GSM / GPRS

AT Command Reference

2130213
Rev 2.0

SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE®

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6,169,884	6,191,741	6,199,168	6,327,154	6,339,405
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1: About This Guide

- Introduction
- References
- Currency
- Document Structure
- Conventions

Introduction

This reference details the Attention (AT) command set supported by the GSM/GPRS products of Sierra Wireless:

- SB750A multi-band wireless modem card
- AirCard® 750 multi-band wireless network PC Card
- AirCard® 710 single-band wireless network PC Card

You should be familiar with the use of AT commands with standard wireline modems to use this document.

The Sierra Wireless GSM/GPRS products present two methods of controlling the modem: through AT commands or through a proprietary interface using our SDK (Software Development Kit). Some features or capabilities of the modem require the use of the SDK. This document presumes that the AT interface is the only interface available to you; features requiring the SDK are not discussed. (For more information regarding the SDK, see the Developer's Central web site: www.sierrawireless.com/developers/default.asp.)

References

This guide covers only the command set used by Sierra Wireless GSM/GPRS products and does not deal with operational use. Please consult the individual product manuals for guidance.

Not all commands include detailed descriptions. Commands are implemented to be compliant with industry standards and reference is often made to the following standards:

- IS-131 (Data Transmission Systems and Equipment - Extensions to Serial Asynchronous dialing and Control)
- EIA/TIA-592 (Asynchronous Facsimile DCE Control Standard, Service Class 2)
- EIA/TIA/IS-134 (Amendments to TIA-592 to Support T.30-1993 (Facsimile protocol standard))

Electronic copies of these standards can be purchased at the ANSI Electronic Standards Store at: webstore.ansi.org. ANSI Customer Service will respond to inquiries about standards information at: sales@ansi.org.

Requests for hard copies of standards should be directed to the Global Engineering Documents Division of Information Handling Services:

voice: 800-854-7179 or 303-397-7956

fax: 303-397-2740

e-mail: global@ihs.com

web: http://global.ihs.com

post: Global Engineering Documents,
15 Inverness Way East,
Englewood, CO 80112

Global Engineering operates offices around the world. Consult the web site above for locations.

Other standards referenced in this document are available through the 3rd Generation Partnership Project (3GPP) web site at www.3gpp.org, and the International Telecommunications Union Standards Division (ITU-T) at www.itu.int. They include:

- ETSI TS 100 916 V7.5.0 (1999-12) (AT Command Set for GSM Mobile Equipment)
- V.25*ter* (ITU-T recommendation V.250), GSM 04.08, GSM 07.07, and GSM 07.05 standards

You may also want to consult the other documents available on the Sierra Wireless web site at www.sierrawireless.com.

Terminology and acronyms

This document makes wide use of acronyms that are in common use in data communications and cellular technology. Our Internet site provides a Glossary (document #2110032) that may be helpful in understanding some acronyms and terminology used in this guide.

Currency

Versions

Document This document is under ongoing revision to expand explanations and enhance detail. This edition is:

Rev 2.0, 2003

This document is current with the following modem firmware revisions:

SB750A Revision 2.0 and above. To determine your firmware revision:

- Enter the Identification command **AT+GMR**
  The modem will respond with the firmware revision information:

+GMR: ... R2_0_0_...

AirCard® 750 Revision 2.0 and above. To determine your firmware revision:

- Enter the Identification command **AT+GMR**
  The modem will respond with the Firmware revision information:

+GMR: ... R2_0_0_...

AirCard® 710 Revision 2.0 and above. To determine your firmware revision:

- Enter the Identification command **AT+GMR**
  The modem will respond with the Firmware revision information:

+GMR: ... R2_0_0_...

Upgrading

If your modem firmware is an earlier version, you can acquire updated firmware from our web site or by contacting your wireless service provider.

GSM and GPRS connections

To help understand the call connection process in GSM/GPRS modems, a basic knowledge of the GSM (Global System for Mobile communication) network helps. There are two primary services available over GSM: circuit switched connections that correspond to the GSM cellular voice network; and GPRS (General Packet Radio Service) packet switched connections.

Note: The AirCard 750 provides support for many voice and data features, some of which require subscriptions and/or network support. The availability of these features depends on your service provider and your account.

Traditional wireline

Using a traditional wireline modem, a call is established by the local modem placing the call over the PSTN (Public Switched Telephone Network).

The local and remote modems are connected and handshake the data protocol to use. The local modem can monitor the call progress by picking up the dial tone, busy, ring, and answer from the PSTN wireline connection.

GSM circuit switched (CSD)

The definitive characteristic of circuit switched communication is that it provides a temporary dedicated channel between the devices that are in communication. That channel is not available to other subscribers until the connection has ended.

Traditional wireline modems create a circuit switched connection. During circuit switch connections, wireless modems operate in a similar way to traditional wireline modems, except that they are using the GSM wireless network instead of the PSTN.

Circuit switched communication is used for both voice and data communication. The charge for this type of communication is usually based on the duration of the call.

All Sierra Wireless GSM/GPRS products are capable of making circuit switched data connections, also known as Circuit Switched Data (CSD). During CSD connections, the data transmission speed is similar to a 14.4 kpbs modem.

GPRS packet switched connections

GPRS service is packet switched rather than circuit switched. In packet switched communication, messages are broken into packets and sent along idle channels using the quickest available route. This type of communication is designed specifically for data communication (rather than voice) and provides much higher data transmission rates than circuit switched. During GPRS connections, the data transmission speed of the AirCard 750 is similar to a 56 kbps modem.

GPRS service is an add-on to GSM networks. In North America, GPRS service is available throughout the GSM coverage area. In highly-populated areas of Europe, this is also the case. In less densely-populated, rural areas of Europe, there are areas where there is GSM coverage but no GPRS coverage.

In areas where GRPS service is available, the modem can connect much like a local area network card. The connection can be “always on” and only actively used when there is packet data to send or receive. The charge for GPRS service is usually based on the amount of data transmitted and received.

Voice service

When used with a headset, Sierra Wireless’s GSM/GPRS devices can also serve as mobile telephones over the GSM digital voice network.

Host Connections

When using AT commands, the Sierra Wireless modem emulates a serial port over the PCMCIA (PC Card) connection.

When communicating with a host computer, the communications settings for the modem should be 115 kbps, 8-bit, with no parity and one stop bit (115, 8, N, 1). The airlink data throughput does not affect the 115 kbps data rate setting for the PCMCIA connection.

Hardware flow control is required for PPP and fax connections. It is enabled by default. For information about flow control, see the **+IPR** command on page 69.

Document Structure

Following this introduction is a section on basic elements important to understanding and communicating with the GSM/GPRS products. This includes notes on the connection between the host (the computer attached to the modem) and the AirCard 750.

The document then presents the commands, registers, result codes, and defaults provided in the command state of the modem.

Commands are often termed *AT commands*. Hayes™ originated the convention of prefixing commands with an "ATtention" string for wireline modems.

In addition to the commands, this document also describes the definitions and use of status registers.

Commands are referenced in strict alphabetical order. This facilitates searches for the syntax, parameters, and operation of specific commands. To help locate whether or not a command exists to perform a desired function, there are tables organizing the commands into these groups:

- Standard modem commands—commands derived from the original Hayes AT wireline modem command set
- GSM commands—commands specified by the GSM standards and related to voice and Circuit Switched Data
- SMS commands—commands related to SMS (Short Messaging Service)
- GPRS commands—commands that control GPRS connections
- Sierra Wireless modem control commands—commands designed specifically for the AirCard 750

Descriptions of the definitions and use of status registers, as well as a table of the factory/reset defaults, follow, along with result codes, both numeric and verbose.

Conventions

The following format conventions are used in this reference:

- Character codes or keystrokes which are described with words or standard abbreviations are shown within angle brackets using a different font: such as <CR> for Carriage Return and <space> for a blank space (spacebar) character.
- Numeric values are decimal unless prefixed as noted below.
  - Hexadecimal values are shown with a prefix of 0x, i.e. in the form 0x3D.
  - Binary values are shown with a prefix of 0b, i.e. in the form 0b00111101.
- Command and register syntax is noted using an alternate font: ATD6045559010.

Note: The AT *characters must be included before all commands, except as noted in the reference tables.*

- Characters that are required are shown in uppercase; parameters are noted in lowercase. Parameters are enclosed in angle brackets (**<i>**) to indicate that they should be replaced with a value. Optional parameters are described in the text, and may also be enclosed in square brackets (**[<m>]**) for clarity.
- Supported parameter values (either set or returned) are described in the text.

Note: The brackets shown with parameters are ***not*** *to be included in the command string.*

The default settings are noted in the command tables. Note that these are the factory default settings and *not* the default parameter value assumed if no parameter is specified. The factory defaults are also noted in a section at the end of the Commands chapter, on page 79.

Result Code This is a numeric or text code that is returned after all commands (except resets). Only one result code is returned for a command line regardless of the number of individual commands contained on the line.

Response This term indicates a response from the modem that is issued prior to a result code. Reading registers or issuing commands that report information will provide a response followed by a result code unless the command generates an error.

See page 22 for a discussion of how the modem frames these two elements.

In this document, responses and result codes from the modem, or host system software prompts, are shown in this font:

```
CONNECT 14400
OK
```

2: Modem Basics

- Establishing a communication session
- Modem modes, states, and conditions
- State Transitions
- Modem Buffers
- Command Handling
- Responses and Result Codes
- Response and Result Framing

This chapter provides the information required to:

- Establish a communications session with the modem that will allow you to enter AT commands
- Understand the operating modes and states of the modem and what causes the modem to transition between them
- Understand how the modem's results and responses are framed and change the framing where required

Establishing a communication session

Any terminal emulation program can be used to create a communications session that will allow you to issue AT commands to the modem. This section describes how to use HyperTerminal, a program typically installed with Windows, to establish a session with the modem.

To establish the communications session:

1. If the modem is not already connected to a serial port on your computer, connect it.
2. If open, close Watcher (or any other program that communicates with the modem).
3. Launch HyperTerminal. (Depending on your version of Windows and how it was installed, you can launch the program by selecting **Start > Programs > Accessories > Communications > HyperTerminal**.)
4. Enter any name and select any icon in the Connection Description window and click **OK**.
5. In the **Connect using** field, select the modem and click **OK**. (There is no need to specify a number to dial.)

6. If a window appears indicating that the phone number is invalid, click **Cancel**.

To verify that the communications session is functional, enter **AT**. The modem should respond with OK. (If the echo is off, your command is not displayed. Enter **ATE1** to turn the echo on.)

Modem modes, states, and conditions

For clarity, this document uses the words *mode* (Circuit Switched Data, GPRS data, or voice), *state* (command or data), and *condition* (online or offline) to describe the modem's operational status.

Connection Modes

The GSM/GPRS modems operate very much like a landline modem. There are, however, some differences in that the modem supports multiple connection *modes*. Different functions of the modem use different AT commands that determine which *mode* the modem operates in. Commands operate the modem either in *Circuit Switched data mode,* in *GPRS data mode*, or in *voice mode*:

CSD In Circuit Switched Data (CSD) mode, the modem operates much like a landline modem.

GPRS In GPRS (General Packet Radio Service) mode the modem establishes a high-speed packet data connection.

Voice You require a 4-wire headset with a 2.5 mm connector, to use the modem as a phone.

Note: Depending on the product, the exact options available can differ. If a mode or state is not available on the product, commands related to those modes and states will return the ERROR *result code.*

States

The modem's *state* indicates what form of communication is occurring between the modem and the host computer.

At any time the modem is in one of two states:

Command The modem exchanges data with the host computer as AT commands and replies. During voice communications the modem is always in command state.

Note: The modem cannot be in voice mode and data state. Even while off-hook with a voice call active, the modem still communicates over the serial connection in command state. Commands can be issued and executed while a voice call is in progress.

Conditions

The modem's *condition* indicates whether there is a network connection (airlink). At any time, the modem is in one of two conditions:

Online Actively connected to a remote terminal or network (off-hook). In the online condition, the modem can either be in command state or in data state.

Offline Disconnected from any remote terminal or network (on-hook). While in offline condition, the modem can only be in command state (without an airlink).

The following tables show the possible combinations of modes, states, and conditions:

Table 2-1: Functional combinations of modem state and mode

	Command State	Data State
CSD Mode	Yes	Yes
GPRS Mode	Yes	Yes
Voice Mode	Yes	***No***

Table 2-2: Functional combinations of modem state and condition

	Command State	Data State
Online Condition	Yes	Yes
Offline Condition	Yes	***No***

State Transitions

On power-up, the modem is in command state.

Command to data state

Note: A transition to command state from data state does not require that the session be closed. This means that DCD will remain asserted while the modem is in command state, online condition.

The modem changes from command to data state when a session is opened either by dialing a connection, or by answering a data call. When a session opens, the modem issues the CONNECT message and, depending on the DCD setting (see page 26), asserts the DCD control signal.

Data to command state

The modem changes from data to command state when:

- The DTR de-asserts (depending on settings made, **&D1** or **&D2**).
- The modem is reset or power-cycled.
- The +++ escape command is entered. (See page 33.)

When the modem changes to command state, it will issue an OK result. This may be preceded by another result (such as NO CARRIER) to indicate that the session was closed by an event outside the modem. A closed session requires the modem to return to command state.

Modem Buffers

Communication between the host and modem is buffered based on the modem's state.

Command buffer

When in command state, the modem buffers the input from the host until a **<CR>** is entered. The buffered data can be edited using the backspace **<BS>**. The modem (unless Echo is disabled) echoes the sequence <BS><space><BS> for human readability.

There is a limit of 200 characters to one command line, including the **AT** prefix and the **<CR>** termination (i.e. 197 characters of useful command buffer). If the command buffer length is exceeded the modem will continue to echo input (which is not buffered) until the **<CR>** is received. When the **<CR>** is entered, the modem returns the ERROR result code

without executing any commands in the line. Once over the limit, the **<BS>** will not bring you back under the limit; the ERROR code is still returned.

The command buffer is distinct from the data receive and transmit buffers. The command buffer retains the contents of the last issued command until the **AT** command prefix is received for the next command. This allows repeating of the last issued command by entering **A/**.

Data buffers

Data being transmitted or received is buffered in several ways depending on the mode and nature of the connection. Some caution must be taken when disconnecting to ensure that any buffered data in the modem has been properly processed prior to breaking the connection.

Specific settings for buffer controls are described in the relevant commands and registers. Normal configuration of the modem will not require you to adjust these settings.

