkyWave-Proprietary Extended Commands

Command	Description	Parameters
%CRC	Error Detection	=<value>
%EVNT	Event Log Get	=<class>,<subclass>
%EXIT	Exit Command	=<value>
%GPS	Get GPS Information	=<staleSecs>,<waitSecs>[,"GGA"][,"RMC"]
%MGFG	To-Mobile Message Get	="<fwdMsgName>",<dataFormat>
%MGFM	To-Mobile Message Rx Retrieved	="<fwdMsgName>"
%MGFN	To-Mobile Message New	[="<fwdMsgName>"]
%MGFS	To-Mobile Message State	[="<fwdMsgName>"]
%MGRC	From-Mobile Message Cancel	="<msgName>"
%MGRS	From-Mobile Message State	[="<msgName>"]
%MGRT	From-Mobile Message Send	="<msgName>",<priority>,<sin>[.<min>],<dataFormat>,<data>|<length>
%SREG	View all S Registers	-
%UTC	Display UTC Date and Time	-

5.6.1 %CRC – Error Detection

Description

This command sets or queries the error detection setting.

The error detection setting is stored in an S register so any change becomes non-volatile (persists reset or power-cycle) when S registers are stored via the `&W` command.

Syntax

```
%CRC=<value>
```

Parameters

`<value>`

0 Disable error detection
1 Enable error detection

Example

```
AT%CRC=1
AT%CRC=0*BBEB
at%crc=0*1749
```

Information Response Syntax

None

Result Codes

OK

Success

ERROR

Invalid parameter

Syntax

```
%CRC?
```

Information Response Syntax

`%CRC:0`

Error detection disabled

`%CRC:1`

Error detection enabled

Result Codes

OK

Success

5.6.2 %EVNT – Event Log Get

Description

Get the most recent Event Log information for the specified class and subclass. Trace log information can also be obtained via S registers.

Syntax

```
%EVNT=<class>,<subclass>
```

Parameters

`<class>`

Event log class (Table 17)

`<subclass>`

Event log subclass (Table 17)

Information Response Syntax

```
%EVNT: <dataCount>,<signedBitmask>,<NetworkID>,
<timestamp>,<class>,<subclass>,<priority>,<data0>,
<data1>,…,<dataN>
```

Parameters

`<dataCount>`

Number of event data values (corresponding to specified event class/subclasses)

`<signedBitmask>`

0 Unsigned
1 Signed
Bit 0 corresponds to <data0>, bit N corresponds to <dataN>

`<NetworkID>`

First eight characters of the modem's Mobile ID

`<timestamp>`

Bits [00…07] – Seconds (0…59)
Bits [08…15] – Minute (0…59)
Bits [16…22] – Hour (0…23)
Bits [23…31] – Reserved

`<class>`

Refer to Table 17

`<subclass>`

Refer to Table 17

`<priority>`

1 Critical
2 Major
3 Minor
4 Information

<data0>,<data1>,…,<dataN>

Class/subclass specific event data. Refer to Table 16, and Table 19 to Table 30.

<dataCount> indicates how many data values are present for the corresponding class/subclass.

<signedBitmask> indicates whether the data longword should be interpreted as an unsigned or signed value.

Result Codes

OK

Event log information successfully obtained (event log corresponding to the specified class and subclass exists)

ERROR

Invalid class and/or subclass specified, or event log corresponding to the specified class and subclass does not yet exist

5.6.3 %EXIT – Exit Command

Description

This command exits the AT command processor and starts a different proprietary serial protocol.

Syntax

`%EXIT=<value>`

Parameters

Number indicates what protocol to invoke upon exit of AT command mode.

`<value>`

1	AT command mode
2 - 4	Reserved
5	Streaming trace log interface

Information Response Syntax

None

Result Codes

OK

Success

ERROR

Invalid parameter

5.6.4 %GPS – Get GPS Information

Description

This command requests NMEA sentence(s). If GPS information no older than <staleSecs> is available, the response is immediate. Otherwise, the response can take up to <waitSecs>.

Syntax

%GPS=<staleSecs>,<waitSecs>[,"GGA"][,"RMC"]

Parameters

<staleSecs>

Age threshold of GPS fix (range 1…600)

<waitSecs>

Duration to wait for new GPS fix (when a GPS fix no older than staleSecs is unavailable) (range 1…600)

"GGA"

Request GGA NMEA sentence

"RMC"

Request RMC NMEA sentence

Note: "GGA" and/or "RMC" must be specified.

Information Response Syntax

%GPS: <GGA NMEA Sentence (if requested)>

<RMC NMEA Sentence (if requested)>

Example

```
%GPS: $GPGGA,182008.00,4520.2015,N,07554.2787,W,1,,,80.8,M,,,*10
$GPRMC,182008.00,A,4520.2015,N,07554.2787,W,000.019,357.43,041110,*39
```

Result Codes

OK

GPS information was obtained

ERROR

GPS information within age limit of <staleSecs> is unavailable and fresh GPS information not obtained within <waitSecs>, parameter out of range, or syntax error

No information response exists when result code is ERROR.

5.6.5 %MGFG – To-Mobile Message Get

Description

This command obtains the data of a specific to-mobile message.

The <dataFormat> parameter specifies whether the data is presented in text format bounded by double-quote (") characters, ASCII-Hex format, Base64 (MIME) format, or via transfer mode.

When text format is specified, ASCII data is bounded by double-quote (") characters, although the following special characters are represented by a backslash (\) character followed by two hexadecimal digits representing the special character's ASCII value: 00..1F,22("),5C(\),7F..FF (all values are in hexadecimal).

When transfer mode is specified, transfer mode is entered after the information response to exchange the data (and AT command mode automatically resumes once the data exchange is complete).

The maximum length of a to-mobile message is 10,000 bytes, including the SIN byte and the MIN byte.

Syntax

```
%MGFG="<fwdMsgName>",<dataFormat>
```

Parameters

<fwdMsgName>

The to-mobile message name reported by %MGFS or %MGFN

<dataFormat>

0 Transfer mode to be entered after information response to transfer message data (and AT command mode automatically resumes once the data transfer is complete)
1 Text format message data (bounded by double-quote (") characters) included in information response
2 ASCII-Hex format message data included in information response
3 Base64 (MIME) encoded message data included in information response

Information Response Syntax

```
%MGFG:"<fwdMsgName>",<msgNum>,<priority>,<sin>,
<state>,<length>,<dataFormat>[,<data>]
```

Parameters

<fwdMsgName>

See above for details

<msgNum>

Message number in the form aa.ss where aa is the system assigned 2-digit message number and ss is the system assigned 2-digit message sequence number

<priority>

Always 0 for to-mobile messages

<sin>

Service identification number

<state>

2 Rx Completed (Entire message received and available, but not yet read)
3 Rx Retrieved (Message has been retrieved/read (via %MGFG) and message data is still available)

<length>

Total message length in bytes (including SIN byte and MIN byte)

<dataFormat>

0 Transfer mode to be entered after information response to transfer message data (and AT command mode automatically resumes once the data transfer is complete)
1 Text format message data (bounded by double-quote (") characters) included in information response
2 ASCII-Hex format message data included in information response
3 Base64 (MIME) encoded message data included in information response

<data>

Message data, formatted as specified by

<dataFormat>

See above for details

Example

The examples below all represent identical message (with message data ¡Olé!)

