GENERAL DESCRIPTION OF MODEL A3LA-R

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GLOSSARY

BIS	Bureau of Industry and Security
DAV	Data After Voice
DoD EMSS	DoD Enhanced Mobile Satellite Services
DTE	Data Terminal Equipment
DSN	Defense Switch Network
EAR	Export Administration Regulations
FDMA	Frequency Division Multiple Access
GPS	Global Positioning System
ISU	Iridium Subscriber Units (Modems, Phones, Trackers)
LBT	L-Band Transceiver
NIPRNET	Non-Secure Internet Protocol Router Network
NOC	Network Operation Center
OFAC	Office of Foreign Asset Controls
PSTN	Public Switch Telephone Network
RHCP	Right Hand Circular Polarization
RUDICS	Router-Based Unrestricted Digital Internetworking Connectivity Solution
SBD	Short Burst Data
SIM	Subscriber Identity Module
SMA	Sub-Miniature Version A
SMS	Short Message Service
TDD	Time Domain Duplex
TDMA	Time Division Multiple Access
VSWR	Voltage Standing Wave Ratio

1.0 PURPOSE

This document describes the electrical and mechanical interfaces of the A3LA-R. Model A3LA-R is a satellite modem comprised of a 9523 L-band transceiver (LBT) with an extended input voltage range. It is designed to operate with the Iridium network. Similar to a standard landline modem, the A3LA-R can be controlled by any DTE (data terminal equipment) capable of sending standard AT commands via a serial port. A DTE can be a desktop computer, a laptop computer, a smart phone, or even a micro-controller. The A3LA-R is functionally compatible with models 9522, 9522A, A3LA-D, 9522B and A3LA-X. It is approximately 60% smaller in volume and 50% lighter than the 9522B. Model A3LA-R-MIL is an A3LA-R that has been certified to MIL-STD-810G standards and IP67 rating.

Services supported include:

1. Dial-Up Data Switch
2. Direct Internet Connection (or NIPRNET Connection)
3. Direct Internet Connection using Apollo Emulator (only for DoD EMSS Gateway)
4. Short Message Service (SMS)
5. Short-Burst Data (SBD)
6. Router-Based Unrestricted Digital Internetworking Connectivity Solution (RUDICS)
7. Voice when combined with the DPL audio handset

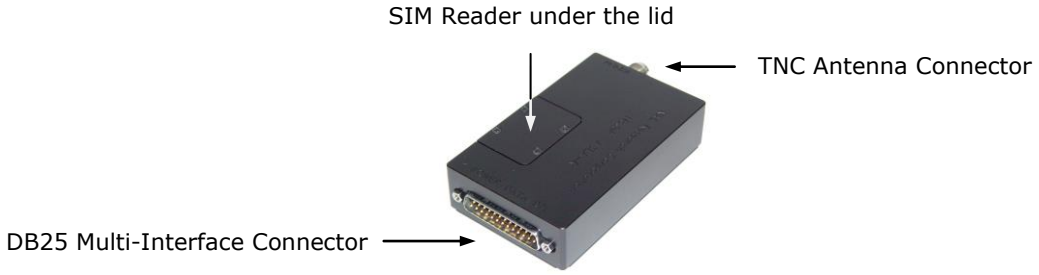


Figure 1. Iridium Satellite Modem A3LA-R.

IMPORTANT: User should not disassemble the A3LA-R for repair or services. The warranty is voided if the A3LA-R is disassembled. It should be returned to NAL Research for any services.

2.0 SPECIFICATIONS

2.1 Mechanical Specifications

Dimensions:	102 mm x 61 mm x 24 mm (4.0” x 2.43” x 0.95”)
Weight:	198 g (7.0 ounces)
Multi-Interface Connector:	25-Pin Male D-Sub
Iridium Antenna:	TNC Female Connector
SIM Chip Reader:	Located beneath a cover plate on top of the A3LA-R
Status Display:	LED
Cooling:	Convection
Enclosure:	Aluminum/EMI shielding

2.2 RF Specifications

Operating Frequency: 1616 to 1626.5 MHz
Duplexing Method: TDD
Multiplexing Method: TDMA/FDMA
Link Margin: 12 dB average
Average Power during a Transmit Slot (Max): 7W
Average Power during a Frame (Typical): 0.6W
Receiver Sensitivity at 50Ω (Typical): –118 dBm

2.3 Electrical Specifications

Main Input Voltage Range: +4.0V to +5.5V or +5.0V to +32.0V
Average Standby Current: ~80mA @ 5.0VDC
Average Data Call Current: ~350mA @ 5.0VDC (peak of 2A)

NOTE: The power requirements apply to DC power measured at the A3LA-R multi-interface connector input. The average data call current may vary depending on the field-of-view between the modem antenna and the Iridium satellite.

2.4 Environmental Specifications

Operating Temperature Range: –30°C to +70°C (–22°F to +158°F)
Operating Humidity Range: < 75% RH
Storage Temperature Range: –40°C to +85°C (–40°F to +185°F)
Storage Humidity Range: < 93% RH

2.5 Data I/O Specifications

Dial-Up Data/RUDICS: 2.4 Kbits/sec (average)
Direct Internet: 2.4 Kbits/sec (average)
Short-Burst Data: 1960 bytes for Mobile-Originated and 1890 bytes for Mobile-Terminated
Short Messaging: 160 Characters (maximum)
Hardware Interface: RS232
Software Interface: Standard AT Commands

2.6 Related Hardware

Antennas: SYN7391 Series, SAF2040 Series, SAF5340 Series, SAF5350 Series
Data Kit/Connector: HRC-24-7R, HRC-24-8R
Power Adapters: LA-3098, LA-7021
Audio Handset: DPLS0401-X

2.7 Reference Documents

A3LA-R Product Information
Getting Started With Model A3LA-R (TN2012-11-V1.0)
SatTerm Software Manual (TN2012-004-V8.6.0)
Additional Information on DirectIP SBD (TN2007-637-V1.0)
Additional Information on SBD (AN2012-04-V4.0)

3.0 MULTI-INTERFACE CONNECTOR

The multi-interface connector is a male 25-pin miniature D-Sub type that includes five interfaces—RS232, DC input power, ON/OFF control line, analog audio and Digital Peripheral Link (DPL). The multi-interface connector pin assignments are summarized in Table 1, which is 'pin-to-pin' the same as model A3LA-X.

PIN #	SIGNAL	DESCRIPTION	INTERFACE
1	EXT_ON_OFF	Power on/off control input	DC Power
2	+12VDC	Output Voltage to Power the DPL Handset	DC Power
3	EXT_GND	External GND input	DC Power
4	EXT_B+	External 4.0V – 5.5V or 5.0V – 32.0V	DC Power
5	SPKR_AUD	Speaker audio output	Analog Audio
6	DA_TX	PCM digital audio output	Digital Audio
7	RI	RS232 Ring Indicate	RS232 Data
8	RTS	RS232 Request To Send	RS232 Data
9	TX	RS232 Transmit Data (Input)	RS232 Data
10	DCD	RS232 Data Carrier Detect	RS232 Data
11	DA_FS	PCM digital audio frame sync output	Digital Audio
12	DA_CLK	PCM digital 2.048MHz audio clock output	Digital Audio
13	RX	RS232 Receive Data (Output)	RS232 Data
14	SIGNAL GND	Signal ground, 0V signal reference and return	GND
15	MIC_AUD	Microphone audio input	Analog Audio
16	EXT_B+	External 4.0V – 5.5V or 5.0V – 32.0V	DC Power
17	EXT_GND	External GND input	DC Power
18	DPL_TX	Digital Peripheral Link (DPL) data output	DPL UART
19	DTR	RS232 Data Terminal Ready	RS232 Data
20	DPL_RX	Digital Peripheral Link (DPL) data input	DPL UART
21	DSR	RS232 Data Set Ready	RS232 Data
22	CTS	RS232 Clear To Send	RS232 Data
23	SIGNAL GND	Signal ground, 0V signal reference and return	GND
24	DA_RX	PCM digital audio input	Digital Audio
25	SIGNAL GND	Signal ground, 0V signal reference and return	GND

Table 1. Pin assignment for the multi-interface connector.

3.1 RS232 Data Interface (Standard 9-Wire Configuration)

The A3LA-R supports a standard RS232 data interface to a DTE incorporating hardware handshaking and flow control. The RS232 data interface comprises of eight standard RS232 data, control and status signals plus a ground level signal reference as shown in Table 1. This interface allows a connected DTE to utilize the A3LA-R's modem functionality through standard AT and extended sets of AT commands. These commands are defined in Appendix A. The A3LA-R will automatically adjust to the DTE baud rate and override the +IPR setting when dissimilar. Autobaud will occur on the following characters 'a', 'A' or CR (carriage return). Autobaud will also occur on the escape sequence character, provided this is an odd number of characters. Normally this is set to '+' in register S2 (see Appendix A for details).

Note that the Ring Indicator is used by the A3LA-R to indicate that a Mobile Terminated SBD (MT-SBD) message is queued at the gateway. Application developers can monitor this pin and apply appropriate AT commands to the A3LA-R to retrieve the MT-SBD message.

3.2 RS232 Data Interface (3-Wire Configuration)

A 3-wire RS232 data interface may also be implemented. Because of risk of over-run and data loss especially at high baud rates, the 9-wire interface is the recommended implementation. Several steps must be taken to allow 3-wire configuration (i.e. only using S_TX, S_RX, and SIGNAL GND). These steps ensure the A3LA-R and DTE to work together without having hardware handshaking.

1. The modem's DTR line must be held high. Using the modem's input voltage is fine for this purpose BUT ONLY if the input voltage is less than 5VDC (see important note below). Looping back the modem's DSR line to DTR line will NOT work. The DSR line on the modem should be left unconnected.
2. Disconnect the CTS, DCD, DSR, DTR, RTS and RI lines between the DTE and modem.
3. AT&Dn must be set to AT&D0 to ignore the DTR input from the DTE.
4. AT&Kn must be set to AT&K0 for no flow control or AT&K4 for XON/XOFF software flow control.
5. The setting can be stored on the modem permanently (until another setting overwrites it) so that it remains after a power cycle. The modem allows two profiles in which settings are stored, and user can choose either as a default profile. The relevant commands are &Wn and &Yn. &Wn stores the present configuration in profile <n>, where <n> can be either 0 or 1. &Yn designates which profile is loaded after reset or power-up, again <n> is either 0 or 1.
6. Any needs of the DTE must be addressed separately.

WARNING: DO NOT use the modem's input voltage to bring the DTR line high when the input voltage is higher than 5VDC. Supplying voltage higher than 5VDC to the DTR line will permanently damage the A3LA-R.

NOTE: The Iridium's Direct Internet service when using the Windows-based Apollo client requires DCD to be present; hence it is incompatible with a 3-wire serial configuration. The Direct Internet with Apollo client is available only on the EMSS DoD gateway and NOT on the commercial gateway.

3.3 DC Power Input

The DC power input is through pin 4 & 16 (EXT_B+) and pins 3 & 17 (EXT_GND). Note that two pins are provided for the external DC input and two pins are also provided for the associated external ground input. This is done to distribute the current across two wires, and therefore all four pins should be utilized in the external power connection. Cables used to supply power to the A3LA-R should be kept as short as possible to prevent significant voltage drop, which can cause the A3LA-R to malfunction during a data call, an SMS session or an SBD session. Power reset by the A3LA-R during a call is an indicative of the DC power source unable to sustain voltage above 4.0V at peak current demand. Appendix E provides the electrical power profile of the A3LA-R.

The A3LA-R accepts either +4.0V to +5.5V or +5.0V to +32V input. The A3LA-R is shipped with hardware set for +5.0V to +32V input. It can be changed to +4.0V to +5.5V input through an internal jumper—POWER MUST BE DISCONNECTED BEFORE RESETING THE JUMPER. The jumper can be found by removing the modem's bottom plate. With the A3LA-R held in the position shown in Figure 2 (DB25 connector to the left), the A3LA-R is set for 4.0V to +5.5V when the red jumper is on the middle and left pins and is set for +5.0V to +32V when the jumper is on the middle and right pins. Each pin is also labeled with 5V and 32V to the left and right pins, respectively. **NOTE:** User MUST remember the input voltage setting on the A3LA-R and not to apply voltage above the maximum limit (of either 5.5V or 32V). The A3LA-R will be damaged beyond repair with warranty voided if this were to occur.

Figure 2. Power Input Setting for the A3LA-R.

> **IMPORTANT:** User can remove the A3LA-R's bottom plate to set the jumper but not for repair or services. The warranty is voided if the A3LA-R is disassembled for any reason other than to set the jumper.

3.4 Power On/Off Control

With the EXT_ON_OFF pin is left unconnected, the A3LA-R will automatically turn on or off when external DC power is applied or removed. Prior to turning the A3LA-R off, command AT*P0 should be issued to ensure all memory write activity is completed. When the A3LA-R is powered off, its internal power-on-reset circuit requires two seconds for voltages to decay. Users should not re-apply power until this time has elapsed. If the two-second wait time is not adhered to, the reset circuit may not operate and the A3LA-R could be placed in a non-operational state. The state is not permanent and can be rectified by the above procedure.

The EXT_ON_OFF pin can be connected to an external I/O control line to turn a powered A3LA-R on and off in a toggle fashion. With this setup, the EXT_ON_OFF line MUST first be held to GND level (i.e. logic low) before applying power to the A3LA-R. As long as DC power input is applied, logic high on the EXT_ON_OFF line turns the A3LA-R on and a logic low turns it off. Logic high is defined as having a voltage ranging from 2.0V to 5.0V—DO NOT allow logic high to exceed 6V. Logic low can range from –0.3V to 0.8V. The current drawn on the external load used to pull the A3LA-R to GND is no more than 20μA. The A3LA-R will draw approximately 20mA even in off state. Thus, DC power must be removed to eliminate any parasitic current drawn. Damage may be caused to the A3LA-R if EXT_ON_OFF is high and DC power is not present. Users must ensure that this condition does not occur.

3.5 Audio Interface

The A3LA-R supports both digital and analog audio I/O. The digital audio is in PCM format. In such format, digital audio cannot travel far (less than one foot); this is why the analog is chosen for the A3LA-R audio handset. The analog audio input is a single-ended, unbalanced input with a minimum impedance of 10kΩ to ground. The A3LA-R accepts a maximum input level of 2.0V peak-to-peak without signal distortion. The analog audio output is also a single-ended, unbalanced output capable of driving an impedance of 600Ω or more to ground. The A3LA-R delivers undistorted audio up to 2.0V peak-to-peak at this port.

The combined analog I/O audio interface (pins 5 and 15) and the DPL UART I/O interface (pins 18 and 20) enable an analog audio handset to be connected to the A3LA-R. With the DPL audio handset model DPLS0401-X and DB25 data kit model HRC-24-8R, the A3LA-R can be used both as a data modem and a satellite phone. This setup as shown in Figure 3 can be an extremely useful developmental tool since the modem status can be seen on the handset LCD similar to a 9555 Iridium phone.

Figure 3. Location of the SIM reader.

3.6 Digital Peripheral Link (DPL)

The DPL interface is composed of two ports—a full duplex asynchronous serial link for control messages and a PCM digital audio link for audio traffic. The protocol used on these ports is made available to application developers only on a case-by-case basis and after appropriate Non-disclosure Agreements and/or License Agreements are executed.

4.0 ANTENNA CONNECTOR

The A3LA-R modem uses a single TNC female 50-ohm connector for both transmit and receive. Cable loss between the modem and the antenna is critical and must be kept less than 3dB at the operating frequency of 1616 to 1626.5 MHz. The minimum link margin of 12 dB must also be maintained. General RF parameters are listed in the table below.

TYPE	DESCRIPTION
Frequency Range	1616 to 1626.5 MHz
Input/Output Impedance	50 Ohms
Oscillator Stability	± 1.5ppm

NAL Research offers several types of antennas for use with the A3LA-R modem. These antennas include the fixed mast, mobile magnetic/permanent mount and portable auxiliary. For low-cost and applications where small form-factor and light-weight are required, NAL Research recommends model SYN7391-C. If the specific application requires a custom antenna, it must meet the specifications in the following table.

PARAMETER	VALUE
Operating Temperature Range	−40°C/+85°C without loss of function
Measurement Frequency Range	1616 to 1626.5 MHz
VSWR	< 1.5 : 1
Maximum Gain	3 dBic
Nominal Impedance	50 Ohms
Polarization	Right Hand Circular (RHCP)
Basic Pattern	Omni directional and hemispherical

Satellite signal strength reported by the A3LA-R when issuing an AT+CSQ command indicates the signal strength of the ring channel. Care should be taken when using this signal reading for comparisons between devices. Of particular notes are the followings:

1. There is a 0.5 dB tolerance on the calibration.
2. Each bar represents a 2 dB increment.
3. Multiple ring channels can be present at the same time so units can lock to different signals.
4. If the reading is near the decision threshold it would be easy to see a 1 bar difference.

5.0 SIM CARD INTERFACE

The A3LA-R modem contains an integrated SIM reader. The modem uses and requires an Iridium SIM chip for operation. The SIM chip is inserted into the opening located on top of the modem as shown in Figure 4. A plastic locking mechanism is used hold the SIM in-place. Place the SIM chip (facing down) into the SIM reader's bracket. Make sure that the cut-off on the SIM chip aligns with the SIM reader.

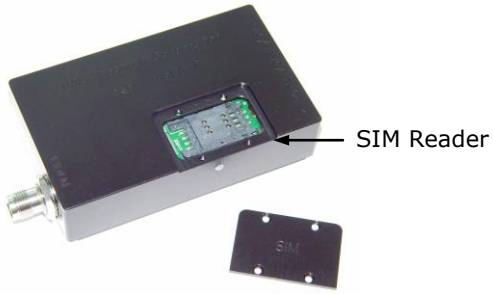


Figure 4. Location of the SIM reader.

6.0 LED DISPLAY

The A3LA-R has a status LED depicted as P for power indicator (see Figure 5). It offers users a quick visual check to ensure power is provided to the modem.

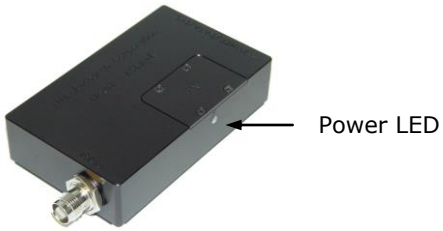


Figure 5. Iridium Satellite Modem A3LA-R.

7.0 CONFIGURATION SETTINGS

The A3LA-R allows users to configure its data port communication parameters. The three configuration types are active, factory default, and stored. The active configuration is the set of parameters currently in use. They can be changed by the users individually via specific AT commands. The factory default configuration is stored in permanent memory. This configuration can be recalled at any time through use of the AT&Fn command.

Two groups of settings, or "profiles", can be stored as user-defined configurations. Users first create desired active configurations and then write them to memory using the AT&Wn command. These profiles can be designated to be loaded as the active configuration upon A3LA-R power-up through use of the AT&Yn command. The A3LA-R can be reset without loss of power to these profiles through use of the ATZn command. The configuration settings are stored in "S-register" locations and are detailed in Appendix A.

8.0 MODES OF OPERATION

The A3LA-R serial data port is always in one of three modes: command mode, SBD data mode or SBD session mode. When the data port is in command mode, AT commands can be entered to control the A3LA-R. In command mode, flow control has no effect, with the RTS input ignored and the CTS output driven ON (low). When in SBD data mode, the A3LA-R is transferring binary or text SBD message data to or from the DTE. In SBD data mode:

1. All characters from the DTE not forming part of the message data are ignored (i.e. no AT commands may be entered).
2. No unsolicited result codes are issued.
3. RTS/CTS flow control, if enabled, is active. When RTS is OFF (high), the A3LA-R suspends transfer of data to the DTE; when CTS is OFF (high), the A3LA-R expects the DTE to suspend transfer of data.

When in SBD session mode, the A3LA-R is attempting to conduct an SBD session with the network. In SBD session mode:

1. The DTE must wait for the +SBDI [X][A] session result code.
2. All characters from the DTE are ignored.
3. Unsolicited result codes are issued where those codes have been enabled.

Transitions between the modes of operation are performed automatically by the A3LA-R in response to the SBD AT commands; the DTE has no other control over the mode.

9.0 MOUNTING RECOMMENDATIONS

The A3LA-R has four features on its bottom surface that can aid in its mounting (see Appendix I). These four features are pre-drilled at a minimum depth of 0.25 inch to accept 6-32 thread type.

10.0 TECHNICAL SUPPORT

FOR TECHNICAL SUPPORT, PLEASE CONTACT US AT

Phone: 703-392-1136
FAX: 703-392-6795
E-mail: contact@nalresearch.com

Technical documents are also available to download on NAL Research's website
www.nalresearch.com

APPENDIX A: AT INTERFACE

A.1 Command Types

The A3LA-R employs two principal types of AT commands: basic and extended. The two types have differing syntax used to query and adjust their settings. They also have unique reference standards. A specific basic AT command is used to reference S-registers and query and adjust their settings. Its syntax is similar to that of extended AT commands.

A.2 Basic Commands

Basic commands are industry standard and originally developed for Hayes-compatible PSTN modems. In many cases, basic commands consist of a single ASCII alpha character. In other cases, a special character precedes the alpha character. Prefix characters used in A3LA-R basic commands include &, \, %, and *.

Most alpha characters in basic commands are followed by a numeric parameter, n. To adjust its setting, a basic command is entered with the appropriate numeric value of n. Note that if the numeric parameter n is omitted from the basic command entry, a value of zero is assumed for n. For example, ATXn is set to a value of 4 by entering ATX4, whereas it is set to value of 0 by entering either ATX0 or ATX.

To query a basic command setting, the AT&V command is entered to view the active configuration of a group of basic commands. Some basic commands listed in this document are marked with "No action, compatibility only". In these cases, the basic command is accepted in the same fashion as is with other modems, but has no effect on the operation of the A3LA-R, since it has no meaning in the Iridium environment.

A.3 Extended Commands

Extended commands perform actions or set parameters that extend the capability of the A3LA-R beyond that which is allowed by basic commands. In some cases, they were designed for non-PSTN networks, such as the GSM network.

Most extended commands include a prefix of + followed by a single alpha character. Prefixes used in A3LA-R extended commands include +C, +D, +G, +I, and +S. Extended commands designed specifically for Iridium products include a –MS prefix. Most extended commands include three alpha characters after the prefix, but some commands include just one or two alpha characters after the prefix.

Some extended commands have a single execution mode. No further syntax is added after the prefix and body of the command. For example, AT+GSN is entered as shown to query the A3LA-R for its assigned serial number (i.e. IMEI). Some extended commands incorporate a test mode to query their range of valid responses. Some extended commands incorporate set, read, and test modes. For example, AT–MSVTR is entered as AT–MSVTR=n in set mode to enable/disable receipt of DTMF messages. It is entered as AT–MSVTR? in read mode to query its current setting and is entered as AT–MSVTR=? in test mode to query its range of valid settings. Extended commands are grouped as shown below.

Extended Cellular Commands:

- +C prefix
- Used for GSM cellular phone-like functions
- Standards: ETSI specifications GSM 07.07 [2] and GSM 07.05 [3]

Extended Data Compression Commands:

- +D prefix
- Used for data compression
- Standard: V.25ter [1]

Extended Generic Commands:

- +G prefix
- Used for A3LA-R issues such as identities and capabilities
- Standard: V.25ter [1]

Extended Interface Control Commands:

- +I prefix
- Used to control the DTE interface
- Standard: V.25ter [1]

Extended Short Burst Data Commands:

- +S prefix
- Used for Short Burst Data messaging

Iridium Satellite Product Proprietary Commands:

- –MS prefix
- Proprietary to the Iridium product line

A.4 Command and Response Characters

The execution of a command string follows a left-to-right execution of each command followed by the reporting of a result code for the entire string. The ASCII character set (CCITT T.50 International Alphabet 5, American Standard Code for Information Interchange) is used for the issuance of commands and responses. Only the low-order 7 bits of each character are used for commands or parameters; the high-order bit is ignored. Upper case characters are equivalent to lower case characters.

A.5 Command Entry

An AT command is a string of characters sent by the DTE to the A3LA-R while it is in command mode. A command string has a prefix, a body, and a terminator. The prefix consists of the ASCII characters AT or at. The body is a string of commands restricted to printable ASCII characters. The default terminator is the <CR> character. AT command entry syntax is critical, and the following rules apply:

- All commands (apart from A/ and +++) begin with a prefix of AT or at.
- The commands in a command string (apart from A/ and +++) are executed only after the return or enter key is pressed.
- Use of upper or lower case letters is allowed, but not a combination of both.
- The maximum number of characters in a command string is 128.
- If the numeric parameter n is omitted from the basic command entry, a value of zero is assumed for n.
- If an optional parameter is omitted from an extended command, the current value is implied. Optional parameters are enclosed by square brackets ([...]) in this document.

- Spaces entered into a command string for clarity between the AT prefix and the body of the command are ignored. Likewise, spaces entered for clarity within the command body between alpha characters and decimal parameters are ignored.
- The backspace or delete keys can typically be used to edit commands.
- Characters that precede the AT prefix are ignored.
- Ctrl-x can be used to abort a command line input.

Consider the following six commands to be entered in a single command line:

ATX0	(set basic command ATXn to n=0)
AT&V	(execute basic command AT&V)
AT+GSN	(execute extended command AT+GSN)
AT+CMEE=?	(query the valid range of responses of extended command AT+CMEE)
AT+CPBR=1,12	(execute extended command AT+CPBR with parameters 1 and 12)
AT–MSVTR?	(query the current setting of extended command AT–MSVTR)

The following are valid single command line entries of above six commands:

at x 0 &v +gsn +cmee=? +cpbr=1,12 -msvtr?	(all lower case)
AT X 0 &V +GSN +CMEE=? +CPBR=1,12 –MSVTR?	(all upper case)
ATX 0 &V +GSN +CMEE=? +CPBR=1,12 –MSVTR?	(space omitted between AT and X)
ATX0 &V +GSN +CMEE=? +CPBR=1,12 –MSVTR?	(space omitted between ATX and 0)
ATX &V +GSN +CMEE=? +CPBR=1,12 –MSVTR?	(0 omitted from ATX0)
ATX;&V;+GSN;+CMEE=?;+CPBR=1,12;–MSVTR?	(semicolon separators)
ATX&V+GSN+CMEE=?+CPBR=1,12–MSVTR?	(no separators)

A.6 Command Responses

A result code is sent to the DTE in response to the execution of a command. It may also occur unsolicited from other conditions such as an incoming call (e.g. RING). Responses returned as a result of a query are called information responses.