Data flow control The modem's CTS and RTS lines control data flow. Where large amounts of data are being exchanged, local hardware flow control must be used to prevent buffer overflows—it is required for PPP and fax connections. Hardware flow control is enabled by default. (See the **+IPR** command on page 69).

Command Handling

AT can be issued as a command without parameters. It acts like a "ping" to the modem and always gives a result code of OK (unless quiet mode is enabled).

Commands are not case-sensitive—they may be entered in upper or lower case, or a combination. Arguments to commands may be case-sensitive.

Concatenation

Note: When concatenated together, AT commands may not function predictably. It is best to avoid concatenating commands without first testing and verifying the results.

More than one command can be included in a single line, although some commands or their parameters must be placed at the end of the line. When concatenating commands, a space between basic commands is optional. Where extended commands (those beginning with a non-alphabetic character after the **AT**) are concatenated, they must be separated by a semicolon (**;**).

Commands are executed in the order entered. If a command results in the ERROR result code the balance of the command line is ignored. Only one result code is returned for the entire command line. The complete concatenated command string must not exceed the command buffer limit. (See page 18).

Parameters

Most AT commands support one or more parameters, usually a number. Allowed values are specified.

In this reference, optional parameters are enclosed in square brackets ([]). Some commands have more than one optional parameters, such as:

+COPS=<mode>[,<format>][,<operator>]

The <mode> parameter is required, but <format> and <operator> are not, as indicated by the brackets. To issue this command, specifying a <mode> of "1" and an <operator> of "1", and without specifying a <format>, you would enter:

AT+COPS=1,,2

Two commas are required before the <operator> parameter because otherwise the "2" would be used as the value for <format>.

Commands that normally accept a single numeric option switch ([<n>]) and are issued without that parameter will assume a value of zero (0).

Note: Entering incorrect syntax or a parameter outside of the specified range may have unexpected results.

Defaults shown in the command tables are those for the factory settings of the modem. They are *not* the defaults assumed for a command issued without parameters, which are noted in the text.

Registers

Some registers are read only. Attempting to write to them yields an ERROR result code.

Some registers store the setting of commands. Changing the register is equivalent to changing the command setting.

The table for S registers indicates the standard default values. The factory defaults are also noted in a separate sub-section.

Responses and Result Codes

Most commands return only a result code; however, some commands request information, which is provided by the modem as a response prior to the result code.

Possible result codes

Result codes are not shown in the command tables unless special conditions apply. Generally the result code OK is returned when the command has been executed. ERROR may be returned if parameters are out of range, and will be returned if the command is not recognized, or the command is not permitted in the current mode, state, or condition of the modem.

See the table on page 78 for a listing of result codes.

Human vs. machine interface

The AT command interface was designed for human interaction. When an intelligent host is managing a modem, the interface may need to be altered (result code words replaced with numbers, for example). Framing characters (line feeds and carriage returns) must be properly understood to ensure the host system properly parses the responses and result codes.

As shipped, the modem is configured with these settings:

- Echo enabled (**E1**) causes the modem to echo characters received from the host back to it while in command state. The backspace is echoed as <BS> <space> <BS> in order to erase the last character.
- Quiet off (**Q0**) enables the modem to issue result codes following commands. Quiet on (**Q1**) suppresses result codes entirely; responses remain unaffected.
- Verbose result codes enabled (**V1**) provides results in English text appended with <CR><LF>. (Verbose off (**V0**) returns the results as ASCII numeral codes. Numeric codes are much easier to process using software.)

With Echo on (**E1** - the default) data received from the local host while in command state is echoed back to the host. This can present problems to machine control, which is not interested in an echo of its own commands to the modem. In some configurations the echo should be turned off (**E0**).

Response and Result Framing

Depending on the modem configuration, modem responses and result codes are framed, typically with the <CR> and <LF> characters.

If you are designing or customizing software that will interface with the modem using AT commands, it is necessary to understand how the modem frames its responses and result codes.

Framing Characters The modem frames its replies with carriage return and line feed characters as they are defined in registers **S3** and **S4** respectively. These are normally the ASCII value 13 for carriage return (<CR>) and 10 for line feed (<LF>). (The following discussion assumes that <CR> and <LF> are used.)

Response framing

Regardless of how the modem is configured, responses to commands are in the form of ASCII text with a trailing <CR><LF>. Where a response has more than one line, each line is terminated with a <CR><LF>.

When the Verbose setting is on (**ATV1**, see page 74) each response has a leading <CR><LF>. If Verbose is off (**ATV0**), there are no leading characters prior to the first line of response.

The setting of Quiet (**ATQ**, see page 74) has no impact on responses.

Result code framing

Every command will return a result code unless the Quiet command is enabled. If Quiet is on (**ATQ1**, see page 74) then neither framing characters nor result code is returned.

A leading <CR><LF> is inserted ahead of the result code if Verbose is on (**ATV1**, see page 28). Otherwise there are no leading characters prior to the ASCII numeral result. The result code is always followed by a <CR>. There is a trailing <LF> only if Verbose is on. For example, the result code OK appears as:

- <CR><LF>OK<CR><LF>
  if verbose is on (**ATV1**)
- 0<CR>
  if verbose is off (**ATV0**)

When **ATV1** is set and there is an error, <CR><LF>ERROR<CR><LF> is sent to the host computer and no subsequent commands in the command line are processed. If **ATV0** is set, result code 4<CR> is sent instead.

The ERROR (or 4) response may be replaced by +CME ERROR: <err> when the command is not processed because of a GSM radio connection error.

3: Command Reference

- Introduction
- Command Types
- Command Reference Table
- Result Codes
- Factory Default Settings

Introduction

As described in the previous chapter, AT commands are available with Sierra Wireless GSM/GPRS products for users of the COM serial interface. The commands allow control of Circuit Switched Data (CSD) calls and data exchange, similar to dial-up modems, but without wires, and with additional commands available specific to GSM and GPRS.

The AT command set has grown from the original set used with Hayes™ landline modems to support wireless connections and is now standardized by the Third Generation Partnership Project (3GPP). The commands are defined in the standards known as V.25*ter* (for standard modem commands), GSM 07.07 (for GSM and GPRS) and GSM 07.05 (for text messaging, also known as short message service—SMS). The following sections describe those commands.

AT commands conform by default to the Phase 2 specifications for GSM 07.07 and GSM 07.05. Some AT commands have been implemented according to Phase 2+ in order to support extended features, such as 14.4 kbps CSD connections.

Note: Not every GSM/GPRS product supports all commands.

The AT commands provide the following features for Sierra Wireless GSM/GPRS devices:

- Voice service
- Short Message Service (SMS)
- Circuit switched data service (CSD), including V.42*bis* data compression
- GPRS packet data service
- Phone book functionality
- Profiles

Command Types

Note: The **AT** *prefix does not appear in the reference tables. It is, however, required and assumed for all commands unless specifically noted otherwise.*

The command reference table (beginning on page 32) details the available AT commands in strict ASCII alphabetic order (including character prefixes such as **!**, **&** and **+**, which in ASCII fall before the letters of the alphabet). Sections preceding those tables outline how the commands are organized into functional groups, including:

- Standard modem commands, beginning on page 26.
- GSM voice, circuit-switched data, and fax, from page 28.
- SMS commands, page 30.
- GPRS packet data commands, page 30.

Within each functional section, commands also appear in ASCII alphabetic order, with a cross-reference to the full description in the reference table. This format allows quick lookup of each command to verify syntax, parameters, and behaviors.

Standard Modem Commands (V.25*ter*)

Sierra Wireless GSM/GPRS devices support most of the standard AT commands used by telecommunications software for over twenty years.

The following commands are derived from the original 1981 Hayes AT landline modem command set, with some additional commands specific to wireless devices.

These commands have been standardized by the International Telecommunications Union (ITU) as ITU-T recommendation V.250 (also known as V.25*ter*). You can find more information on the standard at **www.itu.int**.

Table 3-3: Standard modem commands

Command	Description	p.
&C	Data carrier detect (DCD) options	32
&D	Data terminal ready (DTR) options	33
&F	Reset modem to factory default	33
&V	Display current modem configuration	33
&W	Store user-defined profile	33
+++	Return (escape) from data state to command state	33
+DR	V.42*bis* compression reporting	66

Table 3-3: Standard modem commands (cont.)

Command	Description	p.
+DS	V.42*bis* compression control	66
+GMI	Modem manufacturer	68
+GMM	Modem model	68
+GMR	Current modem firmware version	68
+GOI	Global object identification	68
+GSN	Display IMEI	68
+IFC	Local flow control	68
+IPR	Fixed local data rate	69
A/	Reissue last AT command	70
A	Answer incoming call (or GPRS network request)	70
GSM modes: D<string><gsm mod>;	Dial outgoing call	70
GPRS mode: D*<GPRSSC> *<address> *<L2P> *<cid>#	Make GPRS connection	71
D**##	Make GPRS connection	72
DL	Redial last outgoing number	72
E<n>	Command echo mode	72
H[0]	Hang up (disconnect)	73
I<n>	Display product identification	73
L (ignored)	Set speaker loudness	73
M (ignored)	Set speaker mode	73
O<n>	Switch from command state to data state	73
P (ignored)	Pulse dialing	73
Q<n>	Quiet—suppress result codes	74
S0=<n>=<x> S<n>?	Status Register Set/Query	76

Table 3-3: Standard modem commands (cont.)

Command	Description	p.
T (ignored)	Tone dialing	74
V<n>	Verbose result code format	74
X<n>	Connection code format and call monitoring	75
Z	Reset modem to user-defined profile	75

GSM Voice and Circuit-Switched Data Commands (GSM 07.07)

These commands are specified in the GSM 07.07 standard and control functions related to GSM voice, CSD, and fax—similar to those provided by many GSM mobile phones.

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Table 3-4: GSM commands

Command	Description	p.
+CBST	Select bearer service type	34
+CCFC	Call forwarding number and conditions	34
+CCWA	Call waiting control	36
+CEER	Extended error report	37
+CGMI	Request manufacturer identification	41
+CGMM	Request model identification	41
+CGMR	Request revision identification	41
+CGSN	Display IMEI	43
+CHLD	Call hold and multi-party	44
+CIMI	Request international mobile subscriber identity (IMSI)	44
+CKPD	Keypad control	44
+CLCC	List current calls	45
+CLCK	Facility lock	45
+CLIP	Calling line identification presentation	46
+CLIR	Calling line identification restriction	47
+CMEE	Report mobile equipment error	47

Table 3-4: GSM commands

Command	Description	p.
+CNUM	Display phone number	55
+COPS	Operator selection	55
+CPAS	Modem activity status	57
+CPBF	Find phonebook entries	57
+CPBR	Read phonebook entries	58
+CPBS	Phonebook memory storage	58
+CPBW	Write phonebook entry	58
+CPIN	Enter PIN	59
+CPWD	Change password	60
+CR	Service reporting control	60
+CRC	Cellular result codes for incoming calls	61
+CREG	GSM network registration	61
+CRLP	Radio link protocol	62
+CSCS	Character set	63
+CSTA	Type of address	65
+CSQ	Signal quality report	65
+FCLASS	Fax service class	67
+FMI	Fax manufacturer identification	67
+FMM	Fax model identification	67
+FMR	Fax revision identification	67
+VTD	Tone duration	69
+VTS	DTMF tone generation	69

SMS Commands (GSM 07.05)

The GSM 07.05 standard provides the following commands for controlling text messaging, also known as Short Message Service (SMS).

Table 3-5: SMS commands

Command	Description	p.
+CMGC	Send SMS command	48
+CMGD	Delete SMS message	49
+CMGF	Select SMS message format	49
+CMGL	List SMS messages	49
+CMGR	Read SMS message	51
+CMGS	Send SMS message	51
+CMGW	Write SMS message to memory	52
+CMSS	Send SMS message from storage	53
+CNMI	New SMS message indications	53
+CRES	Restore SMS settings	62
+CSAS	Save SMS settings	63
+CSCA	SMS service center address	63
+CSDH	Show SMS text mode parameters	63
+CSMP	Set SMS text mode parameters	64
+CSMS	SMS message service	64

GPRS Packet Data Commands (GSM 07.07)

These commands, specified in the GSM 07.07 standard, control General Packet Radio Service (GPRS) packet switched data services.

Table 3-6: GPRS commands

Command	Description	p.
+CGACT	GPRS PDP context activation/deactivation	37
+CGATT	GPRS attach or detach	37
+CGCLASS	GPRS mobile station class	38

Table 3-6: GPRS commands

Command	Description	p.
+CGDATA	Enter data state	38
+CGDCONT	Define Packet Data Protocol (PDP) context	39
+CGEREP	Unsolicited GPRS event reporting control	40
+CGPADDR	Show PDP address	41
+CGQMIN	Set or query minimum acceptable quality of service	41
+CGQREQ	Request specified (or query current) quality of service profile	42
+CGREG	GPRS network registration status	43
+CGSMS	Select service for SMS messages	43

Modem Control Commands

These commands provide monitoring and control of the modem, and are proprietary to Sierra Wireless.