Text Example:

```
%MGFG="FM31.63",1
%MGFG: "FM31.63",31.63,0,17,2,6,1,"\AD0l\82!"
```

ASCII-HEX Example:

```
%MGFG="FM31.63",2
%MGFG: "FM31.63",31.63,0,17,2,6,2,AD4F6C8221
```

Base64 Example:

```
%MGFG="FM31.63",3
%MGFG: "FM31.63",31.63,0,17,2,6,3,rU9sgiE=
```

Block mode Example:

```
%MGFG="FM31.63",0
%MGFG: "FM31.63",31.63,0,17,2,6,0  (then obtain AD4F6C8221 via transfer)
```


Result Codes

OK

To-mobile message corresponding to `<fwdMsgName>` exists

ERROR

Otherwise

5.6.6 %MGFM – To-Mobile Message Rx Retrieved

Description

This command changes the state of a to-mobile message from Rx Completed to Rx Retrieved. This allows the message space to be reused for future messages without retrieving the message via the %MGFG command.

Syntax

`%MGFM="<fwdMsgName>"`

Parameters

`<fwdMsgName>`

The to-mobile name as reported by `%MGFS` or `%MGFN`

Information Response Syntax

None

Result Codes

OK

To-mobile message corresponding to `<fwdMsgName>` exists

ERROR

Otherwise

5.6.7 %MGFN – To-Mobile Message New

Description

This command is similar to the %MGFS command, but only lists messages that have not been retrieved (via %MGFG) nor marked as Rx Retrieved (via %MGFM). It may be used to query the state of all Completed to-mobile messages (when ="<fwdMsgName>" is omitted, or ="" is specified), or a specific to-mobile message (when ="<fwdMsgName>" is specified). When ="<fwdMsgName>" is omitted, the response includes all to-mobile messages with the state Completed.

Syntax

```
%MGFN[="<fwdMsgName>"]
```

Parameters

<fwdMsgName>

The to-mobile message name in the form FMaa.ss where aa is the active message number and ss is the system assigned 2-digit message sequence number. An empty string ("") denotes all to-mobile messages.

If a to-mobile message is received with the same active message number and message sequence number as an existing message, the existing message is deleted if its state is Rx Retrieved, and the new message is saved with the name of the deleted message.

If the existing message has not been read (state is Completed), the new message is saved with a name using the format FM*aa.ssx* where *x* is a character (a to z) that supports a message with a unique fwdMsgName.

Information Response Syntax

```
%MGFN:
"<fwdMsgName>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>
```

or

```
%MGFN:
"<fwdMsgName1>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>

"<fwdMsgName2>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>

...

"<fwdMsgNameN>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>
```

Parameters

<fwdMsgName>

The to-mobile name in the form FMaa.ss where aa is the 2-digit active message number and the ss is the 2-digit message sequence number

<msgNum>

Message number in the form active message number followed by '.' And message sequence number

<priority>

Always 0 for to-mobile messages

<sin>

Service identification number

<state>

2 Rx Completed (Entire message received and available, but not yet read)

<length>

Total message length in bytes (including SIN byte and MIN byte)

<bytesRxd>

Number of bytes received (including SIN byte and MIN byte)

Note: <cr><lf> are used to delimit multiple messages.

Result Codes

OK

If all to-mobile messages were specified (via %MGFN or %MGFN="") even if no Completed to-mobile messages exists, or a match was found when a specific msgName was specified (via %MGFN="<fwdMsgName>").

ERROR

Match not found when a specific msgName was specified (via %MGFN="<fwdMsgName>"), or a syntax error

5.6.8 %MGFS – To-Mobile Message State

Description

This command queries the state of a specific to-mobile message (when ="<fwdMsgName>" is specified), or all current to-mobile messages (when ="<fwdMsgName>" is omitted or ="" is specified). Current messages include to-mobile messages with state Completed or with state Rx Retrieved that have not yet been automatically deleted (to make room for new messages).

Syntax

```
%MGFS[="<fwdMsgName>"]
```

Parameters

<fwdMsgName>

The to-mobile message name in the form FMaa.ss where aa is the system assigned 2-digit message number and ss is the system assigned 2-digit message sequence number. An empty string ("") denotes all to-mobile messages.

If a to-mobile message is received with the same active message number and message sequence number as an existing message, the existing message is deleted if its state is Rx Retrieved, and the new message is saved with the name of the deleted message.

If the existing message has not been read (state is Completed), the new message is saved with a name using the format FM*aa.ssx* where *x* is a character (a to z) that supports a message with a unique fwdMsgName.

Information Response Syntax

```
%MGFS:
"<fwdMsgName>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>
```

or

```
%MGFS:
"<fwdMsgName1>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>

"<fwdMsgName2>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>

…

"<fwdMsgNameN>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesRxd>
```

Parameters

<fwdMsgName>

The to-mobile message name in the form FMaa.ss where aa is the system assigned 2-digit message number and ss is the system assigned 2-digit message sequence number

`<msgNum>`

Message number in the form aa.ss where aa is the system assigned 2-digit message number and ss is the system assigned 2-digit message sequence number

`<priority>`

Always 0 for to-mobile messages

`<sin>`

Service identification number

`<state>`

2 Rx Completed (Entire message received and available, but not yet read)

3 Rx Retrieved (Message has been retrieved/read (via `%MGFG`) and message data is still available)

`<length>`

Total message length in bytes (including SIN byte and MIN byte)

`<bytesRxd>`

The number of bytes received (including SIN byte and MIN byte)

Note: <cr><lf> are used to delimit multiple messages.

Result Codes

OK

If all to-mobile messages were specified (via `%MGFS` or `%MGFS=""`) even if no to-mobile messages exist, or a match was found when a specific `msgName` was specified (via `%MGFS="<fwdMsgName>"`)

ERROR

Match not found when a specific `msgName` was specified (via `%MGFS="<fwdMsgName>"`), or syntax error

5.6.9 %MGRC – From-Mobile Message Cancel

Description

This command cancels a specific from-mobile message with a state of Tx Ready.

Syntax

`%MGRC="<msgName>"`

Parameters

`<msgName>`

Message name specified in the corresponding `%MGRT` command

Information Response Syntax

None

Result Codes

OK

Message successfully cancelled

ERROR

Otherwise

5.6.10 %MGRS – From-Mobile Message State

Description

This command queries the state of a specific from-mobile message (when <msgName> is specified), or all from-mobile messages (when =<msgName> is omitted or ="" is specified). When <msgName> is omitted, the response includes all current from-mobile messages. Current from-mobile messages include messages with state Tx Ready, Tx Sending, Tx Completed, or Tx Failed. Messages with status Tx Completed or Tx Failed are deleted when they are reported by the %MGRS command. This command reports current messages created via the %MGRT command.