Result codes can be represented by text if the A3LA-R is in verbose mode or with numbers if in numeric mode. The command ATVn informs the A3LA-R whether to respond in verbose or numeric mode. Further note that responses can be suppressed by setting the command ATQn to ATQ1. Table below shows the difference in format between these modes.

	Numeric Mode **ATQ0 ATV0**	**Verbose Mode** **ATQ0 ATV1**
Result codes	<NUMERIC_CODE><CR>	<CR><LF><VERBOSE_CODE><CR><LF>
Information Responses	<TEXT><CR><LF>	<CR><LF><TEXT><CR><LF>

Command entries with invalid syntax typically respond with ERROR. Command entries of valid syntax with an out-of-range parameter can respond in one of three following manners:

- Disallow out-of-range entry and respond with ERROR
- Disallow out-of-range entry and respond with OK
- Disallow out-of-range entry, accept the closest in-range value, and respond with OK

A.7 Hardware Failure Reporting

If the A3LA-R detects a hardware problem during initialization, it may be unable to function correctly. The A3LA-R notifies the DTE of this situation by issuing an unsolicited result code at the end of initialization:

HARDWARE FAILURE: <subsys>,<error>

where <subsys> identifies the software subsystem that detected the error, and <error> is the subsystem specific error code. Any AT commands that cannot be handled in the failure condition will terminate with result code 4 ("ERROR").

A.8 Command Set Description

A.8.1 AT – Attention Code

This is the prefix for all commands except A/ and +++. When entered on its own, the A3LA-R will respond OK.

A.8.2 A/ – Repeat Last Command

Repeat the last command issued to the A3LA-R unless the power was interrupted or the unit is reset. A/ is not followed by <CR>.

A.8.3 +++ – Escape Sequence

The escape sequence is used to transfer from in-call data mode to in-call command mode without disconnecting from the remote modem. After a pause, the A3LA-R will respond with OK. Register S2 can be used to alter the escape character from +, the factory default, to any hexadecimal value in the range 0 to 255.

A.8.4 En – Echo

Echo command characters.

0 Characters are not echoed to the DTE

1 Characters are echoed to the DTE (default)

A.8.5 On – Online

Enter in-call data mode. This is used to return to in-call data mode from in-call command mode using an existing connection. An error is reported if on-hook.

0 Switch from in-call command mode to in-call data mode

Any value for n accepted

A.8.6 Qn – Quiet Mode

Control A3LA-R responses.

0 A3LA-R responses are sent to the DTE (default)

1 A3LA-R responses are NOT sent to the DTE

A.8.7 Vn – Verbose Mode

Set the response format of the A3LA-R, which may be either numeric or textual.

0 Numeric responses

1 Textual responses (default)

A.8.8 Wn – Error Correction Message Control

Set the format of the CONNECT messages.

0 Upon connection, the A3LA-R reports the DTE speed (default)

1 Upon connection, the A3LA-R reports the line speed, the error correction protocol and the DTE speed in that order

2 Upon connection, the A3LA-R reports its data port speed

A.8.9 Zn – Soft Reset

Reset the A3LA-R to a user-stored configuration.

0 Restores user configuration 0

1 Restores user configuration 1

A.8.10 &Cn – DCD Option

Select how the A3LA-R controls the DCD behavior.

0 DCD is forced on at all times

1 DCD indicates the connection status (default)

A.8.11 &Dn – DTR Option

Set the A3LA-R reaction to DTR signal.

0 DTR is ignored in all modes. A DTR signal input is not needed when set to &D0.

For all other &Dn settings, the following applies.

DTR must be ON during on-hook command mode. If DTR transitions from ON to OFF during on-hook command mode, operation will be locked after approximately 10 seconds. On-hook command mode operation will resume when DTR is restored ON.

DTR must be ON at call connection

DTR must be ON during both in-call command mode and in-call data mode. Reaction to DTR ON to OFF transitions during in-call command mode and in-call data mode is determined by the &Dn setting as shown below. *Note that the +CVHU command can be set to override these specified reactions.*

1 If DTR transitions from ON to OFF during in-call command mode, and DTR is restored ON within approximately 10 seconds, the call will remain up. If DTR is not restored ON within approximately 10 seconds, the call will drop to on-hook command mode.

If DTR transitions from ON to OFF during in-call data mode, the mode will change to in-call command mode. If DTR is restored ON within approximately 10 seconds, the call will remain up. If DTR is not restored ON within approximately 10 seconds, the call will drop to on-hook command mode.

2 If DTR transitions from ON to OFF during either in-call command mode or in-call data mode, the call will drop to on-hook command mode (default).

3 If DTR transitions from ON to OFF during either in-call command mode or in-call data mode, the call will drop to on-hook command mode and the A3LA-R will reset to AT command profile 0.

A.8.12 &Fn – Restore Factory Settings

Recall factory defaults.

0 Recall factory default 0

A.8.13 &Kn – Flow Control

Select the flow control method between the A3LA-R and DTE.

0 Disables flow control

3 Enables RTS/CTS flow control (default)

4 Enables XON/XOFF flow control

6 Enables both RTS/CTS and XON/XOFF flow control

A.8.14 &Mn – Asynchronous/Synchronous Mode

Select the DTR operating mode.

0 Selects normal asynchronous operation (default). (See &Qn)

A.8.15 &Qn – Sync/Async Mode

Select asynchronous mode. This is an extension of the &M command and is used to control the connection modes permitted.

Note: The register is not updated right after the user requests new values because the requested values may or may not be what IRLP will use once a data call is established due to negotiations with the other peer. If the register is updated right away, this may give the user the impression that those values will be used during the data call, but there is no guarantee that will be the case. The real values will only be known once a data call is established and the negotiation phase is done. For that reason, the values are written to the register only after a call is established and both sides have negotiated parameter values (such as mode of operation). The value of the register will be reset to default value (5) after the call completed.

0, 6 Normal asynchronous operation with no error correction (unacknowledged mode)

5 Asynchronous operation with error correction (acknowledged mode) (default)

A.8.16 &Sn – DSR Override

Define the behavior of DSR.

0 DSR always active (default)

1 Same as 0

A.8.17 &V – View Active and Stored Configuration

View the current active configuration and stored profiles.

A.8.18 &Wn – Store Active Configuration

Store the active profile in non-volatile memory. This is used to store user configurations for later use.

0 Store current (active) configuration as profile 0

1 Store current (active) configuration as profile 1

A.8.19 &Yn – Designate Default Reset Profile

Select profile for use after power-up.

0 Select profile 0 (default)

1 Select profile 1

A.8.20 \Kn – Control Break

Control the response of the A3LA-R to a break received from the DTE or the remote modem according to the parameter specified. The response is different in three separate states:

When a break is received from DTE when A3LA-R is in data transfer mode:

0 Enter in-call command mode, no break sent to remote modem

1 Clear data buffers and send break to remote modem

2 Same as 0

3 Send break to remote modem immediately

4 Same as 0

5 Send break to remote modem in sequence with transmitted data (default)

When a break is received from the remote modem during a non-error corrected connection:

0 Clear data buffers and send break to DTE

1 Same as 0

2 Send break to DTE immediately

3 Same as 2

4 Send break to DTE in sequence with received data

5 Same as 4 (default)

A.8.21 %R – Display Registers

Display all the S registers in the system.

A.8.22 *Pn – Power

Turn A3LA-R off.

0 Turn A3LA-R OFF

A.8.23 +CBST – Select Bearer Service Type

Set Command: **+CBST=[<speed>[,<name>[,<ce>]]]**

Select the bearer service type for mobile originated calls.

<speed> can have the following values:

0 Autobauding

1 300 bps V.21

2 1200 bps V.22

3 2400 bps V.22bis

6 4800 bps V.32

7 9600 bps V.32 (default)

65 300 bps V.110

66 1200 bps V.110

68 2400 bps V.110

70 4800 bps V.110

71 9600 bps V.110

<name> takes the following value:

0 data circuit asynchronous

<ce> can only take the following value:

1 non-transparent

***Read Command:* +CBST?**

Query the current bearer service type settings. Response is in the form:

+CBST: <speed>,<name>,<ce>

***Test Command:* +CBST=?**

List the supported <speed>, <name>, <ce>. Response is in the form:

+CBST: (supported <speed>s),(supported <name>s),(supported <ce>s)

A.8.24 +CGMI – Manufacturer Identification

***Exec Command:* +CGMI**

Query A3LA-R RF board manufacturer.

A.8.25 +CGMM – Model Identification

***Exec Command:* +CGMM**

Query A3LA-R RF board model.

A.8.26 +CGMR – Revision

***Exec Command:* +CGMR**

Query A3LA-R RF board revision.

A.8.27 +CGSN – Serial Number

***Exec Command:* +CGSN**

Query A3LA-R IMEI.

A.8.28 +CMEE – Report Mobile Equipment Error

***Set Command:* +CMEE=[<x>]**

Set mobile equipment error reporting level.

<x> takes the following values:

0 Disable error reporting (use ERROR result code) (default)

1 Enable numeric error reporting

2 Enable verbose error reporting

An example of an error report is:

+CME ERROR: <y>

where <y> can be the number or text listed below:

0 A3LA-R RF board failure

1 no connection to A3LA-R

2	A3LA-R RF board-adaptor link reserved
3	operation not allowed
4	operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
20	memory full
21	invalid index
22	not found
23	memory failure
24	text string too long
25	invalid characters in text string
26	dial string too long
27	invalid characters in dial string
28	number is SIM fixed dialing restricted
30	no network service
31	network timeout
32	emergency calls only
40	network personalization PIN required
41	network personalization PUK required
42	network subset personalization PIN required
43	network subset personalization PUK required
44	service provider personalization PIN required
45	service provider personalization PUK required
46	corporate personalization PIN required
47	corporate personalization PUK required
100	unknown

***Read Command:* +CMEE?**

Query mobile equipment error reporting level. The response is in the form:

+CMEE: <x>

***Test Command:* +CMEE=?**

List the supported error reporting level. The response is in the form:

+CMEE: (supported <x>s)

A.8.29 +CPAS – Modem Activity Status

***Exec Command:* +CPAS**

Query A3LA-R activity status. The response is in the form:

+CPAS: <x>

where <x> can take the following values:

0 Ready (allows commands)

1 Unavailable (does not allow commands)

2 Unknown (may not respond to commands)

3 Data Call Ringing (allows commands)

4 Data Call In Progress (allows commands)

A.8.30 +CR – Service Reporting Control

***Set Command:* +CR=[<mode>]**

Set the service reporting level.

<mode> takes the following values:

0 Disable reporting (default)

1 Enable reporting

If reporting is enabled, the intermediate result code +CR: <serv> is returned by the A3LA-R.

<serv> can have one of the following values:

ASYNC	asynchronous transparent
SYNC	synchronous transparent
REL ASYNC	asynchronous non-transparent
REL SYNC	synchronous non-transparent

***Read Command:* +CR?**

Query the current service reporting level settings. The response is in the form:

+CR: <mode>

***Test Command:* +CR=?**

List the supported reporting levels. The response is in the form:

+CR: (supported <mode>s)

A.8.31 +DS – Set Data Compression Function

***Set Command:* +DS=[<direction>[,<comp_neg>[,<max_dict>[,<max_string]]]]**

Set the V.42bis data compression function.

<direction> can take on the following values:

0 No compression

1 Transmit only

2 Receive only

3 Both directions (default)

<comp_neg> can take on the following values:

0 Do not disconnect if V.42bis is not negotiated by the A3LA-R as specified in <direction> (default)

1 Disconnect if V.42bis is not negotiated by the A3LA-R as specified in <direction>

<max_dict> can take on the following values: 512 to 2048. Default is 512.

<max_string> can take on the following values: 6 to 250. Default is 6.

***Read Command:* +DS?**

Query the current data compression parameter settings. The response is in the form:

+DS: <direction>,<comp_neg>,<max_dict>,<max_dict>

***Test Command:* +DS=?**

List the supported data compression parameters. The response is in the form:

+DS: (supported<direction>s),(supported<comp_neg>s,(supported <max_dict>s),(supported<max_dict>s)

Data compression will not work if IRLP is in unacknowledged mode.

Note: The register is not updated right after the user requests new values because the requested values may or may not be what IRLP will use once a data call is established due to negotiations with the other peer. If the register is updated right away, this may give the user the impression that those values will be used during the data call, but there is no guarantee that will be the case. The real values will only be known once a data call is established and the negotiation phase is done. For that reason, the values are written to the register only after a call is established and both sides have negotiated parameter values. The value of the register will be reset to default value (3) after the call is completed.

A.8.32 +DR – Data Compression Report Level

***Set Command:* +DR=[<mode>]**

Set the data compression reporting level.

<mode> can take on the following values:

0 Disable data compression reporting (default)

1 Enable data compression reporting

If reporting is enabled, the following intermediate result codes are transmitted by the A3LA-R:

+DR: NONE No data compression

+DR: V42B Data compression in use in both directions

+DR: V42B RD Data compression in use in receive direction only

+DR: V42B TD Data compression in use in transmit direction only

***Read Command:* +DR?**

Query the current reporting level setting. The response is in the form:

+DR: <mode>

***Test Command:* +DR=?**

List the supported parameter settings. The response is in the form:

+DR: (supported <mode>s)

A.8.33 +CEER – Extended Error Report

***Exec Command:* +CEER**

Execution command causes the A3LA-R to return information text <report> which offers the user an extended report of the reason of the failure in the last unsuccessful call setup (originating or answering) or the reason for last call release. The response is in the form:

+CEER: <report>

An example of a <report> is:

User alerting, no answer

A.8.34 +CHUP – Hangup call

This command causes the A3LA-R to hangup the current data call.

A.8.35 +CMGD – Delete SMS Message

***Exec Command:* +CMGD=<index>**

Execution command deletes message from preferred message storage <mem1> (<mem1> is the selected message storage from the +CPMS command) location <index>. If deleting fails, final result code +CMS ERROR: <cms_err> is returned.

An example of an error report is:

+CMS ERROR: <cms_err>

where <cms_err> can be one of the numbers below:

1	unassigned number
8	operator barred
3	operation not allowed (identical to 302)
10	call barred
21	SM transfer rejected
27	destination out of service
28	unidentified subscriber
29	facility rejected
30	unknown subscriber
38	network out of order
41	temporary failure
42	congestion
47	resources unavailable
50	facility not subscribed
69	facility not implemented
81	invalid SM reference value
95	invalid message
96	invalid mandatory information element
97	nonexistent message type
98	incompatible message
99	nonexistent information element
111	protocol error

127	interworking
128	telephony interworking not supported
129	SM type 0 not supported
130	cannot replace SM
143	unspecified TP-PID error
144	coding scheme not supported
145	message class not supported
159	unspecified TP-DCS error
160	command not actioned
161	command unsupported
176	TPDU not supported
192	SC busy
193	no SC subscription
194	SC system failure
195	invalid SME address
196	destination SME barred
197	SM rejected
208	SIM SMS storage full
209	no SMS storage capability in SIM
210	error in MS
211	memory capacity exceeded
255	unspecified error
300	A3LA-R failure
301	SMS service reserved
302	operation not allowed
303	operation not supported
304	invalid PDU mode parameter
305	invalid text mode parameter
310	no SIM
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
320	memory failure
321	invalid memory index
322	memory full
330	SM-SC address unknown
331	no network service
332	network timeout
500	unknown error

A.8.36 +CMGF – SMS Message Format

Set Command: **+CMGF=[<mode>]**

Set command tells the A3LA-R, which input and output format of messages to use. <mode> indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. Mode can be either PDU mode (entire TP data units used) or text mode (headers and body of the messages given as separate parameters). Only PDU mode is supported at this time.

Valid values for <mode> are:

0 PDU mode (default)

Read Command: **+CMGF?**

Read command returns the current <mode> set. Response is in the form:

+CMGF: <mode>

Test Command: **+CMGF=?**

Test command returns the list of supported <mode>s. Response is in the form:

+CMGF: (list of supported <mode>s)

A.8.37 +CMGL – List SMS Messages

Exec Command: **+CMGL[=<stat>]**

Execution command returns messages with status value <stat> from message storage <mem1> (<mem1> is the selected message storage from the +CPMS command) to the DTE. If listing fails, final result code +CMS ERROR: <cms_err> is returned.

Valid values for <stat> are:

PDU	Text
0	"REC UNREAD" received unread message (i.e. new message) (default)
1	"REC READ" received read message
2	"STO UNSENT" stored unsent message (only applicable to SMs)
3	"STO SENT" stored sent message (only applicable to SMs)
4	"ALL" all messages (only applicable to +CMGL command)

Response is in the following format for PDU mode:

+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu>[<CR><LF>+CMGL:<index>,<stat>,[<alpha>],<length><CR><LF><pdu> [...]]

where:

<alpha>: string type alphanumeric representation of TP-destination address or TP-originating address corresponding to the entry found in the phonebook (optional field);

<length>: in PDU mode, this is the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>: GSM 04.11 [8] SC address followed by GSM 03.40 [9] TPDU in hexadecimal format.

Test Command: **+CMGL=?**

Test command gives a list of all status values supported by the A3LA-R. Response is in the form:

+CMGL: (list of supported <stat>s)

A.8.38 +CMGR – Read SMS Message

Exec Command: **+CMGR=<index>**

Execution command returns the SMS message with location value <index> from message storage <mem1> (<mem1> is the selected message storage from the +CPMS command). If status of the message is 'received unread', status in the storage changes to 'received read'. If reading fails, final result code +CMS ERROR: <cms_err> is returned.

Response is in the following format for PDU mode:

+CMGR: <stat>,[<alpha>],<length><CR><LF><pdu>

where:

<stat>:

0 - MT message unread

1 - MT message read

2 - MO message unsent

3 - MO message sent

(When reading an MT message the first time, the status is reported as 0 (unread). The status is then changed to 1 (read), and that is reported on subsequent reads of that message.)

<alpha>:string type alphanumeric representation of TP-destination address or TP-originating address corresponding to the entry found in the phonebook (optional field);

<length>:in PDU mode, this is the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)

<pdu>: GSM 04.11 [8] SC address followed by GSM 03.40 [9] TPDU in hexadecimal format.

A.8.39 +CMGS – Send SMS Message

Exec Command: **+CMGS=<length><CR><pdu><ctrl-Z/ESC> (PDU mode)**

Execution command sends message from the DTE to the network (SMS-SUBMIT). In PDU mode, <length> is the length of the actual TP data unit in octets; <pdu> is the GSM 04.11 [8] SC address followed by GSM 03.40 [9] TPDU in hexadecimal format.

PDU entry must be terminated by <ctrl-Z>. Sending can be cancelled by the <ESC> character.

Response is in the following format for PDU mode:

+CMGS: <mr>

where <mr> is the message reference value of the message.

If sending fails, final result code +CMS ERROR: <cms_err> is returned.

A.8.40 +CMGW – Write SMS Message To Memory

Exec Command: **+CMGW=<length>[,<stat>]<CR><pdu><ctrl-Z/ESC> (PDU mode)**

Execution command stores a message to memory storage <mem2> (<mem2> is selected by the +CPMS command). In PDU mode, <length> is the length of the actual TP data unit in octets; <pdu> is the GSM 04.11 [8] SC address followed by GSM 03.40 [9] TPDU in hexadecimal format. By default, message status will be set to 'stored unsent', but parameter <stat> allows also other status values to be given.

PDU entry must be terminated by <ctrl-Z>. Storing can be cancelled by sending the <ESC> character.

Response is in the following format for PDU mode:

+CMGW: <index>

where <index> indicates the memory location where the message is stored.

If storing fails, final result code +CMS ERROR: <cms_err> is returned.

A.8.41 +CMOD – Call Mode

Set Command: **+CMOD=[<mode>]**

Set command selects the call mode of further dialing commands (D) or for next answering command (A). Mode can be either single or alternating (the terms "alternating mode" and "alternating call" refer to all GSM bearer and tele-services that incorporate more than one basic service (voice, data, fax) within one call). For the satellite modem, only a single call is supported.

<mode>:

0 single mode (default)

Read Command: **+CMOD?**

Query the current call mode settings. The response is in the form:

+CMOD: <mode>

Test Command: **+CMOD=?**

List the supported call modes. The response is in the form:

+CMOD: (supported <mode>s)

A.8.42 +CNMI – New SMS Message Indications to DTE

Set Command: **+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[, <bfr>]]]]]**

Set command selects the procedure, how receiving of new messages from the network is indicated to the DTE when DTE is active, e.g. DTR signal is ON.

Valid values for <mode> are:

0 Buffer unsolicited result codes in the A3LA-R. If result code buffer is full, older indications are discarded and replaced with the new received indications. (default)

1 Discard indication and reject new received message unsolicited result codes when A3LA-R-DTE link is reserved (e.g. in in-call data mode). Otherwise forward them directly to the DTE.

2 Buffer unsolicited result codes in the A3LA-R when A3LA-R-DTE link is reserved (e.g. in in-call data mode) and flush them to the DTE after reservation. Otherwise forward them directly to the DTE.

Valid values for <mt> are:

0 No SMS-DELIVER indications are routed to the DTE. (default)

1 If SMS-DELIVER is stored in the A3LA-R, indication of the memory location is routed to the DTE using unsolicited result code:

+CMTI: <mem>,<index>

2 SMS-DELIVERs (except class 2 messages and messages in the message waiting indication group (store message)) are routed directly to the TE using unsolicited result code:

+CMT: [<alpha>],<length><CR><LF><pdu> (PDU mode)

3 Class 3 SMS-DELIVERs are routed directly to TE using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

Valid values for <bm> are:

0 No CBM indications are routed to the DTE. (default)

Valid values for <ds> are:

0 No SMS-STATUS-REPORTs are routed to the DTE. (default)

1 SMS-STATUS-REPORTs are routed to the DTE using unsolicited result code:

+CDS: <length><CR><LF><pdu> (PDU mode)

Valid values for <bfr> are:

0 Buffer of unsolicited result codes defined within this command is flushed to the DTE when <mode> 1...3 is entered (OK response is returned before flushing the codes). (default)

1 Buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered.

***Read Command:* +CNMI?**

Read command returns the current settings for the SMS message indication. Response is in the form:

+CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>

***Test Command:* +CNMI=?**

Test command returns the supported settings of the A3LA-R. Response is in the form:

+CNMI: (list of supported <mode>s),(list of supported <mt>s),(list of supported <bm>s),(list of supported <ds>s),(list of supported <bfr>s)

A.8.43 +COPS – Operator Select

***Set Command:* +COPS=[<mode>[,<format>[,<oper>]]]**

Set command forces an attempt to manually register the A3LA-R to the network. Only IRIDIUM as <oper> is supported.

Valid values for the parameters are outlined below.

<mode>:

0 automatic (<oper> field is ignored) (default)

1 manual (<oper> field is optional)

<format>:

0 long format alphanumeric <oper>

1 short format alphanumeric <oper>

2 numeric <oper>

<oper> is of string type enclosed by quotes“”; for example “IRIDIUM”. <format> indicates if the format is alphanumeric or numeric; long alphanumeric format can be up to 16 characters long and short format up to 8 characters; numeric format is the Location Area Identification number which consists of a three BCD (Binary Coded Decimal) digit country code plus a two BCD digit network code; hence the number has structure: (country code digit 3)(country code digit 2)(country code digit 1)(network code digit 2)(network code digit 1). Since IRIDIUM is the only operator, the short and long format is “IRIDIUM” and the numeric format is “90103”. These are the only values accepted.

Note that setting the <mode> to manual does not disable automatic registration of the A3LA-R to the network. It just forces a manual registration procedure when entered.

***Read Command:* +COPS?**

Read command returns the current mode, and will always respond with “000” for <mode>. This is due to the continually enabled nature of the automatic registration mode. The response is in the form:

+COPS: <mode>

For example:

+COPS:000

***Test Command:* +COPS=?**

Test command returns the list of operators present in the network. Response is in the form:

+COPS: [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>)s] [,,(list of supported <mode>s),(list of supported <format>s)]

where <stat> indicates:

2 current

For example:

+COPS:(002),"IRIDIUM","IRIDIUM","90103",,(000-001),(000-002)

A.8.44 +CPBF – Find Phonebook Entries

***Exec Command:* +CPBF=<findtext>**

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric fields start with string <findtext>. <findtext> should be of string type enclosed by “”; for example, “John”.

Entry fields returned are location number <index n>, phone number stored there <number> (of address type <type>), and text <text> associated with the number. Response is in the following format:

+CPBF: <index1>,<number>,<type>,<text>[[...]<CR><LF>+CBPF: <index2>,<number>,<type>,<text>]

***Test Command:* +CPBF=?**

Test command returns the maximum lengths of <number> and <text> fields for phonebook entries. Response is in the form:

+CPBF: <nlength>,<tlength>

where <nlength> indicates the maximum length of <number> and <tlength> shows the maximum length of <text>.

A.8.45 +CPBR – Read Phonebook Entries

***Exec Command:* +CPBR=<index1>[,<index2>]**

Execution command returns phonebook entries in location number range <index1>... <index2> from the current phonebook memory storage selected with +CPBS. If <index2> is left out, only location <index1> is returned.

Entry fields returned are location number <index n>, phone number stored there <number> (of address type <type>) and text <text> associated with the number. Response is in the form:

+CPBR: <index1>,<number>,<type>,<text>[[...] <CR><LF>+CPBR:
<index2>,<number>,<type>,<text>]

***Test Command:* +CPBR=?**

Test command returns location range supported by the current storage and the maximum lengths of <number> and <text> fields. Response is in the form:

+CPBR: (list of supported <index>s),<nlength>,<tlength>

where <nlength> indicates the maximum length of <number> and <tlength> shows the maximum length of <text>.

A.8.46 +CPBS – Select Phonebook Storage

Set Command: +CPBS=<storage>

Set command selects phonebook memory storage <storage>, which is used by other phonebook commands. <storage> should be of string type enclosed by “”; for example, “FD”. <storage> takes the following values:

FD	SIM fixed dialing phonebook
LD	Last ten calls dialed phonebook
ME	A3LA-R phonebook
MT	combined A3LA-R and SIM phonebook (default)
SM	SIM phonebook

***Read Command:* +CPBS?**

Read command returns currently selected memory, the number of used locations and total number of locations in the memory. Response is in the form:

+CPBS: <storage>,<used>,<total>

where <used> indicates the number of used locations and <total> shows the total capacity of <storage>.

