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Satellite Subscriber Products

SSP-ISU-CPSW-USER-0005
Version 1.3

ISU AT Command Reference

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Revision History

Version	Date		Reason
1.0	06-Jul-99		Initial creation.
1.1	22-Oct-99		Fixed default/range values for +IPR, +WIRLP and +DS commands.
1.2	9-Dec-99		Added more GSM 7.07 and GSM 7.05 commands to support Starfish TrueSync application. Added result codes summary table (section 9).
1.3	26-Jan-00		Added +G commands (section 6). Added Motorola satellite product proprietary commands (section 9) and Phase 2 +C commands.

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1 Introduction

1.1 Scope

This document is intended as a reference guide to the usage of the AT command set for the Iridium™/SM subscriber unit. This document only applies to the Motorola satellite series.

The intended audience for this document are the field test engineers, product and intelligent peripheral developers. It is not meant for subscriber use.

1.2 Reference

[1] AT Commands for RC288ACx and RC144ACx Modem Families (Rockwell Semiconductor Systems)

[2] GSM Data Adaptor for Motorola Handsets AT Command Reference

[3] ITU-T Recommendation V.25ter, 08/95.

[4] ETS 300 642: Digital Cellular Telecommunications System (Phase 2); AT Command Set for GSM Mobile Equipment (GSM 07.07).

[5] Iridium Specific AT Commands, SSP-ISU-CPSW-USER-0005

[6] ETS 300 585: Digital Cellular Telecommunications System (Phase 2); Use of DTE-DCE Interface SMS and CBS (GSM 07.05)

[7] ITU-T Recommendation V.24, 03/93.

1.3 Terms and Abbreviations

Asynchronous

A serial data transmission method that uses Start and Stop bits to synchronize reception.

AT Commands

A group of commands that can be sent by a terminal or host computer to control the ISU in Command mode.

Baud

One signalling element per second. This is a measure of the signalling rate on the telephone line. It should not be confused with Bits Per Second (bps) which can differ from the Baud rate.

Bit Mapped Registers

Bit mapping is a technique that allows a single S-Register to hold up to 8 binary variables e.g.:

Reg	*Type*	*Val*	*Default*	*Function*
S14	Bit Mapped	170	Register S14 is a bit-mapped register	
			and provides the following functions:	
			Bit 0	Reserved
			Bit 1	Echo commands to DTE
			Bit 2	Responses
			Bit 3	Word or number responses
			Bit 4	Reserved
			Bit 5	dialing method

Bit 6	Reserved
Bit 7	Answer/Originate operation

CTS

(V.24 Signal) Clear To Send. This signal is normally used in controlling the flow of data to the ISU.(See RTS)

DCD

(V.24 Signal) Data Carrier Detect. This is a signal from the ISU which indicates that the two ends are connected for data transfer.

DCE

Data Communications Equipment, i.e., a data adaptor or modem. In this product, DCE refers to the ISU.

DSR

(V.24 Signal) Data Set Ready. This signal, from the ISU, indicates the readiness of the phone to receive data.

DTE

Data Terminal Equipment, such as a dumb terminal, or a PC running communications software.

DTR

(V.24 Signal) Data Terminal Ready. A signal from the host system to the ISU. Can be used to terminate calls.

ETSI

European Telecommunications Standards Institute.

GSM

Global System for Mobile communications.

IRLP

Iridium Radio Link Protocol

ISU

Individual Subscriber Unit

Modem

MOdulator/DEModulator. A device used to convert digital signals to analog signals for transmission and reception of telephone lines.

Non-transparent

In PLMN data transmission, a configuration where at layer 2, protocol information of the fixed network is mapped on IRLP elements, and vice versa.

RP

Relay Protocol (used in SMS).

SMS

SMS Short Message Service.

SMSSC

Short Message Service - Service Centre (used in SMS).

TP

Transfer Protocol (used in SMS).

Transparent

In PLMN data transmission, a configuration where at layer 2 (and also at the layers above) no protocol conversion takes place.

XON/XOFF

A standard method of controlling the flow of data to and from a ISU to prevent overflow/overrun conditions.

2 Modem Overview

2.1 DTE-ISU Interchange Circuits

The communication between the ISU and the DTE follows the ITU-T V.24 (RS-232) recommendation. Please see reference [7] for details.

2.2 Mode of Operation

The ISU is always in one of two modes - command mode or data mode.

When the ISU is in command mode (or off-line mode), AT commands can be entered to control the phone. When in data (also called on-line) mode, the ISU is connected to a remote system and any characters sent to it will be transmitted to the remote system. It is possible to enter the command mode without terminating the call by using the +++ escape sequence detailed below.

2.3 Command and Response Characters

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.

2.4 Command Entry

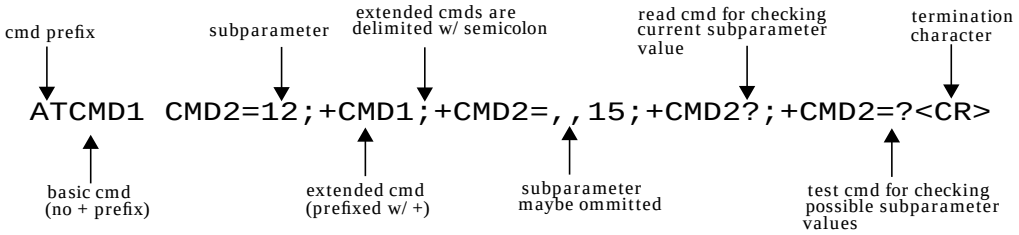
An AT command is a string of characters sent by the DTE to the ISU while the ISU is in command mode. A command string has a prefix, a body, and a terminator. The prefix consists of the ASCII characters AT or at. The body is a string of commands restricted to printable ASCII characters.The default terminator is the <CR> character.