Syntax

```
%MGRS[="<msgName>"]
```

Parameters

<msgName>

From-mobile message name specified in the corresponding %MGRT command. If empty string ("") or omitted all current from-mobile messages are requested.

Information Response Syntax

```
%MGRS:"<msgName>",<msgNum>,<priority>,<sin>,
<state>,<length>,<bytesAcknowleged>
```

or

```
%MGRS: "<msgName1>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesAcknowleged>

"<msgName2>",<msgNum>,<priority>,<sin>,<state>,
<length>,<bytesAcknowleged>

…

"<msgNameN>",<msgNumN>,<priority>,<sin>,<state
<length>,<bytesAcknowleged>
```

Parameters

<msgName>

From-mobile message name specified in the corresponding %MGRT command

<MsgNum>

From-mobile message number in the form aa.ss where aa is the system assigned 2-digit message number and ss is the system assigned 2-digit message sequence number. Note that the from-mobile message number is reported as 0.0 until a valid number is assigned.

<priority>

A range from 1 to 4, where

1 High
2 -
3 -
4 Low

<sin>

Service identification number (1…255)

<state>

4 Tx Ready (Ready to transmit)
5 Tx Sending (Transmission in progress)
6 Tx Completed (Transmission complete and successful)
7 Tx Failed (Transmission failed)

<length>

Total message length in bytes (including SIN byte and MIN byte)

<bytesAcknowleged>

The number of message bytes acknowledged by the gateway (including SIN byte and MIN byte)

Result Codes

OK

If all from-mobile messages were specified (via %MGRS or %MGRS="") even if no from-mobile messages exist, or a match was found when a specific msgName was specified (via %MGRS="<msgName>")

ERROR

Match not found when a specific msgName was specified (via %MGRS="<msgName>"), or syntax error

5.6.11 %MGRT – From-Mobile Message Send

Description

This command sends a from-mobile message from the IDP modem to the gateway.

The <dataFormat> parameter specifies whether the data is processed as text format bounded by double-quote (") characters, ASCII-Hex format, Base64 (MIME) format, or via transfer mode.

For text format, any character value may be included in the string bounded by double-quote (") characters by representing it as a backslash (\) character followed by two hexadecimal digits. For example, "\0D" is a string consisting of a single ASCII carriage return character, and "\ADOl\82!" is the string ¡Olé!. If the backslash (\) character itself is to be represented in a string, it shall be encoded as "\5C". The double-quote character, used as the beginning and ending string delimiter, shall be represented within a string constant as "\22".

When transfer mode is specified, <length> is specified (instead of <data>), and transfer mode is entered after the information response to exchange the data (and AT command mode automatically resumes once the data exchange is complete).

When an (optional) MIN is specified, it is prepended to the message data.

The maximum number of from-mobile messages is 6,400 bytes; including the SIN byte and the MIN byte, if a MIN is specified.

Syntax

```
%MGRT="<msgName>",<priority>,<sin>[.<min>],<dataFormat>,
<data>|<length>
```

Parameters

<msgName>

User-specified from-mobile message name, maximum 8 characters, used by the IDP modem only and not sent to the gateway. The msgName must be unique and not match any previously submitted msgName.

<priority>

1 High
2 -
3 -
4 Low

<sin>[.<min>]

Service identification number (16…255), optionally followed by "." And message identification number (0…255)

<dataFormat>

0 Transfer mode to be entered after information response to transfer message data (and AT command mode automatically resumes once the transfer is complete)
1 Text format message data (bounded by double-quote (") characters) included in information response
2 ASCII-Hex format message data included in information response
3 Base64 (MIME) encoded message data included in information response

<data>

See <dataFormat> above. Text bounded by double-quote (") characters, ASCII-Hex, Base64 (MIME) encoded, omitted for transfer mode. The <data> field can be a maximum of 6398 bytes if the (optional) MIN is specified, or 6399 bytes if the (optional) MIN is not specified.

<length>

Number of valid data bytes to be exchanged via transfer mode (note that 128 byte blocks are used, and that data beyond <msgLen> bytes in the last block are discarded)

Information Response Syntax

None

Result Codes

OK

Message successfully added

ERROR

Otherwise

Example

All of these commands represent identical messages.

Text Example:

```
%MGRT="TestMsg",2,128.0,1,"Hello!"
```

Text Example:

```
%MGRT="TestMsg",2, 128.0,1,"Hello\21"
```

Text Example:

```
%MGRT="TestMsg",2, 128,1,”\00Hello\21”
```

ASCII-HEX Example:

```
%MGRT="TestMsg",2, 128.0,2,48656C6C6F21
```

ASCII-HEX Example:

```
%MGRT="TestMsg",2, 128.0,2,48656c6c6f21
```

ASCII-HEX Example:

```
%MGRT="TestMsg",2, 128,2,0048656c6c6f21
```

Base64 Example:

```
%MGRT="TestMsg",2, 128.0,3,SGVsbG8h
```

Block mode Example:

```
%MGRT="TestMsg",2, 128.0,0,6 (then send Hello! Via block mode)
```


5.6.12 %SREG – View all S Registers

Description

This command displays the current and NVM values and attributes of all S registers in table format.

Syntax

```
%SREG
```

Parameters

-

Information Response Syntax

Multi-line table of all S registers

Result Codes

OK

Success

5.6.13 %UTC – Display UTC Date and Time

Description

This command is used to obtain the current UTC date and time.

Syntax

```
%UTC
```

Parameters

-

Information Response Syntax

```
%UTC:<yyyy>-<mm>-<dd> <hh>:<mm>:<ss>
```

Result Codes

OK

Success

ERROR

UTC unavailable

Example

```
AT%UTC
%UTC: 2011-10-27 18:20:25
```

5.7 Error Result Codes

The error result codes that follow information responses are listed in Table 15. Error codes greater than 100 apply to SkyWave proprietary AT commands.

Table 15 Response Result Codes

Verbose Result Code (ATV1)	Numeric Result Code (ATV0)	Description
OK	0	Acknowledges execution of a command
ERROR	4	Command not recognized, command line maximum length exceeded, parameter value invalid, or other problem with processing the command line
	100[5]	Invalid command line CRC sequence
	101[5]	Unknown command encountered in command line
	102[5]	Invalid command parameter encountered
	103[5]	Message length exceeds permitted size for specified data Format
	104[5]	Transfer mode error occurred
	105[5]	System error
	106[5]	Insufficient resources
	107[5]	Message name already in use
	108[5]	Timeout occurred
	109[5]	Unavailable

[5] ERROR (or numeric code 4) is returned for this code. Register S80 and S81 are populated with a SkyWave-proprietary numeric result code to help identify the reason for the ERROR result code.

6 Trace Log Mode

Traces are sent to a trace table in volatile memory. A new trace record overwrites an old trace record of the same type. In trace log mode, the traces are also sent to the host.