***Test Command:* +CPBS=?**

Test command returns supported storages.

A.8.47 +CPBW – Write Phonebook Entry

Exec Command: **+CPBW=[<index>][,<number>[,<type>[<text>]]]**

Execution command writes phonebook entry in location number <index> in the current phonebook memory storage selected with +CPBS. Entry fields written are phone number <number> (of address type <type>) and text <text> associated with the number. If those fields are omitted, phonebook entry is deleted. If <index> is left out, but <number> is given, entry is written to the first free location in the phonebook. Both <text> and <number> should be of string type enclosed by “”; for example, “John”,”1234”.

Test Command: **+CPBW=?**

Test command returns the location range supported by the current storage, the maximum length of <number> field, supported number formats of the storage, and the maximum length of <text> field. Response is in form:

+CPBW: (list of supported <index>s),<nlength>,(list of supported <type>s),<tlength>

A.8.48 +CPIN – Enter PIN

Set Command: **+CPIN=<pin>[,<newpin>]**

Set command sends to the A3LA-R a password which is necessary before it can be operated (SIM Card PIN Code, SIM PUK, etc.). If no password request is pending, no action is taken by the A3LA-R.

- If the password required is SIM PUK, then <newpin> is required, where <newpin> is the new SIM Card PIN to replace the old SIM Card PIN.
- If the password required is SIM PUK2, then <newpin> is required, where <newpin> is the new SIM Card PIN2 to replace the old SIM Card PIN2
- Both <pin> and <newpin> should be of string type enclosed by “ ”; for example, ”1234”.

Read Command: **+CPIN?**

Read command returns an alphanumeric string indicating whether some password is required or not. Response is in the form:

+CPIN: <code>

where <code> can be one of the following:

READY	A3LA-R is not waiting for any password.
PH PIN	A3LA-R is waiting for Phone Unlock Code to be given.
SIM PIN	A3LA-R is waiting for SIM Card PIN1 Code to be given.
SIM PUK	A3LA-R is waiting for SIM PUK to be given (because SIM PIN1 is blocked).
SIM PIN2	A3LA-R is waiting for SIM PIN2 to be given.*
SIM PUK2	A3LA-R is waiting for SIM PUK2 to be given (because SIM PIN2 is blocked).

***Note:** The response “SIM PIN2” is somewhat misleading, because it indicates one of three possible scenarios:

1. PIN1 has already been successfully entered (thus equivalent to the READY response).

2. No PIN1 is required (thus equivalent to the READY response).
3. The A3LA-R is waiting for PIN2 (used to access Fixed Dialing settings and other subscription-based features).

In any of these three cases, the A3LA-R should be available to place and receive calls.

Note: +CPIN is closely related to +CLCK and +CPWD. See these commands for additional information.

A.8.49 +CPMS – Select Preferred SMS Message Storage

***Set Command:* +CPMS=<mem1>[, <mem2>[,<mem3>]]**

Set command selects memory storages <mem1>, <mem2> and <mem3>. <mem1> is the memory from which messages are read and deleted; <mem2> is the memory to which writing and sending operations are made; <mem3> is the memory to which received SMS messages are to be stored. If a chosen storage is not appropriate for the A3LA-R, final result code +CMS ERROR: <cms_err> is returned.

Valid values for <mem1>, <mem2> and <mem3> are:

"SM" SIM message storage

Response is in the form:

+CPMS: <used1>,<total1>,<used2>,<total2>,<used3>,<total3>

where <used1>: number of messages currently in <mem1>

<total1>: total number of message locations in <mem1>

<used2>: number of messages currently in <mem2>

<total2>: total number of message locations in <mem2>

<used3>: number of messages currently in <mem3>

<total3>: total number of message locations in <mem3>

***Read Command:* +CPMS?**

Read command returns the current storage selected, usage and capacity. Response is in the form:

+CPMS: <mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,<mem3>,<used3>, <total3>

***Test Command:* +CPMS=?**

Test command returns lists of memory storages supported by the A3LA-R. Response is in the form:

+CPMS: (list of supported <mem1>s),(list of supported <mem2>s), (list of supported <mem3>s)

A.8.50 +CREG – Network Registration

***Set Command:* +CREG=[<n>]**

Set command controls the presentation of an unsolicited result code +CREG: <stat> when <n>=1 and there is a change in the A3LA-R network registration status, or code +CREG: <stat>[,<lac>,<ci>] when <n>=2 and there is a change in the registration status of the A3LA-R.

Valid values for <n> are:

0 disable network registration unsolicited result code (default)

1 enable network registration unsolicited result code +CREG: <stat>

2 enable network registration and location information unsolicited result code +CREG: <stat>[,<lac>,<ci>]. <lac> indicates the location area code in string format; <ci> is in the cell identifier which is not applicable to IRIDIUM.

<stat> can be one of the following:

0 not registered, A3LA-R is not currently searching a new operator to register to

1 registered, home network

2 not registered, but A3LA-R is currently searching a new operator to register to

3 registration denied

4 unknown

5 registered, roaming

***Read Command:* +CREG?**

Read command returns the status of result code presentation and an integer <stat> which shows the network registration status of the A3LA-R. Location information elements <lac> and <ci> are returned only when <n>=2 and A3LA-R is registered in the network. Response is in the form:

+CREG: <n>,<stat>[,<lac>,<ci>]

***Test Command:* +CREG=?**

Test command lists the supported settings for +CREG. Response is in the form:

+CREG: (list of supported <n>s)

A.8.51 +CSCA – SMS Service Center Address

***Set Command:* +CSCA=<sca>[,<tosca>]**

Set command updates the SMSC address, through which mobile originated SMs are transmitted. In PDU mode, setting is used by the send and write commands, but only when the length of the SMSC address coded into <pdu> parameter equals zero.

<sca>: GSM 04.11 [8] RP SC address Address-Value field in string format (i.e., enclosed by quotes “”);

<tosca>: GSM 04.11 [8] RP SC address Type-of-Address octet in integer format;

***Read Command:* +CSCA?**

Read command returns the current service center address. Response is in the form:

+CSCA: <sca>,<tosca>

A.8.52 +CSCB – Select Cell Broadcast Message Types

***Read Command:* +CSCB?**

Read command returns the current values for <mode>, <mids> and <dcss>. Response is in the form:

+CSCB: <mode>,<mids>,<dcss>

***Test Command:* +CSCB=?**

Test command returns supported modes. Response is in the form:

+CSCB: (list of supported <mode>s)

A.8.53 +CSCS – Select TE Character Set

***Set Command:* +CSCS=[<chset>]**

Set command informs the A3LA-R which character set <chset> is used by the DTE. Only the IRA character set is currently supported. <chset> should be of string type enclosed by “”; for example, “IRA”.

Valid values for <chset> are: "IRA" international reference alphabet (ITU-T T.50)

***Read Command:* +CSCS?**

Read command returns the current character set used. Response is in the form:

+CSCS: <chset>

***Test Command:* +CSCS=?**

Test command returns the supported character set of the A3LA-R. Response is in the form:

+CSCS: (list of supported <chset>s)

A.8.54 +CSMS – Select SMS Message Service

***Set Command:* +CSMS=<service>**

Set command selects short messaging service <service>. It returns the types of messages supported by the A3LA-R: <mt> for mobile terminated messages, <mo> for mobile originated messages and <bm> for broadcast type messages. If chosen service is not supported, final result code +CMS ERROR:<cms_err> shall be returned. Only message service type 0 is currently supported.

Valid values for <service> are:

0 GSM 03.40 [9] and 03.41 [10] (the syntax of SMS AT commands is compatible with GSM 07.05 [3] Phase 2 version 4.7.0) (default)

Response is in the form:

+CSMS: <mt>,<mo>,<bm>

where, <mt>, <mo>, <bm>:

0 type not supported

1 type supported

***Read Command:* +CSMS?**

Read command returns the current message service type set. Response is in the form:

+CSMS: <service>,<mt>,<mo>,<bm>

***Test Command:* +CSMS=?**

Test command returns the supported message services of the A3LA-R. Response is in the form:

+CSMS: (list of supported <service>s)

A.8.55 +CSTA – Select Type of Address

***Set Command:* +CSTA=[<type>]**

Select the type of number for the dial command D. <type> is the type of address in integer format specified in GSM 4.08 subclause 10.5.4.7. Typical values for <type> are:

129 Unknown type (default)

145 International number

***Read Command:* +CSTA?**

Query the current address type settings. The response is in the form:

+CSTA: <type>

***Test Command:* +CSTA=?**

List the supported address type settings. The response is in the form:

+CSTA: (supported <type>s)

A.8.56 +GMI – Manufacturer Identification

***Exec Command:* +GMI**

Query the A3LA-R RF board manufacturer. This command is similar to +CGMI.

A.8.57 +GMM – Model Identification

***Exec Command:* +GMM**

Query the A3LA-R RF board model. This command is similar to +CGMM.

A.8.58 +GMR – Revision

***Exec Command:* +GMR**

Query the A3LA-R RF board revision. This command is similar to +CGMR.

A.8.59 +GSN – Serial Number

***Exec Command:* +GSN**

Query the A3LA-R IMEI. This command is similar to +CGSN.

A.8.60 +GCAP – General Capabilities

***Exec Command:* +GCAP**

Query the A3LA-R' overall capabilities.

A.8.61 A – Answer

Answer immediately. This causes the A3LA-R to answer the incoming data or voice call.

A.8.62 D – Dial

Dial a data or voice call number. The dial command causes the A3LA-R to enter originate mode and act as an auto dialer for connection to other modems or voice lines. The usual format is ATDnx..x where n is a Dial Modifier and x is a number. The following are valid numbers: 0123456789*#ABC. Dial modifiers are used to alter the manner in which the A3LA-R dials.

L Redial last number

+ International dialing prefix. Allows the international access code to be omitted from dial string.

> Direct dial from phonebook locations. See subsection below for further details.

; Start up a voice call. This modifier should be given after the dialing digits (or modifiers).

Any character received from the DTE during the call establishment phase will cause the call attempted to be terminated.

A.8.62.1 D> – Direct Dial From Phonebook

The A3LA-R and SIM contain phonebooks which have a phone number and an alphanumeric field for each phonebook entry location. The use of V.25ter dialing command ensures that direct dialing from phone memory and SIM phonebook is possible through ordinary communications software which just gives the phone number field to be filled and then uses the D command to originate the call. Available memories may be queried with Select Phonebook Storage test command +CPBS=?, and location range for example with Read Phonebook Entries test command +CPBR=?.

Execute commands: **D><str>[;]**

Originate call to phone number which corresponding alphanumeric field is <str> (if possible, all available memories should be searched for the correct entry). <str> is of string type value and should enclosed by "" (e.g., "John").

D> mem<n>[;]

Originate call to phone number in memory mem entry location <n> (available memories may be queried with Select Phonebook Storage test command +CPBS=?).

mem can be one of the following:

FD	SIM fixed dialing phonebook
LD	Last ten calls dialed phonebook
ME	Phone memory
MT	combined phone and SIM phonebook locations
SM	SIM phonebook

D><n>[;]

Originate call to phone number in entry location <n> (the command Select Phonebook Memory Storage +CPBS setting determines which phonebook storage is used).

A.8.63 Hn – Hangup

Control the hook switch. This command is used to clear a data call connection. It is also used to clear a voice call connection when the A3LA-R/RM/RGS has originated the voice call with the ATD dial command or terminated the voice call with the ATA or ATS0=n answer command.

0	Place the A3LA-R on hook.

A.8.64 S0=n – Auto-Answer

Auto-answer. This causes the A3LA-R to auto-answer the incoming data or voice call.

0	Disable auto-answer.
n>0	Enable auto-answer after n rings

A.8.65 Xn – Extended Result Codes

Select the response set to be used by the A3LA-R when informing the DTE of the results of a command or data or voice call.

0	OK, CONNECT, RING, NO CARRIER, NO ANSWER and ERROR

CONNECT response is used to inform of a data call connection; OK response is used to inform of a voice call connection (only for A3LA-R/RM/RGS).

1 As X0 plus CONNECT x, where x is the DTE speed
CONNECT x response is used for data calls only.

2 As X1 plus NO DIALTONE

3 As X2 plus BUSY

4 As X3 plus CARRIER x, PROTOCOL: and COMPRESSION:, where x is the line speed (default)
CARRIER x, PROTOCOL:, and COMPRESSION: responses are used for data calls only.

Note that the Wn command limits which connection related responses will be reported.

A.8.66 +CLVL – Volume Level Control

***Exec Command:* +CLVL=<level>**

This command is used to select the 'volume' of the audio on the audio path. <level> is an integer type value with the smallest value representing the lowest sound level.

***Read Command:* +CLVL?**

Query the current volume level settings. The response is in the form:

+CLVL: <level>

0 Equivalent to level 0 displayed on a handset's volume indicator

1 Equivalent to level 1 displayed on a handset's volume indicator

2 Equivalent to level 2 displayed on a handset's volume indicator

3 Equivalent to level 3 displayed on a handset's volume indicator

4 Equivalent to level 4 displayed on a handset's volume indicator

5 Equivalent to level 5 displayed on a handset's volume indicator

6 Equivalent to level 6 displayed on a handset's volume indicator

7 Equivalent to level 7 displayed on a handset's volume indicator

***Test Command:* +CLVL=?**

List the supported volume level settings. The response is in the form:

+CLVL: (supported <level>s)

A.8.67 +CMUT – Mute Control

***Exec Command:* +CMUT=<n>**

This command is used to enable and disable the uplink voice muting during a voice call. <n> can take one of the following values:

0 mute off

1 mute on

***Read Command:* +CMUT?**

Query the current mute setting. The response is in the form:

+CMUT: <n>

***Test Command:* +CMUT=?**

List the supported mute settings. The response is in the form:

+CMUT: (supported <n>s)

A.8.68 +CRC – Cellular Result Codes

***ExecSet Command:* +CRC=[<mode>]**

Set the extended format of incoming data or voice call indication.

<mode> takes the following values:

0	Disable extended format (default)
1	Enable extended format

If extended format is enabled, the unsolicited result code +CRING: <type> is returned by the A3LA-R instead of RING, where <type> can be one of the following:

ASYNC	asynchronous transparent
SYNC	synchronous transparent
REL ASYNC	asynchronous non-transparent
REL SYNC	synchronous non-transparent
FAX	facsimile
VOICE	normal voice

***Read Command:* +CRC?**

Query the current result code settings. The response is in the form:

+CR: <mode>

***Test Command:* +CRC=?**

List the supported result code settings. The response is in the form:

+CR: (supported <mode>s)

A.8.69 +CVHU – Voice Hangup Control

***Set Command:* +CVHU=[<mode>]**

Selects whether the Hn (hangup) or &Dn command shall cause a voice call connection to be disconnected or not. <mode> can take one of the following values:

0	Ignore &Dn command specified reaction to DTR ON to OFF transitions. Disconnect as reaction to Hn command. OK response given.
1	Ignore &Dn command specified reaction to DTR ON to OFF transitions. Ignore Hn command. OK response given.
2	Comply with &Dn command specified reaction to DTR ON to OFF transitions. Disconnect as reaction to Hn command (default).

***Read Command:* +CVHU?**

Query the current voice control hangup settings. The response is in the form:

+CVHU: <mode>

***Test Command:* +CVHU=?**

List the supported voice control hangup settings. The response is in the form:

+CVHU: (supported <mode>s)

A.8.70 +CCLK – Real-Time Clock

***Set Command:* +CCLK=[<time>]**

Sets the real-time clock of the A3LA-R. If setting fails, ERROR is returned.

<time>: string type value; format is "yy/MM/dd,hh:mm:ss±zz", where characters indicate year two last digits), month, day, hour, minutes, seconds and time zone. There is no blank space between the two double quotes. Since time zone feature is not supported in Iridium, this particular field (±zz) is ignored if it is entered. The range of valid years is between 1970 and 2058.

For example, May 15, 2011, 22:10:00 hours can be set using +CCLK= "11/05/15,22:10:00".

***Read Command:* +CCLK?**

Read command returns the current setting of the clock.

+CCLK: <time>

A.8.71 –MSVTS – DTMF Generation in Voice Call

***Set Command:* –MSVTS=<string>**

Generate the specified DTMF tone (i.e., send tone DTMF message to network). The parameter <string> shall consist of elements in a list where each element is separated by a comma. Each element should either be (1) a single ASCII character; or (2) string that follows the format: <tone>[,<time>] with each string enclosed in square brackets "[]". The string parameter values are defined as follows:

<tone> specifies the string of tones to be played or generated. The valid values are (in ASCII): '0'-'9', '#', '*'

<time> specifies the duration of each tone in 180-millisecond unit. Default value is 1 for 180 ms.

For example, the command string –MSVTS=1,[9,2],[5,3] will:

1. Generate DTMF 1 with a duration of 180 ms (default)
2. Generate DTMF 9 with a duration of 360 ms (2 * 180 ms)
3. Generate DTMF 5 with a duration of 540 ms (3 * 180 ms)

***Test Command:* –MSVTS=?**

List the supported parameter settings. The response is in the form:

–MSVTS: (supported <tone>s),(supported <time>s)

Note: DTMF generated with the –MSVTS command is never played back locally as tones and is therefore neither played nor muted under control of the –MSVLS command.

A.8.72 –MSVTR – DTMF Received in Voice Call

***Set Command:* –MSVTR=[<mode>]**

Disable or enable the receiving of DTMF messages from the network.

<mode> takes one of the following values:

0 Receiving of DTMF disabled (default)

1 Receiving of DTMF enabled

If receiving DTMF is enabled, the A3LA-R/RM/RGS sends the following unsolicited result code every time a DTMF inband signaling data is received from the network while in a voice call:

–MSTRX: <tone>,<event>

where <tone> is the DTMF tone received ('0'-'9', '#', '*', 'A'-'D') and <event> can be one of the following:

0 tone stopped (i.e. key released)

1 tone started (i.e. key pressed)

***Read Command:* –MSVTR?**

Query the current parameter settings. The response is in the form:

–MSVTR: <mode>

***Test Command:* –MSVTR=?**

List the supported parameter settings. The response is in the form:

–MSVTR: (supported <mode>s)

A.8.73 –MSVLS – Local DTMF Feedback Selection

***Set Command:* –MSVLS=[<mode>]**

Disable or enable playing of DTMF tones locally (i.e. feedback tones) while in a voice call.

<mode> takes one of the following values:

0 No mute. Play all DTMF tones (default) when pressed or received while in voice call.

1 Enable mute mode. Mute both pressed or received DTMF tones while in voice call.

***Read Command:* –MSVLS?**

Query the current parameter settings. The response is in the form: –MSVLS: <mode>

***Test Command:* –MSVLS=?**

List the supported parameter settings. The response is in the form:

–MSVLS: (supported <mode>s)

Note: DTMF generated with the –MSVTS command is never played back locally as tones and is therefore neither played nor muted under control of the –MSVLS command.

A.8.74 –MSSTM – Request System Time

***Exec Command:* –MSSTM**

Query the latest system time received from the network. The response is the form:

–MSSTM: <system_time>

<system_time> can take one of the following forms:

no network service	The A3LA-R has not yet received system time from the network.
XXXXXXX	Where XXXXXXXX is the current Iridium system time available from the network. The system time as received through the Iridium Air Interface, is a 32 bit integer count of the number of 90 millisecond intervals that have elapsed since the epoch. The return value is formatted as an ASCII hexadecimal number. The counter will rollover approximately every 12 years or be changed to prevent a rollover and as a result should not be used as a time source for user applications.

Iridium system time epoch: March 8, 2007, 03:50:21.00 GMT. (Note: the original Iridium system time epoch was June 1, 1996, 00:00:11 GMT, and was reset to the new epoch in January, 2008).

Iridium system time source: The system time is available and valid only after the A3LA-R has registered with the network and has received the Iridium system time from the network. Once the time is received, the A3LA-R uses its internal clock to increment the counter. In addition, at least every 8 hours, or on location update or other event that requires re-registration, the A3LA-R will obtain a new system time from the network.

Time localization: None. The system time value is always expressed in GMT time.

Resolution and accuracy: The resolution of the system time is one Iridium frame tick, or 90 ms. Accuracy as measured by the difference between the time reported and the actual time this message is sent out of the A3LA-R' serial port should not exceed 4 frame ticks (.36 seconds) and in most cases will be one frame tick (.09 seconds) or less.

A.8.75 –MSGEO – Request Geolocation

***Exec Command:* –MSGEO**

Query the geolocation grid code received from the network in the last Access Decision Notification message. The response is of the form:

–MSGEO: <x>,<y>,<z>,<time_stamp>

<x>, <y>, <z> is a geolocation grid code from an earth centered Cartesian coordinate system, using dimensions, x, y, and z, to specify location. The coordinate system is aligned such that the z-axis is aligned with the north and south poles, leaving the x-axis and y-axis to lie in the plane containing the equator. The axes are aligned such that at 0 degrees latitude and 0 degrees longitude, both y and z are zero and x is positive (x = +6376, representing the nominal earth radius in kilometers). Each dimension of the geolocation grid code is displayed in decimal form using units of kilometers. Each dimension of the geolocation grid code has a minimum value of –6376, a maximum value of +6376, and a resolution of 4. <time_stamp> is assigned by the A3LA-R when the geolocation grid code received from the network is stored to the A3LA-R internal memory. Current Iridium system time, which is a running count of 90 millisecond intervals, is used for the time stamp. Time stamp is a 32-bit integer displayed in hexadecimal form.

A.8.76 +CCFC – Call Forward Service

Exec Command:

+CCFC=<reason>,<mode>[,<number>[,<type>[,class>[,<subaddr>[,<satype>[,<time>]]]]]]

This command is based on GSM 07.07 [2] subclause 7.10, and allows control of the call forwarding supplementary service according to GSM 02.82 [11]. Registration, erasure and status query are supported. The valid values for the parameters are as follows:

<reason> takes one of the following values:

0 unconditional

1 mobile busy

2 no reply
3 not reachable
4 all call forwarding (refer GSM 02.30 [5])
5 all conditional call forwarding (refer GSM 02.30 [5])

<mode> takes one of the following values:
0 disable (not used in Call Forward)
1 enable (not used in Call Forward)
2 query status
3 registration
4 erasure

<number>: quoted string type phone number of forwarding address. It contains digits only, or empty string if not applicable.

<type>: type of address octet in integer format (refer to GSM 04.08 [7] subclause 10.5.4.7); default 145 when dialing string is international number, otherwise 129

<classx>: is a sum of integers each representing a class of information:
1 voice (telephony)
2 data

<subaddr>: string type sub-address, not supported by Iridium

<satype>: type of sub-address, not supported by Iridium

<time>: string containing number of seconds (up to 30, in multiples of 5). When 'no reply' is enabled or queried, this gives the time in seconds to wait before call is forwarded.

if <mode>=2 and command is successful, the A3LA-R returns a response in the form:
+CCFC:<status>,<class>[,<number>,<type>]
where <status> may be as follows:
0 not active
1 active
For example:
+CCFC:0,1
+CCFC:1,1,"+441223420024",145
+CCFC:2,3,"00881662990000",,1,,,"30"

***Test Command:* +CCFC=?**

List supported <reason>s. The response is in the form of a range rather than a list:
+CCFC:(000-005)

A.8.77 +CLCC – Request Current Call Status

***Exec Command:* +CLCC**

Returns the current call status of the A3LA-R. The response is a comma separated list of call states. The number of call states in the response depends on the number of active call instances e.g. incoming calls and held calls.

+CLCC: <stat>[,<stat>[,<stat>]]

where <stat> (State of the A3LA-R):

000 Active

001 Call Held

002 Dialing (MO Call)

004 Incoming (MT Call)

006 Idle

Note: the form of this announcement currently differs from the standard given in 3GPP TS 27.007 [12] subclause 7.18. A change to the interface may be made to become more standard.

A.8.78 +CNUM – Read MSISDN Numbers

***Exec Command:* +CNUM**

Get the MSISDN numbers of the SIM. If returning fails, ERROR is returned. Response is in the form:

+CNUM:<text>,<number>,<type>

<text>: alpha tag of the phone numbers

<number>: MSISDN numbers

<type>: if the number starts with a '+', then the type is 145; otherwise the type is 129

Note: MSISDN numbers are only available if they were intentionally stored on the SIM.

A.8.79 +CSSSC – Supplementary Services Short Code

***Exec Command:* +CSSSC="<shortcode>"**

Execute the given shortcode. If the shortcode fails, a CME ERROR code is returned. Otherwise, OK is returned.

Note: Shortcode functionality is only available if provisioned.

Note: This command does not support command concatenation.

A.8.80 +WIRLP – Iridium Radio Link Protocol

Set Command:

+WIRLP=[<ver>[,<k1>[,<k2>[,<t1>[,<n2>[,<t2>[,<r1>[,<r2>[,<t4>[,<mode>]]]]]]]]]

Set desired IRLP parameters to be negotiated with the peer at the start of the next data call. Note that these desired parameters are reset to hardcoded defaults at the end of a data call, so this command should be issued while a call is not in progress.

<ver> specifies the desired IRLP version and can take the following values:

0 Default IRLP version (N0)

<k1> represents the maximum number of sequentially numbered I frames that may be outstanding at any given time at downlink direction (IWF->A3LA-R) and can take the following values:

1-105. Default is 105.

<k2> represents the maximum number of sequentially numbered I frames that may be outstanding at any given time at uplink direction (A3LA-R->IWF) and can take the following values:

1-105. Default is 105.

<t1> is used to supervise the acknowledgment of transmitted unnumbered frames. The values are defined to be the earliest instant to enter the recovery procedure and can take on the following values:

27-255 (in 50-ms unit). Default is 30.

<n2> is used to represent the maximum number of re-transmission attempts of a frame (e.g. I,S,N,U frame) and can take on the following values:

1-255. Default is 15.

<t2> is used to indicate the amount of time available within which the acknowledging frame must be transmitted and can take on the following values:

1-255 (in 10-ms unit). Default is 10.

<r1> is used to represent the maximum number of S frames that are used to acknowledge I frames at downlink direction (IWF->A3LA-R) and can take on the following values:

1-10. Default is 10.

<r2> is used to represent the maximum number of S frames that are used to acknowledge I frames at uplink direction (A3LA-R->IWF) and can take on the following values:

1-10. Default is 10.

