



SATELLIGENT

EXTENDED AT COMMAND GUIDE

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1. Introduction

This document describes the extended AT Commands specifically designed to be used in the SATELLIGENT Iridium product line. The default terminator is the carriage return and line feed <CR><LF> characters.

2. GPS commands

2.1. WSGPF : GPS Location Update

Execution Format: AT-WSGPF<CRLF>

This command is used to request a new GPS location fix. The command instructs the GPS receiver to obtain a position update, resulting in the data fields being populated by the GPRMC sentence.

Command Response: -WSGPF:OK<CRLF>

This will be followed by the sequence below. The time elapsed depends on the amount of time it took for the GPS receiver to obtain a fix or if the GPS receiver time out event occurred. The timeout duration can be set and accessed in the parameter settings table.

<GPRMC Sentence><CRLF>

The following comma separated fields in the GPRMC sentence are displayed on the external UART.

- UTC time of fix in HHMMSS format
- Status; A=Active or V=Void
- Latitude in DDMM.MMMM format; DD in degrees, MM.MMMM in minutes
- Latitude location, N=North or S=South
- Longitude in DDDMM.MMMM format; DDD in degrees, MM.MMMM in minutes
- Longitude location, E=East or W=West
- Speed over ground in knots
- Course over ground in degrees in reference to True North
- UTC Date in DDMMYY

- Mode Indicator (A=Autonomous, D=Differential, E=Estimated, N=Data not valid)
- Checksum data; begins with *

2.2. WSGPLF : Last Known GPS Location Display

Execution Format: AT-WSGPLF<CRLF>

This command is used to output the last known valid GPRMC sentence on the external UART.

Command Response: -WSGPLF:OK<CRLF>

**GPRMC, UTC Time,Status,Latitude,Lat Location,Longitude,Lon
Location,Speed,Course Angle,Date,Mode Indicator,Checksum <CRLF>**

2.3. WSGPSON : GPS Stream On

Execution Format: AT-WSGPSON<CRLF>

This command will turn the GPS receiver on and remain in that state until power disconnect or a turn off command is issued. If GPS stream output pass through option is enabled in the configuration parameter table, the GPS sentences will be displayed on the serial UART communication port of the device.

Command Response: -WSGPSON:OK<CRLF>

2.4. WSGOFF : GPS Stream Off

Execution Format: AT-WSGOFF<CRLF>

This command will turn the GPS receiver off from an on state. This command is useful to exit the GPS stream on command, without a power recycle.

Command Response: -WSGOFF:OK<CRLF>

3. Short Burst Data (SBD) commands

3.1. WSSBDIS : SBD Initiate Session

Execution Format: AT+WSSBDIS<CRLF>

This command implements the Iridium AT+SBDIX command with a few enhancements. When issued, this command initiates an SBD session between the Iridium modem and the Gateway SBD Subsystem, the GSS. An attempt is made to transmit all Mobile Originated (MO) messages buffered in the Iridium controller MO buffer, as well as to receive all Mobile Terminated (MT) messages queued at the GSS and transferred to the MT buffer of the Iridium controller.

Command Response: -WSSBDIS:OK<CRLF>

-SBD SESSION IN PROGRESS<CRLF>

This is followed by +SBDIX commands issued by the controller to the Iridium modem. The number of instances of the SBDIX command being issued is determined by a setting in the parameter table. Each instance of the +SBDIX command returns the following.

<Signal Quality>,<MSG Status><CRLF>

The field <Signal Quality> indicates the received signal strength at the Iridium modem. A value of 0 corresponds to at or below the receiver sensitivity. Increments in steps of one indicate improvement of link margin by about 2 dB. The maximum value is 5, indicating a link margin of 10 dB or above.

The field <MSG Status> corresponds to the Mobile Originated (MO) transaction status information provided by the Iridium modem as a response to the SBDIX command. Only Iridium gateway reported statuses of 0, 1 and 2 are considered successful MO message transfers. Description of unsuccessful MO transmission status messages can be found in the Iridium AT command reference manual.

A number of retry attempts, as defined in the parameter settings table are made by the Iridium controller to transmit all MO messages and receive all MT messages. Upon successful transmission and reception or completion of retries, a final confirmation message is issued as follows.

-WSSBDIS:OK

<MT_Queue>,<MT_RX_Queue>,<MT_RX>,<MO_TX>,<MO_TX_Queue>,<MT_Status>

<MT_Queue> is the number of Mobile Terminated (MT) messages queued at the Iridium gateway to be received by the Iridium controller. A value of **-1** indicates that the modem was unable to establish communication with the GSS during the SBDIS session. All other values are as reported from the GSS.