Table 3-7: Sierra Wireless modem control commands

Command	Description	p.
!BAND	Configure band	32
!GTEMP	Read radio temperature	32
!SHUTDOWN	Shut down/start up protocol stack	32
!VD	Headset volume down	32
!VU	Headset volume up	32

Command Reference Table

Table 3-8 below details the AT commands for the modem in strict ASCII alphabetic order (with **AT+** before **AT&** before **ATA**). For listings by functional group, see the cross-reference tables beginning on page 26. Detailed status register information (for the **ATS** commands) begins on page 76.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
!BAND=<band> **!BAND?** *Note: This command does not apply to the AirCard® 710 modem, which operates only on the PCS band.*	**Configure band** Sets the active radio frequency band, which then remains active until the command is issued again with a different band: • **<band>="900"** EGSM • **<band>="900/1800"** EGSM DCS • **<band>="1900"** PCS • **<band>="auto"** Modem selects the band **!BAND?** returns the current band setting.
!GTEMP?	**Read radio temperature** Returns the temperature of the modem radio as a three-character integer value in degrees Celsius, in the form: !GTEMP: <ddd>
!SHUTDOWN [=<n>] **!SHUTDOWN?**	**Shut down/start up protocol stack** Shuts down or starts up the protocol stack, as specified by **<n>** (a single integer value): • **<n>=1** Shut down the stack • **<n>=0** Start up the stack *(default)* **!SHUTDOWN?** returns the current state of the protocol stack.
!VD	**Headset volume down** Decreases the headset volume one step.
!VU	**Headset volume up** Increases the headset volume one step.
&C<n>	**Data carrier detect (DCD) options** Determines the behavior of the data carrier detect (DCD) line. The DCD line switches on and off based on the value of **<n>**: • **<n>=0:** The DCD control line remains ON regardless of the status of the data carrier. • **<n>=1:** The DCD control line switches ON when there is a connection and OFF when there is no connection.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
&D<n>	**Data terminal ready (DTR) options** Determines how the modem responds when the data terminal ready (DTR) line switches from ON to OFF. Based on the value of **<n>**, when the DTR line switches from on to off, the modem: • **<n>=0**Ignores the DTR status. • **<n>=1**Switches to command state while maintaining any connected call. • **<n>=2**Disconnects any active call and changes to command state.
&F[0]	**Reset modem to factory default** Resets the modem to the default configuration specified at the factory. (See "Factory Default Settings" on page 79.) The command may be issued as either **AT&F** or **AT&F0.**
&V	**Display current modem configuration** The modem returns its current configuration settings. On power-up or reset, these settings are either the factory default settings profile (see page 79) or the settings previously stored with the **AT&W** command.
&W	**Store user-defined profile** Saves current configuration settings into non-volatile memory. When the modem is reset or powered off and on, these settings are restored. This only saves settings configured with these commands: **ATE**, **ATV**, **ATQ**, **ATL**, **ATM**, **ATX**, and **AT&C**. The settings stored using **AT&W** can also be restored using the **ATZ** command (see page 75). The **AT&F** command (see page 33) returns the modem to the factory default settings (see page 79).
+++	**Return (escape) from data state to command state** Used to exit data state and enter command state. *Note: This command is **not** preceded by* AT *and does not require* **<CR>** *to terminate.* The escape character is fixed as the plus sign (**+**) (ASCII 0x2B). The guard time between normal transmission of data and the escape sequence is specified as 1 second and cannot be changed, so the modem requires a minimum of 1 second of inactivity on the serial input, then three plus sign characters, then 1 second of inactivity to escape into command state. *Note: If a PPP session is active, then use PPP to escape the data state.*

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CBST=<speed>[,<name>][,<ce>] **+CBST?** **+CBST=?**	**Select bearer service type** Sets the data rate **<speed>**, bearer service **<name>**, and connection element **<ce>** to be used when originating a GSM data call. The query command **+CBST?** returns current values; **+CBST=?** returns supported values. **Supported values** Available values are: • data rate **<speed>=** 0 autobauding (automatic data rate selection) 1 300 bps (V.21) 2 1200 bps (V.22) 3 1200/75 bps (V.23) 4 2400 bps (V.22bis) 5 2400 bps (V.26ter) 6 4800 bps (V.32) 7 9600 bps (V.32) 12 9600 bps (V.34) 14 14400 bps (V.34) 65 300 bps (V.110) 66 1200 bps (V.110) 68 2400 bps (V.110/X.31) 70 4800 bps (V.110/X.31) 71 9600 bps (V.110/X.31) 75 14400 bps (V.110/X.31) • bearer service **<name>=** 0 data circuit asynchronous (UDI or 3.1 kHz modem) 2 PAD Access (asynchronous) (UDI) • connection element **<ce>=** 0 transparent 1 non-transparent
+CCFC=<reas>, <mode> [,<number>] [,<type>] [,<class>] [,<subaddr> [,<satype>] [,<time>] **+CCFC=?**	**Call forwarding number and conditions** Controls the call forwarding features of the modem, if available on the GSM network and supported by the user's carrier and subscription plan. The command supports registration, erasure, activation, deactivation, and status queries for call forwarding. *Note: When* **<mode>=0**, **1**, **2**, *or* **4**, *only* **<reas>** *and* **<mode>** *parameters are supported.* For all values of **<mode>** other than 2, the set command returns a simple OK (or an error message). When **<mode>=2** and **<reas>=0**, **1**, **2**, or **3**, for registered call-forward numbers, it returns a status line for each class: +CCFC: <status>,<class>,<number>,<type>,<time> +CCFC: <status>,<class>,<number>,<type>,<time> [etc.] For **<mode>=2**, if no call forward numbers are registered (i.e. no classes are active), it returns <status>=0 and <class>=7, which represents inactive status for all classes. +CCFC: 0,7 **+CCFC=?** returns a list of supported values for **<reas>**. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CCFC (continued)	**Call forwarding number and conditions (continued)** **Supported values** **<reas>** can be one of six values: • **0** unconditional • **1** mobile busy • **2** no reply • **3** not reachable • **4** all call forwarding (0-3) • **5** all conditional call forwarding (1-3) **<mode>** can be one of five values: • **0** disable • **1** enable • **2** query status • **3** registration • **4** erase **<number>** is the string-type phone number of the forwarding address in the format specified by **<type>**. **<type>** is the type of address in integer format. The default is **<type>=145** when the dialing string includes the international access code character +, otherwise it is **<type>=129**. **<subaddr>** is a string-type subaddress of the format specified by **<satype>**. **<satype>** is the type of subaddress in integer format. The default is **<satype>=128**. **<class>** can be one of four values: • **1** voice • **2** data • **4** fax • **7** all classes *(default)* **<time>** is the time between 1 and 30 seconds, rounded to a multiple of 5 seconds. The default is 20 seconds. <status> is only returned, and can be one of two values: • 0 inactive • 1 active

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CCWA[=<n>] **[,<mode>]** **[,<class>]** **+CCWA?**	**Call waiting control** Controls the call waiting features of the modem, if available on the GSM network and supported by the user's carrier and subscription plan. The command can activate, deactivate, and query the call waiting service. For all values of **<mode>** other than 2, the set command returns a simple OK (or an error message). When **<mode>=2**, the modem returns a status line for each class: +CCWA:<status>,<class> +CCWA:<status>,<class> [etc.] **+CCWA?** returns the current value of **<n>**. **Supported values** **<n>** can be one of two values: • **0** disable presentation of an unsolicited result code *(default)* • **1** enable presentation of an unsolicited result code **<mode>** can be one of three values: • **0** disable • **1** enable • **2** query status *Note: If no* **<mode>** *value is provided, the network is not interrogated.* **<class>** is a sum of integers each representing a class of information: • **1** voice • **2** data • **4** fax • **7** all classes *(default)* <status> is only returned, and can be one of two values: • 0 inactive • 1 active

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CEER	**Extended error report** A standard GSM command that returns a line of text information reporting the reason for: • the last unsuccessful call setup (originating or answering) or modification. • the last call release. • the last unsuccessful GPRS attach or unsuccessful PDP context activation. • the last GPRS detach or PDP context deactivation. Extended error reports are available for a number of the commands listed in this section, and appear in the form: +CEER: <report>
+CGACT=<state>,<cid> **+CGACT?** **+CGACT=?** *Note: The Sierra Wireless modem permits only one PDP context to be active at a time.*	**GPRS PDP context activation/deactivation** In GPRS packet data mode, the **+CGACT** command activates (**<state>=1**) or deactivates (**<state>=0**) the specified Packet Data Protocol (PDP) context, then returns the modem to command state. **<cid>** (the PDP Context Identifier) is a numeric parameter which specifies a particular PDP context definition. **+CGACT=?** returns the permitted values. (See also +CGPADDR on page 41.) **Details** • If the specified PDP context is already in the requested state, the state for that context remains unchanged. • If the requested state cannot be achieved, the modem returns an error. (Extended error responses are enabled by the **+CMEE** command, page 47.) • If the modem is not GPRS-attached when instructed to activate, it attempts to perform a GPRS attach first. (See page 37.) • If no **<cid>** is specified, the command either activates the default PDP context, or deactivates the active one, as appropriate. **+CGACT?** returns the current activation state for the PDP context, while **+CGACT=?** requests information on the supported PDP context activation states.
+CGATT=<state> **+CGATT?**	**GPRS attach or detach** Attaches or detaches the Sierra Wireless modem from the GPRS network: • **<state>=0** detaches from the GPRS network. • **<state>=1** attaches to the GPRS network. Any other values return an error. **Details** • If the modem is already in the requested state, the command is ignored and the modem returns an OK response. • Any active PDP contexts are deactivated before detaching from the GPRS network. • The **+CGATT?** command returns the current GPRS-attach state of the modem.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGCLASS= <class> **+CGCLASS?** **+CGCLASS=?**	**GPRS mobile station class** The Sierra Wireless modem operates only as a Class B device. (That is, it can be simultaneously attached to GSM and GPRS and can transmit voice or data.) This command exists to query the device and to conform to GSM/GPRS specifications, but only one set value is supported. Any attempt to set any class other than **B** returns an error. **+CGCLASS?** returns the current class of the modem, while **+CGCLASS=?** returns the supported class value. **Supported values** The available class setting is: • **<class>=B** Class B
+CGDATA [=<L2P>][,<cid>] *Note: Since the* **+CGDATA** *command enters data state, any other commands in the AT command line are not processed.* *Note: The Sierra Wireless modem permits only one PDP context to be active at a time.*	**Enter data state** Attempts a GPRS attach and PDP context activation. If successful, the modem returns CONNECT and enters the online data state. (The **D** command can also operate in a similar fashion. See “Make GPRS connection” on page 27.) GPRS attachment and PDP context activation procedures may take place prior to or during the PDP startup if they have not already been performed using the **+CGACT** and **+CGATT** commands (pages 37 and 37). If the activation is successful, data transfer may proceed. After data transfer is complete, and the layer 2 protocol termination procedure has completed successfully, the modem re-enters command state and returns the final result code OK. If there is an error, the V.25ter command state is re-entered and the modem returns the final result code NO CARRIER or, if enabled, +CME ERROR. Attach, activate and other errors may be reported. **+CGDATA=?** returns information on the supported layer 2 protocol. **Supported values** • The Sierra Wireless modem supports only IP PDP, so the only supported layer 2 protocol value of **<L2P>** is **PPP**. Other values will return an error. If context activation takes place during the PDP startup, a context ID **<cid>** may be specified in order to provide the information needed for the context activation request (see **+CGDCONT**, page 39). If no **<cid>** is given or if there is no matching context definition, the modem will attempt to activate the context with default values.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGDCONT= <cid> [,<PDP_type>] [,<APN>] [,<PDP_addr>] [,<data_comp>] [,<head_comp>] **+CGDCONT?** **+CGDCONT=?**	**Define Packet Data Protocol (PDP) context** Specifies PDP context parameter values for a PDP context identified by the local context identification parameter, **<cid>**. The number of PDP contexts that may be in a defined state at the same time is given by the range returned by **+CGDCONT=?**. *Note: The **D****##* command (used to establish GPRS connections) uses only those settings assigned to the PDP Context Identifier 1 (that is, <cid>=1).* *Note: A special form of the set command, **+CGDCONT= <cid>** causes the values for context number **<cid>** to become undefined.* **+CGDCONT?** returns the current settings for each defined context, while **+CGDCONT=?** returns values supported as a compound value. (The parameter value ranges for each <PDP_type> are returned on a separate line.) *Note: The Sierra Wireless modem supports only one active PDP context at a time.* **Supported values** The set command specifies a number of parameters: **<cid>** (PDP Context Identifier) is a numeric parameter which specifies a particular PDP context definition. The range of permitted values (minimum value = 1) is returned by **+CGDCONT=?**. (See also +CGPADDR on page 41.) **<PDP_type>** (Packet Data Protocol type) is a string parameter which specifies the type of packet data protocol. Only the IP context is supported: • **<PDP_type>=IP** Internet Protocol (IETF STD 5) **<APN>** (Access Point Name) is a string parameter used to select the GGSN or the external packet data network. If the value is null or omitted, then the subscription value will be requested. **<PDP_address>** is a string parameter that identifies the MT in the address space applicable to the PDP. If the value is null or omitted, then a value may be provided by the computer during the PDP startup procedure or, failing that, a dynamic address will be requested. **+CGDCONT?** returns the null string even if an address has been allocated during the PDP startup procedure. The allocated address may be read using the +CGPADDR command (page 41). **<data_comp>** is a numeric parameter that controls V.42*bis* PDP data compression, **0** for off, **1** for on. **<head_comp>** is a numeric parameter that controls PDP header compression, **0** for off, **1** for on.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGEREP= <mode> [,<buffer>] **+CGEREP?** **+CGEREP=?**	**Unsolicited GPRS event reporting control** Enables or disables sending of unsolicited result codes, which return as +CGEV: XXX from the modem to the computer in response to modem or network events. **<mode>** controls the processing of unsolicited result codes specified within this command, while **<buffer>** controls the effect on buffered codes, depending on the <mode> setting. Unsupported settings return an error. **+CGEREP?** returns the current mode and buffer settings, while **+CGEREP=?** returns the modes and buffer settings supported by the modem as compound values. **Supported values** • **<mode>=0** Buffer unsolicited result codes in the modem, discarding the oldest if the buffer is full. No codes are forwarded to the computer. • **<mode>=1** Discard unsolicited result codes when in online data mode, otherwise forward them directly to the computer. • **<mode>=2** Buffer unsolicited result codes in the modem when in online data mode and flush them to the computer when the link becomes available, otherwise forward them directly to the computer. • **<buffer>=0** When mode 1 or 2 above is entered, clear the modem's buffer of unsolicited result codes. • **<buffer>=1** The modem's buffer of unsolicited result codes defined within this command is flushed to the host computer when **<mode>=1** or **2** is entered (OK response is given before flushing the codes). **Responses** The following unsolicited result codes and the corresponding events are defined: • +CGEV: NW DEACT <PDP_type>, <PDP_addr>, [<cid>] - The network has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the modem. • +CGEV: ME DEACT <PDP_type>, <PDP_addr>, [<cid>] - The mobile equipment has forced a context deactivation. The <cid> that was used to activate the context is provided if known to the modem. • +CGEV: NW DETACH - The network has forced a GPRS detach. This implies that all active contexts have been deactivated. These are not reported separately. • +CGEV: ME DETACH - The mobile equipment has forced a GPRS detach. This implies that all active contexts have been deactivated. These are not reported separately. • +CGEV: ME CLASS <class> - The mobile equipment has forced a change of MS class. The highest available class is reported (see +CGCLASS, page 38).