Each trace record field is displayed as lines of comma delimited fields. All fields are show in decimal format.

6.1 Trace Log Mode Commands

<Enter> exits trace log mode.

6.2 Trace Types

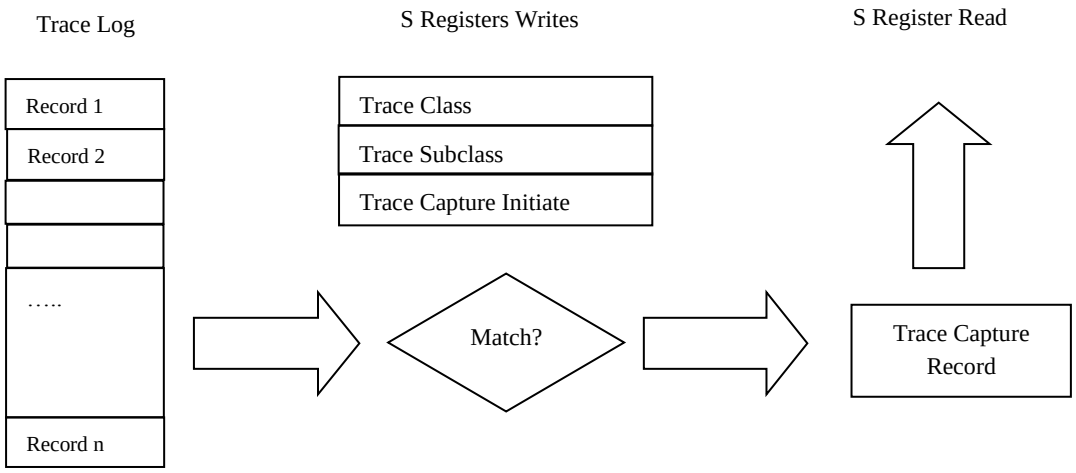
The modem stores trace records of key events in a trace table. The key events can be grouped in the following classes.

- Hardware Faults
- System Events
- Satellite Events
- GPS Events
- Message Events

6.3 AT Command Access

The AT commands have access to the trace log file. Using S registers the AT command can select a specific trace log class that it wants to read. Once the record type is selected, the modem copies the newest matching record into a trace capture record. S registers, that map into each field of the trace capture record can then be used to read the requested record.

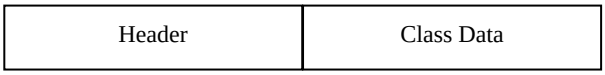
Figure 8 Trace Log



6.4 Trace Record Format

Trace records consist of a common header followed by class specific data.

Figure 9 Trace Record Format



6.4.1 Trace Record Header

The common header format for all trace records is shown in Table 16.

Table 16 Common Trace Log Information

Name	Description	Size (bytes)
Captured trace data count	Number of populated captured trace data S registers (corresponding to captured trace class/subclass)	4
Captured trace signed bitmask	0 – Unsigned 1 – Signed Bit 00 corresponds to S100, bit 23 corresponds to S123	4
Captured Network ID	The first characters of the modem's Mobile ID	4
Captured Trace timestamp	Bits [00…07] – Second (0...59) Bits [08…15] – Minute (0...59) Bits [16…22] – Hour (0...23) Bits [23…31] – Reserved	4
Captured Trace class	See Table 17	1
Captured Trace subclass	See Table 17	1
Captured Trace Severity	1 – Critical 2 – Major 3 – Minor 4 – Information	1

The header contains the class and subclass numbers. The definition for trace class and subclasses are defined in Table 17. Refer to Section 5.4.19 for an explanation of how S registers map to trace classes.

Table 17 Trace Class and Subclasses

Class		Subclass	
No.	**Name**	**No.**	**Name**
1	Hardware Fault Event	-	-
2	System Event	1	Reset
		2	Low power
3	Satellite Event	1	Status (for every successful receive)
		2	Transmit status (for every transmit)
		3	Beam acquire
		4	Beam (beam search result)
		5	Geo adjust
		6	Beam sample
		16	Receive metrics – Subframe block
		17	Receive metrics – Minute
		18	Receive metrics – Hour
		19	Receive metrics – Day
		20	Transmit metrics – Subframe block
		21	Transmit metrics – Minute
		22	Transmit metrics – Hour
		23	Transmit metrics – Day
4	GPS Event	1	Fix statistics (when a fix is received by the GPS server)
		2	Status (when GPS server changes its state)
5	Message Event	1	Receive message statistics
		2	Transmit message statistics
		3	Transmit message utilization

6.4.2 Class Data

A trace record consists of a block of 24, 32-bit data entries. Not all the data indices in the class specific block contain data. The number of data indices containing valid data is defined by the first data entry in the trace header.

Table 18 Trace Data

Name	Description	Size (bytes)
Trace Data 0	Data specific to trace record	4
Trace Data 1	Data specific to trace record	4
…	…	…
Trace Data 23	Data specific to trace records	4

6.5 Trace Class Definitions

6.5.1 System Reset Event Traces (Class 2)

Table 19 Reset Trace Record (Class 2, Subclass 1)

Data Index	Name	Description
0	ResetReason	Micro-controller reset reason 0 – Unknown 1 – Power on 2 – External 3 – Brownout 4 – Watchdog 5 – Debug 6 – Software 7 – Spike
1	HwVer	Hardware version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
2	RelVer	Release version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
3	BootVer	Micro-controller boot version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
4	ApplVer	Micro-controller application version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
5	DspBootVer	DSP boot version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
6	DspApplVer	DSP application version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved
7	DspDbVer	DSP ROM database version Bits [00-07] – Minor Bits [08-15] – Major Bits [16-31] – Reserved

Table 20 Low Power Trace Record (Class 2, Subclass 2)

Data Index	Name	Description
0	Low Power Event Type (see table below for additional details)	1 – Sleep request 2 – Wake up for scheduled receive 3 – Wake up for timeout 4 – Other Wake up
1	Current System Time	Current operating system clock time
2	Current Wake-up Period	Configured wake-up period: 0 – Off 1 – Reserved 2 – Reserved 3 – 3 min 4 – 10 min 5 – 30 min 6 – 60 min
3	Current Power Profile	Configured power profile: 0 – Mobile powered 1 – Fixed powered 2 – Mobile battery 3 – Fixed battery
4	Rx Wake-up Time	Operating system clock time for scheduled receive wake up (0 if none)
5	Beam Search Wake-up Time	Operating system clock time for scheduled beam search
6	GPS Wake-up Time	Operating system clock time for scheduled GPS fix

If Low Power Event Type = 1	
7	Last receive time
8	Requested sleep time
If Low Power Event Type = 2	
7	Current subframe
8	Scheduled subframe
9	Wake-up margin
If Low Power Event Type = 4	
7	Sleep requested flag
8	Reacquire beam

6.5.2 Satellite Event Traces (Class 3)

Table 21 Satellite General Status Trace Record (Class 3, Subclass 1)