<MT_RX_Queue> is the number of messages queued in the Iridium controller MT buffer. This is the total number of messages that are currently present in the MT buffer.

<MT_RX> is the number of MT messages received by the Iridium controller during the SBDIS session.

<MO_TX> is the number of messages transmitted by the Iridium controller during the SBDIS session.

<MO_TX_Queue> is the number of messages queued in the Iridium controller MO buffer to be transmitted. This is the total number of messages that are currently present in the MO buffer.

<MT_Status> indicates the type of message that was received in the MT buffer. It can take the following values,

-1, No MT message was received.

1, MT message was received and the MT buffer was written. Only messages preceded by character U (0x55) will be saved. The message format is U<MT_Message>.

2, MT message was received but the MT buffer was not written. The message was used to change a parameter on the configuration table. Only messages preceded by character V (0x56) will be used for this purpose. The message format is V<1 BYTE PARAM#><4 BYTE VALUE, LSB FIRST>

3, MT message preceding with neither U nor V was received, but the MT buffer was not written. Messages are discarded.

3.2.WSMOSB : Mobile Originated Send Binary

Execution Format: AT-WSMOSB=<message length><CRLF>

This is followed by a <READY><CRLF> message on the external UART from the Iridium controller. The binary message and the two byte checksum calculated by the user application can then be entered at this point as shown,

<Binary Message><Checksum>

The checksum requirement can be disabled through the parameter settings table. However a dummy checksum must be entered as part of the command.

This command is used to send a binary message using the Iridium modem over the satellite network. The <message length> parameter represents the length, in two bytes, of the SBD binary message not including the two-byte checksum. The maximum mobile originated SBD message length is 240 bytes. The minimum mobile originated SBD message length is 1 byte. The checksum is the least significant 2-bytes of the summation of the entire SBD binary message. The high order byte must be sent first.

For example, if the user application were to send the word “hello” encoded in ASCII to the Iridium modem, the message stream would be hex 68 65 6c 6c 6f 02 14.

Command Response: -WSMOSB:OK<CRLF>

-SBD SESSION IN PROGRESS

<Signal Quality>,<MSG Status><CRLF>

The field <Signal Quality> and <MSG Status> are described in the earlier section on – SBDIS command.

Retry attempts are made by the Iridium controller to transmit MO messages as defined in the parameter settings table. Up on successful transmission or completion of retries, a final confirmation message is issued as follows.

-WSMOSB:OK

<MT_Queue>,<MT_RX_Queue>,<MT_RX>,<MO_TX>,<MO_TX_Queue><CRLF>

The return fields are described in the earlier section on –SBDIS command.

Non-transmitted messages are not buffered for future transmission and are discarded at the end of the SBDIS session. The status fields are populated as described in the –SBDIS command.

3.3. WSMOST : Mobile Originated Send Text

Execution Format: AT-WSMOST=<text message><CRLF>

This command is used to send a text message using the Iridium modem over the satellite network. The length of the message is limited to 240 characters.

Command Response: -WSMOST:OK<CRLF>

-SBD SESSION IN PROGRESS

<Signal Quality>,<MSG Status><CRLF>

The field <Signal Quality> and <MSG Status> are described in the earlier section on –SBDIS command.

Retry attempts are made by the Iridium controller to transmit MO messages as defined in the parameter settings table. Up on successful transmission or completion of retries, a final confirmation message is issued as follows.

-WSMOST:OK

<MT_Queue>,<MT_RX_Queue>,<MT_RX>,<MO_TX>,<MO_TX_Queue><CRLF>

The return fields are described in the earlier section on –SBDIS command.

Non-transmitted messages are not buffered for future transmission and are discarded at the end of the SBDIS session. The status fields are populated as described in the –SBDIS command.

3.4. WSMOBW : Mobile Originated Binary Write

Execution Format: AT-WSMOBW=<message length><CRLF>

This command writes a binary SBD message in the MO buffer of the Iridium controller. This command is similar to the send binary –WSMOSB command, with the difference being the binary messages are not written into the Iridium modem buffer and that they are not transmitted. The purpose of this command is to queue up the binary messages into the MO buffer of the Iridium controller for transmission at a later point in time. Once the command is received, the controller will indicate message reception readiness by sending ASCII encoded string **<READY><CRLF>** (hex 52 45 41 44 59 0D 0A) to the external UART. The maximum mobile originated SBD message length is 240 bytes. The minimum mobile originated SBD message length is 1 byte. Once the READY indication is received from the controller, the SBD binary message must be sent to the controller formatted as follows:

<Binary Message><Checksum>

The checksum requirement can be disabled through the parameter settings table. However a dummy checksum must be entered as part of the command.