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGMI	**Request manufacturer identification** Identifies Sierra Wireless, Inc. as the manufacturer of the modem, returned as a text string. Equivalent to **+GMI** (page 68).
+CGMM	**Request model identification** Identifies the model of Sierra Wireless modem, returned as a text string. Equivalent to **+GMM** (page 68) and **+FMM** (page 67).
+CGMR	**Request revision identification** Returns the current firmware revision of the Sierra Wireless modem being queried, as a text string. Equivalent to **+GMR** (page 68) and **+FMR** (page 67).
+CGPADDR [=<cid>] **+CGPADDR=?** *Note: The Sierra Wireless modem permits only one PDP context to be active at a time.*	**Show PDP address** Returns a list of PDP addresses for the specified context identifier. The command returns the IP address. The address may be static or dynamic. For a static address, it will be the one set by the **+CGDCONT** command (page 39) when the context was defined. For a dynamic address it will be the one assigned during the last PDP context activation for the specified **<cid>**. If no address is available, it is omitted. **<cid>** is a numeric parameter which specifies a particular PDP context definition (see the **+CGDCONT** command, page 39). If no **<cid>** is specified, the address for the current defined context is returned. **+CGPADDR=?** returns the current defined <cid>.
+CGQMIN [=<cid>] [,<precedence >] [,<delay>] [,<reliability>] [,<peak>] [,<mean>] **+CGQMIN?** **+CGQMIN=?** *Note: To specify a particular QoS profile, rather than the minimum, use the +CGQREQ command (page 42).*	**Set or query minimum acceptable quality of service** Specifies a minimum acceptable Quality of Service (QoS) profile for the specified local context identification parameter **<cid>**. (See pages 39 and 41 for more information.) The modem checks the quality of service profile against the negotiated profile returned in the Activate PDP Context Accept message. *Note: The **D**##* command (used to establish GPRS connections) uses only those settings assigned to the PDP Context Identifier 1 (that is, <cid>=1).* **+CGQMIN?** returns the current settings for each defined context, in the same order as specified for the set command, while **+CGQMIN=?** returns values supported as a compound value. The parameter value ranges for each PDP type are returned on a separate line. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGQMIN (continued)	**Set or query minimum acceptable quality of service (continued)** *Note: A special form of the set command,* **+CGQMIN= <cid>***, causes the minimum acceptable profile for context number* **<cid>** *to become undefined. In this case no check is made against the negotiated profile.* If a value is omitted for a particular class, then that class is not checked. **Supported values** The **+CGQMIN** command is effectively an extension to the **+CGDCONT** command (page 39). The QoS profile consists of a number of parameters, each of which may be set to a separate value. The **<cid>** value remains as discussed on pages 39 and 41. The remaining parameters are all numeric, and defined in the GSM 03.60 standard: • **<precedence>** Specifies the precedence class where 0=subscribed, 1=high, 2=medium, and 3=low. • **<delay>** is a numeric parameter which specifies the delay class where 0=subscribed, 1=low, 2=medium, 3=high, and 4=best effort. **Supported values continued** • **<reliability>**Specifies the reliability class where 0=subscribed (default), 1=acknowledged, 2=frame acknowledged, 3=block mode acknowledged, 4=data protected, 5=unprotected. • **<peak>**Specifies the peak throughput class where 0=subscribed (default), 1=up to 8 kbps, 2=up to 16 kbps, 3=up to 32 kbps, 4=up to 64 kbps, 5=up to 128 kbps, 6=up to 256 kbps, 7=up to 512 kbps, 8=up to 1024 kbps, 9=up to 2048 kbps. **<mean>**Specifies the mean throughput class where 0=subscribed, 1=up to ~ 0.22 bps, 2=up to ~ 0.44 bps, 3=up to ~ 1.11 bps, 4=up to ~ 2.2 bps, 5=up to ~ 4.4 bps, 6=up to ~ 11.1 bps, 7=up to ~ 22 bps, 8=up to ~ 44 bps, 9=up to ~ 111 bps, 10=up to ~ 0.22 kbps, 11=up to ~ 0.44 kbps, 12=up to ~ 1.11 kbps, 13=up to ~ 2.2 kbps, 14=up to ~ 4.4 kbps, 15=up to ~ 11.1 kbps, 16=up to ~ 22 kbps, 17=up to ~ 44 kbps, 18=up to ~ 111 kbps, 19=best effort (default).
+CGQREQ [=<cid>] [,<precedence >] [,<delay>] [,<reliability>] [,<peak>] [,<mean>] **+CGQREQ?** **+CGQREQ=?**	**Request specified (or query current) quality of service profile** Specifies a Quality of Service Profile to be used when the modem sends an Activate PDP Context Request message to the network. If the specified profile is unavailable, the modem returns an error. *Note: The* ***D**##*** *command (used to establish GPRS connections) uses only those settings assigned to the PDP Context Identifier 1 (that is, <cid>=1).* All parameters are as outlined in **+CGQMIN** (page 41). *Note: To specify a minimum acceptable QoS profile, use the* **+CGQMIN** *command (page 41).*

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CGREG=<n> **+CGREG?** *Note: For circuit switched data registration status, see +CREG on page 61*	**GPRS network registration status** For GPRS data connections, **+CGREG=<n>** controls the presentation of an unsolicited result code, which appears in one of several forms depending on the value of **<n>** (or an error if no status is available): • When **<n>=0**, no network registration unsolicited result codes are returned. • +CGREG: <stat> (registration status only) is returned when **<n>=1** and there is a change in the modem's GPRS network registration status. • +CGREG: <stat>,<lac>,<ci> (which includes location information) is returned when **<n>=2** and there is a change of the network cell. **+CGREG?** returns the status of result code presentation and an integer <stat> showing the current status. (Location information elements <lac> and <ci> are returned only when **<n>=2** and the modem is registered on the network.) **Returned values** The possible returned values of <stat> are: • 0: not registered, modem is not currently searching a new operator to register to • 1: registered <lac> is a string specifying a two-byte location area code in hexadecimal format (e.g. “00C3” equals 195 in decimal). <ci> is a string specifying a two-byte cell ID in hexadecimal format.
+CGSMS[=<n>] **+CGSMS?** **+CGSMS=?**	**Select service for SMS messages** Specifies which service to use for text messaging (Short Message Service, SMS): • **<n>=0**: GPRS • **<n>=1**: circuit switched data (CSD) *(default)* • **<n>=2**: GPRS preferred (use CSD if GPRS not available) • **<n>=3**: circuit switched preferred (use GPRS if CSD not available) **+CGSMS?** returns the currently selected service or service preference, while **+CGSMS=?** returns the currently available services and service preferences. See page 30 for more information on SMS commands.
+CGSN	**Display IMEI** Returns the IMEI (International Mobile Equipment Identity) of the modem. The IMEI uniquely identifies each device on the GSM network. The same value is returned by **+GSN**. (See page 68).

