



IGM-HxII Modem Family

AT Commands

Reference Guide

Contains:

MultiModem[®] & SocketModem[®]

MT9234 Series



AT Commands Reference Guide for the MultiModem and SocketModem MT9234 Series

MT9234SMI
MT9234ZBA
MT9234ZBA-USB
MT9234MU
MT9234ZPX-UPCI
MT9234ZPX-PCIE
ISI9234PCIE

PN S000434F, Version F

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Revisions

Revision Level	Date	Description
A	04/13/07	Initial release.
B	07/12/07	Updated the Escape Sequence text. Added a statement indicating that some commands may not apply to every MT9234 build option. Deleted the \$LL command. Updated the \$LB command.
	08/09/07	Added a note that Voice commands other individual commands cannot be used with the SMI build.
C	10/17/07	Added ISI9234PCIE to the product list to which these commands apply. Updated the Technical Support list.
D	03/25/08	Removed +VDT command. Removed S2 range of 128-255. Changed S24 default to 0. Changed S89 default to 0 and range to 0, 5-65. Changed Communication Standard Setting command "B" defaults to 0 and 15. Added values 4 and 6 to &T command.
E	01/02/09	Added the Quick Connect Command \$FC. Removed +VLS values 8-15 (only values 1-7 are supported).
F	04/28/09	Updated the "Country/Regional Code Configuration" chapter. Changed the syntax for +GCI. Added a note to the following commands that they do not work with parallel, USB, PCI, PCIe: %DC, %DT, %H, %S, \$D, \$EB, \$LB, \$RP, \$SB, #P, #S, and all Callback Security Commands.

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Chapter 1 – AT Commands, S-Registers, and Result Codes

Introduction

The AT commands are used to control the operation of your modem. They are called *AT* commands because the characters **AT** must precede each command to get the *AT*tention of the modem.

AT commands can be issued only when the modem is in command mode or online command mode.

- The modem is in *command mode* whenever it is not connected to another modem.
- The modem is in *data mode* whenever it is connected to another modem and ready to exchange data. *Online command mode* is a temporary state in which you can issue commands to the modem while connected to another modem.
- To put the modem into *online command mode* from *data mode*, you must issue an *escape sequence* (**+++AT**) and the command, e.g., **+++ATH** to hang up the modem. To return to *data mode* from *online command mode*, you must issue the command **ATO**.

To send AT commands to the modem you must use a communications program, such as the HyperTerminal applet in Windows or some other available terminal program. You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem; e.g., to turn auto answer on or off.

The format for entering an AT command is **ATXn**, where *X* is the command and *n* is the specific value for the command, sometimes called the command *parameter*. The value is always a number. If the value is zero, you can omit it from the command; thus, **AT&W** is equivalent to **AT&W0**. Most commands have a *default* value, which is the value that is set at the factory. The default values are shown in the “AT Command Summary”.

You must press ENTER (it could be some other key depending on the terminal program) to send the command to the modem. Any time the modem receives a command, it sends a response known as a *result code*. The most common result codes are *OK*, *ERROR*, and the *CONNECT* messages that the modem sends to the computer when it is connecting to another modem. See a table of valid result codes at the end of this chapter.

You can issue several commands in one line, in what is called a command *string*. The command string begins with **AT** and ends when you press ENTER. Spaces to separate the commands are optional; the command interpreter ignores them. The most familiar command string is the *initialization string*, which is used to configure the modem when it is turned on or reset, or when your communications software calls another modem.

Note: This document applies to all the MT9234 products. However, some commands may not apply to all MT9234 builds.

A Note About Fax Commands

Fax commands are covered in two separate fax reference guides. These guides are included on the product CD and are posted on the Multi-Tech Web site:

<http://www.multitech.com/DOCUMENTS/Families/MultiModemZBA/manuals.asp>.

- Fax Service Class 1 and Fax Service Class 1.0 Developer's Guide.
Document number: S000262x
- Fax Developer's Guide for Classes 2 and 2.0/2.1
Document number: S000239x

Data and General Commands

AT

Description:

Attention Code

The attention code precedes all command lines except A/, A: and escape sequences.

ENTER Key

Description:

Press the ENTER (RETURN) key to execute a command.

+++AT

Syntax:

Escape Sequence

+++AT<CR>

Description:

Allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, AT commands are sent directly to the modem.

Use the return to on-line data mode command (O<value> – Return to On-Line Data Mode) to return to data mode.

A/

Syntax:

Repeat Last Command

A/

Description:

This command repeats the last AT command. The modem repeats the command currently in the command buffer.

IMPORTANT:

Do not use the AT prefix with this command.

Do not conclude the command with a terminating character (ENTER).

A

Syntax:

Answer

ATA

Description:

This command instructs the modem to connect to the line and establish a connection with the remote modem or DCE. This command can be canceled if the modem receives a new command or character from the host system before the handshake begins.

Result Codes:

CONNECT if a connection is established and the extended result code parameter is equal to 0. (See **X<value>** – Select Result Code and Monitor Call Progress).

CONNECT <rate> if a connection is established and the extended result code parameter is not equal to 0.

NO CARRIER if a connection cannot be established or the modem aborts the connection on request of the host system.

OK if the commands are aborted or DTR is turned off by the host system when the data terminal ready control is not set to 0. See **&D** – DTR Control.

ERROR if the modem is in on-line command mode when receiving the **A** command.

B

Description:

Communication Standard Setting

This command selects the communication standard used by the modem.

Syntax:

ATB<value>

Values:

- 0 Selects CCITT V.22 mode when modem is at 1200 bps.
- 1 Select Bell 212A when modem is at 1200 bps.
- 2 Deselect V.23 reverse channel (same as B3).
- 3 Deselect V.23 reverse channel (same as B2).
- 15 Select V.21 when the modem is at 300 bps.
- 16 Select Bell 103J when the modem is at 300 bps.

Defaults:

0 and 15

Result Codes:

OK if <value> = 0-3, 15, 16

ERROR if <value> ≠ 1.

D**Dial**

Description: This command instructs the modem to begin the dialing sequence. The dial string, which is made up of the telephone number and dial modifiers is entered after the **D** command.

A dial string can be up to 60 characters long. Any digit or symbol may be dialed as touchtone digits. Characters such as spaces, hyphens, and parentheses are ignored by the modem and may be included in the dial string to enhance readability.

Syntax: ATD<dial_strings>

Dial String Values: Phone number and dial modifiers.