Command Response: -WSMOBW:OK<CRLF>

3.5.WSMOTW : Mobile Originated Text Write

Execution Format: AT-WSMOTW=<text message><CRLF>

This command writes an SBD text message in the MO buffer of the Iridium controller. This command is similar to the send text –WSMOST command, with the difference being the text messages are not written into the Iridium modem buffer and that they are not transmitted. The purpose of this command is to queue up the text messages into the MO buffer of the Iridium controller for transmission at a later point in time. The length of the message is limited to 240 characters.

Command Response: -WSMOTW:OK<CRLF>

3.6.WSMOBD : Mobile Originated Buffer Display

Execution Format: AT-WSMOBD<CRLF>

This command displays the last queued message in the MO buffer of the Iridium controller on the external UART.

Command Response: -WSMOBD:OK<CRLF>

This will be followed by the last queued message in the MO buffer of the Iridium controller.

3.7. WSMTBD : Mobile Terminated Buffer Display

Execution Format: AT-WSMTBD<CRLF>

This command displays all the messages stored in the MT buffer of the Iridium controller on the external UART.

Command Response: -WSMTBD:OK<CRLF>

This will be followed by all the messages in the MT buffer of the Iridium controller to be displayed in the order in which they were received.

3.8. WSMOBE : Mobile Originated Buffer Erase

Execution Format: AT-WSMOBE<CRLF>

This command erases all the messages stored in the MO buffer on the Iridium controller.

Command Response: -WSMOBE:OK<CRLF>

3.9. WSMTBE : Mobile Terminated Buffer Erase

Execution Format: AT-WSMTBE<CRLF>

This command erases all the messages stored in the MT buffer on the Iridium controller.

Command Response: -WSMTBE:OK<CRLF>

3.10.WSCSQ : Signal Strength Check

Execution Format: AT-WSCSQ<CRLF>

This command is used to check the signal strength received at the Iridium modem.

Command Response: -WSCSQ:OK<CRLF>

CSQ: <Signal Quality>

The field <Signal Quality> is described in the earlier section on –SBDIS command.

3.11. WSSBDPT: SBD Pass Through

Execution Format:

AT-WSSBDPT<CRLF>

This command is used to offer a pass through mechanism, by which the external serial communication port of the controller device can be used to directly interface with the satellite transceiver. The Iridium SBD transceiver will be turned on and only AT commands supported by the transceiver will be recognized. Note that the baud rate remains at 57600 bps.

Command Response: None

The external communication port will only recognize Iridium AT commands. This mode can only be exited with a power reset to the device. It is recommended to disable the continuous loop operation of the controller while using this mode, as the microcontroller operation will have priority. This can be done by configuring the parameter table appropriately.

4. Custom Payload commands

4.1.WSDPC: Data Packet Create

Execution Format: AT-WSDPC<CRLF>

This command is used to create a data packet based on predefined payload information and store in the MO buffer of the Iridium controller. The payload is customizable and can be accessed through the parameter settings table. A new set of samples from all sensors, except the GPS is taken, and the payload is created as per the setting in the parameter table. The payload ID is prefixed to the data packet, and is one byte in length. The following data fields can be enabled or disabled in the payload. The data fields are organized as follows, along with the bit location corresponding to the field.

Bit Number	Data Field Selection
0	Basic GPS. This includes only latitude and longitude information.
1	Extended GPS. This includes GPS year, day hour and minute.
2	Supply Voltage ADC reading. This corresponds to ADC channel 1.
3	ADC Channel 2 reading.
4	ADC Channel 3 reading.
5	GPIO states of channel 0 and channel 1.
6	Reserved.
7	Reserved.

For example, if only information corresponding to basic GPS (LAT, LONG) and ADC channel 2 and 3 are needed, the identification byte will be $b00011001 = 0x19$. The message will then be structured as

Hex 19<Basic GPS><ADC_2><ADC_3>

Command Response: -WSDPC:OK<CRLF>

This is acknowledgement from the microcontroller that the data packet has been created. If another instance of this command is executed before transmitting the packet, the old data packet is buffered in a First In First Out (FIFO) buffer, to be transmitted in sequence.