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CHLD=<n> *Note: This command applies only to voice mode, not to data transmissions.*	**Call hold and multi-party** The Sierra Wireless modem controls the supplementary voice services Call Hold, MultiParty and Explicit Call Transfer. **+CHLD** allows voice calls to be put on hold, recovered, released, added to the conversation, and transferred, if the service is available on the GSM network and supported by the user's carrier and subscription plan. Supported values of **<n>** are: • **<n>=0** Terminate all held calls or UDUB (User Determined User Busy) for a waiting call • **<n>=1** Terminate all active calls (if any) and accept the other call (waiting call or held call) • **<n>=1*x*** Terminate the active call number *x* (*x*=1–7) • **<n>=2** Place all active calls on hold (if any) and accept the other call (waiting call or held call) as the active call • **<n>=2*x*** Place all active calls except call *x* (*x*=1–7) on hold • **<n>=3** Add the held call to the active calls
+CIMI	**Request international mobile subscriber identity (IMSI)** Returns the IMSI value that identifies the individual SIM card used in the Sierra Wireless modem.
+CKPD=<keys> **[,<time>]** **[,<pause>]**	**Keypad control** Emulates a mobile phone keypad, with values specified for the key pressed, the time it is depressed, and any pause between keypresses. **<keys>** is a string of keypress values (as shown in the following table, derived from the standard PCCA STD-101 Annex table I-3). **<time>** (1–255, in seconds) and **<pause>** (0–255, in tenths of a second) can be specified. Unless there is an error, the modem returns OK before sending the keypresses. **Supported keypress character codes** **Char** / **IRA (dec)** / **Comment (+ known key symbols)** #: 35, hash (number sign) *: 42, star (*) 0... 9: 48... 57, number keys :: 58, custom code escape character D/d: 68/100, volume down E/e: 69/101, connection end (END) R/r: 82/114, recall last number (R/RCL/MR) S/s: 83/115, connection start (SEND) U/u: 85/117, volume up Characters between semicolons (**;**) are treated as alphanumeric entries and are not converted to key equivalents. The pause character (IRA 87 or 119) can be used to pause between keypresses for a time specified by **<pause>**.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CLCC	**List current calls** Lists the current calls and their type, if any available. Each call reports on a different line in this format: +CLCC: <id1>,<dir>,<state>,<bst>,<conf>, <number>,<type>,<alpha> **Returned values** <idx> is an integer call identification number, as described in GSM 02.30 [19] subclause 4.5.5.1. <dir> describes the call type: • <dir>=0: mobile originated (MO) call • <dir>=1: mobile terminated (MT) call <state> shows the state of the call: • <stat>=0: active • <stat>=1: held • <stat>=2: dialing (MO call) • <stat>=3: alerting (MO call) • <stat>=4: incoming (MT call) • <stat>=5: waiting (MT call) <bst> indicates the bearer service type: • <bst>=0: voice • <bst>=1: data • <bst>=2: fax • <bst>=9: unknown <conf> indicates whether the call is a party in a conference (multi-party) call: • <conf>=0: call is not part of a conference call • <conf>=0: call is part of a conference call <number> is a string specifying the phone number in the format specified by <type>.<type> is the type of address octet in integer format (refer to GSM 04.08 [8] subclause 10.5.4.7) <alpha> is a string corresponding to the phone book entry for <number>, using the character set specified in +CSCS (page 63).
+CLCK=<fac>, <mode> [,<passwd>] [,<class>] **+CLCK=?**	**Facility lock** Locks, unlocks, or interrogates the modem or a network facility specified in **<fac>**. **+CLCK=?** returns a list of supported <fac>s. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CLCK (continued)	**Facility lock (continued)** **Supported values** **<fac>** values include: **SC** SIM, lock SIM Card. The SIM requests a password when the command is issued or when the modem is powered on. **AO** BAOC, Barr All Outgoing Calls—see GSM 02.88[6] clause 1 **OI** BOIC, Barr Outgoing International Calls—see GSM 02.88[6] clause 1 **OX** BOIC-exHC, Barr Outgoing International Calls except to Home Country—see GSM 02.88[6] clause 1 **AI** BAIC, Barr All Incoming Calls—see GSM 02.88[6] clause 2 **IR** BIC-Roam, Barr Incoming Calls when roaming outside the home country—see GSM 02.88[6] clause 2 **AB** All Barring services (see GSM 02.30[19])—applicable only when **<mode>=0**) **AG** All outGoing barring services (see GSM 02.30[19])—applicable only when **<mode>=0**) **AC** All inComing barring services (see GSM 02.30[19])—applicable only when **<mode>=0**) **PN** Network Personalisation (see GSM 02.22[33]) **<mode>** specifies whether to lock, unlock, or query: **<mode>=0** to unlock, **<mode>=1** to lock, and **<mode>=2** to query the lock status. When **<mode>=2**, a successful query returns each class on its own line: +CLCK: <status>,<class> where <status> is either 0 (not active) or 1 (active). **<passwd>** is a string password, either specified for the facility or set using the +CPWD command (see page 60). **<class>** is a sum of integers each representing a class of information as follows (default 7): • **1** voice (telephony) • **2** data (refers to all bearer services) • **7** all classes *(default)*
+CLIP=<n> **+CLIP?**	**Calling line identification presentation** Sets whether the modem user can receive the Calling Line Identity (CLI, similar to Caller ID for landline phones) for incoming calls, using one of two values: • **<n>=0:** CLI disabled • **<n>=1:** CLI enabled If enabled (**<n>=1**), a RING or +CRING returns the following information. (See “Result Codes” on page 78.) +CLIP: <number>,<type>**Returned values** Returned values when **<n>=1** and an incoming call is detected appear as +CLIP: <number>,<type> and are: • <number>:a string-type phone number of format specified by <type> • <type>:the type of address octet in integer format (see GSM 04.08[8] subclause 10.5.4.7)—<type>=145 when the dialing string includes the international access code character +, otherwise it is 129.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CLIP (continued) **+CLIP?**	**Calling line identification presentation (continued)** **+CLIP?** returns whether CLI is enabled or disabled locally, and whether it is available to the user on the network: +CLIP:0,0 CLI disabled, CLIP not provisioned on network +CLIP:0,1 CLI disabled, CLIP provisioned +CLIP:0,2 CLI disabled, CLIP network status unknown +CLIP:1,0 CLI disabled, CLIP not provisioned on network +CLIP:1,1 CLI disabled, CLIP provisioned +CLIP:1,2 CLI disabled, CLIP network status unknown
+CLIR=<n> **+CLIR?**	**Calling line identification restriction** Sets whether the Sierra Wireless modem respects the remote caller's restriction of CLI (Calling Line Identity) information, and queries the status of CLIR service on the network. **Supported values** To set the CLIR status, the following values are supported: • **<n>=0** Presents CLI information according to the CLIR subscription setting on the network. *(Default)* • **<n>=1** Invokes CLIR (i.e. blocks incoming CLI information) • **<n>=2** Suppresses CLIR (i.e. always displays incoming CLI information if available) *Note: CLIR can only be invoked and suppressed if subscription to the service allows for it.* **+CLIR?** returns the current setting and CLIR network status: +CLIR:0,0 CLIR default, CLIR not provisioned on network +CLIR:0,1 CLIR default, CLIR provisioned (permanent mode) +CLIR:0,2 CLIR default, CLIR network status unknown +CLIR:0,3 CLIR default, CLIR presentation restricted (temporary) +CLIR:0,4 CLIR default, CLIR presentation allowed (temporary) +CLIR:1,0 CLIR invoked, CLIR not provisioned on network +CLIR:1,1 CLIR invoked, CLIR provisioned (permanent mode) +CLIR:1,2 CLIR invoked, CLIR network status unknown +CLIR:1,3 CLIR invoked, CLIR presentation restricted (temp) +CLIR:1,4 CLIR invoked, CLIR presentation allowed (temp) +CLIR:2,0 CLIR suppressed, CLIR not provisioned on network +CLIR:2,1 CLIR suppressed, CLIR provisioned (permanent) +CLIR:2,2 CLIR suppressed, CLIR network status unknown +CLIR:2,3 CLIR suppressed, CLIR presentation restricted (temp) +CLIR:2,4 CLIR suppressed, CLIR presentation allowed (temp)
+CMEE=<n> **+CMEE?**	**Report mobile equipment error** Sets whether the modem reports errors as simply ERROR, or with details in the form +CME ERROR: <err> (either numeric or verbose). *Note: Regardless of how this is set, an ERROR is returned in certain cases (such as if the wrong syntax or an invalid parameter is used).* **+CMEE?** returns the current setting. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMEE (continued) **+CMEE?**	**Report mobile equipment error (continued)** **Supported values** **<n>** can be set to one of three values: • **<n>=0:** Do not report detailed errors, simply return ERROR. • **<n>=1:** Enable +CME ERROR: <err> result codes and use numeric values for <err>. • **<n>=2:** Enable +CME ERROR: <err> result codes and use verbose (English) values for <err>. Numeric and verbose values for <err> appear on page 78.
PDU mode: **+CMGC= <length>** or *Text mode:* **+CMGC=<fo>, <ct>[,<pid>] [,<mn>][,<da>] [,<toda>]**	**Send SMS command** Sends an SMS Command message from the host computer to the network (SMS-COMMAND). The message reference value <mr> is returned (as +CMGC: <mr>) to the host computer if the message is successfully delivered, and can be used to identify the message if an unsolicited delivery status code is received. How the command is used depends on the SMS message format specified in **+CMGF** (page 49): • In PDU mode (**+CMGF=0**), messages are sent as follows: **+CMGC=<length><CR>** ***<PDU data>*<CTRL+Z>** • In text mode (**+CMGF=1**), messages are sent in this form: **+CMGC=<fo>,<ct>,<pid>,<mn>,<da>,<toda><CR>** ***<message text>*<CTRL+Z>** *Note: In both modes, sending* **<ESC>** *instead of* **<CTRL+Z>** *quits without sending the message.* **Supported values** Parameters for the text-mode send command are: • **<fo>** first octet of GSM 03.40 SMS-COMMAND in integer format *(default 2)* • **<ct>** GSM 03.40 TP-Command-Type in integer format *(default 0)* • **<pid>** GSM 03.40 TP-Protocol-Identifier in integer format *(default 0)* • **<mn>** GSM 03.40 TP-Message-Number in integer format Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMGC (continued) *Note: Also see the* **+CMGS** *command on page 51.*	**Send SMS command (continued)** • **<da>** GSM 03.40 TP-Destination-Address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters; type of address given by **<toda>** • **<toda>** GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of **<da>** is + (IRA 43) default is 145, otherwise default is 129) For PDU mode: • **<length>** integer type value indicating the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length)
+CMGD=<index>	**Delete SMS message** Deletes the **<index>**-numbered message from the currently selected memory store. (See **+CMGS**, page 51).
+CMGF=<n> **+CMGF?**	**Select SMS message format** Specifies the input and output format of messages to use. **<n>** indicates the format of messages used with send, list, read and write commands and unsolicited result codes resulting from received messages. There are two available formats for text messages: • **<n>=0** specifies PDU (Protocol Description Unit) mode, in which the complete SMS message, including all header information, is passed as a binary string.. • **<n>=1** specifies text mode, where the headers and body of the messages are given as separate parameters. Text mode is an encoding of the bit stream represented by PDU mode. See **+CMGC** (page 48) for information on sending messages. **+CMGF?** returns the current setting.
+CMGL [=<status>]	**List SMS messages** Lists messages of the specified **<status>** from the message store. If **<status>** is omitted, the command lists all messages (same as **<status>=4**). The format of the returned messages depends on whether the modem has been set to PDU or text mode (see **+CMGF**, page 49): • In PDU mode, returned messages appear in the form: +CMGL: <index>,<status>,<alpha>, <length><CR><LF> *<pdu data>* +CMGL: <index>,<status>,<alpha>, <length><CR><LF> *<pdu data>* etc. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMGL (continued)	**List SMS messages (continued)** • In text mode, returned messages appear in the form: +CMGL: <index>,<stat>,<oa/da>,<alpha>, <scts>,<tooa/toda>, <length><CR><LF> *<message text>* +CMGL: <index>,<stat>,<oa/da>,<alpha>, <scts>,<tooa/toda>, <length><CR><LF> *<message text>* [etc.] **Supported values** The format of **<status>** depends on whether the modem is in PDU or text mode. In PDU mode, it is an integer; in text mode, a string: **PDU Mode** / **Text Mode** / **Meaning** 0 / REC UNREAD / Received unread (i.e. new message) 1 / REC READ / Received read 2 / STO UNSENT / Stored unsent 3 / STO SENT / Stored sent 4 / ALL / All messages (default if **<status>** omitted) **Returned values** <index> — An integer uniquely identifying a message in the message store. The value lies in the range of location numbers supported by the message memory. <status> — The message status, as listed on page 49. <alpha> — An alphanumeric phone number representing the destination address <da> or originating address <oa> in the modem phonebook. <length> — The length of the message body in characters. <pdu> — In PDU mode, the SMS message, in the form of the GSM 04.11 SC address followed by the GSM 03.40 TPDU in hexadecimal format. The modem converts each octet of TP data unit into two IRA character long hexadecimal numbers (e.g. an octet with integer value 42 is presented to the computer as two characters 2A—IRA 50 and 65.) <oa/da> — The Originating-Address-Value <oa> field in string format; type of address given by <tooa>, or the Destination-Address field <da> in string format; type of address given by <toda>. <scts> — Service-Centre-Time-Stamp in time-string format: “yy/MM/dd,hh:mm:ss±zz”. <tooa/toda> — The Type-of-Originating Address octet <tooa> in integer format, or the Type-of-Destination Address octet <toda> in integer format. In both cases, when the first character of the phone number is “+” (IRA 43), the default is 145; otherwise the default is 129. <data> — Message body data for text mode messages.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMGR=<index>	**Read SMS message** Returns the message with the location value **<index>** from the message store. If the **<status>** of the message is “received unread” (<status>=0 in PDU mode, or <status>=REC UNREAD in text mode), then its status changes to “received read” (1 or REC READ). The format of the returned message depends on whether the modem is in PDU or text mode (see **+CMGF**, page 49): • In PDU mode, the returned message appears in the form: +CMGR: <status>,<alpha>,<length> <pdu> • In text mode, the returned message appears in the form: +CMGR:<status>,<oa>,<alpha>,<scts>,<tooa>,<fo>, <pid>,<dcs>, <sca>,<tosca>,<length> <data> **Returned values** Returned parameters are as described in **+CMGL** (page 50), with the addition of: <fo> The first octet of the SMS message according to the ETSI recommendation 03.40. <pid> The Protocol-Identifier in integer format *(default 0)*. <dcs> Depending on the command or result code: GSM 03.38 SMS Data Coding Scheme *(default 0)*, or Cell Broadcast Data Coding Scheme in integer format <sca> A string representing the Service Center address field; the type of address is given by <tosca>. <tosca> Type-of-Service Center Address octet in integer format. As with <tooa> and <toda>, when the first character of the phone number is “+” (IRA 43), the default is 145; otherwise the default is 129.
PDU mode: **+CMGS= <length>** or *Text mode:* **+CMGS=<da> [,<toda>]**	**Send SMS message** Sends an SMS message to the network (SMS-SUBMIT) directly, without requiring that it be stored in memory. A message reference value <mr> is returned if the message has been successfully delivered, in the form +CMGS: <mr>. It can be used to identify the message if an unsolicited delivery status report result code is returned. **PDU mode** The PDU-mode send command is: **+CMGS=<length><CR>** ***<PDU data>*<CTRL+Z>** **<length>** must indicate the number of octets coded in the TP layer data unit to be given (i.e. SMSC address octets are excluded). The **<pdu data>** must be in hexadecimal format (as specified for <pdu> on page 50) and given in one line. The Sierra Wireless modem converts this coding into the actual octets of the PDU. When the length octet of the SMSC address (given in the **<pdu data>**) equals zero, the SMSC address set with command Service Centre Address **+CSCA** (see page 63) is used. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMGS= (continued)	**Send SMS message (continued)** **Text mode** In text mode, the command is in the form: **+CMGS=<da>,<toda><CR>** ***<message text>*<CTRL+Z>** The text in **<message text>** is sent to the address **<da>**. **<toda>** is optional—when the first character of the phone number is "+" (IRA 43), it will default to 145; otherwise the default is 129. *Note: In both modes,* **<CTRL+Z>** *(IRA 26) sends the message.* **<ESC>** *(IRA 27) quits without sending.* Sending SMS messages requires that the service center be configured using **+CSAS**. (See page 29.) **Supported values** See **+CMGL** (page 49–50) and **+CMGC** (page 48) for details on the listed parameters.
+CMGW= **<length>,** **<status><CR>** **<pdu>** (PDU mode) or **+CMGW** **[=<oa/da>]** **[,<tooa/toda>]** **[,<status>]<CR>** **<data>** (text mode)	**Write SMS message to memory** Saves the SMS message (either SMS-DELIVER or SMS-SUBMIT) to the message store. If successful, the memory location <index> of the stored message is returned in the form +CMGW: <index>. By default, message status will be set to "stored unsent" (**<status>=2** or **STO UNSENT**), but another **<status>** may be assigned, as described on page 49. The ending of the message body (in text mode) or PDU (in PDU mode) must be indicated by **<ctrl-Z>** (IRA 26). Saving can be cancelled by passing the **<ESC>** character (IRA 27). **Supported values** See **+CMGL** (page 49–50) for details on the listed parameters. *Note: When storing an SMS-DELIVER to the message store in text mode,* **<vp>** *can be substituted for* **<scts>** *(see* **+CSMP***, page 64).*

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CMSS=<index> [,<da>][,<toda>]	**Send SMS message from storage** Sends the message with location value **<index>** from the message store to the network (SMS-SUBMIT). **<da>** and **<toda>** are optional—if new values are provided, they will be used instead of the **<da>** stored with the message and the default **<toda>**. A message reference value <reference> is returned if the message has been successfully delivered, in the form +CMSS: <reference>. It can be used to identify the message if an unsolicited delivery status report result code is returned. **Supported values** See **+CMGL** (page 49–50) for details on the listed parameters.
+CNMI=<mode> [,<mt>][,<bm>] [,<ds>][,<bfr>] **+CNMI?**	**New SMS message indications** Sets or queries how the computer is notified of new messages when the modem is active. **<mode>** controls the processing of unsolicited result codes, **<mt>** sets the result code indication routing for SMS-DELIVERs, **<bm>** for CBMs and **<ds>** for SMS-STATUS-REPORTs. **<bfr>** defines the handling method for buffered result codes when **<mode>=1**. **+CNMI?** returns the current settings. The default is +CNMI=1,0,0,0. **Supported values** **<mode>** may be one of four integer values: • **<mode>=0:** Buffer unsolicited result codes in the modem. If the buffer is full, the oldest codes are replaced with the new received codes. • **<mode>=1:** Discard indication and reject new received message unsolicited result codes when the modem-computer link is reserved (e.g. in online data mode); otherwise forward them directly to the computer. • **<mode>=2:** Buffer unsolicited result codes in the modem when in online data mode, and flush them to the host computer after reservation. Otherwise forward them directly to the modem. • **<mode>=3:** Forward unsolicited result codes directly to the host computer. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CNMI (continued)	**New SMS message indications (continued)** **<mt>** may be one of four values: • **<mt>=0:** No SMS-DELIVER indications. • **<mt>=1**: If SMS-DELIVER is stored in the modem, indication of the memory location is routed to the host computer using the unsolicited result code: +CMTI: <mem>,<index> • **<mt>=2**: Indication of SMS-DELIVER is returned using unsolicited result codes: +CMT: <alpha>,<length><CR> <pdu> (in PDU mode) or +CMT: <oa>,<alpha>,<scts>,<tooa>,<fo>,<pid>, <dcs>, <sca>,<tosca>,<length><CR> <data> (in text mode) • **<mt>=3**: Class 3 SMS-DELIVERs are routed directly to the most computer using unsolicited result codes defined in **<mt>=2**. Messages of other classes result in the indication as defined in **<mt>=1**. **<bm>** may be one of two values: • **<bm>=0:** No CBM indications are routed to the host. • **<bm>=1:** New CBMs are routed directly to the host using unsolicited result code: +CBM: <length><CR><LF> *<pdu data>* (PDU mode enabled) or +CBM: <sn>,<mid>,<dcs>, <page>,<pages><CR><LF> *<message text>* (text mode enabled) **<ds>** may be one of two values: • **<ds>=0:** No SMS-STATUS-REPORTs returned • **<ds>=1:** SMS-STATUS-REPORTs returned: +CDS: <length><CR><LF> *<pdu data>* (PDU mode enabled) or +CDS: <fo>,<mr>,[<ra>],[<tora>],<scts>,<dt>,<st> (text mode enabled) +**<bfr>** may be one of two values: • **<bfr>=0:** The modem's buffer of unsolicited result codes is flushed to the computer when **<mode>=1**, **2**, or **3** is entered. (OK is returned before flushing the codes.) • **<bfr>=1:** The modem's buffer of unsolicited result codes is cleared when **<mode>=1**, **2**, or **3** is entered. *Note: See* **+CMGL** *(page 49–50) and* **+CMGR** *(page 51) for details on the listed parameters.*