<t4> is used to supervise the re-sequencing of misordered frames. The values are defined to be the earliest instant to consider a tardy frame as lost. It can take on the following values:

20-255 (in 10-ms unit). Default is 25.

<mode> is used to indicate the mode of operation and can take on the following values:

0 unacknowledged mode of operation

1 acknowledged mode of operation (default)

NOTE: For the proper operation of the IRLP procedures, t2 should be less than t1 and 2*t4 should be less than t1.

***Read Command:* +WIRLP?**

Query the actual IRLP parameters resulting from the negotiation (XID exchange) at the start of the most recent data call. Note that these may differ from the desired parameters set using "+WIRLP=…"; from power-up they are set to hardcoded defaults, and will only change as the result of the negotiation. The response is in the form:

+WIRLP: <ver>, <k1>, <k2>, <t1>, <n2>, <t2>, <r1>, <r2>, <t4>, <mode>

***Test Command:* +WIRLP=?**

List the supported IRLP parameter settings. The response is in the form:

+WIRLP: (supported <ver>s), (supported <k1>s), (supported <k2>s), (supported <t1>s),

(supported <n2>s), (supported <t2>s), (supported <r1>s), (supported <r2s), (supported <t4>s), (supported <mode>s)

A.8.81 +WFRNG – Force IRLP Renegotiation

Set Command: **+WFRNG=<frng>**

Set forced renegotiation of IRLP parameters.

<frng> can take the following values:

0 Do not renegotiate (default)

1 Renegotiate

2 Disconnect

Read Command: **+WFRNG?**

Query the current parameter setting. The response is in the form:

+WFRNG: <frng>

Test Command: **+WFRNG=?**

List the supported parameter settings. The response is in the form:

+WFRNG: (supported <frng>s)

A.8.82 +WTM – IRLP Test Mode

Set Command: **+WTM=<tm>**

Select DCE mode of operation.

<tm> can take the following values:

0 IRLP test mode off (default)

1 IRLP test mode on

Read Command: **+WTM?**

Query the current parameter setting. The response is in the form:

+WTM: <tm>

Test Command: **+WTM=?**

List the supported parameter settings. The response is in the form:

+WTM: (supported <tm>s)

A.8.83 +WDLDM – IRLP Dynamic Link Delay Measurement

Set Command: **+WDLDM=[<dldm>[,<mi>[,<dtl>]]]**

Set the DCE dynamic link delay measurement parameters.

<dldm> can take the following values:

0 measurement off (default)

1 measurement on

<mi> denotes the measurement interval and can take the following values:

1-255 (in 1000-ms unit). Default is 15 for 15000 ms.

<dtl> denotes the delay tolerance in the link delay difference and can take the following values:

1-100 (in 1% unit). Default is 10%.

Read Command: **+WDLDM?**

Query the current parameter settings. The response is in the form:

+WDLDM: <dldm>,<mi>,<dtl>

***Test Command:* +WDLDM=?**

List the supported parameter settings. The response is in the form:

+WDLDM: (supported <dldm>s), (supported <mi>s), (supported <dtl>s)

A.8.84 +WDAV – Register or Deregister an RS232 DAV Data Peripheral

***Set Command:* +WDAV=[<DP type>[,<encrypt>]]**

Register or deregister an RS232 DAV Data Peripheral (DP).

<DP type> can take on the following values:

0 Deregister peripheral

1 Register Type 1 RS232 DAV Data Peripheral

<encrypt> can take on the following values:

0 Encryption is not supported at this time

***Read Command:* +WDAV?**

Query the current DP registration parameter settings. The response is in the form:

+WDAV:<DP type>,<encrypt>

***Test Command:* +WDAV=?**

List the supported DP registration parameters. The response is in the form:

+WDAV:(supported <type>s),(supported <encrypt>s)

A.8.85 +SBDWB – Short Burst Data: Write Binary Data

***Exec Command:* +SBDWB=[<SBD message length>]**

This command is used to transfer a binary SBD message from the DTE to the single mobile originated buffer in the A3LA-R. The mobile originated buffer can contain only one message at any one time.

- Once the command is entered, the A3LA-R will indicate to the DTE that it is prepared to receive the message by sending the ASCII encoded string "READY<CR><LF>" (hex 52 45 41 44 59 0D 0A) to the DTE.
- The <SBD message length> parameter represents the length, in bytes, of the SBD message not including the mandatory two-byte checksum.
- The maximum mobile originated SBD message length is 1960 bytes. The minimum mobile originated SBD message length is 1 byte.
- Once the Dte receives the READY indication from the A3LA-R, the SBD message must be sent from the DTE formatted as follows:

  {binary SBD message} + {2-byte checksum}

  - The checksum is the least significant 2-bytes of the summation of the entire SBD message. The high order byte must be sent first. For example if the DTE were to send the word "hello" encoded in ASCII to the A3LA-R the binary stream would be hex 68 65 6c 6c 6f 02 14.
  - The mobile originated buffer will be empty upon power-up.
- If any data is currently in the mobile originated buffer, it will be overwritten.

Command Response:

0: SBD message successfully written to the A3LA-R.

1: SBD message write timeout. An insufficient number of bytes were transferred to the A3LA-R during the transfer period of 60 seconds.

2: SBD message checksum sent from DTE does not match the checksum calculated at the A3LA-R.

3: SBD message size is not correct. The maximum mobile originated SBD message length is 1960 bytes. The minimum mobile originated SBD message length is 1 byte.

A.8.86 +SBDRB – Short Burst Data: Read Binary Data

***Exec Command:* +SBDRB**

This command is used to transfer a binary SBD message from the single mobile terminated buffer in the A3LA-R to the DTE. The mobile terminated buffer can contain only one message at any one time.

- The SBD message is transferred formatted as follows:

  {2-byte message length} + {binary SBD message} + {2-byte checksum}

  - The {2-byte message length} field represents the length, in bytes, of the SBD message not including the length field or the mandatory two-byte checksum. The high order byte will be sent first.
  - The maximum mobile terminated SBD message length is 1890 bytes.
  - The checksum is the least significant 2-bytes of the summation of the entire SBD message. The high order byte will be sent first. For example if the A3LA-R were to send the word "hello" encoded in ASCII to the DTE the binary stream would be hex 00 05 68 65 6c 6c 6f 02 14.
  - If there is no mobile terminated SBD message waiting to be retrieved from the A3LA-R, the message length and checksum fields will be zero.
- The mobile terminated message buffer will be empty upon power-up.

Command Response:

There are no response codes generated by the A3LA-R for this command.

A.8.87 +SBDRT – Short Burst Data: Read Text Message

***Exec Command:* +SBDRT**

This command is used to transfer a text SBD message from the single mobile terminated buffer in the A3LA-R to the DTE. This command is similar to +SBDRB but does not provide a length indicator or checksum. The intent of this command is to provide a human friendly interface to SBD for demonstrations and application development. It is expected that most usage of SBD will be with binary messages.

- Once the command is entered, the SBD message in the mobile terminated buffer is sent out of the port.
- This command is similar to +SBDRB except no length or checksum will be provided.
- The maximum mobile terminated SBD message length is 1890 bytes.

- The mobile terminated message buffer will be empty upon power-up.

Command Response: **+SBDRT: <CR> {mobile terminated buffer}**

A.8.88 +SBDD – Short Burst Data: Clear SBD Message Buffer(s)

Exec Command: **+SBDD[<Delete type>]**

This command is used to clear the mobile originated buffer, mobile terminated buffer or both.

- The <Delete type> parameter identifies which buffers are cleared.
  - 0: Clear the mobile originated buffer
  - 1: Clear the mobile terminated buffer
  - 2: Clear both the mobile originated and mobile terminated buffers
- Using this command or power cycling the phone are the only means by which both buffers are cleared.
- The mobile terminated buffer will be cleared when an SBD session is initiated.
- Sending a message from the A3LA-R to the ESS does not clear the mobile originated buffer.
- Reading a message from the A3LA-R does not clear the mobile terminated buffer.

Command Response:

0: Buffer(s) cleared successfully

1: An error occurred while clearing the buffer(s)

A.8.89 +SBDC – Short Burst Data: Clear SBD MOMSN

Exec Command: **+SBDC**

This command will clear (set to 0) the mobile originated message sequence number (MOMSN) stored in A3LA-R.

- The MOMSN is maintained even after power cycle. Command Response:
  - 0: The MOMSN was cleared successfully
  - 1: An error occurred while clearing the MOMSN

A.8.90 +SBDS – Short Burst Data: Status

Exec Command: **+SBDS**

This command returns current state of the mobile originated and mobile terminated buffers.

Command Response: **+SBDS: <MO flag>, <MOMSN>, <MT flag>, <MTMSN>**

where:

<MO flag>: The MO flag indicates the existence of a message in the mobile originated buffer. The response from the A3LA-R is one of the following numeric codes:

0: No message in mobile originated buffer

1: Message in mobile originated buffer

<MOMSN>: The MOMSN identifies the sequence number that will be used during the next mobile originated SBD session.

<MT Flag>: The MT flag indicates the existence of a message in the mobile terminated buffer. The response from the A3LA-R is one of the following numeric codes:

0: No message in mobile terminated buffer

1: Message in mobile terminated buffer

<MTMSN>: The MTMSN identifies the sequence number that was used in the most recent mobile terminated SBD session. This value will be –1 if there is nothing in the mobile terminated buffer.

A.8.91 +SBDTC – Short Burst Data: Transfer MO Buffer to MT Buffer

***Exec Command:* +SBDTC**

This command will transfer the contents of the mobile originated buffer to the mobile terminated buffer. Developers of DTE can use this command to test reading and writing to the A3LA-R without actually initiating SBD sessions with the ESS.

Command Response:

0: Mobile originated buffer transferred successfully

1: An error occurred while transferring the mobile originated buffer

A.8.92 +CAR – Audio Output Control

***Set Command:* +CAR=<n>**

This command switches the type of audio output between analog, digital and mute (no audio output). Valid values for <n> are as follows:

0 mute

1 analog (Codec port)

2 digital (User Connector port)

***Read Command:* +CAR?**

This command queries the current audio setting. Response is in the form:

+CAR: <n>

***Test Command:* +CAR=?**

This command lists the supported values of <n>. Response is in the form:

+CAR: (list of supported values of <n>)

A.8.93 In – Identification

Requests the A3LA-R to display information about itself.

0 "2400" (traffic channel rate for IRIDIUM data/fax)

1 "0000" (ROM checksum which is not supported so zero is output)

2 "OK" (result of ROM checksum verification which is not supported so OK is always output)

3 "XXXXXXXX" (Software revision level)

4 "IRIDIUM" (Product description)

5 "XXXX" (Country code)

6 "XXX" (Factory identity)

7 "XXXXXXXX" (Hardware specification)

A.8.94 +CIER – Indicator Event Reporting

***Set Command:* +CIER=[<mode>[,<sigind>[,<svcind>]]]**

The set command enables or disables sending of the +CIEV unsolicited result code by the A3LA-R in case of indicator state changes. <mode> controls the processing of the +CIEV unsolicited result codes.

<mode>:

- 0 Disable indicator event reporting; do not send +CIEV unsolicited result codes to the DTE; buffer the most recent indicator event for each indicator in the A3LA-R. (default)
- 1 Enable indicator event reporting; buffer the most recent +CIEV unsolicited result code for each indicator when the data port is not in command mode, and flush them to the DTE on return to command mode; otherwise forward events directly to the DTE.

<sigind>: Control reporting of "signal quality" indicator changes.

- 0 No "signal quality" indicator reporting
- 1 Enable "signal quality" indicator reporting using result code +CIEV:0,<rssi>
  where <rssi> is:
  - 0 Equivalent to 0 bars displayed on the signal strength indicator
  - 1 Equivalent to 1 bar displayed on the signal strength indicator
  - 2 Equivalent to 2 bars displayed on the signal strength indicator
  - 3 Equivalent to 3 bars displayed on the signal strength indicator
  - 4 Equivalent to 4 bars displayed on the signal strength indicator
  - 5 Equivalent to 5 bars displayed on the signal strength indicator

  When enabled, the signal quality indicator is reported only when the signal strength changes.

<svcind>: Control reporting of "service availability" indicator changes.

- 0 No "service availability" indicator reporting
- 1 Enable "service availability" indicator reporting using result code +CIEV:1,<value>
  where <value> is:
  - 0 Network service currently unavailable
  - 1 Network service is available

Network service availability is equivalent to a signal strength greater than 0. The service availability indicator provides a way for the DTE to wait until the A3LA-R can start an SBD session without receiving continual notifications of changes in signal strength.

***Read Command:* +CIER?**

Query the current indicator event reporting settings. The response is of the form:

+CIER:<mode>,<sigind>,<svcind>

***Test Command:* +CIER=?**

List the supported settings. The response is of the form:

+CIER: (supported <mode>s),(supported <sigind>s),(supported <svcind>s)

Note: In <mode> 1, the DTE may miss some indicator state changes if they occur while the data port is reserved (not in command mode). However, the buffering mechanism ensures that the most recent change for each indicator during reservation will be flushed to the DTE on return to command mode; thus the DTE is always made aware of the latest state of each indicator.

A.8.95 +CRIS – Ring Indication Status

***Exec Command:* +CRIS**

Query the ring indication status, returning the reason for the most recent assertion of the Ring Indicate signal. The response contains separate indications for telephony and SBD ring indications.

The response is in the form:

+CRIS:<tri>,<sri>

where <tri> indicates the telephony ring indication status:

0 No telephony ring alert received

1 Incoming voice call

2 Incoming data call

3 Incoming fax call

and <sri> indicates the SBD ring indication status:

0 No SBD ring alert received

1 SBD ring alert received

Note: It is valid for the A3LA-R/RM/RGS to receive a telephony ring alert and an SBD ring alert at the same time. Assertion of the RI signal indicates only the presence of an alert; this command may be used to determine the type(s) of ring alert.

A.8.96 +CSQ[F] – Signal Quality

***Exec Command:* +CSQ[F]**

Execution command returns the received signal strength indication <rssi> from the A3LA-R.

Response is in the form:

+CSQ: <rssi>

where <rssi> is:

0 Equivalent to 0 bars displayed on the signal strength indicator

1 Equivalent to 1 bar displayed on the signal strength indicator

2 Equivalent to 2 bars displayed on the signal strength indicator

3 Equivalent to 3 bars displayed on the signal strength indicator

4 Equivalent to 4 bars displayed on the signal strength indicator

5 Equivalent to 5 bars displayed on the signal strength indicator

Note: The +CSQ form of the command waits for an updated signal strength reading to become available. This will usually be within two seconds of issuing the command. If the A3LA-R is in the process of acquiring the system, or in a satellite handoff, a delay in response of up to 10 seconds may be experienced.

If the A3LA-R has no SIM, is awaiting a SIM PIN entry, has an invalid SIM, or has otherwise not proceeded to successful registration, the delay in response may exceed the 50 second timeout limit. Under such condition, an ERROR response will be received. To avoid a delayed response due to registration problems, issue the +CREG command to verify registration prior to entering the +CSQ command to obtain signal strength.

Note: The +CSQF form of the command returns immediately, reporting the last known signal strength.

***Test Command:* +CSQ=?**

List the supported signal strength indications. The response is in the form:

+CSQ: (supported <rssi>s)

A.8.97 +CULK – Unlock

***Exec Command:* +CULK=<unlock key>**

Unlock the SBD functionality of the A3LA-R after it has been locked by the Gateway. The unlock key must be obtained by contacting Iridium's customer support.

<unlock key>:

0000000000000000 .. FFFFFFFFFFFFFFFF (a string of 16 hexadecimal digits)

While the A3LA-R is locked, it is unable to perform any SBD sessions. Any attempts to start a session will return an error code indicating that the A3LA-R is locked.

***Command Response:* +CULK:<status>**

where:

<status> indicates the lock status of the A3LA-R following the unlock attempt:

- 0 Unlocked – A3LA-R is not locked and is permitted to perform SBD sessions.
- 1 Locked – A3LA-R is locked and unable to perform SBD sessions. It must be unlocked by supplying the correct unlock key to the +CULK command.
- 2 Permanently locked – A3LA-R is locked and unable to perform SBD sessions. It cannot be unlocked and must be returned to the supplier.

***Read Command:* +CULK?**

Query the current SBD lock status of the A3LA-R. The response is of the form:

+CULK:<status>

<status>:

- 0 Unlocked
- 1 Locked
- 2 Permanently locked

A.8.98 +CVMI – Voicemail Indication

***Exec Command:* +CVMI**

Query the status of the voicemail indication flag. The response is of the form:

+CVMI:<vmi>

where <vmi> is:

- 0 No voicemail indication has been received

1 A voicemail indication has been received

The voicemail indication flag indicates whether a voicemail notification message has been received from the voicemail system. The flag is set to 1 when an indication is received, and is cleared to 0 after being queried with the +CVMI command.

Note: For this feature to function, the voicemail number must be programmed into the A3LA-R/RM/RGS.

A.8.99 +CICCID – Read ICC ID from SIM

***Exec Command:* +CICCID**

Query the status ICC ID of the SIM:

+CICCID

This returns the 19 or 20 digit Integrated Circuit Card Identification of the SIM.

Note: This value is cached from the SIM and thus is not available until the caching has completed ~5-10 seconds after startup.

A.8.100 +CLIP – Calling Line Identification Presentation

***Exec Command:* +CLIP=<n>**

Note: While this command is implemented in the A3LA-R, it may not yet be supported in the Iridium network. Stand by for an Iridium Technical Bulletin announcing network support for this feature.

This command controls the presentation of the Calling Line Identity of the calling party in a mobile terminated call via the +CLIP unsolicited result code. <n> controls only the presentation of the unsolicited result code; the delivery of Calling Line Identity information to the A3LA-R is controlled by the provisioning of the CLI Presentation supplementary service in the network where <n> is:

0 Disable the +CLIP unsolicited result code. (default)

1 Enable the +CLIP unsolicited result code to be sent to the DTE following the RING result code when a mobile terminated call is received and Calling Line Identity information is present.

The unsolicited result code has the format:

+CLIP:<number>,<type>

where:

<number> is the phone number of the calling party in "quotes", in the format specified by <type>.

<type> indicates the type of number:

129 Dial string without the international access character

145 Dial string which includes the international access character '+'

***Read Command:* +CLIP?**

Query the current CLI Presentation provisioning status and the status of the +CLIP unsolicited result code. The response is of the form:

+CLIP:<n>,<m>

<m>:

0 CLIP not provisioned

1 CLIP provisioned

2 Unknown (e.g. no network, etc.)

A.8.101 +CLIR – Calling Line Identification Restriction

***Exec Command:* +CLIR=<n>**

Note: While this command is implemented in the A3LA-R, it may not yet be supported in the Iridium network. Stand by for an Iridium Technical Bulletin announcing network support for this feature.

This command controls the presentation of the Calling Line Identity of the calling party to the called party in the next mobile originated call.

<n>:

0 Presentation is determined by the subscription of the CLIR service

1 CLIR invocation – i.e. hide the CLI for the next mobile originated call. This requires CLIR to be provisioned in one of the temporary modes.

2 CLIR suppression – i.e. show the CLI for the next mobile originated call. This requires CLIR to be provisioned in one of the temporary modes.

Note: If the CLIR service is not provisioned, and either invocation or suppression is requested for the next call, the next call may be rejected by the network. It is the DTE's responsibility to check whether CLIR is provisioned using the +CLIR? read command.

***Read Command:* +CLIR?**

Query the current CLI Restriction provisioning status and the CLIR invocation/suppression status for the next call. The response is of the form:

+CLIR:<n>,<m>

<m>:

0 CLIR not provisioned

1 CLIR provisioned in permanent mode

2 Unknown (e.g. no network, etc.)

3 CLIR provisioned in temporary mode, defaulting to presentation restricted

4 CLIR provisioned in temporary mode, defaulting to presentation allowed

A.8.102 +IPR – Fixed DTE Rate

***Set Command:* +IPR=<rate>[,<autoflag>]**

Set the data rate at which the A3LA-R will accept commands. The change in data rate takes effect after the result code (e.g. OK) is received by the DTE.

<rate> takes the following values:

1 600 bps

2 1200 bps

3 2400 bps

4 4800 bps

5 9600 bps

6 19200 bps (default)

7 38400 bps

<autoflag> takes the following values:

0 Fixed rate – automatic rate adjustment is disabled

1 Automatic rate adjustment is enabled (default)

***Read Command:* +IPR?**

Query the current data rate and automatic rate adjustment setting. The response is in the form:

+IPR: <rate>,<autoflag>

***Test Command:* +IPR=?**

List the supported data rates. The response is in the form:

+IPR: (supported <rate>s),(supported <autoflag>s)

A.8.103 +SBDWT – Short Burst Data: Write a Text Message

***Exec Command:* +SBDWT=[<text message>]**

This command is used to transfer a text SBD message from the DTE to the single mobile originated buffer in the A3LA-R.

The text message may be entered on the command line:

- For example, "AT+SBDWT=hello"
- The length of <text message> is limited to 120 bytes. This is due to the length limit on the AT command line interface.
- The message is terminated when a carriage return is entered

Alternatively, the text message may be entered separately:

- Upon entering the command "AT+SBDWT", the A3LA-R will indicate to the DTE that it is prepared to receive the message by sending the string "READY<CR><LF>" (hex 52 45 41 44 59 0D 0A) to the DTE
- Once the DTE receives the READY indication, the text message must be sent, terminated by a carriage return
- The length of the text message entered in this way is limited only by the maximum mobile originated message length of 1960 bytes
- The mobile originated buffer will be empty upon power-up
- If any data is currently in the mobile originated buffer, it will be overwritten

Command Response:

For the "AT+SBDWT" form:

0 SBD message successfully stored in mobile originated buffer

1 SBD message write timeout. No terminating carriage return was sent within the transfer period of 60 seconds.

For the "AT+SBDWT=<text message>" form:

OK SBD message successfully stored in mobile originated buffer

ERROR An error occurred storing SBD message in mobile originated buffer

A.8.104 +SBDDET – Short Burst Data: Detach

***Exec Command:* +SBDDET**

Initiates an SBD session to detach the A3LA-R from the Gateway.

***Command Response:* +SBDDET:<status>,<error>**

where:

<status>:

0 Detach successfully performed

1 An error occurred while attempting the detach

<error>:

Gateway-reported values:

0 Detach successfully performed

1..4 Reserved, but indicate success if used

5..14 Reserved, but indicate failure if used

15 Access is denied

A3LA-R-reported values:

16 Modem has been locked and may not make SBD calls (see +CULK command)

17 Gateway not responding (local session timeout)

18 Connection lost (RF drop)

19 Link failure (A protocol error caused termination of the call)

20..31 Reserved, but indicate failure if used

32 No network service, unable to initiate call

33..34 Reserved, but indicate failure if used

35 A3LA-R is busy, unable to initiate call

36.. Reserved, but indicate failure if used

This instructs the GSS to disable (detach) SBD ring alerts for the calling A3LA-R. Successful completion of the detach command implies that the GSS has performed the requested detach action and the A3LA-R is no longer registered for SBD ring alerts. This session does not transfer any MO or MT messages.

Note: A user can send an MO-SBD message and request a detach at the same time by using the +SBDI command. The +SBDI command always requests a detach.

A.8.105 +SBDI – Short Burst Data: Initiate an SBD Session

Note: The +SBDI command is provided for backwards compatibility with existing DTEs which do not use SBD Ring Alert functionality. For SBD calls invoked with this command:

- The SBD session type is fixed at type 0 – MO call
- The SBD Delivery Short Code will be the value specified by the +SBDDSC command
- An SBD Detach is performed as part of the call
- No SBD location update is performed

DTEs requiring SBD Ring Alert functionality should use the extended +SBDIX command.

***Exec Command:* +SBDI**

This command initiates an SBD session between the A3LA-R and the GSS. If there is a message in the mobile originated buffer it will be transferred to the GSS. Similarly if there is one or more messages queued at the GSS the oldest will be transferred to the A3LA-R and placed into the mobile terminated buffer.

- The message, if any, in the mobile originated buffer will be sent from the A3LA-R to the GSS
- If there is a message queued at the GSS it will be transferred to the A3LA-R and placed into the mobile terminated buffer

Command Response:

+SBDI:<MO status>,<MOMSN>,<MT status>,<MTMSN>,<MT length>,<MT queued>

where:

<MO status>: MO session status provides an indication of the disposition of the mobile originated transaction. The field can take on the following values:

0 No SBD message to send from the A3LA-R

1 SBD message successfully sent from the A3LA-R to the GSS

2 An error occurred while attempting to send SBD message from A3LA-R to GSS

<MOMSN>: The Mobile Originated Message Sequence Number (MOMSN) is a value assigned by the A3LA-R when sending a mobile-originated message to the GSS. This value is incremented each time an SBD session is successfully completed between the A3LA-R to the GSS. This wraparound counter can range from 0 to 65535.

<MT status>: The MT status provides an indication of the disposition of the mobile terminated transaction. The field can take on the following values:

0 No SBD message to receive from the GSS

1 SBD message successfully received from the GSS

2 An error occurred while attempting to perform a mailbox check or receive a message from the GSS

<MTMSN>: The Mobile Terminated Message Sequence Number (MTMSN) is assigned by the GSS when forwarding a message to the A3LA-R. This value is indeterminate if the field <MT status> is zero. This wraparound counter can range from 0 to 65535.

<MT length>: The MT length is the length in bytes of the mobile terminated SBD message received from the GSS. If no message was received, this field will be zero.

<MT queued>: MT queued is a count of mobile terminated SBD messages waiting at the GSS to be transferred to the A3LA-R.

A.8.106 +SBDIX[A] – Short Burst Data: Initiate an SBD Session Extended

Note: The +SBDIX command must be used in place of the +SBDI command for DTEs wishing to make use of SBD Ring Alert functionality.

Exec Command: **+SBDIX[A][=<location>]**

This command initiates an SBD session between the A3LA-R and the GSS, setting the SBD Session. Type according to the type of command +SBDIX or +SBDIXA, Delivery Short Code according to the value specified by the +SBDDSC command, and the type of location according to whether the optional location value is provided. If there is a message in the mobile originated buffer it will be transferred to the GSS. Similarly if there are one or more messages queued at the GSS the oldest will be transferred to the A3LA-R and placed into the mobile terminated buffer.