There are two format types for AT commands: basic and extended. The basic commands consist of single ASCII characters, or single characters preceded by a prefix character, followed by a decimal parameter. Examples of these commands are in section 3. Extended commands are action or parameter commands for which a special syntax is used. The commands in section 4 through section 9 are of this type.

There are a few rules about the entry of commands:

- All commands (apart from A/ and +++) start with 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 all upper or lower case letters, not a combination.
- The maximum number of characters in a command string is 128. Multiple commands can be concatenated onto a single command line or by a semicolon.
- Command editing can usually be performed by the backspace or delete keys.
- If a parameter is missed from a basic command, a zero is implied (e.g. ATH implies ATH0). If an optional parameter is skipped from an extended command, the current value is implied. Optional parameters are enclosed by square brackets ([...]) in this document.
- Spaces can be entered into a command string to increase clarity. These are ignored.
- Characters that precede the AT prefix are ignored.
- Ctrl-x can be used to abort a command line input.

Below shows a sample command structure of an AT command:



2.5 Responses

A result code is sent to the DTE in response to the execution of a command. It may also result 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 ISU is in verbose mode or with numbers if in numeric mode. The command ATVn informs the ISU whether to respond in verbose or numeric mode. The table below shows the difference in format between these modes:

	Numeric Mode	Verbose Mode
Result codes	<NUMERIC_CODE><CR>	<CR><LF><VERBOSE_CODE><CR><LF>
Information Responses	<TEXT><CR><LF>	<CR><LF><TEXT><CR><LF>

2.6 Command Execution

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.

2.7 Configuration Settings

The ISU allows the DTE to configure the communication parameters.There are three types of configurations: active, factory default and stored.

The active configuration is the set of parameters used during phone operation and can be changed by the DTE through AT commands.

The factory default configuration is stored in permanent memory (i.e., ROM). These settings can be recalled at any time by using the AT&Fn command.

The DTE can also store its own settings using the AT&Wn command. These are the stored or user-defined configuration. This configuration can be loaded as the active configuration upon phone powerup by entering the AT&Yn command.

Most of the configuration settings are part of the “S-register” locations. “S-register” is the term used by Hayes-compatible modems for a specific physical location in memory.

2.8 Compatibility

Some commands listed will have the phrase "***No action, compatibility only***" written after them. This is because the command is accepted in the same fashion as other modems but has no effect on the operation of the phone because it has no meaning in the Iridium™/SM environment.

3 Basic AT Commands

3.1 AT - ATtention Code

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

3.2 A/ - Repeat Last Command

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

3.3 +++ - Escape Sequence

The escape sequence is used to transfer from data mode to command mode without disconnecting from the remote modem. After a pause, the ISU 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.

3.4 A - Answer

Answer immediately. This causes the ISU to answer the incoming call.

3.5 Bn - Communication Standards

Select the communications standard to be used for data calls.

No action, compatibility only.

Any value for n accepted.

3.6 Cn - Carrier Control

Control carrier detection.

No action, compatibility only.

Only n=1 accepted.

3.7 D - Dial

Dial a number. The dial command causes the ISU to enter originate mode and act as an auto dialer for connection to other modems or fax machines. 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 ISU dials.

L Redial last number.

P Use pulse dialing.

No action, compatibility only.

S=n Dial stored telephone number n (0-3), previously stored using the &Zn=x..x command.

T Use tone dialing.

No action, compatibility only.

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

> Direct dial from phonebook locations.

; 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.

3.7.1 Direct Dial From Phonebook

The ISU 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 use 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

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).

3.8 En - Echo

Echo command characters.

0 Characters are not echoed to the DTE.

1 Characters are echoed to the DTE (default).

3.9 Fn - Line Modulation

Select line modulation standard.

No action, compatibility only.

Allowed values for n are 0, 1, 3, 4, 5, 6, 7, 8, 9 and 10.

3.10 Hn - Hangup

Control the hook switch. This command is used to clear a connection.

0 Place the ISU on hook.

3.11 In - Identification

Requests the ISU 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 “Motorola IRIDIUM” (Product description)

5 “XXXX” (country code)

6 “XXXXXXXX” (Hardware specification)

3.12 Ln - Loudspeaker Volume

Set the loudspeaker volume according to the parameter supplied.

No action, compatibility only.

Allowed values for n are 0, 1, 2 and 3.

3.13 Mn - Speaker Control

Select when the speaker will be on or off. Note that serially connected products have no speaker.

No action, compatibility only.

Allowed values for n are 0, 1, 2 and 3.

3.14 Nn - Automode Enable

Enable or disable automode detection.

No action, compatibility only.

Any value for n is accepted.

3.15 On - Online

Enter data mode. This is used to return to data mode using an existing connection. If there is no connection an error is reported.

0 Switch from command mode to data mode.

(Any value for n accepted).

3.16 P - Pulse

Set pulse dial.

No action, compatibility only.

3.17 Qn - Quiet Mode

Control ISU responses.

0 ISU responses are sent to the DTE (default).

1 ISU responses are NOT sent to the DTE.

3.18 Sr - Set Register

Read from or write to an S register.

r? Read the value of register r.

r=x Set the value of register r to x, x is a decimal value in the range 0 to 255.

3.19 T - Tone

Set tone dial.

No action, compatibility only.

3.20 V - Verbose Mode

Set the response format of the ISU, which may be either numeric or textual.

0 Numeric responses.

1 Textual responses (default).

3.21 Wn - Error Correction Message Control

Set the format of the CONNECT messages.