Dial string modifiers:

L Redial the last number. (Must be placed immediately after **ATD**.)

P Select pulse-dialing.

T Select tone-dialing.

V Dial using speakerphone. Instructs the modem to switch to speakerphone mode and dial the number. Use the **ATH** command to disconnect the voice call.

W Wait for dial tone. This command instructs the modem to wait for a second dial tone before processing the dial string. (**X2**, **X4**, **X5**, **X6**, or **X7** must be selected.)

, Pause during dialing for the amount of time set in register S8.

; Return to command mode. Instructs the modem to return to command mode after it has finished dialing without disconnecting the call. This modifier must be the last character in the dial string.

! Hook flash. Instructs the modem to go on-hook for 0.5 seconds and then return to off-hook.

@ Wait for quiet answer. Instructs the modem to wait for 5 seconds of silence after dialing the number. If silence is not detected, the modem sends a **NO ANSWER** result code back to the user.

^ Disable data calling tone transmission.

\$ Detect AT&T call card “bong” tone. The character should follow the phone number and precede the user’s call card number:

ATDT1028806127853500\$123456789

S=<location> Dial a number previously stored in the register. Instructs the modem to dial a telephone number previously stored using the **&Z<location>=<dial_string>** command. Valid storage locations are 0 to 2 (0–1 for Parallel {internal}).

Example: ATDS=2

Default: T

Result Codes: **CONNECT** if a connection is established and the extended result code parameter is equal to 0. (See **X<value>** – Select Result Code and Monitor Call Progress).

CONNECT <rate> if a connection is established and the extended result code parameter is not equal to 0.

NO CARRIER if a connection cannot be established or the modem aborts the connection on request of the host system.

BUSY if the **W** or **@** modifiers are used and a busy signal is detected.

NO ANSWER if the **@** modifiers is used and the remote ring followed by 5 seconds of silence is not detected before expiration of the connection timer. See **S7** – Connection Completion Time-Out.

OK if the commands are aborted or DTR is turned off by the host system when the data terminal ready control is not set to 0. See **&D<value>** – Data Terminal Ready (DTR) Control.

ERROR if the modem is in on-line command mode when receiving the **A** command.

E Echo Command

Description: Enables or disables the modem's echo feature. When the echo feature is selected and the modem is in the command mode, characters sent to the modem are sent back to the host and displayed on the monitor.

Syntax: ATE<value>

Values: 0 Do not echo keyboard input to the terminal.
1 Do echo keyboard input to the terminal.

Default: 1

F Online Data Character Echo Command

Description: Controller-based products support this command to ensure backward compatibility with communications software that issues the F1 command.

Syntax: ATF<value>

Values: 0 Enable online data character echo. (Not supported.)
1 Disable online data character echo (included for backward compatibility).

Default: 1

Result Codes: **OK** if <value> = 1
ERROR if <value> ≠ 1.

H Hook Control

Description: Instructs the modem to go on-hook to disconnect a call or go off-hook to make the telephone line busy.

Syntax: ATH<value>

Values: 0 Go on-hook (hang up).
1 Go off-hook (make the phone line busy).

Default: 0

Result Codes: **OK** if <value> = 0 to 1
ERROR if <value> ≠ 0 to 1.

I Request ID Information

Description: Use this command to display product information about the modem. In each case the information is transmitted to the host system followed by a final result code.

Syntax: ATI<value>

Values:

- 0, 3 Returns the modem identity string and driver version number.
- 1 Calculates a ROM checksum and displays it on the DTE (e.g., 12AB).
- 2 Performs a ROM check, calculates the checksum, and then verifies the checksum by displaying OK or ERROR.
- 4 Returns firmware version for the data pump (e.g., 94).
- 5 Returns the code version, board ID, and country/region ID in hexadecimal.
- 9 Returns the country/regional code in English.
- 11 Displays connection information as described below.

Default: 0

Result Codes: The AT111 results are listed on two screens. To get to the second screen, press any key or ESC to Exit. The following is an example of the **AT111** results.

Description	Status
Last Connection	V.92
Initial Transmit Carrier Rate	28800
Initial Receive Carrier Rate	50666
Final Transmit Carrier Rate	28800
Final Receive Carrier Rate	50666
Protocol Negotiation Result	LAPM
Data Compression Result	V44
Estimated Noise Level	46
Receive Signal Power Level	(-dBm) 18
Transmit Signal Power Level	(-dBm) 12
Round Trip Delay	(msec) 10
Description	Status
Near Echo Level	(-dBm) NA
Far Echo Level	(-dBm) NA
Transmit Frame Count	0
Transmit Frame Error Count	0
Receive Frame Count	1
Receive Frame Error Count	0
Retrain by Local Modem	0
Retrain by Remote Modem	0
Rate Renegotiation by Local Modem	0
Rate Renegotiation by Remote Modem	0
Call Termination Cause	0
Robbed-Bit Signaling	10
Digital Loss	(dB) 6
Remote Server ID	NA
Last PCM S PTR	EBB3
Connection Time	(msec) 19646

The **AT111** command may be issued from on-line command mode or after the end of a call. After a call, some of the values are no longer valid.

M Monitor Speaker Mode

Description: Turns the speaker on and off.

Syntax: ATM<value>

Values:

- 0 Speaker always off.
- 1 Speaker on until carrier signal detected.
- 2 Speaker always on when modem is off-hook.
- 3 Speaker on until carrier is detected, except while dialing.

Default: 1

Result Codes: OK if <value> = 0 to 3
ERROR if <value> ≠ 0 to 3.

N Modulation Handshake

Description: Sets the modem protocol for handling handshake negotiation at connection time if the communication speed of the remote modem is different from the speed of the ATN<value>

Values: 0 Modem performs handshake only at communication standard specified by S-Register S37 and the B<value> command.
1 Modem begins handshake at communication standard specified by S-Register S37 and command **B**. During handshake, fallback to a lower speed can occur.

Default: 1

Result Codes: **OK** if <value> = 0 to 1
ERROR if <value> ≠ 0 to 1.

O Return Online to Data Mode

Description: Exits online command mode and enters online data mode. If the modem is not in online command mode when this command is received, the modem generates an **ERROR** result code.

Syntax: ATO<value>

Values: 0 Exits online command mode and returns to data mode.
1 Issues a retrain before returning to online data mode.
3 Issues a rate renegotiations before returning to online data mode.