- The message, if any, in the mobile originated buffer will be sent from the A3LA-R to the GSS
- If there is a message queued at the GSS it will be transferred to the A3LA-R and placed into the mobile terminated buffer
- This command will always attempt an SBD registration, consisting of attach and location update, during the SBD session in order to support SBD Ring Alert. If this is not desired, the +SBDI command should be used.
- The DTE should append an 'A' to the command, i.e. +SBDIXA, when the SBD session is in response to an SBD ring alert

<location> has format:

[+|-]DDMM.MMM,[+|-]dddmm.mmm

where:

DD	Degrees latitude (00-89)
MM	Minutes latitude (00-59)
MMM	Thousandths of minutes latitude (000-999)
ddd	Degrees longitude (000-179)
mm	Minutes longitude (00-59)
mmm	Thousandths of minutes longitude (000-999)

This command initiates an SBD session between the A3LA-R and the GSS, setting the SBD Session. The optional sign indicators specify latitude North (+) or South (-), and longitude East (+) or West (-). If omitted, the default is +.

For example,

AT+SBDIX=5212.483,-00007.350

corresponds to 52 degrees 12.483 minutes North, 0 degrees 7.35 minutes West.

Command Response:

+SBDIX:<MO status>,<MOMSN>,<MT status>,<MTMSN>,<MT length>,<MT queued>

where:

<MO status>: MO session status provides an indication of the disposition of the mobile originated transaction. The field can take on the following values:

Gateway-reported values:

0	MO message, if any, transferred successfully
1	MO message, if any, transferred successfully, but the MT message in the queue was too big to be transferred

2 MO message, if any, transferred successfully, but the requested Location Update was not accepted

3..4 Reserved, but indicate MO session success if used

5..8 Reserved, but indicate MO session failure if used

10 GSS reported that the call did not complete in the allowed time

11 MO message queue at the GSS is full

12 MO message has too many segments

13 GSS reported that the session did not complete

14 Invalid segment size

15 Access is denied

A3LA-R-reported values:

16 Modem has been locked and may not make SBD calls (see +CULK command)

17 Gateway not responding (local session timeout)

18 Connection lost (RF drop)

19 Link failure (A protocol error caused termination of the call)

20..31 Reserved, but indicate failure if used

32 No network service, unable to initiate call

33..34 Reserved, but indicate failure if used

35 A3LA-R is busy, unable to initiate call

36.. Reserved, but indicate failure if used

<MOMSN>: The Mobile Originated Message Sequence Number (MOMSN) is a value assigned by A3LA-R when sending a mobile-originated message to the GSS. This value is incremented each time an SBD session is successfully completed between the A3LA-R to the GSS. This wraparound counter can range from 0 to 65535.

<MT status>: The MT status provides an indication of the disposition of the mobile terminated transaction. The field can take on the following values:

0 No SBD message to receive from the GSS

1 SBD message successfully received from the GSS

2 An error occurred while attempting to perform a mailbox check or receive a message from the GSS

<MTMSN>: The Mobile Terminated Message Sequence Number (MTMSN) is assigned by the GSS when forwarding a message to the A3LA-R. This value is indeterminate if the field <MT status> is zero. This wraparound counter can range from 0 to 65535.

<MT length>: The MT length is the length in bytes of the mobile terminated SBD message received from the GSS. If no message was received, this field will be zero.

<MT queued>: MT queued is a count of mobile terminated SBD messages waiting at the GSS to be transferred to the A3LA-R.

A.8.107 +SBDDSC – Short Burst Data: Delivery Short Code

Set Command: **+SBDDSC=<dsc>**

Set the Delivery Short Code (DSC), which provides dynamic routing or control information for MO or MT messages. This is an 8-bit value providing the ability to set individual fields. Value 0x80 (hexadecimal) sets the most significant bit. Value 0x01 sets the least significant bit. Flag values can be added together to achieve a combination of settings. Some fields are overridden during certain SBD sessions (e.g. a +SBDREG registration session sets flag 0x80). Enable or disable ring indications for SBD Ring Alerts.

<dsc>:

0..255	DSC to be used for subsequent MO messages (0 default)
0x80	Hold MT message delivery
0x40	Leave MT message in queue after delivery
0x20	Destination in MO payload

***Read Command:* +SBDDSC?**

Query the current Delivery Short Code. The response is of the form:

+SBDDSC:<dsc>

A.8.108 +SBDMTA – Short Burst Data: Mobile-Terminated Alert

***Set Command:* +SBDMTA=<mode>**

Enable or disable ring indications for SBD Ring Alerts.

<status>:

0	Disable ring indication
1	Enable ring indication (default)

When SBD ring indication is enabled, the A3LA-R asserts the RI line and issues the unsolicited result code SBDRING when an SBD ring alert is received.

***Read Command:* +SBDMTA?**

Query the current ring indication mode. The response is of the form:

+SBDMTA:<mode>

***Test Command:* +SBDMTA=?**

List the supported mode settings. The response is of the form:

+SBDMTA:(supported <mode> settings)

A.8.109 +SBDREG – Short Burst Data: Network Registration

***Exec Command:* +SBDREG[=<location>]**

Triggers an SBD session to perform a manual SBD registration.

This command initiates an SBD session to perform a manual SBD registration, consisting of an attach and location update. This session does not transfer any MO or MT messages.

Note: The A3LA-R restricts the number of manual and automatic registrations to one every 3 minutes. Successive attempts within 3 minutes will return an error code indicating that the DTE should try later (see error 36 below).

Note: A user can send an MO SBD message and register at the same time by using the +SBDIX

command. The +SBDIX command always performs a registration attempt and should be used for an application requiring SBD Ring Alert. The +SBDI command never includes an SBD registration and should be used for an application that does not require SBD Ring Alert.

<location> has format:

[+|-]DDMM.MMM,[+|-]dddmm.mmm

where:

DD	Degrees latitude (00-89)
MM	Minutes latitude (00-59)
MMM	Thousandths of minutes latitude (000-999)
ddd	Degrees longitude (000-179)
mm	Minutes longitude (00-59)
mmm	Thousandths of minutes longitude (000-999)

This command initiates an SBD session between the A3LA-R and the GSS, setting the SBD Session.

The optional sign indicators specify latitude North (+) or South (-), and longitude East (+) or West (-). If omitted, the default is +.

For example,

AT+SBDIX=5212.483,-00007.350

corresponds to 52 degrees 12.483 minutes North, 0 degrees 7.35 minutes West.

Command Response: **+SBDREG:<status>,<reg err>**

where:

<status> indicates the resulting registration status of the A3LA-R:

0	Detached – A3LA-R is detached as a result of a successful +SBDDET or +SBDI command
1	Not registered – A3LA-R is attached but has not provided a good location since it was last detached
2	Registered – A3LA-R is attached with a good location. Note that this may be the case even when the most recent attempt did not provide a good location.
3	Registration denied – The GSS is denying service to the A3LA-R

<reg err>:

Gateway-reported values:

0	No error
2	Session completed but the requested Location Update was not accepted
3..14	Reserved, but indicate Location Update failure if used
15	Access is denied

A3LA-R-reported values:

16	Modem has been locked and may not make SBD calls (see +CULK command)
17	Gateway not responding (local session timeout)
18	Connection lost (RF drop)
19	Link failure (A protocol error caused termination of the call)

20..31 Reserved, but indicate failure if used

32 No network service, unable to initiate call

33..34 Reserved, but indicate failure if used

35 A3LA-R is busy, unable to initiate call

36 Try later, must wait 3 minutes since last registration

37.. Reserved, but indicate failure if used

***Read Command:* +SBDREG?**

Query the current SBD registration status of the A3LA-R. The response is of the form:

+SBDREG:<status>

<status>:

0 Detached

1 Not registered

2 Registered

3 Registration denied

The registration status is stored in A3LA-R non-volatile memory, and can therefore be queried by the DTE after powering up.

A.8.110 +SBDAREG – Short Burst Data: Automatic Registration

***Exec Command:* +SBDAREG=<mode>**

Set the A3LA-R' Auto-registration mode.

<mode>:

0 Disable automatic registration (default)

1 Set the Auto-registration mode to "Automatic"

2 Set the Auto-registration mode to "Ask"

When auto-registration is enabled, mode 1 or 2, the A3LA-R monitors its current location and triggers an SBD auto-registration when it determines that it has moved sufficiently far away from its last registered location. Note that auto-registration runs only while the A3LA-R is attached to the GSS, i.e. the registration status is "Not registered" or "Registered".

Auto-registration may only be used with system-provided location. If the DTE is providing its own location (e.g. GPS), the DTE should use the manual registration command, +SBDREG. Upon triggering in mode 1, "Automatic", the A3LA-R autonomously initiates an SBD session in order to perform a registration with its updated location. This session does not transfer any MO or MT messages.

Upon triggering in mode 2, "Ask", the A3LA-R reports to the DTE that it should register with the system because its location has changed (see <event> below); it is then the responsibility of the DTE to register via +SBDREG or +SBDIX. +SBDIX allows the DTE to register while including an MO message and/or retrieving any MT message that is pending at the GSS.

When auto-registration is enabled, mode 1 or 2, the A3LA-R reports relevant events to the DTE by issuing an unsolicited result code +AREG:<event>,<reg error>.

<event>:

0 Suggest DTE makes a registration attempt (mode 2 only)

1 Auto-registration has been performed successfully (mode 1 only)

2 Auto-registration has failed and will be retried after a delay (mode 1 only)

<reg error>:

Gateway-reported values:

0 No error

2 Session completed but the requested Location Update was not accepted

3..14 Reserved, but indicate Location Update failure if used

15 Access is denied

A3LA-R-reported values:

16 A3LA-R has been locked and may not make SBD calls (see +CULK command)

17 Gateway not responding (local session timeout)

18 Connection lost (RF drop)

19 Link failure (A protocol error caused termination of the call)

20..31 Reserved, but indicate failure if used

32 No network service, unable to initiate call

33..34 Reserved, but indicate failure if used

35 A3LA-R is busy, unable to initiate call

36 Try later, must wait 3 minutes since last registration

37.. Reserved, but indicate failure if used

***Read Command:* +SBDAREG?**

Query the current automatic MT registration mode. The response is of the form:

+SBDAREG:<mode>

***Test Command:* +SBDAREG=?**

List the supported mode settings. The response is of the form:

+SBDAREG:(supported <mode> settings)

A.8.111 +SBDSX – Short Burst Data: Status Extended

***Exec Command:* +SBDSX**

This command returns current state of the mobile originated and mobile terminated buffers, and the SBD ring alert status.

Command Response:

+SBDSX: <MO flag>, <MOMSN>, <MT flag>, <MTMSN>, <RA flag>, <msg waiting>

where:

<MO flag>: The MO flag indicates the existence of a message in the mobile originated buffer. The response from the A3LA-R is one of the following numeric codes:

0 No message in mobile originated buffer

1 Message in mobile originated buffer

<MOMSN>: The MOMSN identifies the sequence number that will be used during the next mobile originated SBD session.

<MT Flag>: The MT flag indicates the existence of a message in the mobile terminated buffer. The response from the A3LA-R is one of the following numeric codes:

0 No message in mobile terminated buffer

1 Message in mobile terminated buffer

<MTMSN>: The MTMSN identifies the sequence number that was used in the most recent mobile terminated SBD session. This value will be –1 if there is nothing in the mobile terminated buffer.

<RA flag>: The RA flag indicates whether an SBD ring alert has been received and still needs to be answered.

0 No SBD ring alert

1 SBD ring alert has been received and needs to be answered

Note: The RA flag is set whenever the A3LA-R receives an SBD ring alert; this happens even if the +SBDMTA setting specifies that SBD ring indications are disabled.

The RA flag is cleared only on successful completion of an SBD mailbox check, i.e. an SBD session invoked with +SBDI[X[A]] in which the returned MT status indicates that no error occurred.

The value of the RA flag is stored in non-volatile memory so it is preserved across power cycling of the A3LA-R.

<msg waiting>: The message waiting flag indicates how many SBD mobile terminated messages are currently queued at the gateway awaiting collection by the A3LA-R. This flag is updated after every SBD session, including +SBDI, +SBDIX, +SBDIXA, +SBDREG and +SBDDET.

A.8.112 +ADJANT – User Antenna Adjustment Required

Exec Command: **none**

Unsolicited Announcement:

+ADJANT:<adj_required>

where:

<adj_required>:

The adj_required flag indicates whether the user needs to adjust the L-band antenna position to improve reception.

0 Adjustment no longer required

1 Adjustment required

The "+ADJANT:1" message will be sent up to three times, at 5-second intervals, if Layer 1 is attempting to acquire an L-band bearer but is unable to receive the BCCH transmission from the SV, whether the attempt is due to an MT call (prior to RING indication), MO call, or Location Update etc.

It is an indication that the user needs to deploy the antenna or adjust it to a better orientation/location.

Note that if the acquisition fails or succeeds, there will in most cases be a subsequent "+ADJANT:0", but this is not guaranteed in all cases.

A.8.113 +WANTST, +ANTST – Antenna status

***Exec Command:* +WANTST**

This command causes the A3LA-R' internal state-change history to be deleted, so that the next time it polls the antenna status, a +ANTST:<ant_status> unsolicited message will be generated regardless of state.

A result code (normally "OK") will be returned immediately, and the +ANTST:<ant_status> message will follow later (potentially much later – see below).

Unsolicited Announcement:

+ANTST:<ant_status>

where:

<ant_status>:

0 Built-in antenna is stowed

1 Built-in antenna is deployed, or an external antenna (via docking cradle) is connected, and the built-in antenna is disconnected so its stowed/deployed status is irrelevant

The +ANTST:<ant status> message will be sent whenever internal polling indicates that the antenna status has changed, or on polling after +WANTST has been received regardless of whether the state has changed or not. An initial state of 'stowed' can be assumed, but +ANTST:<ant status> will be sent shortly after initialization with the actual status in any case. Internal polling will measure the deployment and docking detector states before any overall state change is announced.

Note that internal polling occurs on each main receiver receive activity, i.e. once per 90ms during a call, at least once every 4.3 seconds while monitoring a Ring signal, and as infrequently as once every 2 minutes when performing Ring searches with no signal present.

A.8.114 +PCDA – Pending call drop alert

***Exec Command:* none**

Unsolicited Announcement: +PCDA:<alert_status>

where:

<alert_status>:

0 Pending call drop alert is inactive

1 Pending call drop alert is active

The +PCDA message will be sent whenever the pending call drop alert status changes.

A.8.115 +DPLCI – DPL Call Indication

***Exec Command:* none**

Unsolicited Announcement:

+DPLCI=<call_state>,<call_type>,<emergency_call>,<telephone_number>

where:

<call_state>:

0 Idle

1 MO Establishing

2 MT Alerting

3 MT Connecting

4 Active

5 Releasing

<call_type>:

0 Speech

1 Data

<emergency_call>:

0 Normal Call

1 Emergency Call

<telephone_number>: Dialed telephone number digits

The +DPLCI message will be sent whenever there is a call state change based on the activity of a DPL peripheral handset.

A.8.116 +CCWA – Call Waiting service

Command	Possible Response(s)
+CCWA=	None (command ignored without error)
+CCWA=<n>[,<mode>,<classx>]	**When command unsuccessful** +CME ERROR: <err> **When <mode>=2 command successful** +CCWA:<status>,<class1> [<CR><LF>+CCWA:<status>,<class2> [...]] (but the A3LA-R will in practice only report a single line, <class1> = 1) **When <mode> not 2 and command successful** None
+CCWA?	**Current unsolicited result presentation status** +CCWA:<n>
Test command +CCWA=?	**List of supported <n>s** +CCWA:(0,1)
None	**Unsolicited result notifying that a call is waiting** +CCWA:<number>,<type>,<class>

Note: While this command is implemented in the A3LA-R, it may not yet be supported in the Iridium network. Stand by for an Iridium Technical Bulletin announcing network support for this feature.

This command is based on GSM 07.07 [2] subclause 7.11, and allows control of the Iridium Call Waiting supplementary service similar to GSM 02.83 [6]. Activation, deactivation and status query are supported. Parameter <n> is used to disable/enable the presentation of the unsolicited result code to the DTE when the Call Waiting service is enabled.

Command is abortable in the cases when the network is interrogated. The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Defined values

<n> (sets/shows the result code presentation status in the A3LA-R):

0 disable unsolicited result presentation

1 enable unsolicited result presentation

On a DTE-DCE command, <n> will set the result code presentation status in the A3LA-R, regardless of the value of any <mode> parameter.

<mode> (when <mode> parameter is not given, network is not interrogated):

0 disable Call Waiting service for specified class(es)

1 enable Call Waiting service for specified class(es)

2 query status of Call Waiting service for specified class(es)

<classx> is a sum of integers each representing a class of information:

1 voice

2 data

4 fax

This parameter defaults to 7, equal to all classes, but the A3LA-R/RM/RGS only supports Voice Call Waiting so this is illegal. Therefore in practice the DTE must supply <classx>=1.

<status>:

0 Call Waiting service not active for specified Class

1 Call Waiting service active for specified Class

<number>: quoted string type phone number of calling address in format specified by <type>

<type>: type of address octet in integer format (refer GSM 04.08 [7] subclause 10.5.4.7);default 145 when dialing string is international number, otherwise 129.

If the network rejects a request to activate/deactivate the Call Waiting service due to it not being provisioned (or for other reasons), the reported CME ERROR code will be 133 "requested service option not subscribed". This is strictly speaking a GPRS-related code (GSM 07.07 [2] subclause 9.2.2), but is the most informative choice in this case.

Informative examples:

The status of only the Voice class can be queried:

AT+CCWA=1,2,1

If the command is successful, the A3LA-R might return (after contacting the network):

+CCWA:1,1

If a remote caller tries to place a voice call to the A3LA-R while it already has a call in progress, and the Call Waiting service has been made active for class Voice, then the network will send a message to the A3LA-R. Then, if <n> has previously been set to '1', the A3LA-R will send an unsolicited result code to the DTE, e.g.:

+CCWA:"+441223420024",145,1

A.8.117 +CLCK – Facility Lock

Command	Possible Response(s)
+CLCK=	None (command ignored without error)
+CLCK=<fac>,<mode>[<passwd>[,<classx>]]	**When command unsuccessful** +CME ERROR: <err> **When <mode>=2 and command successful** +CLCK:<status>[,<class1> [<CR><LF>+CLCK:<status>,<class2> [...]] (but the A3LA-R will in practice only report a single line, <class1> = 1) **When <mode> not 2 and command successful** None
Test command +CLCK=?	**List of supported <fac>s** +CLCK:("CS","SC","FD","AO","AI","AB")

This command is based on GSM 07.07 [2] subclause 7.4, and is used to enable, disable or interrogate an ME or a network facility <fac>.

Command is abortable in the cases when network facilities are set or interrogated. The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

Execute command is used to activate or deactivate Call Barring Supplementary Services, SIM Fixed Dialling feature, the SIM card PIN Code, or to enable or disable the Phone Lock feature in the A3LA-R. A password code (detailed below) may be required, depending on the action chosen.

Not all Call Barring services detailed in GSM 07.07 [2] subclause 7.4 are supported. A subset of those implemented in the H1 menu MMI is supported.

Note: This command will not work unless the SIM PIN has been entered using the +CPIN command.

Note: Once this command has been issued to disable the PIN, neither it nor the +CPIN need to be issued again unless the PIN function is reactivated.

The following parameter values are currently supported:

<fac>:

"CS" CNTRL Surface (Enable/Disable Phone Lock feature). The current Phone Unlock Code is required as <passwd>.

"SC" SIM: Activate/Deactivate SIM card PIN Code, in which the SIM asks password in ME power-up. The PIN code is required as <passwd>.

"FD" SIM fixed dialling memory feature (PIN2 is required as <passwd>)

"AO" BAOC (Bar All Outgoing Calls) (refer GSM 02.88 [4] clause 1). The Call Barring password is required as <passwd>.

"AI" BAIC (Bar All Incoming Calls) (refer GSM 02.88 [4] clause 2). The Call Barring password is required as <passwd>.

"AB" All Barring services (refer GSM 02.30 [5]) (applicable only for <mode>=0). The Call Barring password is required as <passwd>.

Note: Several GSM standard facility codes including the following are NOT supported:

"OI" BOIC (Bar Outgoing International Calls) (refer GSM 02.88 [4] clause 1). All Iridium calls are International, so this facility should not be exercised by a user interface.

"OX" BOIC-exHC (Bar Outgoing International Calls except to Home Country) (refer GSM 02.88 [4] clause 1). All Iridium calls are International, so this facility should not be exercised by a user interface.

"IR" BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (refer GSM 02.88 [4] clause 2). In Iridium it is not possible to roam (there is only one "home country"), so this facility should not be exercised by a user interface.

"AG" All outGoing barring services (refer GSM 02.30 [5]) (applicable only for <mode>=0). This subgroup of services cannot be addressed; the user interface should just use "AB".

"AC" All inComing barring services (refer GSM 02.30 [5]) (applicable only for <mode>=0). This subgroup of services cannot be addressed; the user interface should just use "AB".

<mode>:

0 Disable (Deactivate)

1 Enable (Activate)

<passwd>: string type, enclosed by " "; for example, "1234".

Note: Factory default SIM card PIN Code is "1111"

Note: Factory default Phone Unlock Code is "1234"

<classx> is a sum of integers each representing a class of information:

1 voice

2 data

4 fax

This parameter defaults to 7, equal to all classes, but the A3LA-R only supports Voice Call Barring so this is illegal. Therefore in practice the DTE must supply <classx>=1 when querying or changing the status of any Call Barring facility. When querying (<mode>=2),

<passwd> is irrelevant and should be supplied as "" in order to allow the <classx>=1 parameter to be supplied.

For facilities "CS", "SC"and "FD", the <passwd> and <classx> parameters are not relevant and will be ignored if supplied.

***Test Command:* +CLCK=?**

Test command returns the facility values supported by the phone. The response is in the form:

+CLCK:(list of supported <fac>s)

Note: Only "CS" will appear as a supported value if there is no SIM card in the device.

Note: +CLCK is closely related to +CPIN and +CPWD. See these commands for additional information.

A.8.118 +CPWD – Change Password

***Exec Command:* +CPWD=<fac>,<oldpwd>,<newpwd>**

This command sets a new password for the facility lock function defined by the AT command Facility Lock +CLCK. The following parameter values are currently supported:

<fac>:

"CS"	CNTRL Surface (Phone Unlock Code)
"SC"	SIM (SIM Card PIN Code)
"P2"	SIM PIN2 (SIM Card PIN2 Code)
"AB"	Call Barring password (single password used for all call barring supplementary services)

Note: AT+CPWD="SC",<oldpwd>,<newpwd> will return "Error" unless the SIM Card Pin Code is currently activated (see AT command Facility Lock +CLCK).

Note: A user interface may prompt the user for two copies of the new password, in which case it should check the two are identical as only one copy is needed for this command.

***Test Command:* +CPWD=?**

Test command returns a list of pairs which present the available facilities and the maximum length of their password. Response is in the form:

+CPWD: list of supported (<fac>,<pwdlength>)s

where <pwdlength> indicates the maximum length for the password.

Note: +CPWD is closely related to +CLCK and +CPIN. See these commands for additional information.

A.8.119 +CSDT – Sidetone

***Exec Command:* +CSDT=<sidetone enabled>**

This command controls the A3LA-R RF board sidetone generation. Enabling sidetone will cause the A3LA-R to start sidetone generation. Disabling sidetone will cause the A3LA-R to stop sidetone generation. The following parameter values are currently supported:

< sidetone enabled >:

1	Enable sidetone

0 Disable sidetone

***Query Command:* +CSDT?**

This command returns the current transceiver board sidetone generation state. 1 = enabled, 0 = disabled.

***Test Command:* +CSDT=?**

Test command returns a list of valid values. Response is in the form:

+CSDT: list of supported modes

A.8.120 +CHLD – Call Hold and Multiparty

Command	Possible Response(s)
+CHLD=	None (command ignored without error)
+CHLD=<n>	**When command unsuccessful** +CME ERROR: <err> **When command successful** OK
Test command +CHLD=?	**List of supported <n>s** +CHLD:(0,1,1x,2,2x,3)

Note: While this command is implemented in the A3LA-R, it may not yet be supported in the Iridium network. Stand by for an Iridium Technical Bulletin announcing network support for this feature.

This command is based on GSM 07.07 [2] subclause 7.12, and is used to invoke the HOLD and MPTY supplementary services for switching between held calls, etc. The values of <n> are the same as those that a user can enter via a numeric keypad, as described in GSM 02.30 [5] subclause 4.5.5.

This command is not abortable, and finishes without waiting for a response from the network. The interaction of this command with other commands based on other GSM supplementary services is described in the GSM standard.

The following parameter values are currently supported:

<n>:

"0" Releases all held calls or sets User Determined User Busy (UDUB) for a waiting call

"1" Releases all active calls (if any exist) and accepts the other (held or waiting) call

"1X" Releases a specific active call X

"2" Places all active calls (if any exist) on hold and accepts the other (held or waiting) call

"2X" Places all active calls on hold except call X with which communication shall be supported

"3" Adds a held call to the conversation

"4" Not supported (Connects the two calls and disconnects the subscriber from both calls (ECT))

"4*dirno" Not supported (Redirect an incoming or a waiting call to the specified directory number)

"5" Not supported ($(CCBS)$: Activates the Completion of Calls to Busy Subscriber Request)

***Test Command:* +CHLD=?**

Test command returns the <n> values supported by the phone. The response is in the form:

+CHLD:(list of supported <n>s)

Note: "AT+CHLD=0" can be used to set UDUB when there is an incoming call, whether or not there is a current call active (or held), in order to support GSM 02.30 [5] subclauses 4.4.2.3 and 4.5.5.2.

A.8.121 +XCSI – Extended Call State Information

This proprietary unsolicited announcement was added to allow the DTE to keep track of call state during Call Hold and Multiparty operations using AT+CHLD.