0 Upon connection, the ISU reports the DTE speed (default).

1 Upon connection, the ISU reports the line speed, the error correction protocol and the DTE speed in that order.

2 Upon connection, the ISU reports the DCE speed.

3.22 Xn - Extended Result Codes

Select the response set to be used by the ISU when informing the DTE of the results of a command.

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

1 As X0 plus CONNECT x, where x is the DTE speed.

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).

3.23 Yn - Long Space Disconnect

Enable or disable the generation and response to long space disconnect.

No action, compatibility only.

Any value for n is accepted.

3.24 Zn - Soft Reset

Reset the ISU to a user-stored configuration.

0 Restores user configuration 0.

1 Restores user configuration 1.

3.25 &Cn - DCD Option

Select how the ISU controls the DCD behavior.

0 DCD is forced on at all times.

1 DCD indicates the connection status (default).

3.26 &Dn - DTR Option

Set the ISU reaction to DTR signal.

0 DTR transitions are ignored.

1 ISU returns to command mode, without dropping the line, after a ON to OFF DTR transition.

2 ISU hangs up, inhibits auto-answer and returns to command mode after a ON to OFF DTR transition (default).

3 ISU resets and returns to command mode after a ON to OFF DTR transition.

3.27 &Fn - Restore Factory Settings

Recall factory defaults.

0 Recall factory default 0.

3.28 &Gn - Guard Tone

Select guard tone.

No action, compatibility only.

Any value for n is accepted.

3.29 &Jn - Jack Control

Control the telephone jack configuration.

No action, compatibility only.

Allowed values for n are 0 and 1.

3.30 &Kn - Flow Control

Select the flow control method between the ISU 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.

3.31 &Ln - Leased Line Operation

Request leased line or dial-up operation.

No action, compatibility only.

Any value for n is accepted.

3.32 &Mn - Asynchronous/Synchronous Mode

Select the DTR operating mode.

0 Selects normal asynchronous operation (default). (See &Q0.)

3.33 &Pn - Pulse Dial Make/Break Ratio

Select the make/break ratio during pulse dialing.

No action, compatibility only.

Allowed values for n are 0, 1, 2 and 3.

3.34 &Qn - Sync/Async Mode

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

0 Normal asynchronous operation with no error correction (unacknowledged mode). (default).

5 Asynchronous operation with error correction (acknowledged mode).

6 Same as 0.

3.35 &Rn - RTS/CTS Option

Select how the ISU controls CTS.

No action, compatibility only.

Allowed values for n are 0 and 1.

3.36 &Sn - DSR Override

Define the behavior of DSR.

0 DSR always active (default).

1 Same as 0.

3.37 &V - View Active and Stored Configuration

View the current active configuration and stored profiles.

3.38 &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.

3.39 &Xn - Select Synchronous Clock

Select the source of the transmit clock for synchronous mode of operation.

No action, compatibility only.

Any value for n is accepted.

3.40 &Yn - Designate Default Reset Profile

Select profile for use after reset or power-up.

0 Select profile 0 (default).

1 Select profile 1.

3.41 &Zn=x - Store Telephone Number

Store a telephone number x in location n. n = 0-3, x is up to 36 digits and can include all the dial modifiers described in the ATD section. To dial the number use the `ATDS=n` command.

No action, compatibility only.

3.42 \An - MNP Block Size

Select maximum MNP block size.

No action, compatibility only.

3.43 \Bn - Transmit Break

Transmit break to remote. In non-error correction mode, the ISU will transmit a break signal to the remote modem with a length in multiples of 100 ms according to the parameter specified. Values for n is 1-9.

No action, compatibility only.

3.44 \Gn - XON/XOFF Flow Control

Set the use of XON/XOFF flow control in normal mode.

No action, compatibility only.

3.45 \Jn - DTE Auto Rate

Enable DTE auto rate adjustment

No action, compatibility only.

3.46 \Kn - Control Break

Control the response of the ISU 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 ISU is in data transfer mode:

0 Enter on-line 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)

3.47 \Nn - Link Type

Define the link type to be used.

No action, compatibility only.

3.48 \S - Show Status

Show the status of the commands and S-Registers in effect.

3.49 %Cn - Compression Control

Enable/disable data compression. Data compression can only be performed on an error corrected link (i.e., acknowledged mode).

No action, compatibility only. Use the +DS command to set data compression.

3.50 %En - Auto Retrain

Enable/disable auto retrain.

No action, compatibility only.

Allowed values for n are 0, 1 and 2.

3.51 %R - Display Registers

Display all the S registers in the system.

3.52 *Pn - Power Phone

Turn phone off.

0 Turn phone OFF.

4 Extended Cellular Commands (+C)

The following commands are taken from the ETSI specifications GSM 07.07 (reference [4]), and GSM 07.05 (reference [6]).

4.1 +CBC - Battery Charge

***Exec Command:* +CBC**

Execution command returns the battery connection status <bcs> and battery charge level <bcl> of the phone. The response is in the form:

```
+CBC: <bcs>,<bcl>
```

where <bcs>:

0	ISU is powered by the battery
1	ISU has a battery connected, but is not powered by it
2	ISU does not have a battery connected
3	Recognized power fault, calls inhibited

and <bcl>:

0	battery is exhausted, or ME does not have a battery connected
1...100	battery has 1-100 percent of capacity remaining

***Test Command:* +CBC=?**

Test command returns the values for <bcs> and <bcl> supported by the ISU. Response is in the form:

```
+CBC: (list of supported <bcs>s),(list of supported <bcl>s)
```

4.2 +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
4	2400 bps V.22bis
6	4800 bps V.32 (default)
7	9600 bps V.32
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)
```

4.3 +CEER - Extended Error Report

***Exec Command:* +CEER**

Execution command causes the phone 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
```

4.4 +CGMI - Manufacturer Identification

***Exec Command:* +CGMI**

Query phone manufacturer.