Default: 0

Result Codes: **CONNECT** if <value> = 0, 1, 3 and result code and call progress monitor are set to 0 (**X0**).
CONNECT <rate> if <value> = 0, 1, 3 and the result code and call progress monitor are not set to 0 (**X<value>** where n = 1 to 7).
NO CARRIER if the connection is not successfully resumed.
ERROR if <value> ≠ 0, 1, 3.

P Set Pulse or Tone Dialing Default

Description: Configures the modem for pulse (non-touch-tone) or Tone dialing. All subsequent **D<dial_string>** commands use pulse dialing until either the **T** command or a tone dial modifier is received by the modem. Tone dialing is the default setting. This command does not use parameters and generates an **ERROR** result code when parameters are attached to the command.

Syntax: ATP

Values: P Pulse Dialing
T Tone Dialing

Default: T

Q Result Codes Enable/Disable

Description: Result codes are informational messages sent from the modem and displayed on the monitor. Basic result codes include **OK**, **CONNECT**, **RING**, **NO CARRIER**, and **ERROR**.
Use the **Q<value>** command to enable or disable result code generation by the modem. If result codes are disabled and an invalid parameter value is entered, the modem does not generate an **ERROR** result code because result codes are turn off.

Syntax: ATQ<value>

Values: 0 Enable result codes.
1 Disable result codes.

Default: 0

Result Codes: **OK** if <value> = 0 to 1
ERROR if <value> ≠ 0 to 1.

Sr S-Register Control

Description: Use this command to view or change an S-register. S-registers contain parameters used by the modem. This command has two forms, one to show the contents of the register and the other to change the contents of the register. Some registers are read only and are not affected by the **S<register number>=<value>** command. Each register has a specific function.

Syntax: **ATS<register number>=<value>** Sets the contents of the register to <value> if the register is not read only.
ATS<register number>? Displays register contents.

Default: None

Result Codes: **OK** if <register number> is a valid register.
ERROR if <register number> is not a valid register.

T Select Tone Dialing

Description: Configures the modem for DTMF (touch-tone) dialing. All subsequent **D<dial string>** commands use tone dialing until either the **P** command or a pulse dial modifier is received by the modem. Tone dialing is the default setting. This command does not use parameters and generates an ERROR result code when parameters are attached to the command.

Syntax: ATT

V Result Code Format

Description: Controller-based modems generate result codes using one of two formats. Verbose mode generates result codes in the familiar text formats using words. Numerical mode generates result codes as a number. Each result codes has a number assigned to it.

Use this command to switch between numerical and verbose modes. Call progress and negotiation progress messages are affected by this command.

Syntax: ATV<value>

Values: 0 Displays result codes as digits (terse response).
1 Displays result codes as words (verbose response).

Default: 1

Result Codes: OK if <value> = 0 to 1.
ERROR if <value> ≠ 0 to 1.

W Result Code Options

Description: Use this command to select the modem's CONNECT message options.

Syntax: ATW<value>

Values: 0 CONNECT result code reports DTE receive speed; disables protocol result codes.
1 CONNECT result code reports DTE receive speed; enables protocol result codes.
2 CONNECT result code reports DCE receive speed; enables protocol result codes.

Default: 2

Result Codes: OK if <value> = 0 to 2.
ERROR if <value> ≠ 0 to 2.

X Select Result Code and Monitor Call Progress

Description: Use this command to enable tone detection options used in the dialing process. As each function is chosen, the modem's result codes are also affected. Therefore, this command is frequently used to control the modem's responses. The primary function of this command is to control call response capabilities.

Function	Enabled	Disabled
Ext Result Codes	Modem displays basic result codes, connect messages with data rate, and an indication of the modems error correction and data compression operations.	Modem displays the basic result codes.
Dial Tone Detect	Modem dials upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.	Modem dials a call regardless of whether it detects a dial tone. Register S6 contains the dial delay.
Busy Tone Detect	Modem monitors for busy tones.	Modem ignores any busy tones it receives.

Syntax: ATX<value>

Values:	Command	Extended Result Codes	Dial Tone Detect	Busy Tone Detect
	0	Disabled	Disabled	Disabled
	1	Enabled	Disabled	Disabled
	2	Enabled	Enabled	Disabled
	3	Enabled	Disabled	Enabled
	4	Enabled	Enabled	Enabled
	5, 6	Enabled	Enabled	Enabled
	7	Disabled	Enabled	Enabled

Default: 4

Result Codes: OK if <value> = 0 to 7.
ERROR if <value> ≠ 0 to 7.

Call Progress Result Codes:

Command	Result Codes
0	OK, RING, ERROR, CONNECT, NO CARRIER
1	OK, RING, ERROR, CONNECT<RATE>, NO CARRIER
2	OK, RING, ERROR, CONNECT<RATE>, NO CARRIER, NO DIALTONE
3	OK, RING, ERROR, CONNECT<RATE>, NO CARRIER, BUSY, BLACKLISTED
4	OK, RING, ERROR, CONNECT<RATE>, NO CARRIER, BUSY, BLACKLISTED, DELAYED, NO DIALTONE, CALL WAITING DETECTED
5, 6	OK, RING, ERROR, CONNECT<RATE>, NO CARRIER, BUSY, BLACKLISTED, DELAYED, NO DIALTONE, CALL WAITING DETECTED
7	OK, RING, ERROR, CONNECT, NO CARRIER

Z Reset and Recall Stored Profile

Description: Use this command to make the modem go on-hook and restore the profile saved by the last **&W** command.
Note: Both **Z0** or **Z1** restore the same profile (See **&W** – Store Current Configuration). Agere Systems controller-based modems have only one stored profile.

Syntax: ATZ<value>

Values: 0 Reset and restore stored profile (saved by the last **&W** command).
1 Same as **Z0**.

Default: None

Result Codes: OK if <value> = 0 to 1.
ERROR if <value> ≠ 0 to 1.

&C**Data Carrier Detect (DCD) Control**

Description:	Use this command to control the modem's response to receiving a remote modem's carrier signal. Data carrier detect (DCD) is a signal from the modem to the computer indicating that the carrier signal is being received from a remote modem. The modem typically turns off DCD when it no longer detects the remote modem's carrier signal.
Syntax:	AT&C<value>
Values:	0 DCD remains ON at all times. 1 DCD turns ON when the remote modem's carrier signal is detected, and turns OFF when the carrier signal is not detected.
Default:	1
Result Codes:	OK if <value> = 0 to 1. ERROR if <value> ≠ 0 to 1.