***Exec Command:* none**

Unsolicited Announcement:

+XCSI=<overall call_state>,<active call_state>,<held_call state>,<active index>,<held index>

where:

<overall call_state>:

0 Idle (dialling possible)

1 One single-party call active

2 One multiparty call active

3 Incoming call arriving (otherwise idle)

4 One single-party call active, plus waiting call

5 One multiparty call active, plus waiting call

6 One single-party call held (dialing possible)

7 One multiparty call held (dialing possible)

8 Dual single-party call (one active, one held)

9 Dual call: single party call held, multiparty call active

10 Dual call: single party call active, multiparty call held

11 One single-party call held, plus waiting call

12 One multiparty call held, plus waiting call

13 Dual single-party call (one active, one held), plus waiting call

14 Dual call: single party call held, multiparty call active, plus waiting call

15 Dual call: single party call active, multiparty call held, plus waiting call

16 Busy, i.e. one or more calls are waiting for the network to process a change

<active call_state>, <held call state>:

0 Call is idle
1 MO establishment in progress
2 Waiting for user to answer MT call
3 User accepted MT call, completing establishment
4 Fully active
5 Call is part of fully active multiparty call
6 Call held
7 Call is part of held multiparty call
8 Multiparty (conference) build requested
9 Hold requested
10 Multiparty hold requested
11 Retrieve requested
12 Multiparty retrieve requested
13 Call is being removed (split) from multiparty call
14 Reestablishing
15 Releasing

<active index>,<held index>:
0..5 Index of call record
255 No call record

The +XCSI message extends the information available in the +DPLCI announcement. It will be sent whenever there is a non-data call state change in the A3LA-R' internal Call Control (MMICC) state machines, including during a voice call session (possibly with multiple concurrent calls) when any call becomes held/active/waiting. There will be no +XCSI announcements during a data call, but there could be one after the data call has finished, when the overall call state goes idle.

The call index fields identify the call records for the active and held calls. Note that the A3LA-R implementation allows at most one held call at a time. The index values can be used in the "<1x>" and "<2x>" options of the AT+CHLD command.

A.8.122 +CDSI – Report SMS status

This announcement is sent when the network responds after a mobile-originated SMS send attempt.

Exec Command: **none**

Unsolicited Announcement:

+CDSI:<status>

where:

<status>:
0..255 Success code or failure cause (TD_SMS_RP_CAUSE_*)
1 Unassigned Number
8 Operator Barring

10	Call Barred
21	SM Transfer Rejected
22	Memory Capacity Exceeded
27	Destination Out Of Order
28	Unidentified Subscriber
29	Facility Rejected
30	Unknown Subscriber
38	Network Out Of Order
41	Temporary Failure
42	Congestion
47	No Resources
50	Facility Not Subscribed
69	Facility Not Implemented
81	Invalid RP MR
95	Semantic Error
96	Mandatory IE Error
97	RP MT Not Implemented
98	Bad State
99	IE Not Implemented
111	Unspecified Error
127	Interworking Error
128	Success
129	Success Ack
253	No Transaction Id
254	CM Internal Error
255	RL Timeout

Values up to 127 are defined by GSM for SMS-PP Relay Layer messages and values 128 and above are internal codes introduced by Iridium.

A.8.123 +GPSSTA – Configure GPS status

This command enables and disables the GPS receiver when the module is idle. When the module is in a call, then the GPS receiver is disabled to avoid interference between the module's Iridium band transmitter and the GPS band receiver.

Note: the GPS receiver (and associated circuitry) is optional and is not fitted to some revisions of the A3LA-R RF board. In this case all forms of the +GPSSTA command will return an error.

***Exec Command:* +GPSSTA=<mode>**

where:

<mode>:

0	disable GPS receiver
1	enable GPS receiver

***Query Command:* +GPSSTA?**

This command returns the current GPS receiver state. 1 = enabled, 0 = disabled.

Test Command: **+GPSSTA=?**

Test command returns a list of valid values. Response is in the form:

+GPSSTA: list of supported modes

APPENDIX B: S-REGISTER DEFINITIONS

S-registers allow control over specific A3LA-R operations. Some S-registers contain a single numeric value. Other S-registers are bit mapped where individual bits, or sets of bits, control specific functions.

B.1 S-Register Commands

Commands allow S-registers to be read, written, or simply referenced (i.e. set a pointer to designate the current, referenced S-register). S-register commands are described in the following subsections.

B.1.1 Sr – Direct S-Register Reference

Set a pointer to reference S-register r.

B.1.2 Sr? – Direct S-Register Read

Read the value of S-register r.

B.1.3 Sr=n – Direct S-Register Write

Set the value of S-register r to n, where n is a decimal value in the range 0 to 255.

B.1.4 ? – Referenced S-Register Read

Read the value of the current referenced S-register. The current referenced S-register is that which was last acted upon by a direct reference (ATSr), read (ATSr?), or write (ATSr=n) command.

B.1.5 =n – Referenced S-Register Write

Set the value of the current referenced S-register to n. The current referenced S-register is that which was last acted upon by a direct reference (ATSr), read (ATSr?), or write (ATSr=n) command.

B.2 Standard S-Registers

Register Number	Range	Default	Description	Sr=n Command Write Protected in SAC0201
S3	0 – 127	13	Carriage return character	
S4	0 – 127	10	Line feed character	
S5	0 – 32	8	Backspace character	
S6	0 – 255	4	Wait for dial-tone **No action, compatibility only**	
S7	0 – 255	50	Communication standard used by A3LA-R **No action, compatibility only**	
S8	0 – 255	4	Pause time for comma **No action, compatibility only**	
S9	0 – 255	6	Carrier detect response time **No action, compatibility only**	

S10	0 – 255	14	Carrier loss time **No action, compatibility only**	
S11	0 – 255	0	DTMF tone duration **No action, compatibility only**	Yes
S12	0 – 255	40	Escape guard time. Time, in 50ths of a second, until OK displayed after entering command mode by escape sequence.	
S14	0 – 255	170	Bitmap register where bit 1 reflects the En setting, bit 2 turns off command responses, bit 3 reflects the Vn setting, bit 5 reflects pulse/tone dial mode	
S21	0 – 255	48	Bitmap register where bit 0 reflects telephone jack control, bit 2 reflects RTS/CTS on/off, bits 3 and 4 reflect the &Dn setting, bit 5 reflects the &Cn setting, bit 6 reflects DSR on/off, and bit 7 reflects disconnecting long space.	Yes
S22	0 – 255	246	Bitmap register where bits 0 and 1 reflect the speaker volume setting, bits 2 and 3 reflect the speaker on/off setting, and bits 4, 5 and 6 reflect the Xn setting.	Yes
S23	0 – 255	61	Bitmap register: bit 0: autobaud setting bits 1-3: DTE baud rate bits 4-5: parity bits 6-7: guard tone	Yes
S25	0 – 255	5	Sets length of time in hundredths of a second that a change in the DTR status has to persist for before it is recognized.	
S27	0 – 255	9	Bitmap register where bits 0, 1 and 3 reflect the &Qn setting, bit 3 reflects leased line operation setting, bits 4 and 5 reflect synchronous clock setting.	Yes
S30	0 – 255	0	Disconnect activity timer. Timer used to determine how long the call connection has been inactive, in increments of 1/10000ms. A value of 0 disables this function.	
S31	0 – 255	0	Bitmap register where bit 1 reflects line modulation method setting, bits 2 and 3 reflect the Wn setting.	Yes
S36	0 – 255	7	Bitmap register where bits 0, 1 and 2 reflect the link type setting. **No action, compatibility only**	Yes

S39	0 – 255	3	Bitmap register where bits 0, 1 and 2 reflect the &Kn setting.	Yes
S40	0 – 255	192	Bitmap register where bits 2, 3, and 4 reflect the \K setting, and bits 6 and 7 reflect the \An setting, bits 3-5 reflects the \Kn setting. **No action, compatibility only**	Yes
S41	0 – 255	3	Bitmap registers where bits 2 and 6 enable retrain on bad signal quality setting, bit 4 reflects xon/xoff usage setting, and bit 5 reflects DTE auto rate adjustment setting. **No action, compatibility only**	Yes
S95	0 – 255	0	Bitmap register for extended result codes (overrides Wn setting). 0 = CONNECT shows DCE speed 2 = Enable CARRIER XXXX 3 = Enable PROTOCOL: XXXX 5 = Enable COMPRESSION: XXXX	

B.3 Iridium Specific S-Register Extensions

Register Number	Range	Default	Description	Sr=n Command Write Protected in SAC0201
S13	0 – 255	0	Bitmap register where bits 0-1 reflect the DCE data bits, bits 2-3 reflect the DCE stop bits, bits 4-6 reflect the DCE parity settings, and bit 7 is not used	Yes
S15	0 – 2	0	Auto-answer mode selection Bits 0-1: 0 (auto-answer voice and data calls) 1 (auto-answer voice calls only) 2 (auto-answer data calls only)	
S34	0 – 255	0	Bitmap register where bit 7 reflects the +DR setting, bits 0-1 reflect the data compression type (PT), bit 6 reflects the +DS compression negotiation setting.	Yes
S35	0 – 255	5	Bearer service capabilities	
S42	0 – 255	0	GSM Call clearing code as returned by the network. Refer to GSM 04.08 [7] Table 10.86 Cause Information Element Values.	Yes
S43	0 – 255	32	Bitmap register: 0 = +CMGF setting	Yes

			1 = +CBST parameter <name> setting 2 = +CMEE setting 3 = +CMEE setting 5 = +CBST parameter <ce> setting 6 = +CRC setting 7 = +CR setting	
S44	0 – 255	4	Bitmap register: 0-2 = +CPBS setting 5-6 = +CREG setting 7 = +CLIP setting	Yes
S45	0 – 255	0	Bitmap register: 0-1 = +CNMI parameter <mode> setting 2-3 = +CNMI parameter <mt> setting 4-5 = +CNMI parameter <bm> setting 6-7 = +CNMI parameter <ds> setting	Yes
S47	0 – 255	0	Bits 4,5, and 6 reflect TON settings for dial string	
S49	0 – 255	1	Bits 0-3 reflect NPI settings for dial string	
S51	0 – 255	0	V.42bis maximum codewords (P1), high byte	Yes
S52	0 – 255	128	V.42bis maximum codewords (P1), low byte	
S54	0 – 255	20	V.42bis maximum string size (P2)	
S58	0 – 255	0	V.42bis compression direction (P0)	
S96	0 – 255	0	IRLP version number (N0) parameter	
S98	0 – 105	105	IRLP k iwf->isu parameter	
S99	0 – 105	105	IRLP k isu->iwf parameter	
S100	1 – 15	15	IRLP N2 parameter	
S102	26 – 255	30	IRLP T1 parameter	
S103	10 – 255	10	IRLP T2 parameter	
S104	4 – 255	4	IRLP T4 parameter	
S106	1 – 10	10	IRLP riwf->isu parameter	
S107	1 – 10	10	IRLP risu->iwf parameter	
S112	0 – 255	0	SBD upload message sequence number (high byte)	Yes
S113	0 – 255	0	SBD upload message sequence number (low byte)	Yes

S121	0 – 31	1	Bitmap register: bit 0: +SBDMTA setting (SBD ring indication) bits 1-2: +SBDAREG setting (SBD automatic registration) bit 3: +CCWA<n> setting bit 4: +GPSSTA<n> setting	Yes
S122	0 – 31	0	Bitmap register: bit 0: unused: bits 1-3: +CIER setting (indicator event reporting)	Yes
S123	0 – 255	8	Bitmap register: bit 0: unused bit 1 = +WTM bit 2 = +WDLDM<dldm> bit 3 = +WIRLP<mode> bits 4-5 = +WFRNG	Yes
S124	0 – 255	15	Dynamic link measurement interval (+WDLM <mi> setting). Value in 1000 ms unit.	
S125	1 – 100	10	Dynamic link delay measurement delay tolerance (+WDLM<dtl> setting). Value in % unit.	
S126	0 – 255	2	Bitmap register: 0 = Ignore &Dn command specified reaction to DTR ON to OFF transitions. Disconnect as reaction to Hn command. OK response given. 1 = Ignore &Dn command specified reaction to DTR ON to OFF transitions. Ignore Hn command. OK response given 2 = Comply with &Dn command specified reaction to DTR ON to OFF transitions. Disconnect as reaction to Hn command.	Yes
S127	0 – 255	0	Bitmap Register containing copies of MSVTR/MSVLS parameters: Bit 0 = –MSVTR: 0 = Disabled (default) 1 = Enabled Bit 1 = –MSVLS: 0 = No Mute (default) 1 = Mute Enabled Bits 2-5 = Reserved (see IID#2600)	Yes

APPENDIX C: SUMMARY OF RESULT CODES

The following tables list the result codes returned by the A3LA-R.

V.25ter/Hayes Result Codes

Numeric (V0)	Verbose (V1)	Description
0	'OK'	Acknowledges execution of command; voice call connection has been established.
1	'CONNECT'	Data call connection has been established.
2	'RING'	Incoming data or voice call received (unsolicited).
3	'NO CARRIER'	Data or voice call connection terminated.
4	'ERROR'	Command not accepted.
5	'CONNECT 1200'	Data call connection established at 1200 bps.
6	'NO DIALTONE'	No dialtone detected.
7	'BUSY'	Busy signal detected.
8	'NO ANSWER'	Data or voice call connection completion timeout.
9	'CONNECT 0600'	Data call connection established at 600 bps.
10	'CONNECT 2400'	Data call connection established at 2400 bps.
11	'CONNECT 4800'	Data call connection established at 4800 bps.
12	'CONNECT 9600'	Data call connection established at 9600 bps.
13	'CONNECT 7200'	Data call connection established at 7200 bps.
14	'CONNECT 12000'	Data call connection established at 12000 bps.
15	'CONNECT 14400'	Data call connection established at 14400 bps.
16	'CONNECT 19200'	Data call connection established at 19200 bps.
17	'CONNECT 38400'	Data call connection established at 38400 bps.
18	'CONNECT 57600'	Data call connection established at 57600 bps.
19	'CONNECT 115200'	Data call connection established at 115200 bps.
40	'CARRIER 300'	Data rate detected at 300 bps.
44	'CARRIER 1200/75'	Data rate detected at V.23 backward channel.
46	'CARRIER 1200'	Data rate detected at 1200 bps.
47	'CARRIER 2400'	Data rate detected at 2400 bps.
48	'CARRIER 4800'	Data rate detected at 4800 bps.
49	'CARRIER 7200'	Data rate detected at 7200 bps.
50	'CARRIER 9600'	Data rate detected at 9600 bps.

51	‘CARRIER 12000’	Data rate detected at 12000 bps.
67	‘COMPRESSION: V.42bis’	Data call connected with V.42bis compression enabled.
69	‘COMPRESSION: NONE’	Data call connected with no data compression.
126	‘SBDRING’	SBD ring alert received, indicating presence of a mobile terminated SBD message at gateway.
127	‘HARDWARE FAILURE: <subsys>,<error>’	Issued at initialization in case of a hardware failure.
as verbose	‘+DR: V42B NONE’	Data call connected with no data compression.
as verbose	‘+DR: V42B TD’	Data call connected with V.42bis compression enabled on transmit direction.
as verbose	‘+DR: V42B RD’	Data call connected with V.42bis compression enabled on receive direction.
as verbose	‘+DR: V42B’	Data call connected with V.42bis compression enabled on both transmit and receive direction.

GSM 7.07 Result Codes

Numeric (V0)	Verbose (V1)	Description
as verbose	‘+CR: ASYNC’	Asynchronous transparent data connection
as verbose	‘+CR: REL ASYNC’	Asynchronous non-transparent data
as verbose	‘+CME ERROR: <error>	Command not accepted
as verbose	‘+CREG: <stat>[,<lac>,<ci>]	Registration indication status (unsolicited if enabled)
as verbose	‘+CRING: ASYNC‘	Asynchronous transparent data call indication
as verbose	‘+CRING: REL ASYNC‘	Asynchronous non-transparent data
as verbose	‘+CRING: VOICE‘	Voice call connection

GSM 7.05 Result Codes

Numeric (V0)	Verbose (V1)	Description
as verbose	‘+CMTI: <mem>,<index>’	SMS-DELIVER message indication (unsolicited if enabled).
as verbose	‘+CMT: <alpha>],<length><CR><LF><pdu>’ (PDU mode)	SMS-DELIVER message indication (unsolicited if enabled).
as verbose	‘+CDS:<length><CR><LF><pdu>’ (PDU mode)	SMS-STATUS-REPORT message indication (unsolicited if enabled).
as verbose	‘+CMS ERROR: <error>	SMS command failed.

Iridium Specific Result Codes

Numeric (V0)	Verbose (V1)	Description
as verbose	‘READY’	Ready to receive SBD binary message data from DTE.
as verbose	‘+AREG:<event>,<reg error>’	Auto-registration event report.
as verbose	‘+CIEV:<sig><value>’	Indicator event report.
as verbose	'+ADJANT:<deployed>'	User antenna adjustment is required.

APPENDIX D: INFORMATIVE EXAMPLES

The examples below are presented in two different formats. The format used in each example has no significance. A single format will be used in a future revision of this document.

D.1 Unit Identification

When beginning to build a communication link, a general DTE application controlling the A3LA-R should confirm the type of Iridium device to which it is connected.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+CGMI		Get manufacturer name
	Iridium OK	
AT+CGMM		Get model number
	<model ID> OK	
AT+CGMR		Get revision
	Call processor version: <revision> DSP version: <revision> … OK	
AT+CGSN		Get IMEI
	300001000000000 OK	

D.2 Setting the Default Configuration

The DTE sets the A3LA-R' default configuration to no flow control, SBD automatic notifications enabled.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT&K0		Disable RTS/CTS flow control
	OK	
AT+SBDMTA=1		Enable SBD ring indications
	OK	
AT&W0		Store the configuration as profile 0
	OK	
AT&Y0		Select profile 0 as the power-up default
	OK	

D.3 Power-on to Sending an SBD Message

The DTE will power up the A3LA-R, wait for the A3LA-R to acquire the network, and send a 70-byte message.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
		Wait for DSR to become asserted
AT+CIER=1,0,1		Enable service indication reporting (note that this can be stored in the default configuration)
	OK	
	+CIEV: 1, 1	Wait for the A3LA-R to acquire the network
AT+SBDWB=70		
	READY	Transfer message to A3LA-R
<binary transfer>		
	0	
AT+SBDIX		Perform SBD session
	+SBDIX: 0, 23, 0, -1, 0, 0	
AT+SBDD0		Clear the MO message buffer
	OK	

D.4 SBD Automatic Notification Registration

The DTE verifies its registration state, performs a registration in order to be able to receive automatic notifications, and enables automatic notification indications.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+SBDREG?		Query the A3LA-R registration status
	+SBDREG: 0	A3LA-R is detached, i.e. un-registered
AT+SBDREG		Tell the A3LA-R to register for automatic notifications
	+SBDREG: 2,0	A3LA-R is now registered
AT+SBDREG?		Query the A3LA-R registration status
	+SBDREG: 2	A3LA-R is registered
AT+SBDMTA=1		Enable SBD ring indications from A3LA-R to DTE
	OK	

D.5 SBD Automatic Notification Message Reception

The DTE verifies its registration state. Upon receiving automatic notification the DTE initiates an SBD session to receive an MT message.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+SBDREG?		Query the A3LA-R registration status
	+SBDREG: 2	A3LA-R is registered
	…	Vendor application sends an MT message to the GSS

	+SBDRING	A3LA-R indicates an incoming message. The RI line also toggles.
AT+SBDIXA		DTE initiates an SBD session in answer to the automatic notification
	+SBDIXA:0,23,1,237,90,2	A3LA-R informs DTE that a 90-byte message was successfully received with MTMSN 237, and that two further MT messages are queued at the GSS
AT+SBDRB		DTE retrieves the received message from the A3LA-R
	<binary transfer>	

D.6 SBD Automatic Notification Automatic Registration

The DTE verifies its registration state and enables automatic registration using the "Ask" mode.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+SBDREG?		Query the A3LA-R registration status
	+SBDREG: 2	A3LA-R is registered
AT+SBDAREG=2		DTE sets the automatic registration to "Ask" mode
	OK	
	…	A3LA-R is moved
	+AREG: 0, 0	A3LA-R notifies DTE that it needs to register
AT+SBDREG		DTE instructs the A3LA-R to register
	+SBDREG: 2, 0	Registration is successful

D.7 Originating a Data Call

An example of how to make a data call is given below:

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+CBST=6,0,1		Asynchronous modem 4800 bps and IRLP
	OK	
AT+CR=1		Enable reporting
	OK	
ATD1234567890		Dial remote modem
	OK	
+CR: REL ASYNC		Call connected at DTE rate of 9600
	CONNECT ASYNC 9600	

D.8 Answering a Data Call

The A3LA-R is capable of accepting mobile terminated data calls. The following is a sequence of commands that can be used to establish the connection.

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
	RING	Indicates arrival of call request
ATA		Manually answer the call
	CONNECT 9600	Call connected at DTE rate of 9600
ATS0=2		To automatically answer a call, register 0 should be set to a non-zero value
	RING	Indicates arrival of call request
	CONNECT	Call connected at DTE rate of 9600

D.9 Disconnecting a Data Call

To A3LA-R (from DTE)	To DTE (from A3LA-R)	Description
AT+CBST=6,0,1		Asynchronous modem 4800 bps and IRLP
	OK	
AT+CR=1		Enable reporting
	OK	
ATD1234567890		Dial remote modem
	OK	
+CR: REL ASYNC		Call connected at DTE rate of 9600
	CONNECT ASYNC 9600	
…	…	Data transfer
<+++>		Send escape sequence
	OK	
ATH0		Hang up call
	OK	

D.10 Coordination of +CLCC and +CPAS responses

In order to determine the call state of the A3LA-R, the +CLCC and +CPAS commands may be used. The following table demonstrates how the output of the two commands, as well as the Extended Ring Message, can be combined to provide a more detailed definition of the call state than any one of the results provides by itself.

Call State	+CLCC Response	+CPAS Response	Extended Ring Message
Idle	+CLCC: 006	+CPAS: 000 or 003	n/a
Handset dialing - Voice	+CLCC: 002	+CPAS: 000 or 003	n/a
ATD dialing – Voice	command aborts call	command aborts call	n/a
ATD dialing - Data	command aborts call	command aborts call	n/a

Alerting after ATD dialing - Voice	command aborts call	command aborts call	n/a
Alerting after ATD dialing - Data	command aborts call	command aborts call	n/a
Ringing - Voice	+CLCC: 004	+CPAS: 003	CRING: VOICE
Ringing - Data	+CLCC: 004	+CPAS: 003	CRING: DATA
In call - Voice	+CLCC: 000	+CPAS: 000 or 003	n/a
In call - Data	+CLCC: 000	+CPAS: 004	n/a
On hold - Voice	+CLCC: 001	+CPAS: 000 or 003	n/a
Call waiting - Voice	2 or more call states, one of which is 004 e.g. +CLCC: 000,004	+CPAS: 000 or 003	n/a

APPENDIX E: POWER CONSUMPTION

This section provides the electrical power profile of the A3LA-R. It does not describe every situation; however, it does offer a starting point for users to continue their own development design. The actual usage profile can vary for a number of reasons including manufacturing variation from unit-to-unit. Users are reminded to optimize their setup to attain the lowest possible power consumption. Some of the setup parameters to be carefully observed include:

1. Have a clear view of the sky for the antenna—poor visibility of the sky is when a clear line-of-sight is not available between the A3LA-R and the satellites.
2. Keep the antenna's VSWR low—the higher the antenna VSWR the higher the current consumed by the A3LA-R.
3. Keep the antenna cables' loss to less than 3dB—the higher the antenna cable loss the higher the current consumed by the A3LA-R.
4. Keep the power cable between the A3LA-R and the power source as short as possible.
5. Use both power input pins on the multi-interface connector.

Power consumption of the A3LA-R can be divided into five distinct operating segments: (1) standby, (2) data-switch/RUDICS call, (3) SBD transmission, (4) SMS transmission and audio call. Typical current drawn and power consumption for these cases are shown in plots below.

The A3LA-R is designed to accept input power at two different voltage ranges—either from 4.0V to 5.5V or from 5.0V to 32V. A different internal DC-DC converter is used for each range. In each figure below, electrical profile for both ranges are displayed in separate curves.

The A3LA-R can be connected to a DPL handset through an HRC-24-8R data kit to make voice calls. The DPL handset requires 12V, which is supplied by the A3LA-R through pin 2 of the multi-interface connector. When the DPL handset is on with the backlight powered up, the DPL handset current drawn is about 350mA at 12V or about 500mA at 5V. Therefore, when a DPL handset is connected to an A3LA-R, user must account for the added current drawn.

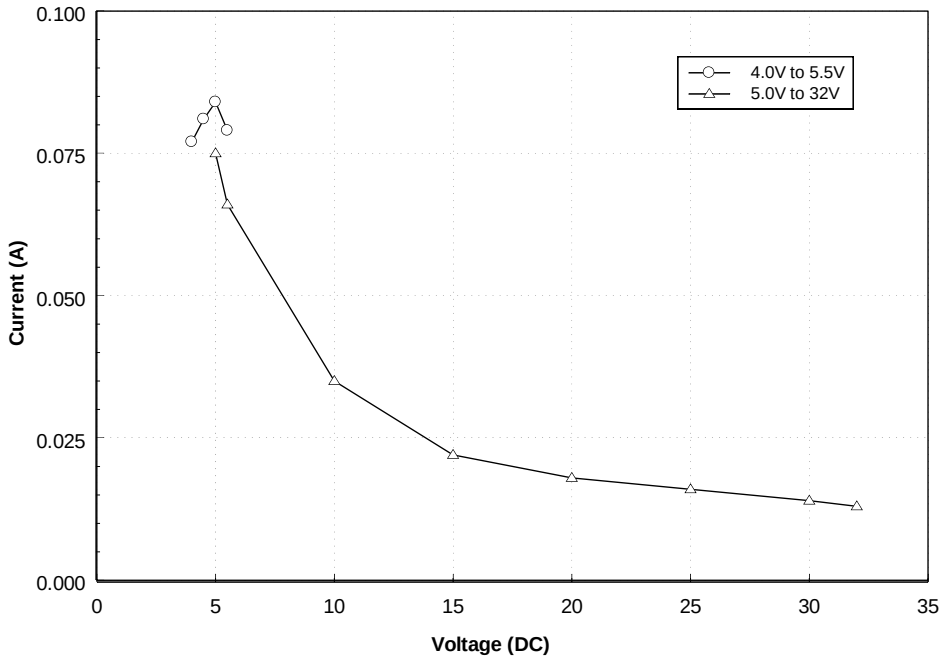


Figure E1. Average current drawn during standby.