4.5 +CGMM - Model Identification

***Exec Command:* +CGMM**

Query phone model.

4.6 +CGMR - Revision

***Exec Command:* +CGMR**

Query the phone revision.

4.7 +CGSN - Serial Number

***Exec Command:* +CGSN**

Query the phone serial number (i.e., IMEI).

4.8 +CHUP - Hangup call

This command causes the phone to hangup the current data call.

4.9 +CLCK - Facility Lock

***Exec Command:* +CLCK=<fac>,<mode>[,<passwd>[,<class>]]**

Execute command is used to lock, unlock or interrogate the phone pin codes or a network facility <fac>. Password is normally needed to do such actions. The following parameter values are currently supported:

<fac>:

"CS"	CNTRL (phone lock)
"SC"	SIM (lock SIM card)

<mode>:

0	unlock (disable)
1	lock (enable)

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

<class> is a sum of integers each representing a class of information (default 7 equals to all classes):

1	voice
2	data
4	fax

The parameter <class> is not applicable to the ISU and therefore, does not affect phone operation.

***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)
```

4.10 +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	phone failure
1	no connection to phone
2	phone-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
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)
```

4.11 +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
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	phone 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

4.12 +CMGF - SMS Message Format

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

Set command tells the phone, 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)
```

4.13 +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 SC address followed by GSM 03.40 TPDU in hexadecimal format.

***Test Command:* +CMGL=?**

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

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

4.14 +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:

<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 SC address followed by GSM 03.40 TPDU in hexadecimal format.

4.15 +CMGS - Send SMS Message

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

Execution command sends message from a 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 SC address followed by GSM 03.40 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.

4.16 +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 SC address followed by GSM 03.40 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.

4.17 +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 teleservices that incorporate more than one basic service (voice, data, fax) within one call). For the satellite phones, 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)
```

4.18 +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 phone. 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 ISU-DTE link is reserved (e.g. in on-line data mode). Otherwise forward them directly to the DTE.

2 Buffer unsolicited result codes in the phone when ISU-DTE link is reserved (e.g. in on-line 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 phone, 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 phone. 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)
```

4.19 +COPS - Operator Select

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

Set command forces an attempt to manually register the phone to the network. Only the 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>: string type enclosed by ““; <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 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 “90130”. These are the only values accepted.

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

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

Read command returns the current mode and the currently selected operator. If no operator is selected, <format> and <oper> are omitted. The response is in the form:

```
+COPS: <mode>[,<format>,<oper>]
```

***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
```

where <stat> indicates:

2 current

4.20 +CPAS - Phone Activity Status

***Exec Command:* +CPAS**

Query phone activity status. The response is in the form:

```
+CPAS: <x>
```

where <x> can take the following values:

0	Ready.
1	Unavailable.
2	Unknown.
3	Ringing.
4	In Call.

4.21 +CPBF - Find phonebook entries

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

Execution command returns phonebook entries (from the current phonebook memory storage selected with +CPBS) which alphanumeric field start with string <findtext>. <findtext> should 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>.

4.22 +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>.

4.23 +CPBS - Select phonebook storage

Set Command: **+CPBS=<storage>**

Set command selects phonebook memory storage <storage>, which is used by other phonebook commands.

<storage> takes the following values:

"FD" SIM fixed dialing-phonebook

"ME" ME phonebook

"MT" combined ME 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.

4.24 +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>
```

4.25 +CPIN - Enter PIN

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

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

If the PIN required is SIM PUK or SIM PUK2, the second pin is required. This second pin, <newpin>, is used to replace the old pin in the SIM.

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	ISU is not pending for any password
SIM PIN	ISU is waiting for SIM PIN to be given
SIM PUK	ISU is waiting for SIM PUK to be given
SIM PIN2	ISU is waiting for SIM PIN2 to be given
SIM PUK2	ISU is waiting for SIM PUK2 to be given

4.26 +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 phone, 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 phone. Response is in the form:

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

4.27 +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 plus PIN2.

<fac>:

"CS"	CNTRL surface (phone lock)
"SC"	SIM (lock SIM card)
"P2"	SIM PIN2

***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.

4.28 +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 ISU.

<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)
```

4.29 +CRC - Cellular Result Codes

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

Set the extended format of incoming 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 ISU 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

***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)
```

4.30 +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 ME network registration status, or code `+CREG: <stat>[,<lac>,<ci>]` when <n>=2 and there is a change in the registration status of the phone.

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, ME is not currently searching a new operator to register to

1 registered, home network

2 not registered, but ME 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 whether the network registration status of the phone. Location information elements <lac> and <ci> are returned only when <n>=2 and phone 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)
```

4.31 +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 RP SC address Address-Value field in string format (i.e., enclosed by quotes “”);

<tosca>: GSM 04.11 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>
```

4.32 +CSCB - Select Cell Broadcast Message Types

Set Command: **+CSCB=[<mode>[,<mids>[,<dcss>]]]**

Set command selects which types of CBMs are to be received by the ME.

No action, compatibility only.

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)
```

4.33 +CSCS - Select TE Character Set

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

Set command informs the phone 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 phone. Response is in the form:

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

4.34 +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 phone: <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 and 03.41 (the syntax of SMS AT commands is compatible with GSM 07.05 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 phone. Response is in the form:

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

4.35 +CSQ - Signal Quality

***Exec Command:* +CSQ**

Execution command returns the received signal strength indication <rssi> and channel bit error rate <ber> from the phone. No real signal quality indication is supported at this time for the satellite phones.