4.2. WSDPT: Data Packet Create and Transmit

Execution Format: AT-WSDPT<CRLF>

This command is used to create and transmit a data packet based on predefined payload information. A new set of samples from all sensors, including the GPS is taken; and the payload is assembled as per the parameter table setting. The payload operations, including data field selection is exactly as defined in the earlier section on the -WSDPC command.

Command Response: -WSDPT:OK<CRLF>

This is acknowledgement from the microcontroller that the data packet has been created. This will be followed by attempts to transmit the data packet created. The -WSSBDIS command is initiated and return fields as described earlier are displayed on the external UART.

4.3. WSPNCMSG: Panic Message Entry

Execution Format:

AT-WSPNCMSG=<panic message><CRLF>

This command is used to store a panic or emergency text message into the memory of the controller. When enabled using the appropriate configuration parameters and triggered by means of a hardware signal, the controller will send a data packet with this text message.

Command Response: -WSPNCMSG:OK<CRLF>

5. GPIO commands

5.1. WSIOM : General Purpose I/O Mode Select

Execution Format: AT-WSIOM<arg1>,<arg2>,<arg3><CRLF>

This command is used to select the GPIO mode of a specific I/O pin. Arguments include GPIO number and desired function. The GPIO lines can be configured as input (with or without pull-up or pull-down) or as output (push-pull or open-drain).

The arguments for this command are as follows.

<arg1> – GPIO channel ID, can be 0 or 1.

<arg2> – GPIO Direction can be,

0- Input

1- Output

<arg3> – GPIO Type.

If GPIO line is set as an input, it can be,

0- Pull-up and Pull-down disabled.

1- Pull-up enabled (approx. 45 K).

2- Pull-down enabled (approx. 45 K).

If GPIO line is set as an output, it can be,

0- Push-Pull type enabled.

1- Open-drain type enabled.

Command Response: -WSIOM:OK<GPIO_ID>,<GPIO_Direction>,<GPIO_Type><CRLF>

5.2.WSIORD : General Purpose I/O Read

Execution Format: AT-WSIORD<arg1><CRLF>

If configured as an input, this command is used to read the GPIO line, determined by the <arg1> parameter. The field <arg1> can have 0 or 1 as values.

Command Response: -WSIORD:OK<GPIO_ID>,<GPIO_Status><CRLF>

The field <GPIO_Status> could have the following values

0- State read on selected GPIO line is logic low.

1- State read on selected GPIO line is logic high.

5.3. WSIOWT : General Purpose I/O Write

Execution Format: AT-WSIOWT<arg1>,<arg2><CRLF>

If configured as an output, this command is used to set the GPIO line low or high, determined by the <arg1> parameter. The field <arg1> can have 0 or 1 as values.

Command Response: -WSIOWT:OK<GPIO_ID>,<GPIO_Status><CRLF>

The field <GPIO_Status> could have the following values

0- Output logic low on selected GPIO line.

1- Output logic high on selected GPIO line.

*When configured as open drain output lines, <GPIO_Status> represents the complement of the status of the gate drive. So a '1' presents logic low and a '0' presents logic high at the gate.

5.4. WSOCH : Set Open Collector HIGH

Execution Format: AT-WSOCH<arg1><CRLF>

This command is used to drive the base of the selected open collector circuit HIGH. The open collector circuit is selected based on the argument supplied. It can have a value of 1 or 2.

Command Response: -WSOCH:OK<OC_ID> <CRLF>

<OC_ID> can have a value of 1 or 2, corresponding to open collector channel 1 or 2.

5.5. WSOCL : Set Open Collector LOW

Execution Format: AT-WSOCL<arg1><CRLF>

This command is used to drive the base of the selected open collector circuit LOW. Argument is the open collector circuit number. It can have a value of 1 or 2.

Command Response: -WSOCL:OK<OC_ID> <CRLF>

<OC_ID> can have a value of 1 or 2, corresponding to open collector channel 1 or 2.

6. Analog to Digital convertor commands

6.1.WSADRD : Analog to Digital channel Read

Execution Format: AT-WSADRD<arg1><CRLF>

This command is used to sample the analog input on the Analog to Digital convertor channels on the Iridium controller board. The ADC readings are then output on the external UART. The argument for this command is as follows,

<arg1> – Analog channel ID. This field can have the following values,

1- Supply voltage to the Iridium controller. This is considered as ADC channel 1.

2- ADC Channel 2.

3- ADC Channel 3.

Command Response: -WSADRD:OK <Analog ID>,<ADC Sample> <CRLF>

Here <Analog ID> is the ADC channel that was selected, and <ADC Sample> corresponds to the raw 12 bit reading at the ADC input.