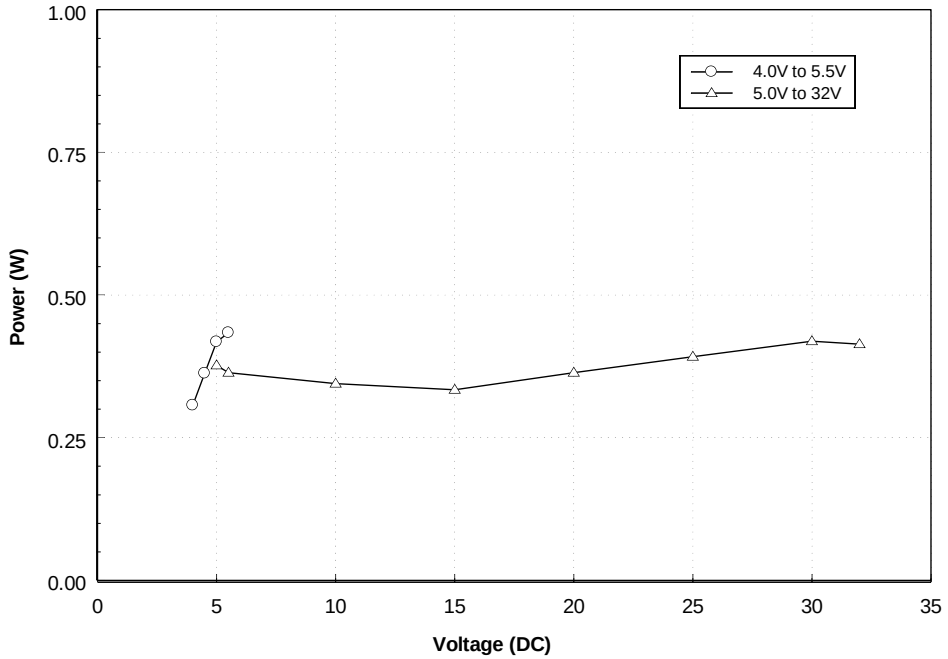


Figure E2. Average power consumption during standby.

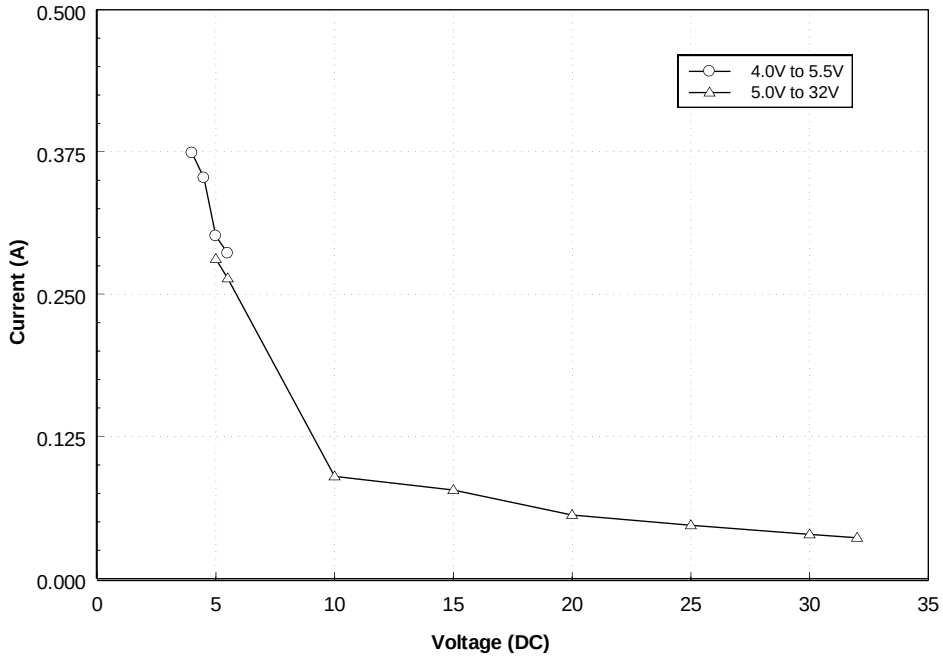


Figure E3. Average current drawn during a data switch call.

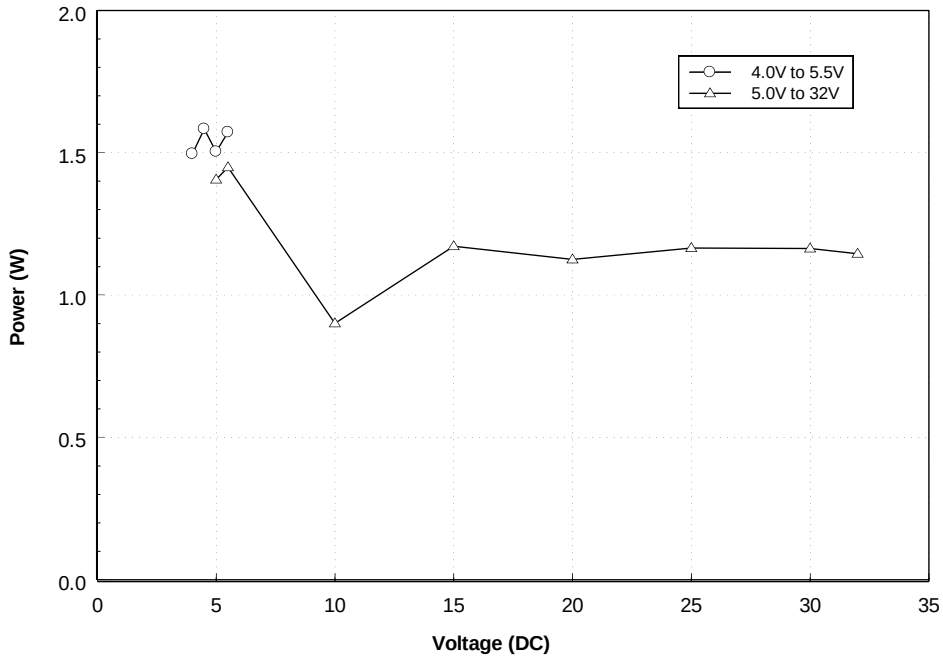


Figure E4. Average power consumption during a data switch call.

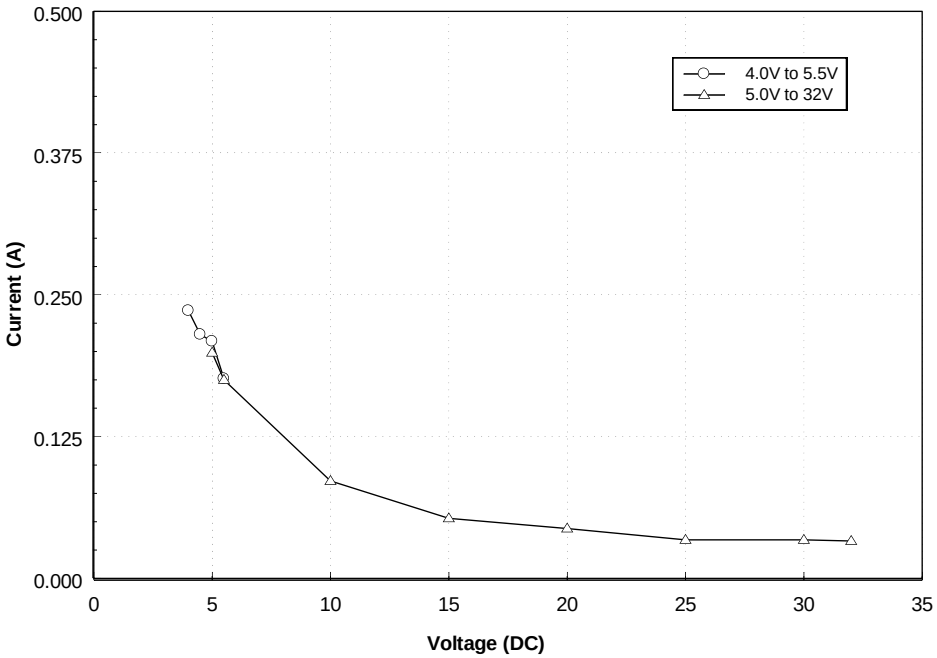


Figure E5. Average current drawn during an SBD transmission.

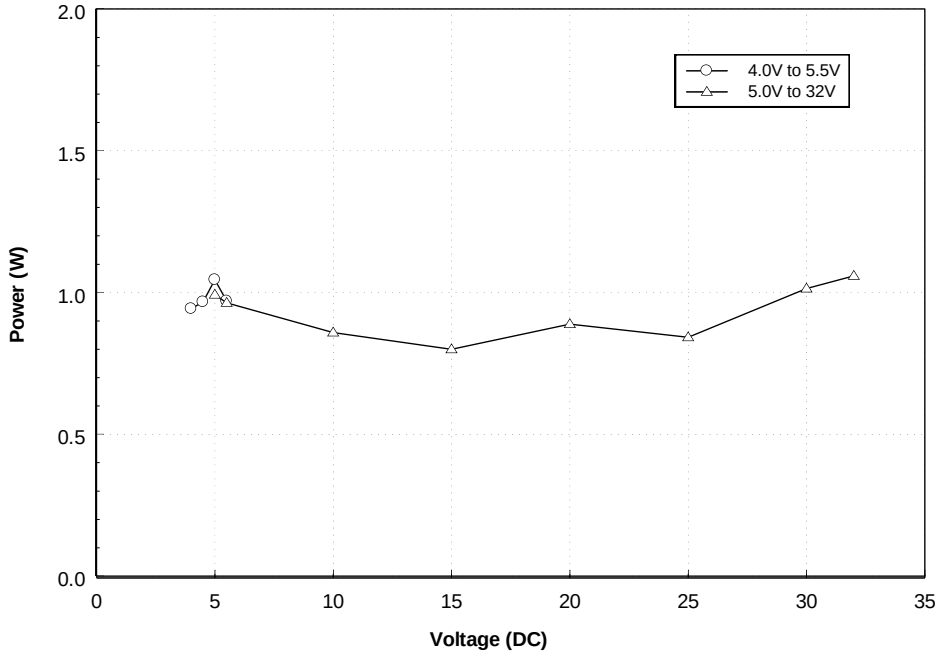


Figure E6. Average power consumption during and SBD transmission.

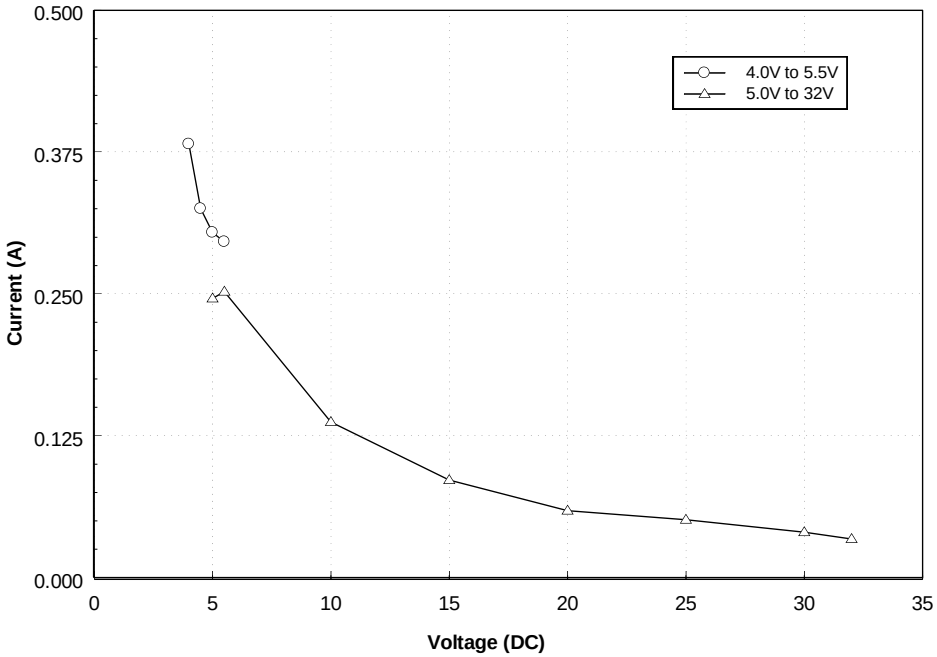


Figure E7. Average current drawn during an SMS transmission.

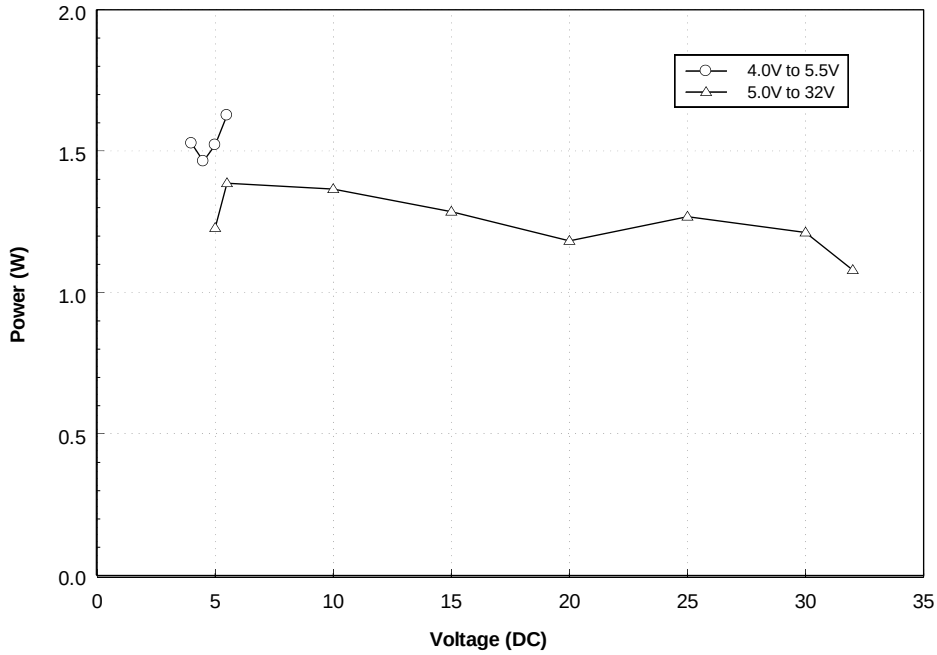


Figure E8. Average power consumption during and SMS transmission.

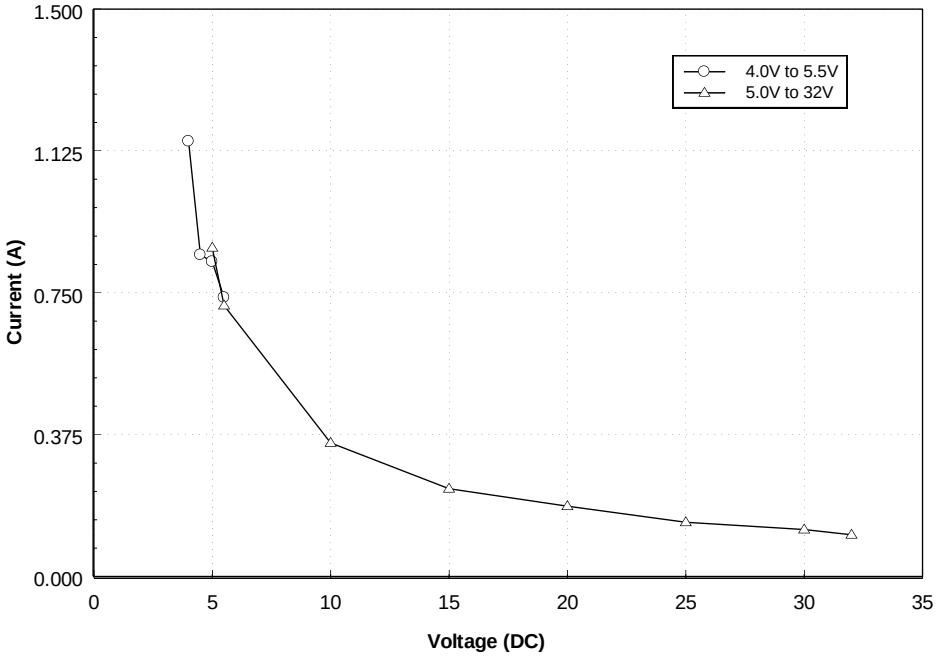


Figure E9. Average current drawn during a voice call using DPL handset.

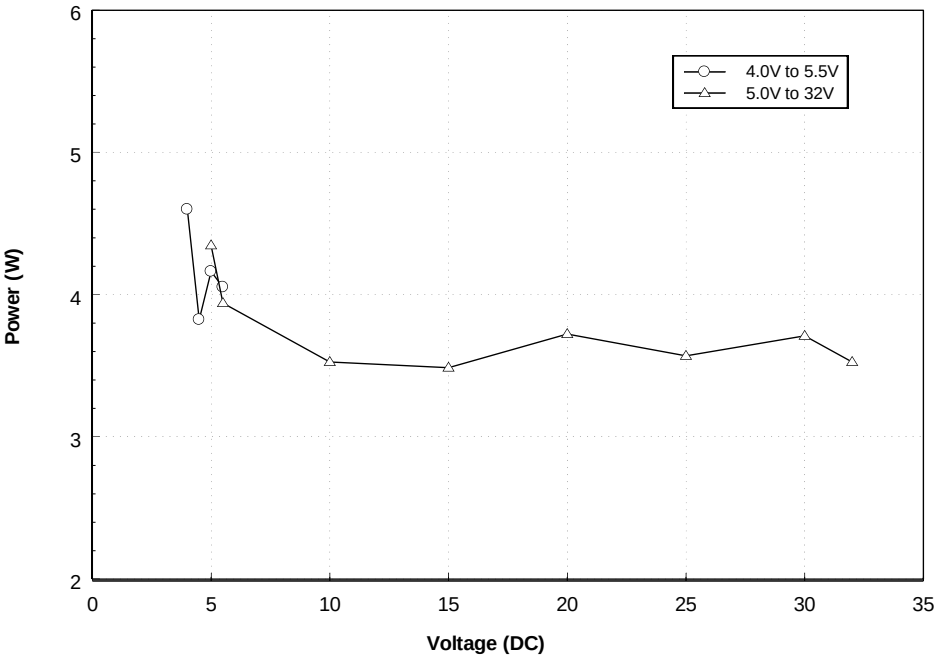
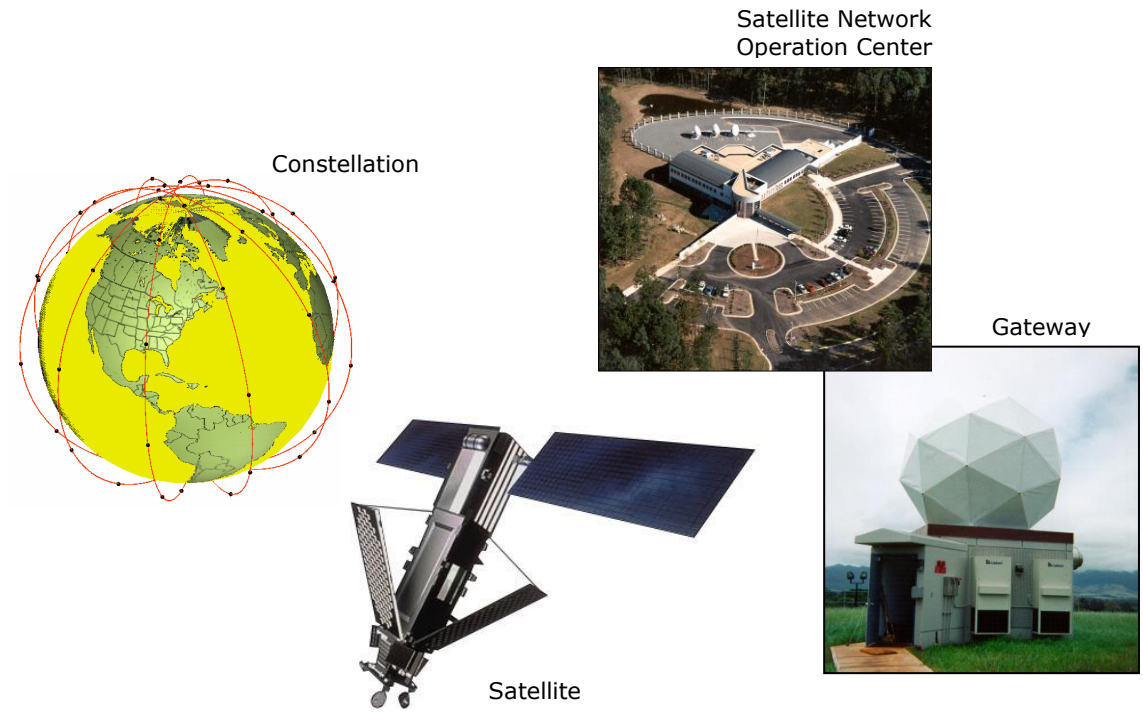


Figure E10. Average power consumption during a voice call using DPL handset.

APPENDIX F: DESCRIPTION OF THE IRIDIUM NETWORK

F.1 Description of the Iridium Network

The Iridium satellite network is owned and operated by Iridium Satellite LLC (ISLLC). It was constructed as a constellation of 66 satellites in low-earth orbit, terrestrial gateways and Iridium subscriber units (ISU). An ISU can either be an Iridium satellite phone or any of NAL Research's A3LA series modems. The satellites are placed in an approximate polar orbit at an altitude of 780 km. There are 6 polar planes populated with 11 satellites per orbit constituting the 66 satellite constellation. The near polar orbits of the Iridium constellation provide truly real-time and global coverage from pole-to-pole.



The Iridium is designed to operate in the band of 1616 to 1626.5 MHz although the exact frequencies used depend on the local regulating authorities and issued licenses in any particular region. Each satellite projects 48 beams on the surface of earth, which may be viewed as providing coverage cells on the ground similar to terrestrial systems. Each beam is approximately 600 km in diameter. The 66-satellite constellation has the potential to support a total of 3,168 spot beams; however, as the satellite orbits converge at the poles, overlapping beams are shut down. The satellite footprint is ~4,700 km in diameter. Under each footprint, a satellite is power limited to ~1,100 simultaneous circuits.

The Iridium network uses a time domain duplex (TDD) method and transmits and receives in an allotted time window within the frame structure. Since the system is TDD, the ISU transmit and receive in the same frequency band. The access technology is a FDMA/TDMA (frequency division multiple access/time division multiple access) method whereby an ISU is assigned a channel composed of a frequency and time slot in any particular beam. Channel assignments may be changed across cell/beam boundaries and is controlled by the satellite. The system will provide an average link margin of 12 dB.

Although there are multiple gateways, a user is registered to a single gateway. The gateways perform call connection setup and administrative duties such as billing and resource management. The satellite constellation provides connectivity between users, from a user to the Iridium system gateway, and between gateways. Within the Iridium network architecture, the satellites are cross-linked which allows ISU to ISU communication independent of gateway intervention once the call connection is established.

There are currently two commercial Iridium gateways located in Arizona, United States and Fucino, Italy. The U.S. government owns and operates an Iridium gateway located in Hawaii, United States. Each gateway generates and controls all user information pertaining to its registered users, such as user identity, geo-location and billing items. The gateway also provides connectivity from the Iridium system to the terrestrial based networks such as the PSTN.

F.2 Description of the Iridium Network Data Capabilities

For data communications, the Iridium network supports five different modes of operation as shown in Figure F1—dial-up data service, direct Internet connection, short-burst data (SBD), short-messaging service (SMS) and router-based unrestricted digital internetworking connectivity solution (RUDICS).

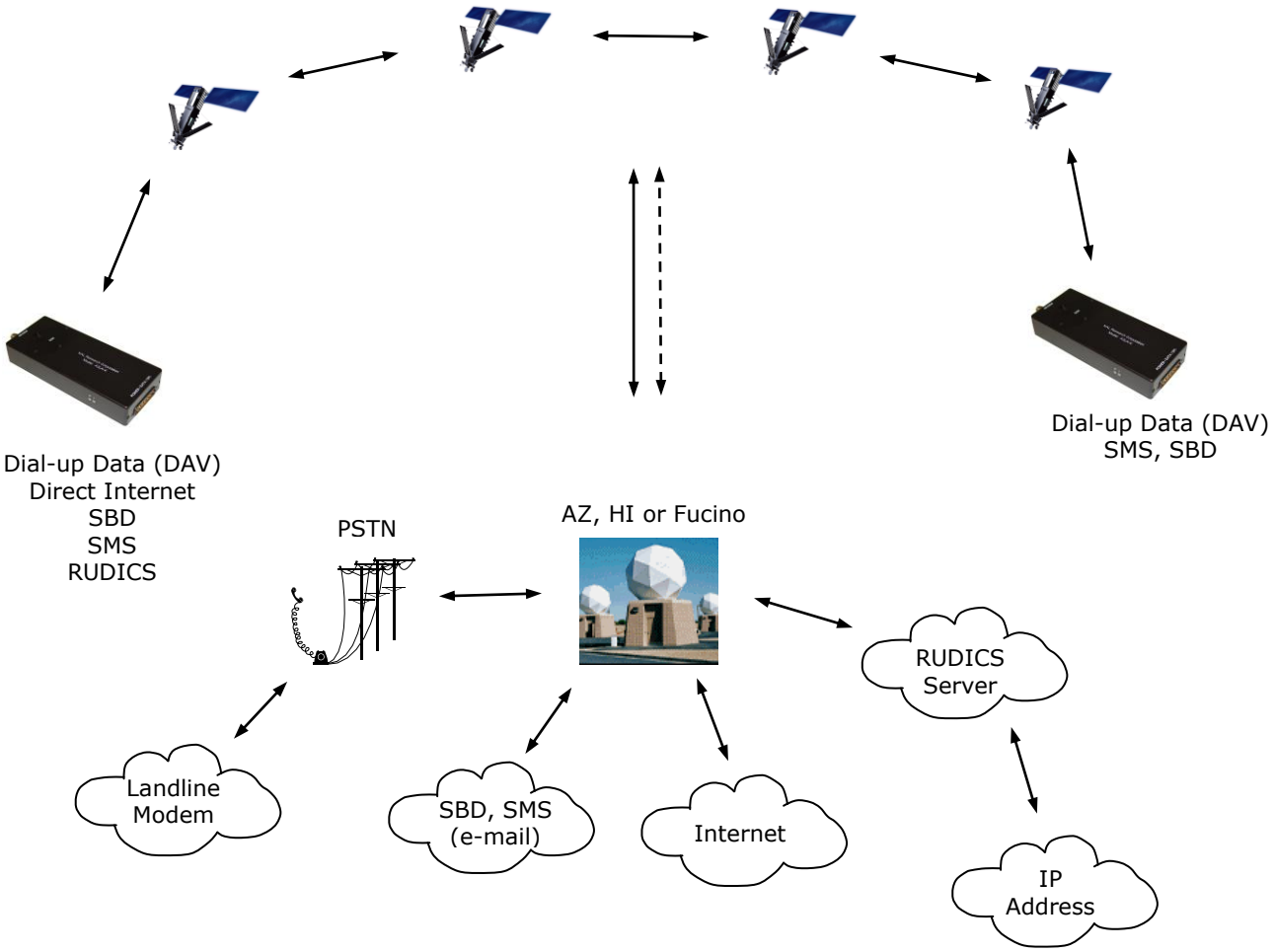


Figure F1. Iridium Network Data Capabilities.