Response is in the form:

```
+CSQ: <rssi>,<ber>
```

where <rssi> is:

99 not known or not detectable

and <ber> (in percent):

99 not known or not detectable

4.36 +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)
```

4.37 +CCFC - Set Call Forwarding

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

This command allows control of the call forwarding supplementary service according to GSM 02.82. Registration, erasure, activation, deactivation, and status query are supported. The valid values for the parameters are as follows:

<reason>:

0	unconditional
1	mobile busy
2	no reply
3	not reachable
4	all call forwarding (refer GSM 02.30 [19])
5	all conditional call forwarding (refer GSM 02.30)

<mode>:

0	disable
1	enable
2	query status
3	registration
4	erasure

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

<type>: type of address octet in integer format (refer GSM 04.08 subclause 10.5.4.7); default 145 when dialing string includes international access code character '+', otherwise 129

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer GSM 04.08 subclause 10.5.4.8); default 128

<class x> is a sum of integers each representing a class of information (default 7 equals to all classes):

1	voice (telephony)
2	data

<time>: 1...30 when 'no reply' is enabled or queried, this gives the time in seconds to wait before call is forwarded, default value 20.

<status>:

0	not active
1	active

If <mode>=2 and command is successful, the ISU returns the following response:

```
+CCFC: <status>,<class1>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]][ <CR><LF>+CCFC: <status>,<class2>[,<number>,<type> [,<subaddr>,<satype>[,<time>]]] [...]]
```

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

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

```
+CCFC: (supported <reason>s)
```

4.38 +CIMI - Request IMSI

***Exec Command:* +CIMI**

Request the international mobile subscriber identity (IMSI) of the SIM.

4.39 +CLCC - Request Current Calls

***Exec Command:* +CLCC**

Returns list of current calls of ISU. If no calls are available, no information response is sent to DTE. Response if in the form:

```
[+CLCC: <id1>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>]] [<CR><LF>+CLCC: <id2>,<dir>,<stat>,<mode>,<mpty>[, <number>,<type>[,<alpha>]] [...]]]
```

where:

<id x>: integer type; call identification number as described in GSM 02.30 subclause 4.5.5.1;

<dir>:

0 mobile originated (MO) call

1 mobile terminated (MT) call

<stat> (state of the call):

0 active

1 held

2 dialing (MO call)

3 alerting (MO call)

4 incoming (MT call)

5 waiting (MT call)

<mode> (bearer/teleservice):

0 voice

1 data

2 fax

9 unknown

<mpty>:

0 call is not one of multiparty (conference) call parties

1 call is one of multiparty (conference) call parties

<number>: string type phone number in format specified by <type>

<type>: type of address octet in integer format (refer GSM 04.08 subclause 10.5.4.7)

<alpha>: string type alphanumeric representation of <number> corresponding to the entry found in phonebook; used character set should be the one selected with command Select TE Character Set +CSCS

4.40 +CLVL - Loudspeaker Volume Level Control

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

This command is used to select the volume of the internal loudspeaker of the ISU. <level> is an integer type value with range TBD (smallest value represents the lowest sound level).

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

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

```
+CLVL: <level>
```

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

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

```
+CLVL: (supported <level>s)
```

4.41 +CMER - Mobile Equipment Event Reporting

Set Command: **+CMER=[<mode>[,<keyp>[,<disp> [,<ind>[,<bfr>]]]]]**

Enables or disables sending of unsolicited result codes from ISU to DTE in the case of key presses, display changes, and indicator state changes. <mode> controls the processing of unsolicited result codes specified within this command. <bfr> controls the effect on buffered codes when <mode> 1, 2 or 3 is entered. If setting is not supported by the ISU, +CME ERROR: <err> is returned. The defined values for the parameters are as follows:

<mode>:

0 buffer unsolicited indications in the ISU; if the buffer is full, the oldest indications are discarded

1 discard unsolicited indications when ISU-DTE link is reserved (e.g. in on-line data mode); otherwise forward them directly to the DTE

2 buffer unsolicited result codes in the ISU when ISU-DTE link is reserved (e.g. in on-line data mode) and flush them to the DTE after reservation; otherwise forward them directly to the DTE.

<keyp>:

0 no keypad event reporting

1 keypad event reporting using result code +CKEV: <key>,<press>. <key> indicates the key and <press> if the key is pressed or released (1 for press and 0 for release).

NOTE: When this mode is enabled, corresponding result codes of all keys currently pressed are flushed regardless of <bfr> setting.

2 keypad event reporting using result code +CKEV: <key>,<press>. All key pressings are directed from ISU to DTE.

NOTE: When this mode is enabled, corresponding result codes of all keys currently pressed are flushed regardless of <bfr> setting.

<disp>:

0 no display event reporting

1 display event reporting using result code +CDEV: <elem>,<text>. <elem> indicates the element order number and <text> is the new value of text element. Character set used in <text> is as specified by command Select TE Character Set +CSCS

2 display event reporting using result code +CDEV: <elem>,<text>. All display events are directed from ISU to DTE. Character set used in <text> is as specified by command Select TE Character Set +CSCS

<ind>:

0 no indicator event reporting

1 indicator event reporting using result code +CIEV: <ind>,<value>. <ind> indicates the indicator order number and <value> is the new value of indicator.

2 indicator event reporting using result code +CIEV: <ind>,<value>. All indicator events are directed from ISU to DTE.

<bfr>:

0 buffer is cleared when <mode> 1...3 is entered

1 buffer is flushed to the DTE when <mode> 1...3 is entered (OK response shall be given before flushing the codes)

***Read Command:* +CMER?**

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