&D**Data Terminal Ready (DTR) Control**

Description:	Use this command to select the modem's response to the data terminal ready (DTR) signal. The host system generates the DTR signal and supplies it to the modem.
Syntax:	AT&D<value>
Values:	0 Modem ignores true status of DTR signal and treats it as always on. Use this command if the computer does not provide DTR to the modem. 1 If DTR is not detected while in online data mode, the modem enters command mode, issues an <i>OK</i> , and remains connected. 2 If DTR signal is not detected while in online data mode, the modem disconnects. 3 Resets the modem on the on-to-off DTR transition.
Default:	2
Result Codes:	OK if <value> = 0 to 3. ERROR if <value> ≠ 0 to 3.

&E**XON/XOFF Pacing Control**

Description:	Enables or disables XON/XOFF pacing.
Syntax:	AT&E<value>
Values:	12 Disables XON/XOFF pacing. 13 Enables XON/XOFF pacing.
Default:	12
Result Codes:	OK if <value> = 12 to 13. ERROR if <value> ≠ 12 to 13.

&F**Restore Factory Default Configuration**

Description:	Use this command to reset the modem to the configuration programmed at the factory. This operation replaces all of the command options* and S-register settings in the active configuration with factory default values. Note: In voice mode, the command line is ignored if the AT&F command is placed on the same line as the other commands. To load factory settings in voice mode, issue the &F<value> command by itself.
Syntax:	AT&F<value>
Values:	0 Loads factory settings as active configuration.
Default:	None
Result Codes:	OK if <value> = 0. ERROR if <value> ≠ 0.
Note:	There are several noted exceptions to this command and caution should be used when determining the state of the command options once this command has been executed.

&G**V.22bis Guard Tone Control**

Description: Use this command to select which guard tone, if any, the modem will send while transmitting in the high band (answer mode). This command is only used in V.22 and V.22 bis mode. This option is not used in North America; it is for international use only.

Syntax: AT&G<value>

Values:

0	Disables guard tone.
1	Sets guard tone to 550 Hz.
2	Sets guard tone to 1800 Hz.

Default: 0

Result Codes: OK if <value> = 0 to 2.
ERROR if <value> ≠ 0 to 2.

Note: The **&G** command is not used in North America.

&K**Local Flow Control Selection**

Description: Use this command to select a flow control method.

Syntax: AT&K<value>

Values:

0	Disables flow control.
3	Enables CTS/RTS hardware flow control.
4	Enables XON/XOFF software flow control.

Default: 3

Result Codes: OK if <value> = 0, 3, or 4.
ERROR if <value> ≠ 0, 3, or 4.

&L**Leased Line Operation**

Description: Sets standard dial-up or leased-line operation. Note: This command does not apply to all models or build options.

Syntax: AT&L<value>

Values:

0	The modem is set for standard dial-up operation.
1	The modem is set for leased line operation in originate mode.
2	The modem is set for leased line operation in answer mode.

Default: 0

Note: For **&L1** and **&L2**, there is a 30-second window between power up and the starting of the leased line handshake. During this time, you can turn off the command, if desired.

Result Codes: OK if <value> = 0 to 2.
ERROR if <value> ≠ 0 to 2.

&P**Pulse Dial Make-to-Break Ratio Selection**

Description: Use this command to select the make-to-break ratio. This command is effective only for Japan.

Syntax: AT&P<value>

Values:

0	Selects 39% to 61% make-to-break ratio at 10 pulses per second.
1	Selects 33% to 67% make-to-break ratio at 10 pulses per second.
2	Selects 33% to 67% make-to-break ratio at 20 pulses per second.

Default: 1

Note: The **&P2** command is available only if the country/regional code is set to Japan.

Result Codes: OK if <value> = 0 to 2.
ERROR if <value> ≠ 0 to 2.

&Q**Asynchronous Communications Mode**

Description:	This command is supported to ensure backward compatibility with communication software that issues the &Q command. The preferred method for changing the asynchronous communication mode is to use the \N command.
Syntax:	AT&Q<value>
Values:	0 Asynchronous with data buffering. Same as \N0 . 5 Error control with data buffering. Same as \N3 . 6 Asynchronous with data buffering. Same as \N0 . 8 MNP error control mode. If MNP error control is not established, the modem falls back according to the setting in S36 . 9 V.42 or MNP error control mode. If neither error control is established, the modem falls back according to the setting in S36 .
Default:	5
Result Codes:	OK if <value> = 0, 5, 6, 8, or 9. ERROR if <value> ≠ 0, 5, 6, 8, or 9.

&S**Data Set Ready (DSR)**

Description:	Use this command to control DSR action.
Syntax:	AT&S<value>
Values:	0 DSR is always ON. 1 DSR goes ON only during a connection.
Default:	0
Result Codes:	OK if <value> = 0,1. ERROR if <value> ≠ 0, 1.

&T**Self-Test Commands**

Description:	Use this command to perform diagnostic tests on the modem. Each test is designed to isolate a problem location when experiencing periodic data loss or random errors.
Syntax:	AT&T<value>
Values:	0 Terminates the test in progress. 1 The &T1 command runs the Local Analog Loopback Test. This test verifies modem's transmitter and receiver circuits are functioning properly. To work properly, the modem must be off-line. 3 The AT3 runs the Local Digital Loopback Test. This test allows you to verify that the remote computer or terminal, the remote modem, serial ports, the telephone line, and the local modem are functioning properly. To work properly, the modem must be online. 4 The &T4 command must be sent to the remote modem to run the Remote Digital Loopback Test. 6 The &T6 command runs the Remote Digital Loopback Test. This test allows you to verify that the local computer or terminal, the two modems, and the transmission line between them are functioning properly. To work properly, the modem must be online.
Default:	None
Result Codes:	OK if <value> = 0. CONNECT if <value> = 0 or 3. ERROR if <value> ≠ 0, 1, or 3.

&V**View Active Configuration**

Description:	Use this command to view the active configuration.
Syntax:	AT&V

&W Store Current Configuration

Description: Use this command to store the modem's command options and all S- registers except S3, S4, and S5. The **Z0** command or a power-up reset of the modem restores these profiles.

Note: This command is not valid during a cellular call.

Syntax: AT&W<value>

Values: 0 Stores current configuration as profile 0.

Default: 0

Result Codes: OK if <value> = 0.
ERROR if <value> ≠ 0.