F.3 Dial-Up Data Service

Dial-up data service provides connectivity through the Iridium satellite network to another Iridium modem, to the public switch telephone network (PSTN), to the Defense Switch Network (DSN), to a remote LAN (e.g., a corporate network) or to an Internet Service Provider (ISP) at a nominal data rate of 2.4 kilobits per second (Kbps). The connection time involving user authentication and handshaking (or modem training) can range from 15 to 30 seconds. For an Iridium-to-Iridium call, dial-up data service offers an additional option known as data after voice or DAV. Similar to a voice call, a DAV call is routed directly from one Iridium modem to another Iridium modem without going through the gateway.

Many desktop and laptop computers are equipped with either an internal or external modem to perform dial-up data applications across the landline telephone network (PSTN). On these computers, terminal emulator software or a dial-up networking connection can be configured to a specific modem with a phone number to dial, user identification and password. The modem can then be used to call another computer, a remote LAN or an Internet service provider as shown in Figure F2. The handshaking and protocols are established between the modems independent of the landline.

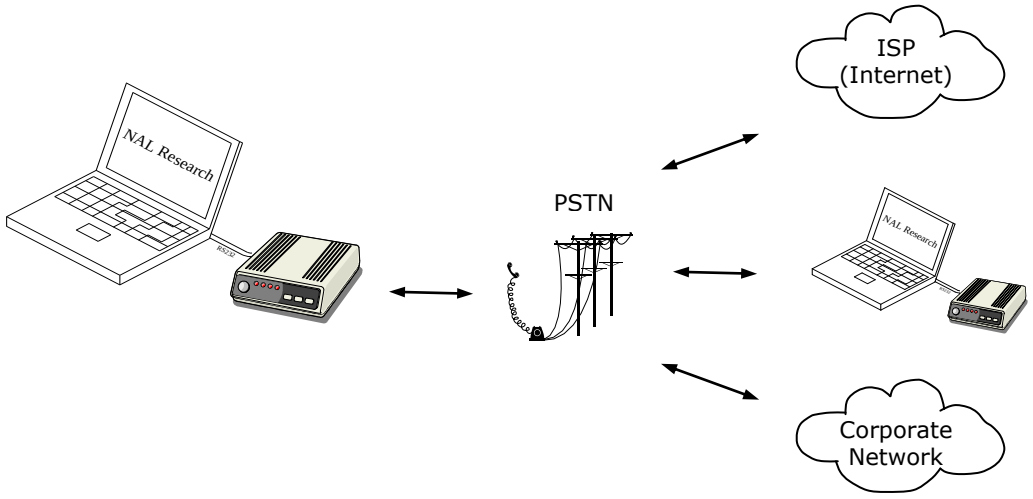


Figure F2. PSTN Dial-Up Connectivity.

The Iridium dial-up data service functions in much the same way as the PSTN dial-up connectivity. From the perspective of a computer, the Iridium modem is just another external modem. The only difference is that the dialed telephone number must conform to the international dialing pattern used by Iridium. When a data call is placed, the Iridium modem actually dials and initiates a connection with the Iridium gateway through the Iridium satellite constellation. Since the Iridium modem is requesting to establish a data connection, the switch at the gateway routes the call through another modem. The modem at the Iridium gateway then dials into and connects to another modem at the other end. Figure F3 illustrates how an Iridium dial-up data service call is routed. The handshaking and protocols established between the modems independent of the Iridium network.

For those ISU-to-ISU dial-up calls where data transmission delay is critical such as the application of TCP/IP protocol, DAV should be considered in the design. This option eliminates the Iridium gateway once

authentication and registration is completed allowing ISU-to-ISU communication without the gateway in the loop.

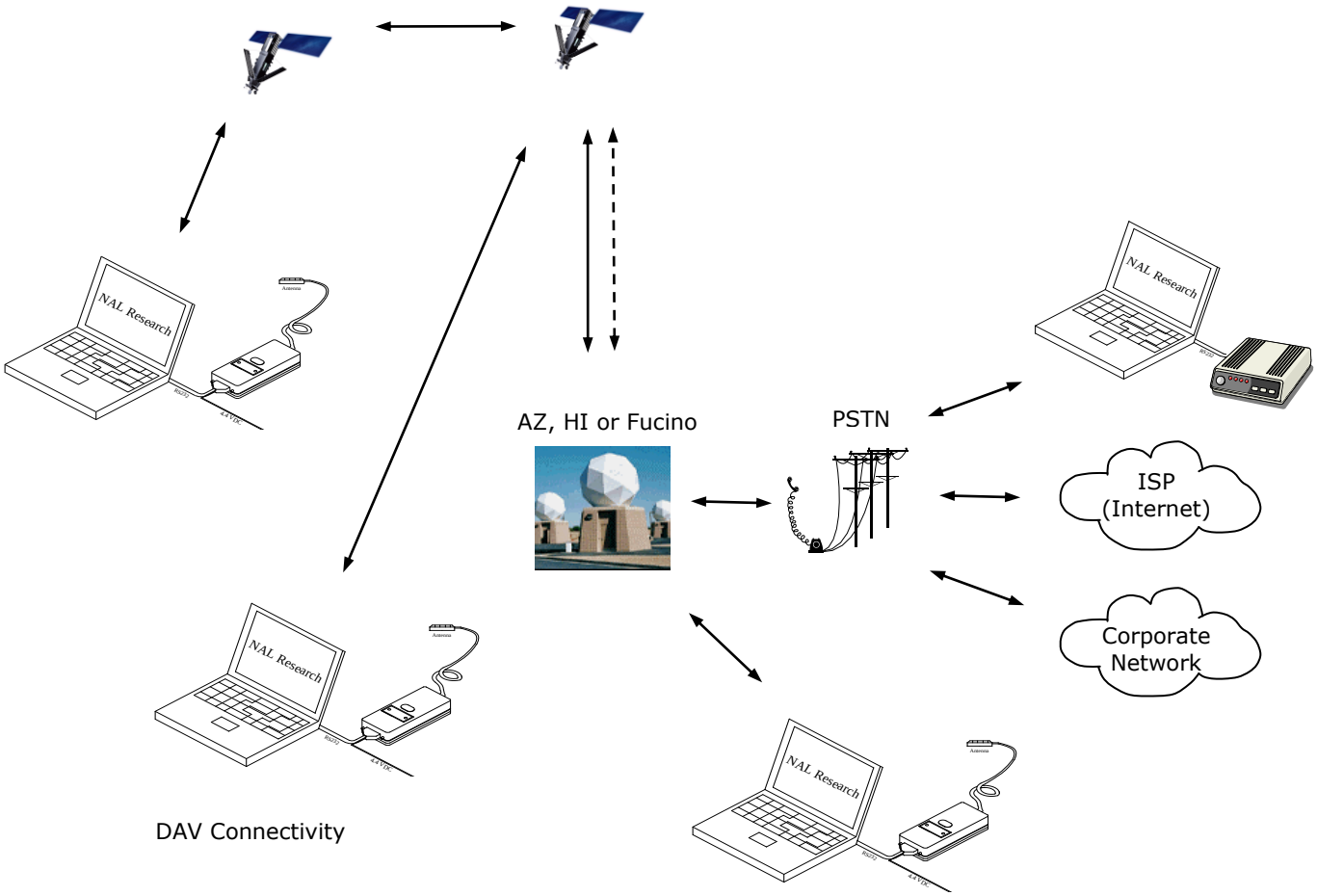


Figure F3. Iridium Dial-Up Data Service.

F.4 Direct Internet Connection

The Iridium Direct Internet service allows users to connect to the Internet via the Iridium gateway without having to sign up with an Internet service provider. This service utilizes a dedicated Apollo Server at the Iridium gateway, which provides high-speed connectivity to the Internet and optimizes server-to-Iridium modem communications. The dial-up networking setup is similar to the dial-up networking setup for landline telephone. The only difference is that the dialed telephone number is an international number provided by Iridium. Figure B3 illustrates how Iridium Internet (NIPRNet) call is routed.

Direct Internet service can be enhanced using Windows-based emulated point-to-point protocol (PPP) called the Apollo Emulator. With the use of the Apollo Emulator software instead of Microsoft Windows® dial-up networking, Direct Internet service can reduce connection time and improve data throughput. In addition, the Apollo Emulator offers a feature called Smart Connect™, which manages airtime by seamlessly connecting and disconnecting a user through the Iridium system. Airtime charges accumulate only while the call is connected. Improved effective data throughput is achieved through the use of user-transparent data

compression. The channel rate is still 2.4 Kbps. However, 10 Kbps effective throughput can be achieved depending on content (graphics and images will result in lower effective throughput).

F.5 Short-Burst Data (SBD)

SBD is a simple and efficient bi-directional transport capability used to transfer messages with sizes ranging from zero (a mailbox check) to 1960 bytes. SBD takes advantage of signals within the existing air interface, without using the dedicated traffic channels. As a result, small amounts of data can be transferred more efficiently than those associated with circuit-switched data calls. Messages that originate from an Iridium modem can be delivered to a variety of destinations. Commonly, data are delivered across terrestrial communications networks (NIPRnet and Internet) to servers and applications that process data from one or multiple fielded Iridium modems. SBD service also supports the transfer of messages to Iridium modems, where messages may originate from terrestrial sources. Delivery methods and options are initially configured when the Iridium modem is first purchased and may be easily modified via web pages at a later time.

F.6 Short Messaging Service (SMS)

SMS is a mechanism to deliver short data messages over the Iridium satellite network to the NIPRNet/Internet. Iridium SMS service incorporates a subset of the GSM SMS features. Each SMS message can be up to 160 text characters (7-bit coded) in length. The text characters are based on a 7-bit alphabet, which is encoded and transmitted as 8-bit data, hence the 140 octet (byte) maximum message size.

SMS service is a store and forward method of transmitting messages to and from an Iridium modem. The short message from the modem is stored in a central Short Message Center (SMSC) which then forwards it to the destination. In the case that the recipient is not available, the SMSC will attempt to deliver the SMS until it is delivered or the validity period expires. SMS supports a limited confirmation of message delivery**.** The sender of the short message can request to receive a return message notifying them whether the short message has been delivered or not. With this option, the originator gets a confirmation that the message was delivered to the SMSC. Unlike standard GSM, the Iridium SMS can only acknowledge that the message was delivered to the SMSC and not the end-destination.

SMS messages can be sent and received simultaneously while a voice call is in progress. This is possible because SMS messages travel over and above the radio channel using the signaling path, whereas the voice call uses a dedicated "traffic" radio channel for the duration of the call.

F.7 RUDICS

RUDICS is an enhanced gateway termination and origination capability for circuit switched data calls across the Iridium satellite network. When an Iridium modem places a call to the RUDICS Server located at the Iridium Gateway, the RUDICS Server connects the call to a pre-defined IP address allowing an end-to-end IP connection between the Host Application and the Iridium modem. There are three key benefits of using RUDICS over the conventional PSTN circuit switched data connectivity or mobile-to-mobile data solutions: (1) elimination of analog modem training time, (2) increased call connection quality, reliability, and maximized throughput and (3) protocol independence.

F.8 Iridium Geo-Location

The Iridium network makes calculations of the geographical location (geo-location) of an ISU each time a call is placed. The technique employed to determine the geo-location of an ISU is based on measurements of the ISU and satellite propagation delay and Doppler frequency shift. These measurements are used to estimate cosines of spherical angles that identify the ISU's location relative to the satellite by the gateway.

The Iridium network can locate an ISU to within 10 km only about 78% of the time. The so-called error ellipse can have a large eccentricity with the major axis oriented in the azimuth dimension and the minor axis oriented in the radial dimension. The position of the ISU in the radial dimension relative to the satellite can almost always be determined to within 10 km with just one measurement. Errors in the azimuth dimension relative to the satellite are largest along the satellite's ground path and tend to increase with distance from the satellite. Geo-location errors in the east-west dimension, therefore, are sometimes more than 100 times greater than in the north-south dimension.

APPENDIX G: STANDARDS COMPLIANCE

The A3LA-R comprises of an Iridium 9523 L-band transceiver board. The 9523 is a regulatory approved daughter module transceiver that can be fitted within an enclosed host system. The 9523 is designed to comply with the standards for Radio Emissions Compliance, Electromagnetic Compatibility, and AC Safety in the United States, European Union and Canada assuming an antenna with a gain of ~3dBi and adequate shielding.

FCC Compliance: The 9523 is certified under FCC CFR47 Parts 2, 15 and 25 as FCC ID: Q639523. Operation is subject to the condition that this device does not cause harmful interference. Any changes or modifications, including the use of a non-standard antenna, not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CE Compliance: The 9523, when marked with the CE symbol, complies with the European Community Council Directive for R&TTE, 99/5/EC, provided that the integrator/user adheres to the instructions detailed in this LBT Interface Specification. This product is in compliance with applicable ETSI standards. Compliance with the requirements of ETSI EN 301 441 V1.1.1 requires the use of a shielded digital data interface cable.

Industry Canada: The 9523 is compliant with Industry Canada RSS-170 Issue 2 for RF Exposure.

IMPORTANT: Output power listed is conducted. Peak power is 5.16W and mean power is 0.48W. The antenna gain, including cable loss, must not exceed 3dBi. To comply with FCC RF exposure experiments, a minimum separation of 20 cm is required between the antenna and all persons. Additional testing and certification are required for applications that combine the 9523 with another radio element or are intended for use within 20 cm of a person.

NATIONAL TECHNICAL SYSTEMS

CERTIFICATE OF COMPLIANCE

March 25, 2013

Customer: NAL Research Corporation
9300 West Courthouse Road
Manassas, VA 20110

Purchase Order #: PO3736
NTS Project #: PR018792

Test Items:

Item #	Qty	Description	Part #	Serial #
1	1	Satellite Modem	A3LA-RG-MIL	Q00F7S
2	1	Satellite Modem	A3LA-RG-MIL	Q00F43
3	-	Satellite Modem	A3LA-R-MIL	N/A
4	-	Satellite Modem	A3LA-RM-MIL	N/A
5	-	Satellite Modem	A3LA-RGS-MIL	N/A

Test Specifications:

NAL Research Corporation Purchase Order No. PO3736 dated 10/16/12
MIL-STD-810G

Test Performed	Test Standard/Method	Test Date(s)
Altitude Operation	MIL-STD-810G Method 500.5 Procedure II	1/24/13
High Temperature Storage	MIL-STD-810G Method 501.5 Procedure I	1/22/13
High Temperature Operation	MIL-STD-810G Method 501.5 Procedure II	1/23/13
Low Temperature Storage	MIL-STD-810G Method 502.5 Procedure I	1/22/13
Low Temperature Operation	MIL-STD-810G Method 502.5 Procedure II	1/24/13
Blowing Rain	MIL-STD-810G Method 506.5 Procedure I	2/15/13
Humidity	MIL-STD-810G Method 507.5 Procedure II	1/25/13-2/4/13
Salt Fog	MIL-STD-810G Method 509.5	3/4/13-3/7/13
Sand and Dust	MIL-STD-810G Method 510.4 Procedure I and II	1/28/13-2/7/13
Non Operational Shock	MIL-STD-810G Method 516.6 Procedure I	3/4/13

National Technical Systems (NTS) certifies that the above referenced item(s) has/have been tested in accordance with the above Requirements set forth in the above referenced documents.

David Potpinka
NTS Quality Representative

Mark Betts
NTS Project Manager

36 Gilbert Street South • Tinton Falls, New Jersey 07701
(732) 936-0800 • Fax (732) 936-0700
www.nts.com

APPENDIX I: EXPORT COMPLIANCE INFORMATION

The A3LA-R is controlled by the export laws and regulations of the United States of America (U.S.). It is the policy of NAL Research to fully comply with all U.S. export and economic sanction laws and regulations. The export of NAL Research products, services, hardware, software and technology must be made only in accordance with the laws, regulations and licensing requirements of the U.S. Government. NAL Research customers must also comply with these laws and regulations. Failure to comply can result in the imposition of fines and penalties, the loss of export privileges, and termination of your contractual agreements with NAL Research.

The export and re-export of NAL Research products and services are subject to regulation by the Export Administration Regulations (15 CFR 730-744), as administered by the U.S. Department of Commerce, Bureau of Industry and Security ("BIS"). See: http://www.bxa.doc.gov for further information on BIS and the Export Administration Regulations (EAR). Additional export restrictions are administered by the U.S. Department of the Treasury's Office of Foreign Asset Controls ("OFAC"). See: http://www.ustreas.gov/ofac for further information on OFAC and its requirements.

DWG. NO.	SHEET	REV
92364	1	1.1

REVISIONS				
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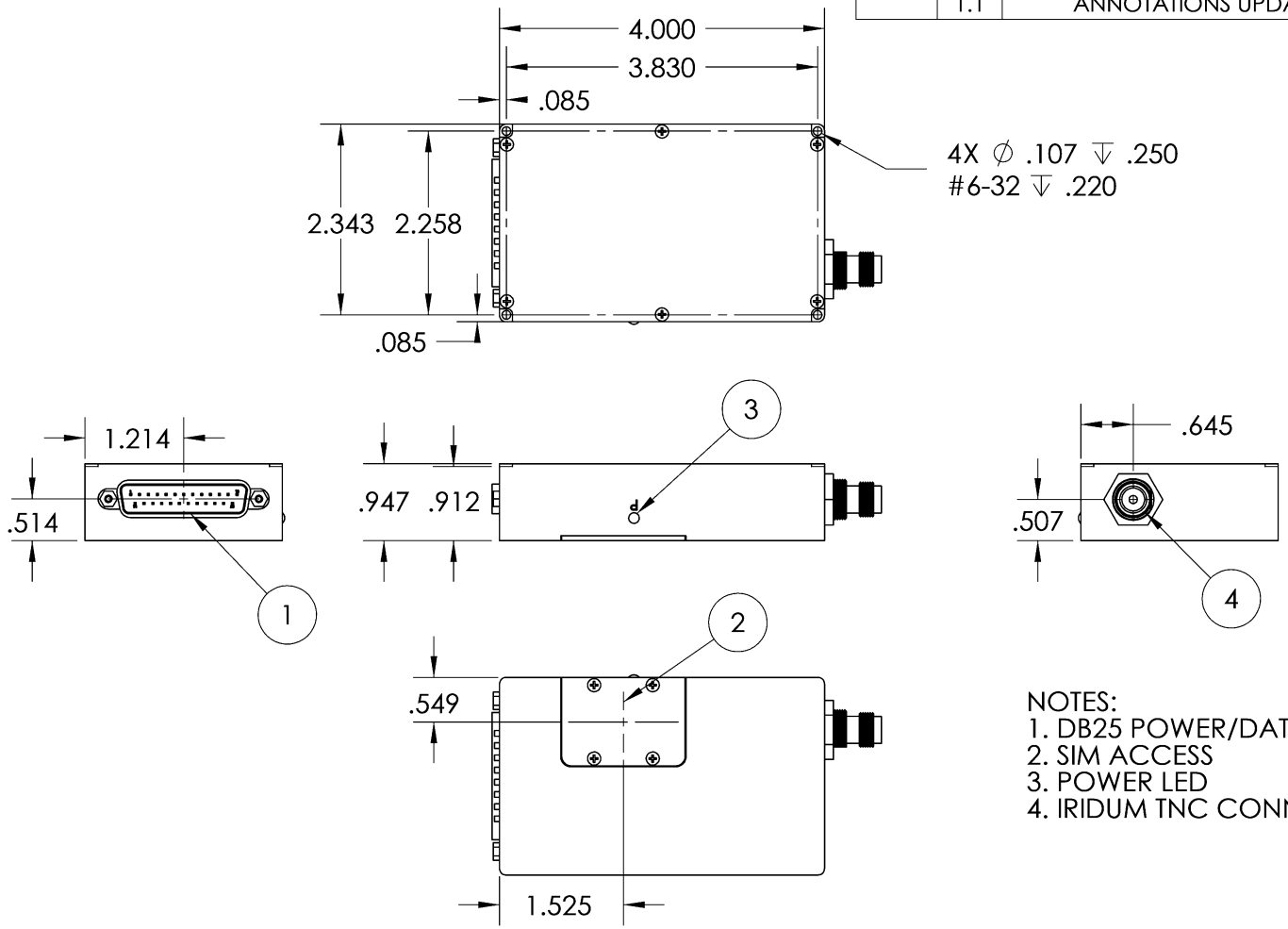
	1.1	ANNOTATIONS UPDATED	4/2/2012	DG



NOTES:
1. DB25 POWER/DATA/DPL CONNECTION
2. SIM ACCESS
3. POWER LED
4. IRIDUM TNC CONNECTION

DWG. NO. 92364 | SHEET 1 | REV 1.1

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL DECIMALS .XX ± .01" .XXX ± .005" ANGLES	CONTRACT NO.		NAL RESEARCH CORP.
	APPROVALS	DATE	DRAWING NAME A3LA-R
MATERIAL	DESIGNER E. RODERICK	4/2/12	
	CHECKER		A CAGE CODE DWG. NO. 92364 REV 1.1
FINISH	PROJECT ENGINEER		
	APPROVED D. GAIBROIS	4/2/12	SCALE: 1:2 SHEET: 1 OF 1

DRAWING FILE NAME: A3LA-R

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DWG. NO. 92364 | SHEET 1 | REV 1.1

DWG. NO.	SHEET	REV
92380	1	1.0

REVISIONS

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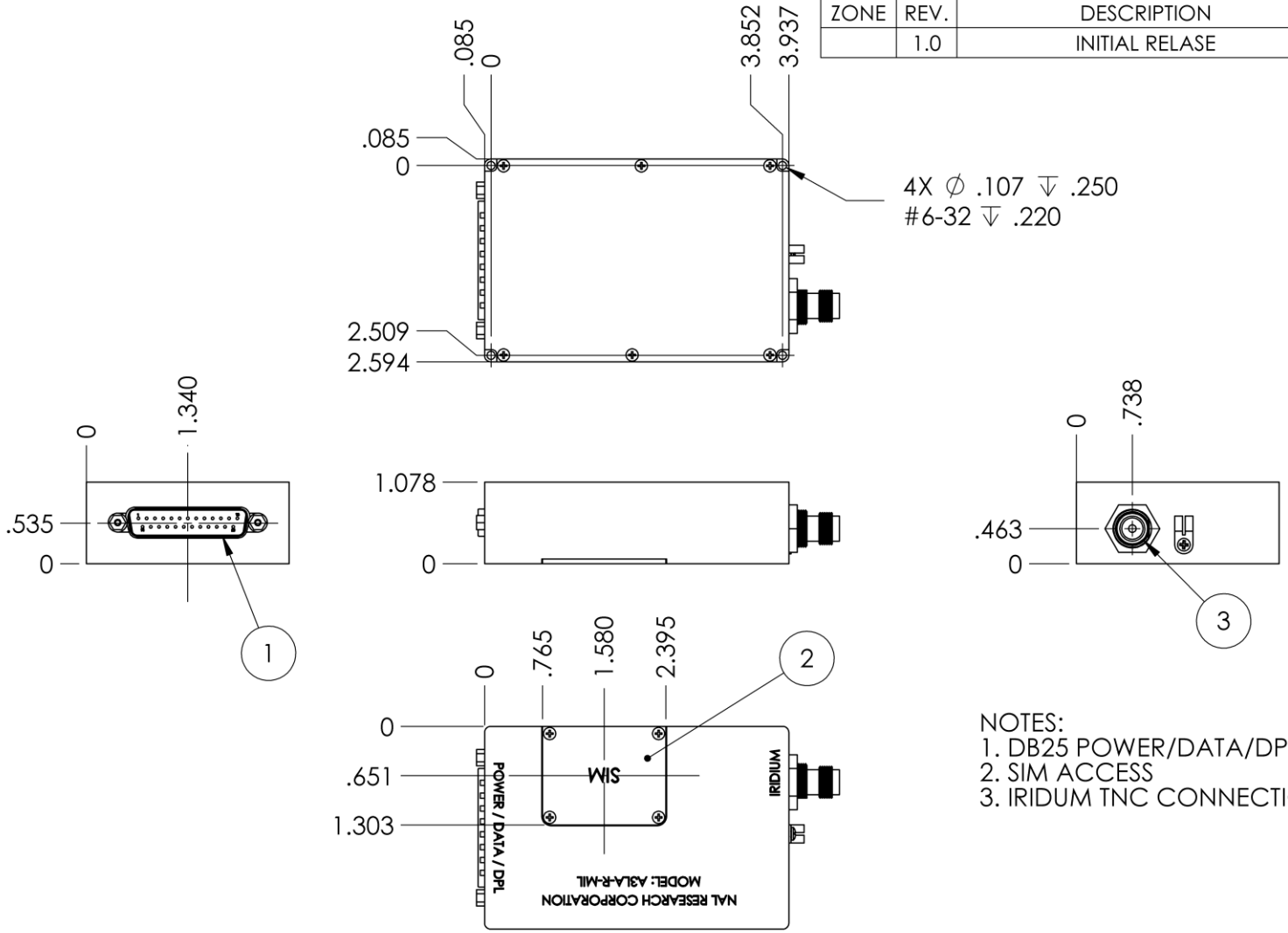

NOTES:
1. DB25 POWER/DATA/DPL CONNECTION
2. SIM ACCESS
3. IRIDUM TNC CONNECTION

DWG. NO.	SHEET	REV
92380	1	1.0

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MATERIAL	APPROVALS / DATE DESIGNER E. RODERICK 3/26/13 CHECKER	DRAWING NAME A3LA-R-MIL
FINISH	PROJECT ENGINEER APPROVED D. GAIBROIS 3/26/13	A CAGE CODE DWG. NO. 92380 REV 1.0 SCALE: 1:2 SHEET: 1 OF 1

DRAWING FILE NAME: A3LA-R-MIL

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