```
+CMER: <mode>,<keyp>,<disp>,<ind>,<bfr>
```

***Test Command:* +CMER=?**

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

```
+CMER: (list of supported <mode>s),(list of supported <keyp>s),(list of supported <disp>s),(list of supported <ind>s),(list of supported <bfr>s)
```

4.42 +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 volume level settings. The response is in the form:

```
+CMUT: <n>
```

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

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

```
+CMUT: (supported <n>s)
```

4.43 +CNUM - Request Subscriber Number

***Exec Command:* +CNUM**

This command returns the MSISDNs related to the subscriber (this information can be stored in the SIM or in the ME). If subscriber has different MSISDN for different services, each MSISDN is returned in a separate line. Response is in the format:

```
+CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]]
[<CR><LF>+CNUM: [<alpha2>],<number2>,<type2>[,<speed>,<service>
[,<itc>]] [...]]
```

where:

<alpha x>: optional alphanumeric string associated with <number x>; used character set are the one selected with command Select TE Character Set +CSCS

<number x>: string type phone number of format specified by <type x>

<type x>: type of address octet in integer format (refer GSM 04.08 subclause 10.5.4.7)

<speed>: as defined in subclause 6.7

<service> (service related to the phone number):

0 asynchronous modem

1 synchronous modem

2 PAD Access (asynchronous)

3 Packet Access (synchronous)

4 voice

5 fax

<itc> (information transfer capability):

0 3.1 kHz

1 UDI

4.44 +CSSN - Supplementary Service Notification

Set Command: **+CSSN=[<n>[,<m>]]**

This command refers to supplementary service related network initiated notifications. The set command enables or disables the presentation of notification result codes from the ISU to the DTE.

<n> can have one of the following values:

0 disable

1 enable

When <n>=1 and a supplementary service notification is received after a mobile originated call setup, intermediate result code `+CSSI: <code1>[,<index>]` is sent to DTE before any other MO call setup result codes. When several different <code1>s are received from the network, each of them shall have its own `+CSSI` result code.

<m> can have one of the following values:

0 disable

1 enable

When <m>=1 and a supplementary service notification is received during a mobile terminated call setup or during a call, or when a forward check supplementary service notification is received, the unsolicited result code `+CSSU: <code2>[,<index>[,<number>,<type>[,<subaddr>,<satype>]]]` is sent to the DTE. When several different <code2>s are received from the network, each of them shall have its own `+CSSU` result code.

The values returned in the unsolicited result codes are as follows:

<code1>:

0 unconditional call forwarding is active

1 some of the conditional call forwardings are active

2 call has been forwarded

3 call is waiting

4 this is a CUG call (also <index> present)

5 outgoing calls are barred

6 incoming calls are barred

7 CLIR suppression rejected

8 call has been deflected

<index>: refer "Closed user group +CCUG"

<code2>:

0 this is a forwarded call (MT call setup)

1 this is a CUG call (also <index> present) (MT call setup)

2 call has been put on hold (during a voice call)

3 call has been retrieved (during a voice call)

4 multiparty call entered (during a voice call)

5 call on hold has been released (this is not a SS notification) (during a voice call)

6 forward check SS message received (can be received whenever)

7 call is being connected (alerting) with the remote party in alerting state in explicit call transfer operation (during a voice call)

8 call has been connected with the other remote party in explicit call transfer operation (also number and subaddress parameters may be present) (during a voice call or MT call setup)

9 this is a deflected call (MT call setup)

<number>: string type phone number of format specified by <type>

<type>: type of address octet in integer format (refer GSM 04.08 subclause 10.5.4.7)

<subaddr>: string type subaddress of format specified by <satype>

<satype>: type of subaddress octet in integer format (refer GSM 04.08 subclause 10.5.4.8)

***Read Command:* +CSSN?**

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

```
+CSSN: <n>,<m>
```

***Test Command:* +CSSN=?**

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

```
+CSSN: (supported <n>s),(supported <m>s)
```

4.45 +CVHU - Voice Hangup Control

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

Selects whether ATH (hook on) or "drop DTR" shall cause a voice connection to be disconnected or not. <mode> can take one of the following values:

0 "Drop DTR" ignored but OK response given. ATH disconnects.

1 "Drop DTR" and ATH ignored but OK response given.

2 "Drop DTR" behavior according to &D setting. ATH disconnects.

***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)
```

5 Extended Data Compression Commands (+D)

The following commands are used for data compression and are taken from V.25ter, reference [3].

5.1 +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 (default)

1 Transmit only

2 Receive only

3 Both directions

<comp_neg> can take on the following values:

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

1 Disconnect if V.42bis is not negotiated by the remote DCE 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 unacknowledge mode.***

5.2 +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 ISU:

`+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)
```

6 Extended Generic Commands (+G)

The following commands are used for generic DCE issues such as identities and capabilities. These are taken from V.25ter, reference [3].

6.1 +GMI - Manufacturer Identification

Exec Command: **+GMI**

Query phone manufacturer. This command is similar to +CGMI.

6.2 +GMM - Model Identification

Exec Command: **+GMM**

Query phone model. This command is similar to +CGMM.

6.3 +GMR - Revision

Exec Command: **+GMR**

Query the phone revision. This command is similar to +CGMR.

6.4 +GSN - Serial Number

Exec Command: **+GSN**

Query the phone serial number (i.e., IMEI). This command is similar to +CGMR.

6.5 +GCAP - General Capabilities

Exec Command: **+GCAP**

Query the phone's overall capabilities.

7 Extended Interface Control Commands (+I)

The following commands are used to control the DTE interface and are taken from V.25ter, reference [3].

7.1 +IPR - Fixed DTE Rate

Set Command: **+IPR=<rate>**

Set the data rate at which the ISU will accept commands. The change in data rate takes into 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

Read Command: **+IPR?**

Query the current data rate. The response is in the form:

```
+IPR: <rate>
```

Test Command: **+IPR=?**

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

```
+IPR: (supported <rate>s)
```

8 Extended Wireless Commands (+W)

The following commands are specific to the IRIDIUM network and are taken from reference [5].

8.1 +WIRLP - IRIDIUM Radio Link Protocol

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

Set IRLP parameters.

<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->ISU) 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 (ISU->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 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->ISU) 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 (ISU->IWF) and can take on the following values: 1-10. Default is 10.

<t4 > is used to supervise the re-sequencing of miss-ordered 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 IRLP parameters. 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)
```

8.2 +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)
```

8.3 +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)
```

8.4 +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)
```

8.5 +WDAV - Set DAV Device

***Set Command:* +WDAV=<client>[,<encryption>]**

Set the DAV (Data After Voice) device type connected to the ISU. The type of DAV device registered determines how voice and data calls are handled.

<client> can take the following values:

0 No DAV device is registered. This means only standard data calls are setup. No DAV connection are going to be established (default).

1 A type 1 DAV peripheral is registered. Type 1 devices can setup a standard point-to-point data call. When a type 1 device is registered, the ISU shall initiate a voice call and on answer, negotiate a DAV data connection. Both mobile originated and network initiated calls are accepted.

2 A type 2 DAV peripheral is registered. Type 2 devices can only setup a mobile originated data connection to an Internet Protocol (IP) server that is directly attached to the switch in an Iridium gateway. When a call is initiated, a DAV call is already assumed. Network initiated DAV and standard data calls are rejected.

<encryption> can take the following values:

0 No encryption (default).

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

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

```
+WDAV: <client>,<encryption>
```

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

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

```
+WDAV: (supported <client>s), (supported <encryption>s)
```

9 Motorola Satellite Product Proprietary Commands

The following commands are proprietary to the Motorola Satellite Series product line.

9.1 -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)
```

9.2 -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 ISU 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)
```

9.3 -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)
```

9.4 -MSSTM - Request System Time

Exec Command: **-MSSTM**

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

```
-MSSTM: <system_time>
```

10 S-Register Definitions

S-registers allow control over specific ISU modem operations. Some contain a numeric value, others are bit mapped. When bit mapped, each bit of the register controls a specific function: for further details refer to the glossary. The registers are described by the register number, the range of values which can be entered and the default value. Those not listed are RESERVED.

10.1 Standard S-Registers

Register Number	Range	Default	Description
S0	0-255	0	Auto-answer. Assigning a value from 1 to 255 in register S0 tells the ISU to automatically answer incoming calls. The factory setting of 0 turns off the automatic answer feature.
S1	0-255	0	Ring count (read only)
S2	0-255	43	Escape code character
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	Wait time for carrier. ***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***
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 reflects the Qn setting and bit 3 reflects the Vn setting.
S21	0-255	48	Bitmap register where bits 3 and 4 reflect the &Dn setting and bit 5 reflects the &Cn setting.
S22	0-255	246	Bitmap register where bits 2 and 3 reflect the Mn setting and bits 4, 5 and 6 reflect the Xn setting.

Table 1: Standard S-Registers

S23	0-255	27	Bitmap register where bits 1, 2 and 3 reflect the DTE baud rate and bits 4 and 5 reflect the DTE parity.
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.
S30	0-255	0	Disconnect activity timer. Timer used to determine how long the call connection been inactive. If the inactivity time is greater than the value contained in the register, in 10s of seconds, then the hang-up process is entered. A value of 0 disables this function.
S31	0-255	0	Bitmap register where bits 2 and 3 reflect the Wn setting.
S36	0-255	7	Bitmap register where bits 0, 1 and 2 reflect the \Nn setting. ***No action, compatibility only***
S39	0-255	3	Bitmap register where bits 0, 1 and 2 reflect the &Kn setting.
S40	0-255	192	Bitmap register where bits 6 and 7 reflect the \An setting, bits 3-5 reflects the \Kn setting. ***No action, compatibility only***
S41	0-255	3	Bitmap register where bits 0 and 1 reflect the %Cn setting. ***No action, compatibility only***
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

Table 1: Standard S-Registers

10.2 Iridium Specific S-Register Extensions

Register Number	Range	Default	Description
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.

Table 2: Iridium-Specific S-Registers

S34	0-255	0	Bitmap register where bit 7 reflect the +DR setting, bits 0-1 reflect the data compression type (PT), bit 6 reflect the +DS compression negotiation setting.
S35	0-255	4	Copy of +CBST parameter <speed>.
S42	0-255	0	GSM Call clearing code as returned by the network. Refer to GSM 04.08 Table 10.86 Cause Information Element Values.
S43	0-255	32	Bitmap register: 0 = +CMGF setting 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 3-4 = +CNMI parameter <bfr> setting 5-6 = +CREG setting 7 = reserved
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
S47	0-4	0	Type of Number being called: 0 = Unknown 1 = International 2 = National 3 = Network Specific 4 = Dedicated PAD
S49	0-5	1	Numbering Plan of called number: 0 = Unknown 1 = ISDN/Telephony 2 = Data 3 = Telex 4 = National 5 = Private
S51	0-255	0	V.42bis maximum codewords (P1), low byte
S52	0-255	128	V.42bis maximum codewords (P1), high byte
S54	0-255	20	V.42bis maximum string size (P2)
S58	0-255	0	V.42 bis compression direction (P0)
S96	0-255	0	IRLP version number (N0) parameter

Table 2: Iridium-Specific S-Registers

S98	1-105	105	IRLP k iwf->isu parameter
S99	1-105	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 r iwf->isu parameter
S107	1-10	10	IRLP r isu->iwf parameter
S123	0-255	8	Bitmap register: 0 = +WFRNG 1 = +WTM 2 = +WDLDM<dldm> 3 = +WIRLP<mode>
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.