Data Index	Name	Description
0	Subframe Number	Received subframe number
1	VC ID	Traffic channel ID
2	Configuration ID	Received configuration ID
3	Beam Number	Received beam number
4	Reserved	Reserved
5	System Information Packet Access	Transmit access level from the System Information Packet
6	Network Access Level	Transmit access level configured by the network operator
7	Customer Access Level	TransmitMute configured by customer
8	Transmit Suspended	True if transmit suspended (for beam change, etc.)
9	Number of Active Transmit Messages	Number of active messages currently being transmitted
10	Number of Total Transmit Messages	Total number of messages (active + waiting)
11	Number of Active Transmit Jobs	Number of outstanding transmit packets
12	Transmit State	Transmit State: 0 – Active 1 – Suspending 2 – Suspended (for GPS management or required GPS fix)
13	Number of Active Receive Messages	Number of messages being received
14	Averaging Window	Size of main adjacent beam samples window. Used for beam switching
15	Averaging Count	Current number of main adjacent beam samples. Used for beam switching.
16	C/N x 100	Current average main beam C/N (C/N x 100)
17	Beam Sample Threshold	Threshold for enabling background beam sample
18	Beam Sample Timer	Current value of beam search enable timer
19	Flags	General system activity flags: 0x001 – Registered 0x002 – Sending beam change notification 0x010 – Beam search enabled 0x020 – Need beam sample 0x040 – Beam switch pending 0x100 – GPS valid 0x200 – Need GPS fix 0x400 – GPS fix requested
20	GPS State timer	Duration that modem network services has gone without a GPS fix
21	Reserved	Reserved
22	Satellite Control State	Satellite control state: 0 – Stopped 1 – Waiting for GPS 2 – Starting search 3 – Beam search 4 – Beam found 5 – Beam acquired 6 – Beam switch in progress

Data Index	Name	Description
		7 – Registration in progress 8 – Receive only 9 – Receiving global bulletin board 10 – Active
23	Beam Search State	Beam search state: 0 – Idle 1 – Search for any traffic channel 2 – Search for the last acquired traffic channel 3 – Reserved 4 – Search for another traffic channel ID 5 – Search for a global traffic channel 6 – Delay the traffic channel search 7 – Delay the last acquired traffic channel search 8 – Search for a traffic channel better than the current one

Table 22 Transmit Status Trace Record (Class 3, Subclass 2)

Data Index	Name	Description
0	Status	Transmit status: 0 – Accepted 1 – Acknowledgement received 2 – No acknowledgement received 3 – Fail 4 – Unable to send (lost signal) 5 – Unable to send (priority or Tx disabled/suspended) 6 – Missed Acknowledgement (acknowledged subframe not received) 7 – Modem error
1	Channel Type	Channel type: 0 – Half second channel 1 – Once second even channel 2 – One second odd channel 3 – Small packet channel 4 – Acknowledgement channel
2	Subframe Time	Transmit subframe
3, 4	Reserved	Reserved
5	Message Type	Modem message type
6	Reserved	Reserved
7	Slot	Slot (for quarter second packets or acknowledgments)
8	Modem Return Code	Modem return code
9	Message Number	Message number
10	Packet Type	Packet type: 0 – Acknowledgement 1 – Transmit data half second coding rate (0P33) 2 – Transmit data half second coding rate (0P50) 3 – Transmit data half second coding rate (0P75) 4 – Transmit data half second coding rate (0P95) 5 – Transmit data one second coding rate (0P33) 6 – Transmit data one second coding rate (0P50) 7 – Transmit small packet
11	Packet Size	Packet size
12	Packet Index	Packet index
13	Sequence Number	Packet sequence number
14	Priority Packet	Priority packet
15	First Packet	First packet (0/1)
16	Retry Send	Retry flag (0/1)
17	Acknowledgement Subframe	Expected acknowledgement subframe
18	Acknowledgement Bitmask	Expected acknowledgement bitmask

Table 23 Satellite Acquire Trace Record (Class 3, Subclass 3)

Data Index	Name	Description
0	Subframe Number	Received subframe number
1 to 15	Reserved	Reserved

Table 24 Satellite Beam Status Trace Record (Class 3, Subclass 4)

Data Index	Name	Description
0	Beam Success	True if beam found
1	Return Code	Modem return code
2	Subframe	Subframe where beam found (0 if unsuccessful)
3	Reserved	Reserved
4	Latitude	Geographic position of the modem. Latitude degrees *100
5	Longitude	Geographic position of the modem. Longitude degrees * 100
6	SF Number	Sub-frame number from SIP
7	VC ID	Traffic channel ID from SIP
8	Config ID	Configuration ID from SIP
9	Beam No	Beam number from SIP
10	BHP ID	Beam hop pattern ID from SIP
11	SF Offset	Subframe offset from SIP
12	Freq Offset	Frequency offset *100
13	Time Offset	Time offset in mS
14	UW Strength	Signal strength of unique word
15	UW C/No	C/No of unique word * 100
16	UW Berr	Bit error in unique word
17	UW Bits	Number of bits in unique word

Table 25 Satellite Geographic Adjust (Class 3, Subclass 5)

Data Index	Name	Description
0	VC ID	Traffic channel ID from SIP
1	Config ID	Configuration ID from SIP
2	Geo Beam ID	-
3	Coverage Definition	-
4	Latitude	Geographic position of the modem. Latitude degrees *100
5	Longitude	Geographic position of the modem. Longitude degrees * 100
6	Sat Longitude	Geographic longitude of the satellite
7	Latency	Latency in Ms
8	FL offset	Forward link offset
9	Coding Rate	Return link coding rate

Table 26 Satellite Event Log Data (Class 3, Subclass 6)

Data Index	Name	Description
0	rc	modem return code
1	switchbeams	1 if a beam switch will occur 0 if not
2	VC ID	Traffic channel ID from SIP of background beam
3	Config ID	Configuration ID from SIP of background beam
4	Beam No	Beam number from SIP of background beam
5	BHP ID	Beam hop pattern ID from SIP of background beam
6	Avg C/No Curr	Average C/No of current beam * 100
7	Avg C/No Bgr	Average C/No of background beam * 100
8	Beam switch delta	Difference of current and background bean C/No
9	Count	Number of samples in average
10	Access Level	Current network access level
11	Latitude	Geographic position of the modem. Latitude degrees *100
12	Longitude	Geographic position of the modem. Longitude degrees *100

Table 27 Rx Metrics Trace Record (Class 3, Subclass 16)

Data Index	Name	Description
0	Success	Successful receive
1	Subframe Number	Subframe number of this receive
2	Beam Number	Beam number
3 to 8	Reserved	Reserved
9	Number Packet Symbols	Number of packet symbols in this receive
10	Number Packet Errors	Number of packet errors
11	C/N	C/N (x100)
12	Number Packets Detected	Number of packets decoded

The Rx metrics are defined below. Rx metrics are reported as accumulated totals over the last full minute, last full hour and last full day. The average values can be calculated by dividing the totals by the number of samples. The subclasses for the Rx metrics are:

- Last Full Minute - Subclass 17
- Last Full Hour - Subclass 18
- Last Full Day - Subclass 19

Table 28 Rx Metrics Trace Record (Class 3, Subclass 17, 18 and 19)

Data Index	Name	Description
0	Total C/N	Accumulated C/N (x100)
1	Total Error Rate	Accumulated error rate (x100)
2	Total UW Error Rate	Accumulated unique word error rate (x100)
3	Total Receives	Count of completed receive requests
4	Total Receive OK	Count of receives with good CRC
5	Number Samples	Number of samples (for accumulated stats)
6	Total Receive Fail	Number of failed receive requests (no signal or modem error)

Example:

The Full Hour Receive Metrics show the following values, each of which is the sum of the individual sample values times 100:

totCNO = 3122952
totChErrRate = 23
totUWErrRate = 2

The number of receives (samples) is:

totReceives = 688
totReceiveOK = 688
numSamples = 688
totReceiveFail = 0

The average values are calculated by dividing each total by the `numSamples` value times 100 (68800).

avg C/N0 = 3122952/68800 or 45.4 dBHz.
avg Channel Error Rate = 23/68800 or 3.3 x 10e-4
avg. UW Error Rate = 2/68800 or 2.9 x 10e-5

The Tx metrics counts are reported over the last full minute, last full hour and last full day. A subclass is provided to support each Tx metrics type.

- Last Full Minute - Subclass 21
- Last Full Hour - Subclass 22
- Last Full Day - Subclass 23

Table 29 Tx Metrics Trace Record (Class 3, Subclass 20, 21 and 22)

Data Index	Name	Description
0	Tx Packets Sent[Acknowledgements]	Number of packets of each type
1	Tx Packets Sent[type 1] half second .33	
2	Tx Packets Sent[type 2] half second .5	
3	Tx Packets Sent[type 3] half second .75	
4	Tx Packets Sent[type 4] half second .94	
5	Tx Packets Sent[type 5] one second .33	
6	Tx Packets Sent[type 6] one second .5	
7	Tx Packets Sent[type 7] small packet	
8	Tx Packets Success [Acknowledge]	Number of successful packets of each type
9	Tx Packets Success [type 1] half second .33	
10	Tx Packets Success [type 2] half second .5	
11	Tx Packets Success [type 3] half second .75	
12	Tx Packets Success [type 4] half second .94	
13	Tx Packets Success [type 5] one second .33	
14	Tx Packets Success [type 6] one second .5	
15	Tx Packets Success [type 7] small packet	
16	Tx Packets Lost [Acknowledge]	Number of lost packets of each type
17	Tx Packets Lost [type 1] half second .33	
18	Tx Packets Lost [type 2] half second .5	
19	Tx Packets Lost [type 3] half second .75	

Data Index	Name	Description
20	Tx Packets Lost [type 4] half second .94	
21	Tx Packets Lost [type 5] one second .33	
22	Tx Packets Lost [type 6] one second .5	
23	Tx Packets Lost [type 7] small packet	

6.5.3 GPS (Class 4)

Table 30 GPS Fix Statistics Trace Record (Class 4, Subclass 1)

Data Index	Name	Description
0	Current Fix Type	Current fix type: 1 – 2D 2 – 3D
1	Latitude	Latitude x 600,000
2	Longitude	Longitude x 600,000
3	Date	Encoded as a decimal number e.g. 20101225 for 2010/12/25
4	Time to First Fix	Time to first fix (ms)
5	Current Fix Elapsed Time	Elapsed time since start of session (seconds)
6 to 23	Reserved	Reserved

Table 31 GPS Status Trace Record (Class 4, Subclass 2)

Data Index	Name	Description
0 to 5	Reserved	Reserved
6	Current Fix Valid	Valid fix: 0/1
7	Current Fix Age	Current fix age (seconds)
8	Current Fix Type	Current fix type: 1 – 2D 2 – 3D
9	Current Fix Elapsed Time	Current fix elapsed time (Ms)
10	Current Latitude	Current latitude x 600000
11	Current Longitude	Current longitude x 600000
12	Reserved	Reserved
13	Previous Latitude	Previous latitude x 600000
14	Previous Longitude	Previous longitude x 600000
15	Request Fix Type	Request fix type: 0 – None 1 – 2D 2 – 3D
16	Request Stale Time	Request stale time (seconds)
17	Request Wait Time	Request wait time (seconds)
18	Reserved	Reserved

6.5.4 Receive Message (Class 5)

Table 32 Receive Message Trace Record (Class 5, Subclass 1)

Data Index	Name	Description
0 to 5	Reserved	Reserved
6	SIN	Message control block message service identification number
7, 8	Reserved	Reserved

Table 33 Transmit Message Trace Record (Class 5, Subclass 2)

Data Index	Name	Description
0	Reserved	Reserved
1	Error	0 – None 1 – Unknown type 2 – Too large 3 – No message number available 4 – Service not available 5 – No data 6 – Format not configured 7 – Priority disabled 8 – No system resources
2, 3	Reserved	Reserved
4	Priority	Message control block message priority
5	Reserved	Reserved
6	SIN	Message control block message service identification number
7 to 9	Reserved	Reserved

Table 34 Transmit Message Trace Record (Class 5, Subclass 3)

Data Index	Name	Description
0	Packets Formatted rate 1	Number of unique packets submitted for rate 1 (.5 s/.33)
1	Packets Transmitted rate 1	Number of packets transmitted (including retries)
2	Flags, rate 1	Bit 00 – Rate permitted in current location Bit 01 – Rate disabled due to excessive errors
3	Packets Formatted rate 2	As above, for rate 2 (.5 s/.50)
4	Packets Transmitted rate 2	
5	Flags, rate 2	
6	Packets Formatted rate 3	As above, for rate 3 (.5 sec/.75)
7	Packets Transmitted rate 3	
8	Flags, rate 3	
9	Packets Formatted rate 4	As above, for rate 4 (.5 sec/.94)
10	Packets Transmitted rate 4	-
11	Flags, rate 4	As above, for rate 3 (.5 sec/.75)
12	Packets Formatted rate 5	As above, for rate 5 (1.0 sec/.33)
13	Packets Transmitted rate 5	As above, for rate 2 (.5 s/.50)
14	Flags, rate 5	Reserved
15	Packets Formatted rate 6	As above, for rate 6 (1.0 sec/.50)
16	Packets Transmitted rate 6	As above, for rate 3 (.5 sec/.75)
17	Flags, rate6	-
18	Packets Formatted rate 7	As above, for rate 7 (small pkt)

Data Index	Name	Description
19	Packets Transmitted rate 7	As above, for rate 2 (.5 s/.50)
20	Flags, rate 7	Reserved
21	Utilization Disable Threshold	Error threshold for disabling a rate (number sent/ number formatted)*100
22	Utilization Age Time	Duration (in minutes) after which the error counts are divided by 2

APPENDIX A Supported AT Commands

The table below list the AT commands supported by the modem.