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CNUM=?	**Display phone number** Returns the account phone number(s) stored on the SIM. The format of the returned message is: +CNUM: [<alpha1>],<number1>,<type1>[,<speed>,<service>[,<itc>]] [<CR><LF>+CNUM:[<alpha2>],<number2>,<type2>[,<speed>,<service> [,<itc>]][...]] **Returned values** Returned parameters are as described in **+CMGL** (page 50), with the addition of: <alphax> An optional description of <numberx>. <numberx> The phone number in the format specified by <typex>. <typex> The address type in integer format. (See GSM 04.08 [8] subclause 10.5.4.7.) <speed> The speed as set by the **+CBST** command. <service> The 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> The information transfer capability: 0 3.1 kHz 1 UDI
+COPS=<mode> [,<format>] [,<operator>] **+COPS?** **+COPS=?**	**Operator selection** **+COPS=<mode>,<format>,<operator>** attempts a forced selection and registration on the GSM network using a particular operator (i.e. GSM service carrier). **<mode>** determines whether the selection is performed automatically by the modem or is forced to the specific operator given in **<operator>**, using the format specified in **<format>**. (The format setting is retained if the **+COPS?** command is reissued.) The selected <mode> applies to all further network registrations (e.g. after **<mode>=2**, the modem is unregistered until **<mode>=0** or **1** is selected). *Note: Unless* **<mode>=4**, *if the selected operator is not available, no other operator is selected.* Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+COPS (continued)	**Operator selection (continued)** **+COPS?** returns the current mode and the currently selected operator. If no operator is selected, <format> and <operator> are omitted. **+COPS=?** returns a list of quadruplets, each representing an operator present on the GSM network, follows by a list of supported <modes> and <format>s: +COPS: <status>,<loperator>, <soperator>,<noperator> supported <mode>s,supported <format>s Each quadruplet consists of a <status> integer indicating the availability of the operator, the long <loperator> and short <soperator> alphanumeric names of the operator, and the <noperator> numeric code for the operator. If any of the formats is unavailable, its field is empty (*not* omitted). *Note: Operators are listed in this order: home network, networks listed in the SIM card, and other networks.* **Supported values** **<mode>** sets how the modem should determine the GSM operator. It can be one of four values: • **<mode>=0**: Automatically (**<operator>** field is ignored) • **<mode>=1**: Manually (**<operator>** field required, no operator selected if not available) • **<mode>=2**: Deregister from the network. • **<mode>=3**: Only set the **<format>** (for the read command **+COPS?**)—do not attempt registration/deregistration. The <operator> field is ignored. • **<mode>=4**: Manually if possible (**<operator>** field is required). If manual selection fails, the modem switches to automatic (**<mode>=0**). **<format>** selects which format to use for the **<operator>** parameter. It can be one of three values: • **<format>=0:** Long format alphanumeric (equivalent to <loperator> from **+COPS=?**). • **<format>=1**: Short format alphanumeric (equivalent to <soperator>). • **<format>=2:** numeric (equivalent to <noperator>). **<operator>** is a string, whose type is determined by the **<format>** parameter. The long alphanumeric format can be upto 16 characters long, and the short up to 8 characters. The numeric format is the GSM Location Area Identification number (see the standard GSM 04.08[8] subclause 10.5.1.3), in the format: <country code digit 3><country code digit 2> <country code digit 1><network code digit 2> <network code digit 1> <status> returns the status of an operator: • <status>=0: Unknown • <status>=1: Available • <status>=2: Current • <status>=3: Forbidden

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CPAS	**Modem activity status** Returns the activity status of the Sierra Wireless modem in the form: +CPAS: <n>. The command can be used to interrogate the modem before requesting action from it. **Supported values** <n> can have one of six values: • <n>=0: Ready to accept commands. • <n>=2: Unknown—may not respond to commands. • <n>=3: Ringing—the modem is ready for commands, but the ringer is active. • <n>=4: Call in progress—the modem is ready for commands, but a call is in progress.
+CPBF=<string> **+CPBF=?**	**Find phonebook entries** Searches the phonebook memory (as selected in **+CPBS**, see page 58) for the text specified in **<string>**. Returns all results matching or beginning with **<string>**, in the following form: +CPBF: <index>,<number>,<type>,<text> If more than one entry returns, each one appears on a separate line. **Supported values** The **+CPBF=?** command returns the maximum lengths of the <number> and <text> parameters, both as integers: +CPBF: <nlength>,<tlength> *Note: If* **+CPBS** *has set the phonebook memory to use the SIM card, parameter lengths may not be available.* **<string>** is alphanumeric, with a maximum length of <tlength> as noted above. Returned parameters from searches are: • <index>: Integer values indicating the phonebook location of the returned entry. • <number>: A string of type specified in <type>, showing the phone number of the entry. • <type>: The type of address octet in integer format (see GSM 04.08 [8] subclause 10.5.4.7). <text>: A string of maximum length <tlength>, with a character set as specified in **+CSCS** (page 63), indicating the name of the entry.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CPBR=<index> [,<index> (etc.)] **+CPBR=?**	**Read phonebook entries** Similar to **+CBPF** (page 57), but instead of searching by alphanumeric string, returns phonebook entries from the preferred memory (see **+CPBS**, page 58) using the specified **<index>** numbers. All returned values are as discussed in **+CPBF** on page 57. **+CPBR=?** returns the index location range supported by the current storage as a compound value, and the maximum lengths of the **<number>** and **<text>** fields (i.e. <nlength>,<tlength>: +CPBF: <indexrange>,<nlength>,<tlength> *Note: If* **+CPBS** *has set the phonebook memory to use the SIM card, parameter lengths may not be available.*
+CPBS=<type> **+CPBS?**	**Phonebook memory storage** Sets which memory type to use for phonebook commands. **+CPBS?** returns the current storage type in use (a string value), as well as the number of used locations and the total number of locations in the memory (both integers): +CPBF: <type>,<used>,<total> **Supported values** The following memory types may be set for **<type>**: • **<type>=DC:** The dialled calls list (**+CPBW** not applicable—page 58) • **<type>=FD:** The SIM fixed dialing phonebook • **<type>=LD:** The SIM last dialing phonebook • **<type>=ON:** The SIM's or modem's "own numbers" (MSISDNs) list • **<type>=SM:** The SIM phonebook *Note: If the phonebook memory is set to use the SIM card, parameter lengths may not be available (see* **+CPBF**, **+CPBR**, *and* **+CPBW** *commands, pages 57, 58, and 58).*
+CPBW =[<index>], [<number>] [,<format>] [,<text>] **+CPBW=?**	**Write phonebook entry** Creates, overwrites, or erases a phonebook entry in the memory specified by **+CPBS** (see page 58). The parameters are the same as defined in **+CPBF** (page 57), specifying the phonebook entry number (**<index>**), the phone number (**<number>**), the phone number format (**<format>**), and the text name for the entry (**<text>**). If **<number>** and **<text>** are omitted, the phonebook entry is deleted. If **<index>** is left out but **<number>** is provided, a new entry is created in the first free location in the phonebook. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CPBW (continued) **+CPBW=?**	**Write phonebook entry (continued)** *Note: The following characters in* **<text>** *must be entered via the escape sequence:* **GSM char.** **Seq.** **Seq.(hex)** **Note** \ \5C 5C 35 43 backslash " \22 5C 32 32 string delimiter **BSP** \08 5C 30 38 backspace **NULL** \00 5C 30 30 GSM null *0 (GSM null) may cause problems for application layer software when reading string lengths.* **+CPBW=?** returns the location range as a compound value, he maximum length of the **<number>** field, supported number formats of the storage, and the maximum length of **<text>** field: +CPBF: <indexrange>,<nlength>, <typerange>,<tlength> *Note: If* **+CPBS** *has set the phonebook memory to use the SIM card, parameter lengths may not be available.*
+CPIN=<pin> [,<newpin>] **+CPIN?** *Note: When the modem is waiting for a SIM PIN, SIM PUK, or PH-SIM password, it will still accept the +CGMI, +CGMM, +CGMR, +CGSN, emergency call, +CPAS, and +CPIN commands.*	**Enter PIN** Sends a PIN (Personal Identification Number) password **<pin>** to the modem in order to authenticate a command. There are several types of PINs, described below. If no PIN request is pending from the modem, the command returns an error. Certain types of password requests (SIM PUK or SIM PUK2) require a second password **<newpin>**, which replaces the old PIN in the SIM card. The **+CPIN?** command returns +CPIN: <code>, indicating which password is required, if any: <code>=READY — Modem is not waiting for a PIN. <code>=SIM PIN — SIM password. <code>=SIM PUK — SIM unblocking. <code>=PH-SIM PIN — Password between modem and SIM card (anti-theft). <code>=PH-SIM PUK — Unblocking password between modem SIM card (anti-theft). <code>=SIM PIN2 — SIM password 2. (Only if preceding command was acknowledged with +CME ERROR:17.) <code>=SIM PUK2 — SIM unblocking password 2. (Only if preceding command was acknowledged with +CME ERROR:18.)

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CPWD=<fac>, [<oldpassword>],<new password> **+CPWD=?**	**Change password** Sets a new password for the facility lock function defined by the Facility Lock **+CLCK** command (see page 45). **+CPWD=?** returns a list of pairs which show the available facilities and the maximum length of their passwords: +CPWD: <fac>,<passlength> <fac>,<passlength> etc. **Supported values** The **+CPWD** command generally supports the same values of **<fac>** shown for the **+CLCK** command (page 45). However, **+CPWD** also supports the additional value **<fac>=P2** for the SIM PIN2, and does **not** support **<fac>=PS**, **PN**, **PU**, **PP**, or **PC**. **<oldpassword>** and **<newpassword>** are both strings, defining the old password and the new one which is to replace it. <passlength> is an integer showing the maximum number of characters permitted for a password for the <fac> shown.
+CR=<n> **+CR?** *Note: This command replaces the V.25ter command Modulation Reporting Control +MR, which is not appropriate for use on the GSM network.*	**Service reporting control** Sets whether service type is returned (using the result code +CR: <service>) when the modem has determined which speed and quality of service will be used, but before any error control or data compression reports are transmitted, and before CONNECT is returned. • **<n>=0** sets the modem not to report the service type. • **<n>=1** reports service type. **+CR?** returns the current setting. The <service> parameter in result codes reports: • ASYNC asynchronous transparent • SYNC synchronous transparent • REL ASYNC asynchronous non-transparent • REL SYNC synchronous non-transparent Data compression reporting can be enabled with the +DR command (page 66).

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CRC=<n> **+CRC?**	**Cellular result codes for incoming calls** Sets whether incoming calls or GPRS network requests for PDP context activation indicate a simple RING or a detailed, extended-format result code in the form +CRING: <type>: • **<n>=0** disables the extended format, returning only RING. • **<n>=1** enables the extended format in the form +CRING: <type>. **+CRC?** returns the current setting. **Supported values** Incoming calls or PDP context activation requests report the following values for +CRING: <type>: <type>=ASYNC — asynchronous transparent <type>=SYNC — synchronous transparent <type>=REL ASYNC — asynchronous non-transparent <type>=REL SYNC — synchronous non-transparent <type>=VOICE — normal voice For GPRS context activation, <PDP_type> and <PDP_addr> are as defined in the Define PDP Context (**+CGDCONT**) command (see page 39).
+CREG[=<n>] **+CREG?** *Note: For GPRS data registration status, see +CGREG on page 43.*	**GSM network registration** For GSM CSD or voice connections, **+CREG=<n>** controls the presentation of an unsolicited result code, which appears in one of several forms depending on the value of **<n>** (or an error if no status is available): • When **<n>=0**, no network registration unsolicited result codes are returned (the default). • +CREG: <stat> (registration status only) is returned when **<n>=1** and there is a change in the modem's GPRS network registration status. • +CREG: <stat>,<lac>,<ci> (which includes location information) is returned when **<n>=2** and there is a change of the network cell. **+CREG?** returns the status of result code presentation and an integer <stat> showing the current status. (Location information elements <lac> and <ci> are returned only when **<n>=2** and the modem is registered on the network.) **Returned values** The possible returned values of <stat> are: • 0: not registered; not seeking a new operator • 1: registered, home network • 2: not registered; currently seeking a new operator • 3: registration denied • 4: unknown • 5: registered, roaming <lac> is a string specifying a two-byte location area code in hexadecimal format (e.g. “00C3” equals 195 in decimal). <ci> is a string specifying a two-byte cell ID in hexadecimal format.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CRES	**Restore SMS settings** Restores the SMS settings of the Sierra Wireless modem for **+CMGF** (page 49), **+CNMI** (page 53), and **+CSDH** (page 63) from settings stored in non-volatile memory. *Note: For information on saving these settings to non-volatile memory, see* **+CSAS** *on page 63.*
+CRLP[=<iws>] [,<mws>][,<T1>] [,<N2>] [,<version>] **+CRLP?** **+CRLP=?**	**Radio link protocol** When originating non-transparent data calls, the **+CLRP** command sets the Radio Link Protocol (RLP) parameters. **+CRLP?** returns current settings for each supported RLP <version>, each on a separate line, with only RLP parameters applicable to the corresponding <version> on each line returned: +CRLP: <iws>,<mws>,<T1>,<N2>,<version>,<T4> +CRLP: <iws>,<mws>,<T1>,<N2>,<version>,<T4> etc. **+CRLP=?** command returns values supported by the modem as a compound value. The RLP parameter value ranges for each <version> are returned on a separate line: +CRLP: supported <iws>s, supported <mws>s, supported <T1>s, supported <N2>s, <version>, supported <T4>s +CRLP: supported <iws>s, supported <mws>s, supported <T1>s, supported <N2>s, <version>, supported <T4>s etc. *Note: See also* **+DS** *(page 66).* **Supported values** **<version>** is the RLP version number in integer format, either **0** or **1**. If it is not present, **<version>=0** is the default. *Versions 0 and 1 share the same parameter set.* **+CRLP?** *and* **+CRLP=?** *return only one line for this set (where* **<version>** *is not present).***<iws>, <mws>, <T1>**, and **<N2>** are the IWF-to-MS window size, MS-to-IWF window size, acknowledgement timer, and retransmission attempts, respectively. All are integers, and their default values and value ranges depend on the RLP version—see the standard GSM 04.22[18]). However, versions 0 and 1, supported here, share the same parameter values: **Param** **Range** **Default** **Description** **<iws>** 0–255 61 interworking window size **<mws>** 0–255 61 mobile window size **<T1>** 0–255 48 acknowledgment timer (10 ms increments) **<N2>** 0–255 6 retransmission attempts