Table 2: Iridium-Specific S-Registers

11 Summary of Result Codes

The following tables list the result codes returned by the ISU.

Table 11-1: V.25ter/Hayes Result Codes

Numeric (V0)	Verbose (V1)	Description
0	‘OK’	Acknowledges execution of command.
1	‘CONNECT’	Connection has been established
2	‘RING’	Incoming call received (unsolicited)
3	‘NO CARRIER’	Connection terminated
4	‘ERROR’	Command not accepted
5	‘CONNECT 1200’	Connection established at 1200 bps
6	‘NO DIALTONE’	No dialtone detected
7	‘BUSY’	Busy signal detected
8	‘NO ANSWER’	Connection completion timeout
9	‘CONNECT 0600’	Connection established at 600 bps
10	‘CONNECT 2400’	Connection established at 2400 bps
11	‘CONNECT 4800’	Connection established at 4800 bps
12	‘CONNECT 9600’	Connection established at 9600 bps
13	‘CONNECT 7200’	Connection established at 7200 bps
14	‘CONNECT 12000’	Connection established at 12000 bps
15	‘CONNECT 14400’	Connection established at 14400 bps
16	‘CONNECT 19200’	Connection established at 19200 bps
17	‘CONNECT 38400’	Connection established at 38400 bps
18	‘CONNECT 57600’	Connection established at 57600 bps
19	‘CONNECT 115200’	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.42 bis’	Connected with V.42bis compression enabled
69	‘COMPRESSION: NONE’	Connected with no data compression
as verbose	‘+DR: V42B NONE’	Connected with no data compression
as verbose	‘+DR: V42B TD’	Connected with V.42bis compression enabled on transmit direction

Numeric (V0)	Verbose (V1)	Description
as verbose	'+DR: V42B RD'	Connected with V.42bis compression enabled on receive direction
as verbose	'+DR: V42B'	Connected with V.42bis compression enabled on both transmit and receive direction

Table 11-2: 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 connection
as verbose	'+CME ERROR: <error>	Command not accepted. See section 4.10.
as verbose	'+CREG: <stat>[,<lac>,<ci>]	Registration indication status (unsolicited if enabled). See section 4.30.
as verbose	'+CRING: ASYNC'	Asynchronous transparent data call indication
as verbose	'+CRING: REL ASYNC'	Asynchronous non-transparent data connection.

Table 11-3: GSM 7.05 Result Codes

Numeric (V0)	Verbose (V1)	Description
as verbose	'+CMTI: <mem>,<index>'	SMS-DELIVER message indication (unsolicited if enabled). See section 4.18.
as verbose	'+CMT: [<alpha>],<length><CR><LF><pdu>' (PDU mode)	SMS-DELIVERs message indication (unsolicited if enabled). See section 4.18.
as verbose	'+CDS:<length><CR><LF><pdu>' (PDU mode)	SMS-STATUS-REPORTs message indication (unsolicited if enabled). See section 4.18.
as verbose	'+CMS ERROR: <error>	SMS command failed. See section 4.11.

Appendix A Informative Examples

A.1 Unit Identification

When beginning to build a communication link, a general DTE application controlling the ISU should determine the type of ISU to which it is connected.

```
AT+CGMI                    (get manufacturer name)
Motorola
OK
AT+CGMM                    (get model number)
9500 Satellite Series
OK
AT+CGMR                    (get revision)
OK
Call processor version: INC0607
DSP version: INC0401,INC0400
NVM version: INC0400
OK
AT+CGSN                    (get serial number)
901063131000002
OK
```

A.2 Originating a Data Call

An example of how to make a data call is given below:

```
AT+CBST=6,0,1                      (asynchronous modem 4800 bps and IRLP)
OK
AT+CR=1                            (enable reporting)
OK
ATD1234567890                      (dial remote modem)
+CR: REL ASYNC
CONNECT 9600                       (call connected at DTE rate of 9600)
```

A.3 Answering a Data Call

The ISU is capable of accepting mobile terminated data calls. The following is a sequence of commands that can be used to establish the connection.

```
RING                               (indicates arrival of call request)
ATA                                (manually answer the call)
CONNECT 9600                       (call connected at DTE rate of 9600)
```

To automatically answer a call, register 0 should be set to a non-zero value.

```
ATS0=2
RING
CONNECT 9600                       (call connected at DTE rate of 9600)
```

A.4 Disconnecting a Data Call

```
AT+CBST=6,0,1                    (asynchronous modem 4800 bps and IRLP)
OK
AT+CR=1                          (enable reporting)
OK
ATD1234567890                    (dial remote modem)
+CR: REL ASYNC
CONNECT 9600                     (call connected at DTE rate of 9600)
```

< ... data transfer ... >

```
<+++>                            (send escape sequence)
OK
ATH0                             (hangup call)
OK
```

A.5 Originating and Disconnecting a Voice Call

An example of how to make and disconnect a voice call is given below:

```
ATD1234567890;                    (dial remote phone)
OK                               (call connected; phone stays in command mode)
```

< ... conversation ... >

```
ATH                               (hangup call)
OK
```