Command	Description	Parameter
E	Echo	[<value>]
I	Request identification information	[<value>]
Q	Quiet	[<value>]
V	Verbose	[<value>]
Z	Load current configuration with NVM stored values	[<value>]
&F	Load current configuration with factory default values	[<value>]
&V	Display current and stored configuration	[<value>]
&W	Store current configuration to NVM	[<value>]
Null	Null command (AT)	-
A/	Repeat last command (no leading AT)	-
+GCAP	Request complete capabilities list	-
+GMI	Request manufacturer identification	-
+GMM	Request model identification	-
+GMR	Request revision identification	-
+GSN	Request product serial number identification (Mobile ID)	-
+IPR	Baud rate	=<rate>
%CRC	Error detection	=<value>
%EXIT	Exit command	=<value>
%GPS	Get GPS information	=<staleSecs>,<waitSecs>[,"GGA"] [,"RMC"]
%MGFS	To-mobile message state	[="<fwdMsgName>"]
%MGFG	To-mobile message get	="<fwdMsgName>",<dataFormat>
%MGFM	To-mobile message retrieved	="<fwdMsgName>"
%MGFN	To-mobile message new. If empty string ("") or omitted all current to-mobile messages are requested	[="<fwdMsgName>"]
%MGRT	From-mobile message send	="<msgName>",<priority>,<sin>[.<min>],<dataFormat>,<data>|<length>
%MGRS	From-mobile message state	[="<msgName>"]
%MGRC	From-mobile message cancel	="<msgName>"
%SREG	View all S registers	-
%UTC	Display UTC date and time	-

APPENDIX B To-Mobile Messages

All parameters include the SIN and the Message Type.

Element	Description	Value
SIN	service identification number	0
messageType	Indicates this message	<varies based on message>

B.1 reset (MIN 68)

Definition

This message causes various types of mobile device resets. The Gateway may restrict some types of resets.

Note: ***Reset types 2 and 3 cause a hardware reset of the terminal application processor using the designated digital output port on the mobile device which is connected to the reset pin on the terminal board. Application messages can be sent over-the-air to the terminal to cause other types of terminal resets.***

Syntax

```
reset
```

Fields

ResetType 8 bits

Details

Field	Description	Value
ResetType	Indicates the type of reset and whether queued from-mobile message are kept or flushed. 0 – (modem preserve) Modem software reset with messages preserved (note this resets both the DSP and microcontroller processors). Messages are reattempted from packet 1 after the reset. 1 – (modem flush) Modem software reset with messages flagged as not delivered. Messages are not reattempted after the reset. 2 – (terminal) Terminal application processor hardware reset 3 – (terminal/modem flush) Modem software reset and terminal processor hardware reset (modem messages flagged as not delivered and are not reattempted) 4 to 255 – Reserved	0-255

B.2 setSleepSchedule (MIN 70)

Definition

This message sets the wake-up period for a low power mode modem. The response to the setSleepSchedule is a sleepSchedule confirmation from the modem.

Syntax

`setSleepSchedule`

Fields

WakeupPeriod 8 bits

Details

Field	Description	Value
WakeupPeriod	Length of time the modem sleeps between attempts to receive to-mobile messages. 0 – Off (terminal receives every 5 seconds) 1 – Reserved 2 – Reserved 3 – 3 minutes 4 – 10 minutes 5 – 30 minutes 6 – 60 minutes	0-6

B.3 setTxMute (MIN 71)

Definition

This message controls an individual mobile's transmit capability.

If `muteFlag` is set to 1 (mute) the transmission control level is only allows registration, beam login, and responses to to-mobile messages.

If `muteFlag` is set to 0 (unmute) the transmission control level allows all messages (normal operation).

Syntax

`setTxMute`

Fields

Reserved 7 bits
TxMute 1 bit

Details

Field	Description	Value
TxMute	This sets the transmission control state	0 – Unmute 1 – Mute

B.4 getPosition (MIN 72)

Definition

This message polls for a position report.

The response to this message is `position`.

Syntax

`getPosition`

Fields

No fields

B.5 getConfiguration (MIN 97)

Definition

This message requests configuration information from the mobile device.

Syntax

`getConfiguration`

Fields

No fields

B.6 pingRequest (MIN 112)

Definition

This message is posted at the IsatData Pro Gateway Web Service (IGWS) interface and sent to the mobile device.

The mobile responds with pingResponse.

Syntax

`pingRequest`

Fields

RequestTime 16 bits

Details

Field	Description	Value
RequestTime	Time the requested was posted to the Gateway (seconds since midnight UTC)	0-86, 399

B.7 pingResponse (MIN 113)

Definition

This message is sent by the Gateway in response to the pingRequest.

Syntax

```
pingResponse
```

Fields

RequestTime	16 bits
ResponseTime	16 bits

Details

Field	Description	Value
RequestTime	Time the original request was sent (seconds since midnight UTC). Copied by the Gateway from the pingRequest message	0-86, 399
ResponseTime	Time this response was created by the Gateway (seconds since midnight UTC)	0-86, 399

B.8 getBroadcastIDs (MIN 115)

Definition

This message queries mobile device broadcast IDs. The modem responds with a list of its broadcast IDs.

The mobile responds with pingResponse.

Syntax

```
getBroadcastIDs
```

Fields

No fields

APPENDIX C From-Mobile Messages

C.1 modemRegistration (MIN 0)

Definition

The mobile device registration message is sent by the mobile when it is powered-on or reset. This is the first message a mobile sends after a reset. It is the mobile's way of requesting activation within the IsatData Pro network. The mobile receives the registration reply message prior to conducting any other communication.

The Gateway aborts any from- or to-mobile messages in progress (sending state) when the registration message is received. Any from-mobile messages in progress are restarted by the modem unless the registration is due to a restart which marks the messages in the queue as failed.

Syntax

```
modemRegistration
```

Fields

HardwareVersion	16 bits
SoftwareVersion	16 bits
Product	8 bits
WakeupInterval	8 bits
LastResetReason	8 bits
Traffic channel	12 bits
Beam	4 bits
VAIN	16 bits
Reserved	2 bits
OperatorTxState	3 bits
UserTxState	3 bits
BroadcastIDCount	8 bits

Details

Field	Description	Value
HardwareVersion	Identifies the mobile's hardware version	-
SoftwareVersion	Identifies the mobile's software version	-
Product	Identifies the mobile's product ID	0-255
WakeupInterval	Specifies the wake-up interval currently set in the mobile. 0 – Always on (5s) >0 – Low power	0-255
LastResetReason	Specifies the reason of the last registration/login. 0 – Power on 1 – Low voltage 2 – Reset pin 3 – Watchdog	0-255
Traffic Channel	Specifies the to-mobile traffic channel that the mobile communicates with and is registering in.	1-4095 0 – Invalid
Beam	Specifies the beam number of the traffic channel that the mobile communicates with.	1-15 0 – Invalid

Field	Description	Value
VAIN	Mobile parameter used to control a mobile's access to specific traffic channels.	0 – 65535 0 – Default
OperatorTxState	Specifies the operator transmission control level	0 – Normal operation All other values are for SkyWave use
UserTxState	Specifies the operator transmission control level	0-7 0 – Unmute, normal operation 5 – Mute, only registration and beam login messages All other values are for SkyWave use
BroadcastIDCount	Number of active broadcast IDs provisioned in this modem	0-16

C.2 protocolError (MIN 2)

Definition

This message is sent when the modem encounters an error that prevents successful message delivery.