&Z Store Dialing Location and Number

Description: Use this command to store a dialing string. Controller-based modems can save four dialing strings. The format for the command is: **&Z<storage_location> = <dialing_string>**. The dial string may contain up to 40 characters. The **ATDS=<storage_location>** command dials using the stored string.

Syntax: AT&Z<location>=<stored number>

Values: <storage_location> = 0 to 2 for serial; 0 to 1 for parallel.

<dialing_string> = Dialing command.

Default: None

Result Codes: OK if <value> = 0 to 2.
ERROR if <value> ≠ 0 to 2.

\A Select Maximum MNP Block Size

Description: Use this command to select a *MNP* error corrected link with a maximum block size controlled by the parameter <block size>.

Syntax: AT\A<value>

Values: 0 64-character maximum

1 128-character maximum

2 192-character maximum

3 256-character maximum

Default: 3

Result Codes: OK if <value> = 0 to 3.
ERROR if <value> ≠ 0 to 3.

\B Transmit Break

Description: Use this command in non-error-controlled mode. The command causes the modem to transmit a break signal to the remote modem. The minimum break length is 100 ms and the maximum break length is 900 ms. The <break_time> parameter has values between one and nine with each increment representing 100 ms. The default of <value> = 3 corresponds to a length of 300 ms.

The command works in conjunction with the **\K** command.

Syntax: AT\B<value>

Values: <break_time> = 0–9 in 100 ms units

Default: 3 (300 ms)

Result Codes: OK if <value> = 0, 1.
ERROR if <value> ≠ 0, 1.

IK**Break Control**

Description: Use this command to control the response of the modem to a break received from the DTE, remote modem, or the **\B<value>** command. The command values are different in three situations:

Syntax: AT\K<value>

Values: **IK<value> – Modem Is Operating in Data Transfer Mode**

The modem receives a break from the DTE when it is operating in data transfer mode.

Values	Function
0, 2, 4	Enter online command mode, no break sent to remote modem.
1	Clear data buffers and send a break to remote modem.
3	Send a break to the remote modem immediately.
5	Send a nondestructive, nonexpedited break to remote modem. 5 is the default.

IK<value> – Modem Is in Online Command Mode During Data Connection

The modem is in the online command state (waiting for AT commands) during a data connection, and the **\B<value>** command is received in order to send a break to the remote modem.

Values	Function
0, 1	Clear data buffers and send break to the remote modem.
2, 3	Send a break to the remote modem immediately.
4, 5	Send a break to the remote modem in sequence with data. 4, 5 are the defaults.

IK<value> – Break Is Received During Connection

The modem receives a break from the remote modem during a connection.

Values	Function
0, 1	Clear data buffers and send break to the DTE.
2, 3	Send a break to the DTE immediately.
4, 5	Send a break to the DTE in sequence with the received data. 4, 5 are the defaults.

Result Codes: OK if <value> = 0 to 5.
ERROR if <value> ≠ 0 to 5.

IN**Error Correction Mode Selection**

Description: Use this command to select the type of error control used by the modem when sending or receiving data.

Syntax: AT\N<value>

Values:

0	Buffer mode. No error control (same as &Q6).
1	Direct mode.
2	MNP or disconnect mode. The modem attempts to connect using MNP2-4 error control procedures. If this fails, the modem disconnects. This is also known as MNP reliable mode.
3	V.42, MNP, or buffered. The modem attempts to connect in V.42 error control mode. If this fails, it will attempt to connect in MNP mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/MNP auto reliable mode (same as &Q5).
4	V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the modem disconnects.
5	V.42, MNP, or buffered (same as IN3).
7	V.42, MNP, or buffered (same as IN3).

Default: 3

Result Codes: OK if <value> = 0 to 5, or 7.
ERROR if <value> ≠ 0 to 5, or 7.

IQ**Local Flow Control Selection**

Description: Use this command to set the local flow control method.

Syntax: AT\Q<value>

Values: 0 Disable flow control (same as **&K0**).
 1 XON/XOFF software flow control (same as **&K4**).
 3 RTS/CTS to DTE. (same as **&K3**)

Default: 3

Result Codes: OK if <value> = 0, 1, 3.
 ERROR if <value> ≠ 0, 1, 3.

IT**Inactivity Timer**

Description: Use this command to specify the delay time used by the inactivity timer. The delay time is the length of time in minutes that the modem waits during periods of inactivity before disconnecting. Periods of inactivity are defined by no data being sent or received by the DCE. To disable the inactivity timer use the **T0** command. The delay time may also be specified in S-register S30.

Syntax: AT\T<value>

Values: 0 Inactivity timer disabled.
 1 to 255 Specifies the length of time in minutes that the modem will wait before disconnecting when no data is sent or received.

Default: 0

Result Codes: OK if <value> = 0 to 255.
 ERROR if <value> ≠ 0 to 255.

IV**Protocol Result Code**

Description: Use this command to enable or disable protocol result codes.

Syntax: \V<value>

Values: \V0 Disables protocol result code appended to the DCE speed.
 \V1 Enables protocol result code appended to the DCE speed.
 \V2 Same as **\V1**.

Default: \V1

Result Codes: OK if <value> = 0, 1, 2.
 ERROR if <value> ≠ 0, 1, 2.

IX**XON/XOFF Pass-Through**

Description: Use this command to restrict the XON/XOFF flow control to the local DCE for processing or to have the local DCE send the flow control characters to the remote DCE.

Syntax: AT\X<value>

Values: 0 Modem processes XON/XOFF flow control characters locally.
 1 Modem passes XON/XOFF flow control characters.

Default: 0

Result Codes: OK if <value> = 0, 1.
 ERROR if <value> ≠ 0, 1.

-C**Data Calling Tone**

Description: Enables/disables the V.25 data calling tone to deny/allow data/fax/voice discrimination.

Syntax: AT-C<value>

Values: 0 Disable V.25 data calling tone to deny remote data/fax/voice discrimination.
 1 Enable V.25 data calling tone to allow remote data/fax/voice discrimination.

Default: 1

Result Codes: OK if <value> = 0, 1.
 ERROR if <value> ≠ 0, 1.

%A**Adaptive Answer Result Code Enable**

Description: The %A command controls whether the DATA or FAX result codes will be sent by the modem. The modem must be in fax mode for this command to work. Also, the modem must be set to **+FAA=1**, which enables the modem to distinguish between a fax and a data call. When these commands are enabled, the modem sends DATA to the computer when it detects data tones and FAX when it detects fax tones. These strings are used by some servers to select the appropriate communication program..