7. Peripherals and configuration control commands

7.1.WSLDON : Set LED ON

Execution Format: AT-WSLDON

This command is used to turn on the on-board LED.

Command Response: -WSLDON:OK<CRLF>

7.2.WSLDOFF : Set LED OFF

Execution Format: AT-WSLDOFF<CRLF>

This command is used to turn off the on-board LED.

Command Response: -WSLDOFF:OK<CRLF>

7.3.WSEPON : Set External Power Supply ON

Execution Format: AT-WSEPON<CRLF>

This command is used to turn on the 5V DC supply switch, made available on the user connector.

Command Response: -WSEPON:OK<CRLF>

7.4.WSEPOFF : Set External Power Supply OFF

Execution Format: AT-WSEPOFF<CRLF>

This command is used to turn off the 5V DC supply switch, made available on the user connector.

Command Response: -WSEPOFF:OK<CRLF>

7.5.WSRST : Controller Reset

Execution Format: AT-WSRST<CRLF>

This command is used to reset the Iridium controller using firmware.

Command Response: -WSRST:OK<CRLF>

This will be followed by the startup device identification sequence, indicating the hardware and firmware version and build details.

7.6.WSCFGDSP: Display Parameter Table

Execution Format:

AT-WSCFGDSP<CRLF>

This command is used to display the contents of the parameter table, stored internally on the controller board.

Command Response: -WSCFGDSP:OK<CRLF>

This will be followed by displaying the satellite transceiver IMEI, configuration parameters as well as hardware and firmware revisions. Please refer to the appendix for the list of configuration parameters and their descriptions.

7.7.WCONST: Write Parameter Table

Execution Format:

AT-WCONST<SPACE><PARAM_NUM><SPACE><PARAM_VAL><CRLF>

This command is used to update a specific configuration parameter on the internally stored table, one at a time using the command line interface.

Here PARAM_VAL is the value with which parameter number PARAM_NUM needs to be updated with.

Command Response: OK<CRLF>

7.8.RCONST: Read Parameter Table

Execution Format:

AT-RCONST<SPACE><PARAM_NUMBER><CRLF>

This command is used to read a specific configuration parameter from the internally stored table, one at a time using the command line interface.

Command Response: OK<CRLF>

<PARAM_VAL>

8. Appendix

Configuration Parameter Table

Parameter #	Parameter Name	Parameter Description
9	ActivityLoopActive	Operation mode selection. 0-Slave, 1-Free running.
10	ActivityLoopTimePeriod	Amount of time for a sensor sampling and SBD transmission cycle. Value written in seconds. Max=86400s
11	PanicTransmission	To set emergency message settings. See notes for details.
12	GPSAntennaStatus	GPS antenna type selection. 0-Active, 1-Passive.
13	GPSAquisitionTimeout	Amount of time allowed for acquiring GPS in each cycle. Value written in milliseconds.
14	GPSOutputPassthrough	GPS sentence stream output on external UART. 0-Disable, 1-Enable.
15	DelayBeforeSleep	Amount of time the UART stays active before going to sleep, up on no activity. Value written in milliseconds.
16	FID	Header byte setting. The value dictates what sensor information is used to create the data packet.
17	IridiumRetryCount	Number of retries attempted to deliver a data packet over the Iridium network.
18	Checksum Enable	Checksum setting for SBD data entered over the external UART. 0-Disable, 1-Enable.
19	SBDIX Wait Time	Amount of time allowed for each individual SBD session. An instance of the SBDIX command is executed during this time. Value written in milliseconds.
20	Panic FID	Header byte setting for emergency message. The value dictates what sensor information is used to create the data packet.



21	FID In Data	Header byte presence in transmitted data packet. 0-Enable, 1-Disable.
22	ExtPowDelay	Amount of time external 5V supply is kept ON in each activity cycle. Value written in milliseconds.
23	ActivityLoopTransmission Frequency	Number of sampling cycles executed prior to SBD transmission.
Note: 0-Panic messaging disabled. 1-Only panic text message transmitted. 2-New data packet is created and transmitted as per parameter 20 setting. 3-Both panic text message and new data packet is created and transmitted. 4-Last known data packet is transmitted as per parameter 20 setting. 5-Both panic text message and last known data packet are transmitted.		

9. Revision History

Version	Date	Comments
1.0	24-Mar-2014	Initial Release.
1.1	11-Aug-2014	Formatting updates.
1.2	02-Sep-2015	Added command line configuration details.