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CSAS	**Save SMS settings** Saves the current SMS settings for **+CMGF** (page 49), **+CNMI** (page 53), and **+CSDH** (page 63) to non-volatile memory. *Note: For information on restoring these settings to active memory, see* **+CRES** *on page 62.*
+CSCA=<sca> [,<tosca>] **+CSCA?**	**SMS service center address** Updates the SMSC (SMS Service Center) address, through which mobile originated SMS messages are transmitted from the modem. The setting is used in both PDU and text modes. *Note:* **<sca>** *must be set before SMS messages can be sent.* **<sca>** is a string indicating the service center address, as a GSM 04.11 RP SC address Address-Value field in string format; BCD numbers (or GSM default alphabet characters) are converted to characters. The type of address is given by **<tosca>**, which is optional. if it is not specified, when the first character of the phone number is + (IRA 43), the default is **145**; otherwise the default is **129**. **+CSCA?** returns the current setting.
+CSCS [=<string>] **+CSCS?**	**Character set** Tells the modem which character set is used by the connected computer. The modem can then convert character strings correctly between the character sets in use on the two devices. This command is available for querying and to support GSM standards only. The Sierra Wireless modem supports only the GSM standard character set, **<string>=GSM**, which is the GSM default alphabet (GSM 03.38 subclause 6.2.1). **+CSCS?** returns the current setting.
+CSDH=<n> **+CSDH?**	**Show SMS text mode parameters** Controls whether detailed header information is shown in SMS text mode result codes. <n> can be one of two values: • **<n>=0:** Do not show responses with optional parameters (detailed headers). • **<n>=1:** Show responses with optional parameters. **+CSDH?** returns the current setting.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CSMP[=<fo>] [,<vp>][,<pid>] [,<dcs>] **+CSMP?**	**Set SMS text mode parameters** In SMS text mode, this command selects values for additional parameters needed when an SMS message is sent to the network or stored in memory. It is possible to set the validity period **<vp>** starting from when the message is received by the SMSC (**<vp>** as an integer between 0–255, default 167) or define the absolute time of the validity period termination (**<vp>** as a time string). The format of **<vp>** is given by **<fo>**. *Note: When storing an SMS-DELIVER to the message store in text mode (see* **+CMGW**, *page 52),* **<vp>** *can be substituted for* **<scts>**. **+CSMP?** returns the current settings. **Supported values** The validity period **<vp>** determines when an SMS message expires. It can be an integer between 0 and 255 days (default 167), or a time string of the form "yy/MM/dd,hh:mm:ss±zz". Its format is determined by the **<fo>** parameter. Other parameters are as described for **+CMGR** on page 51.
+CSMS= <service> **+CSMS?**	**SMS message service** Selects the SMS message service to be used by the Sierra Wireless modem, as specified in **<service>**. It returns the types of messages supported by the service in the form: +CSMS: <mt>,<mo>,<bm> • <mt> for mobile terminated messages • <mo> for mobile originated messages • <bm> for broadcast type messages For each returned parameter, 0 means that the type is not supported, and 1 that it is supported. **+CSMS?** returns the current service and message types supported, in the form: +CSMS: <service>,<mt>,<mo>,<bm> **Supported values** • **<service>=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. Phase 2+ features which do not require new command syntax may be supported (e.g. correct routing of messages with new Phase 2+ data coding schemes). • **<service>=128** SMS PDU mode - TPDU only used for sending/ receiving SMSs. Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CSMS (continued)	**SMS message service (continued)** **<mt>:** Mobile Terminated Messages: • **0** Type not supported • **1** Type supported **<mo>:** Mobile Originated Messages: • **0** Type not supported • **1** Type supported **<bm>:** Broadcast Type Messages: • **0** Type not supported • **1** Type supported
+CSTA [=<string>] **+CSTA?**	**Type of address** Selects the type of number to be used for further dialing commands (**D**—page 70) according to GSM specifications. **+CSTA?** returns the current setting. **Supported values** **<type>** is the type-of-address octet in integer format (see the standard GSM 04.08[8], subclause 10.5.4.7) The default value depends on the format of the dialing string • When the string includes the international access code character +, **<type>=145** by default. • Otherwise, **<type>=129** by default.
+CSQ	**Signal quality report** Returns the Received Signal Strength Indication (RSSI) and channel Bit Error Rate (BER) from the modem: +CSQ: <rssi>,<ber> **Returned values** <rssi> is an integer representing a range of RSSI values: • 0 -113 dBm or less • 1 -111 dBm • 2-30 -109 through -53 dBm • 31 -51 dBm or greater • 99 not known or not detectable Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+CSQ (continued)	**Signal quality report (continued)** <ber> is an integer representing the percentage of bit errors: • 0-7 RXQUAL values in the table in the standard GSM 05.08[20], subclause 8.2.4: 0=BER < 0.2% 1=0.2% < BER < 0.4% 2=0.4% < BER < 0.8% 3=0.8% < BER < 1.6% 4=1.6% < BER < 3.2% 5=3.2% < BER < 6.4% 6=6.4% < BER < 12.8% 7=12.8% < BER • 99 Not known or not detectable
+DR=<n> **+DR?**	**V.42*bis* compression reporting** Sets whether the V.42*bis* compression status is returned (using the result code +DR: <type>) before going into the online data state, for either originated or answered calls: • **<n>=0** sets the modem not to report compression status. • **<n>=1** reports compression status. <type> can be one of four values: • NONE data compression is not in use • V42B Rec. V42*bis* is in use in both direction • V42B RD Rec. V42*bis* is in use in receive direction only • V42B TD Rec. V42*bis* is in use in transmit direction only **+DR?** returns the current setting for reporting. Service type reporting can be enabled with the **+CR** command (page 60). V.42*bis* compression is controlled by **+DS** (page 66).
+DS [=<direction>] [,<negotiation>] [,<P1>][,<P2>] **+DS?**	**V.42*bis* compression control** Controls the functions of V.42*bis* data compression. See the GSM 04.22[18] specification for more information. **Supported values** *Note: This command must be used in conjunction with command* **+CRLP** *(page 62) to enable compression.* Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+DS (continued)	**V.42*bis* compression control (continued)** **<direction>** Specifies the desired direction(s) of operation of data compression: • **<direction>=0**: negotiated; no compression (V.42*bis* P0=0). • **<direction>=1**: transmit only. • **<direction>=2**: receive only. • **<direction>=3**: default, both directions, accept any direction (V.42*bis* P0=11)—the default. **<negotiation>** specifies whether or not the modem should continue to operate if the desired result is not obtained: • **<negotiation>=0**: Do not disconnect if V.42*bis* is not negotiated by the remote modem as specified in <direction>. (The default.) • **<negotiation>=1**: Disconnect if V.42*bis* is not negotiated by the remote modem as specified in <direction>. **<P1>** Specifies the maximum number of dictionary entries (512–2048 entries, with 512 as the default) which should be negotiated. **<P2>** Specifies the maximum string length (6–255 bytes, default 20) to be negotiated (V.42bis P2). **+DS?** reports the current settings.
+FCLASS=<n> **+FCLASS?**	**Fax service class** Sets, reads, or tests the service class of the modem. Putting the modem into a particular mode of operation (data, fax, voice etc.) makes it process information in a manner suitable for that type of information (rather than for other types of information). **+FCLASS?** returns the current service class mode. **Supported values** The Sierra Wireless modem supports the following service class settings: • **<n>=0** data (default) • **<n>=1** fax class 1 (TIA-578-A)
+FMI	**Fax manufacturer identification** Identifies Sierra Wireless as the manufacturer of the modem, returned as a text string. Equivalent to **+CGMI** (page 41) and **+GMI** (page 68).
+FMM	**Fax model identification** Identifies the model of Sierra Wireless modem, returned as a text string. Equivalent to **+CGMM** (page 41) and **+GMM** (page 68).
+FMR	**Fax revision identification** Identifies the firmware revision of the Sierra Wireless modem, returned as a text string. Equivalent to **+CGMR** (page 41) and **+GMR** (page 68).

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+GMI	**Modem manufacturer** Returns a text string listing Sierra Wireless as the manufacturer of the modem. Equivalent to **+CGMI** (page 41).
+GMM	**Modem model** Returns a text string identifying the model of Sierra Wireless modem in use. Equivalent to **+CGMM** (page 41).
+GMR	**Current modem firmware version** Returns a text string identifying the current firmware revision of the Sierra Wireless modem. Equivalent to **+CGMR** (page 41).
+GOI	**Global object identification** Returns the ISO system Global Object Identification (GOI) of the modem. The general format is defined in ITU-T Recommendation X.208, and the encoding rules in ITU-T Recommendation X.209.
+GSN	**Display IMEI** Returns the IMEI (International Mobile Equipment Identity) of the modem. The IMEI uniquely identifies each device on the GSM network. The same value is returned by **+CGSN**. (See page 43).
+IFC [=<by_comp>] [,<by_modem>] **+IFC?**	**Local flow control** Sets or queries the local flow control between the computer and the Sierra Wireless modem in data state. **Supported values** **<by_comp>** specifies the method to be used by the computer to control the flow of received data from the modem: • **<by_comp>=0**: None. • **<by_comp>=1**: XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass characters to data stack. • **<by_comp>=2**: Line 133 (Ready for Receiving)—the default. • **<by_comp>=2**: XON/XOFF on transmitted data (XON/XOFF on transmit data); pass characters to data stack. **<by_modem>** specifies the method to be used by the modem to control the flow of transmitted data from the computer: • **<by_modem>=0**: None. • **<by_modem>=1**: XON/XOFF on received data. • **<by_modem>=2**: Line 106: Clear to send (CTS). *(Default.)* **+IFC?** returns the current settings.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
+IPR[=<n>] **+IPR?**	**Fixed local data rate** Sets or queries a fixed local data rate for the local connection (between modem and computer): • **<n>=[bits per second]** sets the data rate. Permitted values are **300, 1200, 2400, 9600, 19200, 28800, 38400, 57600,** and **115200** (the default). • **<n>=0** instructs the modem to use the host's data rate automatically (autobauding). *Note: When using autobauding, issuing a "ping"* **AT<CR>** *command (with no other characters) should yield an* OK *response. If not, send another* **AT<CR>** *to permit the modem to adapt to the host data rate.* **+IPR?** returns the current setting.
+VTD=<n> **+VTD?**	**Tone duration** Defines the length of tones emitted when using the **+VTS** command (page 69), with **<n>** in tenths of a second between 1 and 255. It does not affect the **D** command (page 70). If **<n>=0** the value is set to the default. (See "Factory Default Settings" on page 79.) **+VTD?** returns the current setting.
+VTS=<DTMF> or **+VTS=<tone1>, <tone2>, <duration>** or **+VTS=<DTMF>, <duration>**	**DTMF tone generation** This command allows the transmission of DTMF (Dual Tone Multi-Frequency, also known as Touch-Tone™ tones, used to access voice mail and other tone-controlled remote systems. The command is separate from **D** (page 70), which is used only for dialing. The command is write-only, and does not operate in data or fax modes of operation (**+FCLASS=0,1,2-7**, see page 67). **Supported values** The string parameter of the command consists of combinations of the following, separated by commas: 1. **+VTS=<DTMF>** is a single ASCII character in the set **0-9, #,*,A-D**. This is interpreted as a single ACSII character whose duration is set by the **+VTD** command (page 69). In GSM, this command type operates only in voice mode. 2. **+VTS=<DTMF>,<duration>** is interpreted as a DTMF tone of different duration from that mandated by the **+VTD** command (page 69). In GSM, this operates only in voice mode.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
A/	**Reissue last AT command** Re-executes the last command string entered. The last-executed command remains in the command buffer until AT is entered again or the modem is reset or power-cycled. A/ will reissue that same command. It executes immediately when the slash (/) is entered. *Note: This command is **not** preceded by* AT *and does not require* <CR> *to terminate.*
A	**Answer incoming call (or GPRS network request)** **GSM mode** When operating in *GSM voice, or CSD mode,* ATA instructs the modem to immediately go off-hook and attempt to establish a connection without waiting for a ring. This is used to answer an incoming call if the auto-answer status register (S0—see page 27) is disabled. The command presumes a RING has been received. If the command is issued without a RING, and the modem is in *command state,* the modem replies with OK and remains in command state. *Note: If the incoming call is a fax call, the modem must be ready for the fax call before receiving the* RING. *(See listings beginning on page 67 for information on fax AT commands.)* Once the RING arrives, the modem looks for carrier to negotiate the connection, and either issues: • CONNECT and enters data state; or • NO CARRIER and remains in command state. **GPRS mode** When operating in *GPRS packet mode,* the ATA command answers a network request for a PDP context activation announced by the unsolicited result code RING. The modem responds with CONNECT and enters the V.25*ter* online data state to initiate a GPRS connection.
GSM modes: **D[<string>] [gsmmod][;]**	**Dial outgoing call** **GSM mode** When operating in *GSM voice, CSD, or fax mode,* ATD dials the specified characters in order to originate a call. **dialing digits** The dial string may consist of the following characters: • 1 2 3 4 5 6 7 8 9 0 * # + A B C • D is ignored Continued on next page.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
D*(GSM mode)* **(continued)**	**Dial outgoing call (continued)** **Modifier characters** The following characters may modify the string: • **,** (comma) indicates a pause, with its length specified in the **S8** status register (see page 77). • **>** permits direct dialing from phone books. The string following the **>** character may be an alphanumeric string (to search phone book entries—**ATD><string>**), or may specify a particular memory location (**ATD>mem<n>**), or may specify a numeric entry (**ATD><n>**). (See "GSM Voice and Circuit-Switched Data Commands (GSM 07.07)" on page 28.) • **I i** override the CLIR supplementary service subscription default value for this call; I = invocation (restrict CLI presentation) and i = suppression (allow CLI presentation). (See "GSM Voice and Circuit-Switched Data Commands (GSM 07.07)" on page 28.) **G g T P ! W @** are ignored by the modem. ! (hook flash) may be useful when accessing services on the PSTN. **GSM modifiers** **<gsmmod>** values are **I** (capital i) to override the current **+CLIR** setting for the call (see page 47), and **G** or **g** for CUG info set with **+CCUG** (page 53). **Semicolon for voice origination** At the end of a dial string, a semicolon (**;**) originates a voice call to the given address, and the modem immediately returns to command state. For example, **ATD>mem3;** would make a voice call to phone book memory location 3.
GPRS mode: **D*[<GPRSSC>]** ***[<address>]** ***[<L2P>]** ***[<cid>]#** *Note: After issuing* **ATD** *in GPRS mode, no further AT commands may follow on the command line until the GPRS connection is terminated.*	**Make GPRS connection** **GPRS mode** When operating in *GPRS packet mode,* the **ATD** command attempts to make a GPRS packet data connection to the Public Data Network (PDN). The **+CGDATA** command (page 38) performs a similar function. In GPRS mode, **D** uses the following parameters: • **<GPRSSC>** (GPRS Service Code) is a digit string specifying which kind of GPRS service to use. For example, code **98** (known as GPRCSC_IP) requests the network to use GPRS with Internet Protocol (PDP types IP and PPP). • **<address>** enables the modem to automatically set up a virtual call to the specified address after the PDP context has been activated. The format depends on the protocol in use—for IP, it would be a standard IP address of the form *xxx.xxx.xxx.xxx*, for instance. • **<L2P>** is a digit string specifying the Layer 2 Protocol to be used—only **PPP** is supported (see **+CGDATA** on page 38). • **<cid>** is a digit string which specifies a particular PDP context definition (see **+CGDCONT** command on page 39).