Syntax: AT%A<value>

Values: 0 Disables adaptive answer result codes.
1 Enables adaptive answer result codes.

Default: 0

Result Codes: OK if <value> = 0, 1.
ERROR if <value> ≠ 0, 1

%B**View Numbers in Blacklist**

Description: Blacklisting is a method of handling failed or troubled calls encountered during automatic dialing. This command is only used to display the contents of the blacklist when blacklisting is active. It does not affect the functionality associated with blacklisting.

When the blacklisting option is active, use this command to display the telephone numbers and status of any failed or troubled calls. The blacklisting option is associated with the country selection. Some countries have national requirements which prohibit repeat calls to the same number through automatic dialing.

Syntax: AT%B

Values: N/A

Result Codes: <list of phone numbers and their status> if country supports blacklisting.
OK if no failed calls occur.
ERROR if country selection does not support blacklisting.

%C**Data Compression Control**

Description: Use this command to enable or disable data compression. This command enables or disables V.44, V.42 *bis*, and MNP class 5 data compression. The command overwrites the current status of the **+DCS** command. The command is also overwritten by changes made by the **+DCS** command. On-line changes do not take effect until a disconnect occurs.

Syntax: AT%C<value>

Values: 0 Disable V.42bis/MNP 5. No data compression.
1 Enable V.42bis/MNP 5. Data compression enabled.

Default: 1

Result Codes: OK if <value> = 0, 1.
ERROR if <value> ≠ 0, 1.

%DC**AT Command Control**

Description: Use this command to set whether or not the modem will respond to AT commands.

Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT%DC<value>

Values: 0 The modem responds to AT commands. The modem will respond to AT%DC for 10 seconds after it is turned on.
1 The modem ignores AT commands.

Default: 0

%DT **Set AT Command Mode Timer**

Description: Sets the length of time that the command mode will be disabled when set for %DC1 (the modem ignores AT commands).
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT%DT<value>

Values: 0-255 in 1 second increments

Default: 0

%E **Fallback and Fall Forward Control**

Description: This command provides the option for the modem to automatically monitor line quality, to fall back when line quality is insufficient, and to fall forward when line quality is sufficient.

Syntax: AT%E<value>

Values: 0 Disable fallback and fall forward.
 1 Enable fallback and disable fall forward.
 2 Enable fallback and fall forward.

Default: 2

Result Codes: OK if <value> = 0, 1, 2.
 ERROR if <value> ≠ 0, 1, 2.

%H **Set Callback Security – Direct Connect Enable**

Description: Sets Callback Security to normal operation or to direct connect.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT%H<value>

Values: 0 Sets callback security to normal operation.
 1 All callback security calls will be direct connect regardless of whether the password or phone number has the - character.

Default: 0

%S **Command Speed Response**

Description: Sets the modem to respond to AT commands at desired speeds.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT%S<value>

Values: 0 Sets modem to respond to AT commands at all normal speeds.
 1 AT commands accepted at 115200 bps only. Other speeds are ignored.

Default: 0

+A8E**V.8 and V.8bis Operation Controls**

Description:

Use this command to set the control parameters for early call negotiation through V.8 and V.8bis. **+A8E** may also be used as an action command to reinitiate V.8 or V.8 bis if an earlier attempt to use either protocol has failed. (ITU-T Recommendation V.251 (02/98) standardized this command. However, the controller-based command set only includes partial support for the standard.)

On-Hook: If issued while the modem is on-hook, used to precondition V.8 and V.8bis originating and answering operation. It is issued by the DTE before the Dial (D) or Answer (A) command.

Off-Hook: If issued while the modem is off-hook, to (re)start V.8 or V.8bis negotiation. For example, if initial V.8 negotiation failed, but subsequent T.30 negotiation indicated V.8 capability, this command may be used to initiate V.8 negotiation.

The **ATD** and **ATA** commands behave as specified in V.250, and +A8n indications are not generated by the modem.

For subparameter values <v8o>=6 and <v8a>=5, the +A8l indications are issued during the course of the V.8 session to notify the DTE when the relevant V.8 signals are received.

<v8o> enables or disables DCE-controlled V.8 origination negotiation.

<v8a> enables or disables DCE-controlled V.8 answer negotiation.

<v8b> disables V.8 negotiation or sets it to DCE controlled or DTE controlled negotiation.

<a8cf> sets the V.8 CI signal call function to the value specified.

The valid range for this parameter is 0 to FF, with a default of 0xC1.

Syntax:

AT+A8E=<v8o>,<v8a>,<v8cf>,<v8b>

<v8o> Values:

<v8o> Decimal number which enables/disables issuance of +A8x indications during modem-controlled V.8 origination negotiation.

1 Enable DCE-controlled V.8 origination negotiation without +A8x indications. (Default)

6 Enable DCE-controlled V.8 origination negotiation with +A8x indications.

<v8a> Values:

<v8a> Decimal number which enables/disables issuance of +A8x indications during modem-controlled V.8 answer negotiation.

1 Enable DCE-controlled V.8 answer negotiation without +A8x indications. (Default)

5 Enable DCE-controlled V.8 answer negotiation with +A8x indications.

<v8b> Values:

<v8b> Decimal number which enables/disables V.8bis negotiation.

0 Disable V.8 negotiation.

1 Enable DCE-controlled V.8bis negotiation. (Default)

2 Enable DTE-controlled V.8 negotiation.

<v8cf> Values

<v8cf> Set the V.8 CI signal call function to the hexadecimal octet XY.
00 (Default)

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C1

Reporting:

+A8E? Reports current or selected values.

+A8E=? Reports supported parameter values.

Result Codes:

OK if <v8o> = 1, 6 and <v8a> = 1, 5 and <v8cf> = 0 to FF and <v8b> = 0 to 2.

ERROR if <v8o> ≠ 1, 6 or <v8a> ≠ 1, 5 or <v8cf> ≠ 0 to FF or <v8b> ≠ 0 to 2.

OK if <signal> = 0–10 and <sig en> = 0, 1 and <msg en> = 0, 1 and <supp delay> = 0,1.

ERROR if <signal> ≠ 0 to 10 or <sig en> ≠ 0, 1 or <msg en> ≠ 0, 1 or <supp delay> ≠ 0,1.