Syntax

```
protocolError
```

Fields

Reserved	5 bits
MessageReference	8 bits
ErrorCode	8 bits
ErrorInfo	8 bits

Details

Field	Description	Value
MessageReference	Provides the reference number of the to-mobile message causing this error	0-2047
ErrorCode	Specifies the particular error encountered	1 – Unable to allocate message buffer 2 – Unknown message type
ErrorInfo	For some error codes, this extra byte is used	errorCode=2, this value is the offending messageType

C.3 sleepSchedule (MIN 70)

Definition

This message is returned from the modem to confirm that the new wake-up interval has been set.

Syntax

```
sleepSchedule
```

Fields

WakeupPeriod	8 bits
MobileInitiated	1 bit
MessageReference	11 bits
Reserved	5 bits

Details

Field	Description	Value
WakeupPeriod	Length of time the modem sleeps between attempts to receive to-mobile messages. 0 – Off (terminal receives every 5 seconds) 1 – Reserved 2 – Reserved 3 – 3 minutes 4 – 10 minutes 5 – 30 minutes 6 – 60 minutes	0-6
MobileInitiated	Flag which indicates that this request was initiated from the modem AT interface. Set to 1 if request was terminal initiated.	0-1
MessageReference	Message reference number of the to-mobile request. Set to 0 if the request was terminal initiated.	-

C.4 position (MIN 72)

Definition

This message is sent by the modem as a regular message. This 15-byte report is sent in response to the getPosition message.

Syntax

```
position
```

Fields

FixStatus	8 bits
Latitude	24 bits
Longitude	25 bits
Altitude	15 bits
Speed	8 bits
Heading	8 bits
DayOfMonth	5 bits
MinuteOfDay	11 bits

Details

Field	Description	Value
FixStatus	Status of fix	1 – Valid
Latitude	Latitude in 0.001 minutes (2's complement)	-
Longitude	Longitude in 0.001 minutes (2's complement)	-
Altitude	Altitude in meters (2's complement)	Up to ± 16,380 m
Speed	Speed in km/hour	0-255
Heading	Heading in 2º increments	0-179
DayOfMonth	Day of month this GPS fix taken	1-31
MinuteOfDay	Minutes of day this GPS fix taken	0-1439 0 – Midnight GPS time

C.5 configuration (MIN 97)

Definition

The configuration reply is sent by the mobile device in response to the mobile's configuration request message. This information is used for diagnostic purposes only.

Syntax

```
configuration
```

Fields

Refer to modemRegistration (MIN 0) for field sizes

Details

Refer to modemRegistration (MIN 0) for field details

C.6 pingResponse (MIN 112)

Definition

This message is sent by the modem in response to the pingRequest message.

Syntax

```
pingResponse
```

Fields

RequestTime	16 bits
ResponseTime	16 bits

Details

Field	Description	Value
RequestTime	Time the original request was sent (seconds since midnight UTC). Copied by the modem for the pingRequest message.	-
ResponseTime	Time this reply was created by the modem (seconds since midnight UTC)	0-86, 399

C.7 pingRequest (MIN 113)

Definition

This message is posted at the modem AT interface and sent to the Gateway. The Gateway sends a response to this message.

Syntax

```
pingRequest
```

Fields

RequestTime	16 bits

Details

Field	Description	Value
RequestTime	Time the request was posted at the modem (seconds since midnight UTC)	0-86, 399

C.8 testMessage (MIN 114)

Definition

This message is generated automatically by the mobile device as a means to continually test the satellite network. The message content, length and repeat period are specified using the command line interface. The command line interface starts and stops the process.

Syntax

```
testMessage
```

Fields

Text variable size

Details

Field	Description	Value
Text	A variable length byte array containing ASCII text. The length is determined by the message length.	-

C.9 broadcastIDs (MIN 115)

Definition

This message is the response to the getBroadcastIDs message. The response contains the entire list of 16 broadcast IDs. IDs of 0 are null (no broadcast service).

Syntax

```
broadcastIDs
```

Fields

BroadcastIDs (16)

ID 24 bits

Details

Field	Description	Value
ID	An array of 16 ID fields, each 24 bits	-

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Documentation Version

Version	Date	Details
04	Dec 2011	Identified S50 and S51 as non-volatile.
03	Nov 2011	See What's New? section for details
02	Oct 2011	New Transmit Message Trace Record table (Class 5, Subclass 3), New %UTC command to display UTC date and time, Added new parameter for Request ID, New extended command - Event Log Get, New Response Result Code added, Added DSP RomDB Version to Class 2, Subclass 1, Updated satellite control state and beam search state values, and Renamed the to-mobile and from-mobile messages throughout the document.
01	Aug 2011	Official customer release
.10	Feb 2011	Preliminary customer release
.17	Apr 2011	Limited customer release

Acronyms/Glossary

AT	AT is prefix for commands that comply with AT command set. It means attention.
AT command mode	A mode that is part of the AT command set. In command mode, the modem interprets and executes the incoming serial data as AT commands. The incoming data is not passed through the modem to the remote host.
beam number	Identifies the beam number transmitting the to-mobile message.
C/N	Carrier-to-Noise Ratio
CRC	Cyclic Redundancy Check
Transfer mode	While in transfer mode, the modem transfers data via the XMODEM–CRC protocol using block sizes of 128 bytes.
DCE	data communications equipment – A device such as a modem that sits between the data terminal equipment (DTE) and a data transmission circuit. Also known as data circuit-terminating equipment.
DTE	data terminal equipment – The source of destination of data, such as a terminal or computer, which communicates with data communications equipment (DCE).
IDP 100 series	The family of IsatData Pro mobile DCE (modem) devices.
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
Network ID	The first eight characters of a mobile ID or broadcast ID. Sometimes referred to as the Link ID.
MIN	message identification number – Each SIN has a suite of possible messages, identified by the MIN.
NVM	non-volatile memory
packet	A data element passed on the satellite channel that consists of a packet header, a data portion and a Cyclic Redundancy Check.
PRN	pseudo random number
SF	subframe
SIN	service identification number – part of the IsatData Pro protocol that identifies the originator of from-mobile messages or destination of to-mobile messages. Messages originated from the DCE have a SIN equal to 0. The SIN is one byte long, giving a possible 256 numbers (0 to 255).
SNR	signal-to-noise ratio
µC	microcontroller
UW	unique word
Traffic Channel ID	Uniquely identifies this traffic channel from all others globally. The mobile device uses this field to verify that it has acquired the correct channel.

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SkyWave