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
D *(GPRS mode)* **(continued)**	If successful, **ATD** returns a CONNECT message. When the GPRS data connection is terminated, either as a result of an orderly shutdown or an error, the modem returns to command state with NO CARRIER as its final result code. *Note: Usage for* **<L2P>** *and* **<cid>** *is the same as in* **+CGDCONT**, **+CGQREQ**, *and other related commands (see page 39 and page 42). They may then be used in the modem initialization AT command string to set values for PDP type, APN, QoS, and so on.*
D**##[n]	**Make GPRS connection** Establishes a connection using the specified profile. The GPRS profile used in the connection is specified by **n**: • **<n>=0** Default profile. (Set by the **!CGDCONT** command.) • **<n>=1** Profile 1 • **<n>=2** Profile 2 • **<n>=3** Profile 3 The connection uses the PDP context settings assigned using **+CGDCONT**, **+CGQMIN**, and **+CGQREQ** to the PDP Context Identifier 1. (That is, the <cid> must be 1. **D**##** cannot be configured to use any other value for the <cid>.) In order to establish a connection with specific QoS (Quality of Service) settings, or header or data compression settings, the settings must be assigned to PDP Context Identifier 1 (<cid>=1) using the **+CGDCONT**, **+CGQMIN**, and **+CGQREQ** commands.
DL[;]	**Redial last outgoing number** Redials the last number entered into the buffer. The number remains in the buffer until **ATD** is entered again or the modem is reset or power-cycled. **Semicolon for voice origination** As for **D**, at the end of a dial string, a semicolon (**ATDL;**) originates a voice call to the redialled address, and the modem immediately returns to command state.
E[<n>]	**Command echo mode** Controls echoing of characters received from the host back to the host when in command state. This also affects framing of responses. (See “Response and Result Framing” on page 22.) **n** may be one of two values: • **0**: Disable echo • **1**: Enable echo (Default)

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
H[0] *Note: The* 0 *parameter (*ATH0*) is the only one permitted. It is optional and has no effect on the command.*	**Hang up (disconnect)** **GSM mode** When operating in *GSM voice, or CSD mode,* ATH or ATH0 hangs up the call, disconnecting it. The modem goes from online condition to offline condition. **GPRS mode** When operating in *GPRS packet mode,* the ATH on-hook command may be used to reject a network request for PDP context activation announced by the unsolicited result code RING. The modem responds with OK. If there is no outstanding connection request, the modem responds with ERROR. *Note: This is an extension to the usage of the* H *command from the V.25*ter *standard.*
I[<value>]	**Display product identification** Displays model and version information. The **<value>** determines what information is displayed: • **<value>=0** Manufacturer and model • **<value>=4** Mobile ID used by the MT protocol. (See **!MPMTCONF** on page 41.) The Mobile ID is derived from the IMEI. (See **+CGSN** on page 43.) • **<value>=5** Firmware revision • **<value>=6** Bootloader revision
L **(ignored)**	**Set speaker loudness** This command is provided for compatibility reasons; no action is taken by the modem. Parameters are ignored.
M **(ignored)**	**Set speaker mode** This command is provided for compatibility reasons; no action is taken by the modem. Parameters are ignored.
O[0] *The* 0 *parameter (*ATO0*) is the only one permitted. It is optional and has no effect on the command.*	**Switch from command state to data state** Switches modem to from online command state to online data state. The modem responds with the normal CONNECT response codes (if enabled) as if the connection were new. If the connection cannot be established, a NO CARRIER or NO ANSWER response results, as appropriate.
P **(ignored)**	**Pulse dialing** This command is provided for compatibility reasons; no action is taken by the modem. Parameters are ignored.

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
Q[<n>]	**Quiet—suppress result codes** Controls the return or suppression of result codes to the host computer. There are two values for **<n>**: • **0**: Result codes are returned from the modem. Default and recommended. • **1**: Enable Quiet mode, suppressing result codes.. If **<n>=0**, the modem returns OK. If **<n>=1**, result codes are suppressed and there is no response.
S<n>[=<x>] S<n>?	**S-Register Set/Query** Sets (or queries) the contents of the specified S-register **<n>** to the new value **<x>**. Zeros are assumed where parameter values are omitted. **Var.** **Range** **<n>** Valid S-register number (See Table 3-9 on page 76 on page 76 for values). **<x>** as determined by the S-register **<n>**.
T (ignored)	**Tone dialing** This command is provided for compatibility reasons; no action is taken by the modem. Parameters are ignored.
V[<n>]	**Verbose result code format** Specifies whether the modem displays the result codes in numeric format (non-verbose) or as words (verbose). See page 78 for a numerical list of the result codes. *Note: Numeric codes are returned as ASCII character numerals.* This command also affects framing of responses (see page 22 for details). Settings for **<n>** are: • **0**: Numeric result codes • **1**: Verbose result codes (default) **Result codes** • If **<n>=0**, the result code is 0. • If **<n>=1**, the result code is OK. (The default.) • ERROR or 4 results otherwise, depending on the current state (verbose or not)

Table 3-8: Command Reference Table (ASCII Alphabetic)

Command	Description
X[<n>]	**Connection code format and call monitoring** Enables tone detection options used in the dialing and handshaking process. As options are chosen, the result codes are also affected. The prime function is to control the modem call response capabilities when the **ATD** (Dial) command (see page 27) is issued. **Dial tone detection** When disabled, the modem waits for the period set in register **S6** (length of pause, see page 77) and dials "blind," without trying to detect a dial tone. When enabled, the modem allows five seconds to receive at least 1 second of dial tone. If none is detected then the result code is NO DIAL TONE. **Busy signal detection** When disabled, the modem waits for the period set in register **S7** (wait time for connection, see page 77). If no connection is made then the result code is NO CARRIER. When enabled, the modem can return the result code BUSY if detected. For **X0**, the modem returns CONNECT only, while for other values of **<n>**, a more detailed CONNECT<text> is returned. Values enable (**Y**) or disable (*N*) tone detection and result codes as indicated in the chart below: Value / Dial Tone / Busy Signal 0 / *N* / *N* 1 / *N* / *N (default)* 2 / **Y** / *N* 3 / *N* / **Y** 4 / **Y** / **Y**
Z *Note: Additional commands on the same line are ignored.*	**Reset modem to user-defined profile** The modem disconnects any active call, and then resets the command and register parameters to the defaults stored in the non-volatile memory's user profile by the **AT&W** command (see page 26).

Status Registers

Some of these registers relate to the call progress timing at the IWF (the interface between the GSM network and the PSTN) with the PSTN connection. These are noted below using the (Remote) tag.

Table 3-9: S registers

Reg.	Description	Range	Default	Units
0	**Number of rings before answer (or accept/reject PDP context activation request)** **GSM mode** When operating in *GSM voice or CSD mode, the* **S0** status register is used to set the number of rings before automatically answering a call—**<n>** is a numeric value between 0 and 255 representing the number of rings before pickup. A value of **<n>=0** deactivates auto-answering.	0–255	000	rings
	GPRS mode When operating in *GPRS packet mode,* the **S0** status register can be used to set whether the modem automatically accepts incoming PDP context activation requests from the network. • If **<n>=0**, the modem will not automatically accept a network connection request. • If **<n>=1** or any other greater value, the modem will automatically accept a connection request. *Note:* **ATS0=0** *does not perform an automatic GPRS detach.* **Inquiry** **ATS0?** returns the current setting of the register.	0, 1	0	Boolean
3	**Command line termination character (usually <CR>)** Sets the standard end-of-line character used to indicate the end of an AT command. This character is also used as the carriage return character for framing responses and result codes in command state. The default and standard line termination character is the carriage return <CR> (ASCII 13).	0–127	013 (CR)	ASCII
4	**Response formatting character (usually <LF>)** Sets the standard character sent by the modem to the host at the end of a response or return code in command state. The default and standard response-end character is the line feed <LF> (ASCII 10).	0–127	010 (LF)	ASCII
5	**Command line editing character (usually <BS>)** Sets the standard character used to backspace when editing on the command line. The default and standard response-end character is the backspace <BS> (ASCII 8).	0–127	008 (BS)	ASCII

Table 3-9: S registers (cont.)

Reg.	Description	Range	Default	Units
6	**Length of pause before dialing (ignore dial tone)** This register denotes the wait time (between 2 and 10 seconds) before a blind dial, with no dial tone detection. The default value is **<n>=2** seconds. The value of ATS6 is used when the ATX command is set to 1 or 3. (See “X<n>” on page 28.) ATX settings of 2 and 4 enable dial tone detection and disable blind dialing. Therefore, when X is set to 2 or 4, the value of S6 is ignored.	0–255	002	seconds
7	**Wait time for connection** This register sets the limit, between 1 and 255 seconds, for how long the modem will wait for a carrier signal from a remote modem before hanging up. The default value is **<n>=50** seconds.	1–255	060	seconds
8	**Length of comma pause** This command is provided for compatibility reasons; no action is taken by the modem. Parameters are ignored.	0–255	002	seconds
10	**Carrier detection and carrier loss delay** Specifies how long the carrier from a remote modem can be absent before the modem disconnects (between 0 and 255 seconds). Longer delays allow temporary disruptions to the carrier without disconnecting. Shorter delays detect dropped carriers more efficiently when the connection is good. The default value is **<n>=15** seconds. A setting of **<n>=255** causes the modem to disable carrier detection and presume the carrier is always present.	1–255	015	0.1 s

Result Codes

The Sierra Wireless modem returns result codes when AT commands are entered. These result codes can be numeric or verbose (English language), as described beginning on page 21 of this document. The available codes are described in the following sections.

Basic Result Codes

This table provides a numerical list of the standard result codes possible.

Table 3-10: Result codes

Code	Verbose	Meaning
0	OK	Command executed without errors
1	CONNECT	Connected at any of the supported speeds.
2	RING	Alerting Signal (Ring) signal received from the network.
3	NO CARRIER	Carrier signal lost or not detected. Unable to activate the service.
4	ERROR	Command not recognized or could not be executed. Illegal command. Error in command line. Command line exceeds buffer size. Parameters out of range.
6	NO DIAL TONE	Dial tone not detected within timeout and subsequent commands not processed.
7	BUSY	Reorder (Busy) signal detected and subsequent commands not processed.
8	NO ANSWER	Five seconds of silence not detected after ring back when “@” (quiet answer) dial modifier is used.

Factory Default Settings

&F (Reset modem to factory default) restores these settings, overwriting any that currently differ from the factory defaults.

Table 3-11: Profile settings

Command	Description	Factory
&C	Data carrier detect (DCD) options	1
&D	Data terminal ready (DTR) options	2
+CAOC	Advice of charge	1
+CBST	Select bearer service type	7,0,1
+CCUG	Closed user group control	0,0,0
+CCWA	Call waiting control	0
+CLIP	Calling line identification presentation	0
+CLIR	Calling line identification restriction	0
+CMEE	Report mobile equipment error	0
+CMGF	Select SMS message format	0
+CNMI	New SMS message indications	2,1,0,0,0
+COLP	Connected line identification presentation	0
+CR	Service reporting control	0
+CRC	Cellular result codes for incoming calls	0
+CREG	GSM network registration	0
+CRLP	Radio link protocol	61,61,48,6,1,3
+CSDH	Show SMS text mode parameters	0
+CSMS	SMS message service	0
+DR	V.42bis compression reporting	0
+DS	V.42bis compression control	3,0,512,20
+FCLASS	Fax service class	0
+IFC	Local flow control	2,2
+IPR	Fixed local data rate	115200
E	Command echo mode	1

Table 3-11: Profile settings (cont.)

Command	Description	Factory
L	Set speaker loudness (ignored)	0
M	Set speaker mode (ignored)	0
Q	Quiet—suppress result codes	0
V	Verbose result code format	1
X	Connection code format and call monitoring	4
S registers		
S0	Number of rings before answer (or accept/reject PDP context activation request)	0 (disabled)
S3	Command line termination character (usually <CR>)	013 (CR)
S4	Response formatting character (usually <LF>)	010 (LF)
S5	Command line editing character (usually <BS>)	008 (BS)
S6	Length of pause before dialing (ignore dial tone)	002 (2 seconds)
S7	Wait time for connection	060 (60 seconds)
S8	Length of comma pause	002 (2 seconds)
S10	Carrier detection and carrier loss delay	015 (1.5 seconds)

Appendix A: ASCII Table

A

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
NUL	0	00	FS	28	1C	8	56	38
SOH	1	01	GS	29	1D	9	57	39
STX	2	02	RS	30	1E	:	58	3A
ETX	3	03	US	31	1F	;	59	3B
EOT	4	04	SP	32	20	<	60	3C
ENQ	5	05	!	33	21	=	61	3D
ACK	6	06	“	34	22	>	62	3E
BEL	7	07	#	35	23	?	63	3F
BS	8	08	$	36	24	@	64	40
HT	9	09	%	37	25	A	65	41
LF	10	0A	&	38	26	B	66	42
VT	11	0B	’	39	27	C	67	43
FF	12	0C	(	40	28	D	68	44
CR	13	0D	)	41	29	E	69	45
SO	14	0E	*	42	2A	F	70	46
SI	15	0F	+	43	2B	G	71	47
DLE	16	10	,	44	2C	H	72	48
XON	17	11	-	45	2D	I	73	49
DC2	18	12	.	46	2E	J	74	4A
XOFF	19	13	/	47	2F	K	75	4B
DC4	20	14	0	48	30	L	76	4C
NAK	21	15	1	49	31	M	77	4D
SYN	22	16	2	50	32	N	78	4E
ETB	23	17	3	51	33	O	79	4F
CAN	24	18	4	52	34	P	80	50
EM	25	19	5	53	35	Q	81	51
SUB	26	1A	6	54	36	R	82	52
ESC	27	1B	7	55	37	S	83	53

Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex
T	84	54	**c**	99	63	**r**	114	72
U	85	55	**d**	100	94	**s**	115	73
V	86	56	**e**	101	95	**t**	116	74
W	87	57	**f**	102	96	**u**	117	75
X	88	58	**g**	103	97	**v**	118	76
Y	89	59	**h**	104	98	**w**	119	77
Z	90	5A	**i**	105	99	**x**	120	78
[	91	5B	**j**	106	6A	**y**	121	79
\	92	5C	**k**	107	6B	**z**	122	7A
]	93	5D	**l**	108	6C	**{**	123	7B
^	94	5E	**m**	109	6D	**|**	124	7C
_	95	5F	**n**	110	6E	**}**	125	7D
‘	96	60	**o**	111	6F	**~**	126	7E
a	97	61	**p**	112	70	**DEL**	127	7F
b	98	62	**q**	113	71		128	80

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SIERRA WIRELESS
HEART OF THE WIRELESS MACHINE®