+A8T**Send V.8 bis Signal and/or Message**

Description: Use this command to send a V.8 bis signal or message from the local DCE. This command is only supported when V.80 is enabled.

Syntax: AT+A8T=<signal>,<1st message>,<2nd message>,<sig en>,<msg en>,<supp delay>

<signal> Values:

- 0 None
- 1 Initiating Mre.
- 2 Initiating MRd.
- 3 Initiating CRe, low power
- 4 Initiating CRe, high power
- 5 Initiating CRd
- 6 Initiating Esi
- 7 Responding MRd, low power
- 8 Responding MRd, high power
- 9 Responding CRd
- 10 Responding Esr

<sig_en> Values:

- 0 Enable detection of initiation signals. Default.
- 1 Enable detection or responding signals

<msg_en> Values:

- 0 Disable detection of messages. Default.
- 1 Enable detection of V.8 bis messages

<supp_delay> Values:

- 0 No delay inserted. Default.
- 1 Insert 1.5 second delay between transmitted V.8 bis signal and the subsequent V.8 bis message

Reporting:

- +A8T? Reports current or selected values.
- +A8T=? Reports supported parameter values.

Result Codes: OK if <signal> = 0 to 10 and <sig en> = 0, 1 and <msg en> = 0, 1 and <supp delay> = 0,1.
ERROR if <signal> ≠ 0 to 10 or <sig en> ≠ 0, 1 or <msg en> ≠ 0, 1 or <supp delay> ≠ 0,1.

+DCS**Select V.42bis or V.44 Data Compression**

Description: Use this command to configure the available compression algorithms. The <v42bis> parameter enables or disables the V.42 bis and the <v44> parameter enables or disables V.44. This command works in conjunction with the %C command and the result of either the %C command or the +DCS command replaces the current data compression configuration.

Syntax: AT+DCS=<v42bis>,<v44>

Values:

- 0,0 V.42bis and V.44 data compression are both disabled.
- 0,1 V.42bis is disabled; V.44 data compression is acceptable.
- 0,2 V.42bis is disabled; V.44 only when connected to a V.92 server.
- 1,0 V.42bis is acceptable; V.44 data compression is disabled.
- 1,1 V.42bis is acceptable; V.44 data compression is acceptable.
- 1,2 V.42bis is acceptable; V.44 only when connected to a V.92 server.

Reporting:

- +DCS? Reports current or selected values.
- +DCS=? Reports allowed parameter values.

Result Codes: OK if <v42bis> = 0, 1 and <v44> = 0 to 2.
ERROR if <v42bis> ≠ 0, 1 or <v44> ≠ 0 to 2.

+DR V.44 Data Compression Reporting

Description:	Enables or disables the V.44 data compression report. If the compression report is enabled, the +DR:<type> intermediate result code reports the current DCE-DCE data compression type. It is issued after the Error Control Report (+ER) and before the final result code (e.g., CONNECT).	
Syntax:	AT+DR=<value>	
Values:	0	Disables the V.44 compression report.
	1	Enables the V.44 compression report.
Default:	0	
Reporting:	+DR?	Reports current or selected values.
	+DR=?	Reports supported parameter values.
Result Codes:	OK if <value> = 0, 1. ERROR if <value> ≠ 0, 1. +DR: NONE Data compression not in use. +DR: V42B V.42bis is in use in both directions. +DR: V44 V.44 is in use in both directions.	

+DS V.42bis Data Compression

Description:	This extended-format compound parameter controls the V.42bis data compression function if this function is provided in the modem.	
Syntax:	AT+DS=<direction>,<compr_neg>,<max_dict>,<max_string>	
<direction> Values:	Specifies the desired direction(s) of operation of the data compression function from the DTE point of view. 0 Do not negotiate V.42 bis compression. 3 Modem accepts V.42 bis compression in both directions. Default.	
<compr_neg> Values:	Specifies whether or not the modem should continue to operate if the desired result is not obtained. 0 Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>. Default.	
<max_dict> Values:	Specifies maximum number of dictionary entries (2048 entries) negotiated. May be used by the DTE to limit the code word size transmitted, based on its knowledge of the nature of the data to be transmitted. Default = 2048.	
<max_string> Values:	Specifies maximum string length (32 bytes) to be negotiated. Default = 32.	
Reporting:	+DS?	Reports current or selected values.
	+DS=?	Reports allowed parameter values.
Result Codes:	OK ERROR	

+DS44**V.44 Data Compression**

Description:	Controls the V.44 data compression function.
Syntax:	AT+DS44=<direction>,<compression_negotiation>,<compatibility>,<max_codewords_tx>,<max_codewords_rx>,<max_string_tx>,<max_string_rx>,<max_history_tx>,<max_history_rx>
<direction> Values:	Specifies the DTE direction of the data compression. 0 No compression. 3 Compression in both directions (default).
<max_codewords_tx> Values:	Specifies the maximum number of code words to be negotiated in the transmit direction. 1024 Default. 256–2048 Maximum number of code words in transmit direction.
max_codewords_rx Values:	Specifies the maximum number of code words to be negotiated in the receive direction. 1024 Default. 256–2048 Maximum number of code words in receive direction.
max_string_tx Values:	Specifies the maximum string length to be negotiated in the transmit direction. 255 Default. 31–255 Maximum string length in transmit direction.
max_string_rx Values:	Specifies the maximum string length to be negotiated in the receive direction. 255 Default. 31–255 Maximum string length in receive direction.
max_history_tx Values:	Specifies the maximum length of the history buffer to be negotiated in the transmit direction. 5120 Default. 512–11008 History buffer size in transmit direction.
max_history_rx Values:	Specifies the maximum length of the history buffer to be negotiated in the receive direction. 4096 Default. 512–11008 History buffer size in receive direction
Reports:	+DS44=? Reports supported options. Example: +DS44: (3, 0), (0), (0), (256-2048), (256-2048), (31-255), (31-255), (512-11008), (512-11008). +DS44? Reports current or selected options. Example: +DS44: 3, 0, 0, 1024, 1024, 255, 255, 5120, 4096.
Result Codes:	OK ERROR

+EB Break Handling in Error Control Operation

Description: This extended-format compound parameter controls the break handling in V.42 operation. It accepts three numeric subparameters.

Syntax: AT+EB=<break_selection>,<default_length>

<break_selection> Values:

- 0 Ignore break. Default.
- 1 Nonexpedited, nondestructive.
- 2 Expedited, nondestructive.
- 3 Expedited, destructive.

<default_length> Values:

- 10 ms to 90 ms Specify break length.

Reports: +EB=? Reports supported options.
+EB? Reports current or selected options.

+EFCS 32-bit Frame Check Sequence

Description: This extended-format numeric parameter controls the use of the 16-bit or 32-bit frame check sequence (FCS) option in V.42.

Syntax: AT+EFCS=<value>

Value: 0 Sets the 32-bit frame check sequence to a 16-bit frame check sequence.

Reports: +EFCS? Reports current or selected options.
+EFCS=? Reports supported options.

+ER Error Control Report

Description: Use this command to enable or disable the error control report.

Syntax: AT+ER<value>

Values: +ER0 Error control reporting disabled (no +ER intermediate result code transmitted). Default.
+ER1 Error control reporting enabled (+ER intermediate result code transmitted).

Reports: +ER? Reports current or selected options.
+ER=? Reports supported options.
+ER <type> The +ER <type> reported is the current (negotiated or renegotiated) modem-modem error control type. If enabled, the intermediate result code is transmitted at the point during error control negotiation (handshaking) at which the modem has determined which error control protocol will be used (if any), before the final result code (e.g., CONNECT) is transmitted. Specifically, the +ER intermediate result code is issued after the modulation report (+MCR and +MRR) and before the data compression report (+DR).

Result Codes: +ER: NONE Data compression not in use.
+ER: LAPM V.42 LAPM protocol is in use.
+ER: ALT V.42 alternative protocol is in use.
OK if <value> = 0, 1.
ERROR if <value> ≠ 0, 1.

+ES**Error Control Selection**

Description:	Use this command to select the error correction mode. If the modem is operating in V.80 mode (synchronous buffered mode), and +ES=,,8 , the +ES? will always return +ES: 6,,8 . The setting of this command overwrites the W command, and the +ES command is overwritten by the setting on a W command.	
Syntax:	AT+ES=<orig_rqst>,<orig_fbk>,<ans_fbk>	
Values:	Values Combination	Mode
	+ES=1,0,1	Buffered mode
	+ES=0,1,0	Direct mode
	+ES=4,4,6	MNP or disconnect mode
	+ES=3,3,5	LAPM or disconnect mode
	+ES=4,0,6	MNP or buffered mode
	+ES=3,0,2	LAPM, MNP, or buffered mode (Default)
	+ES=2,0,2	LAPM or buffered mode
	+ES=3,2,4	LAPM, MNP, or disconnect mode
	+ES=,,8	V.42 sync buffer mode (V.80 enabled)
	+ES=6,,8	V.42 sync buffer mode (V.80 enabled)
Reports:	+ES?	Reports current or selected options.
	+ES=?	Reports supported options.
Result Codes:	OK ERROR	

+ESA**Set Up Error Control Parameters**

Description:	Sets the control parameters for the DCE in Synchronous Access Mode.	
Syntax:	AT+ESA=<trans_idle>,<frame_idle>,<crc_type>,<nrzi_en>	
Values:	Values Combination	Meaning
	+ESA=0,,,0,0,,	Disables CRC generation and checking.
	+ESA=0,,,1,0,,	Causes the DCE to generate a 16-bit CRC in the transmit direction in framed sub-Mode and check the CRC in the receive direction.
<crc_type> Values:	0	Disable CRC generation and checking.
	1	In framed submode, the 16-bit CRC specified in V.42 is generated by the DCE in the transmit direction and checked by the DCE in the receive direction.
Result Codes:	OK ERROR	

+ETBM**Call Termination Buffer Management**

Description:	Sets the behavior of the modem upon call termination. Only +ETBM=0,0,0 is a valid combination. This means that the modem will discard all the buffered data when the call is terminated.	
Syntax:	AT+ETBM=<pending_TD>,<pending_RD>,<timer> AT+ETBM=0,0,0	
Values:	<pending_TD>	0 specifies that disconnect will occur immediately and all buffered transmit data will be discarded when the local DTE requests call disconnection.
	<pending_RD>	0 specifies that disconnect will occur immediately and all buffered receive data will be discarded when the local DTE requests call disconnection.
	<timer>	0 specifies that the modem will not attempt to deliver the buffered data before abandoning the attempt and discarding remaining data.
Reports:	+ETBM?	Reports current or selected options.
	+ETBM=?	Reports supported options.
Result Codes:	OK ERROR	

+FCLASS**Fax Class Indication**

Description:	Use this command to set the modem service class. The service class determines if the modem is in data, FAX, or voice mode.	
Syntax:	AT+FCLASS <Value>	
Values:	+FCLASS=0	Selects data mode.
	+FCLASS=1.0	Selects Class 1.0 FAX mode.
	+FCLASS=1	Selects Class 1 FAX mode.
	+FCLASS=2	Selects Class 2 FAX mode.
	+FCLASS=2.1	Selects Class 2.1 FAX mode.
	+FCLASS=8	Selects voice mode.
Reports:	+FCLASS?	Reports current or selected options.
	+FCLASS=?	Reports supported options.
Result Codes:	OK or ERROR	

+GCAP**Complete List of Capabilities Request**

Description:	Use this command to display the modem's supported capabilities. The +GCAP command is an action command that always generates an OK result code.	
Syntax:	AT+GCAP	
	Sample Responses	
	+GCAP: +FCLASS, +MS, +ES, +DS, for a data modem that supports all capabilities listed. Where:	
	+FCLASS	(Class 1 and Class 2 facsimile DCE control)
	+MS	+M commands (Modulation Control: +MS and +MR commands)
	+ES	+E commands (Error Control: +ES, +EB, +ER, +EFCS, +ETBM)
	+DS	+D commands (Data Compression: +DS and +DR)

+GCI**Country of Installation**

Description:	Use this command to set the modem country/region code.	
Syntax:	AT+GCI=<country code>	
Reports:	+GCI?	Reports current or selected option.
	+GCI=?	Reports supported options.
Result Codes:	OK or ERROR	

+GMI**Manufacturer Identification Request**

Description:	Displays the modem product manufacturer.	
Syntax:	AT+GMI?	
Reports:	+GMI?	Reports current or selected option.
Result Codes:	OK when using the +GMI and +GMI? syntax. ERROR when using the +GMI=? syntax.	

+GMM**Model Identification Request**

Description:	Displays the modem identity string and driver version number.	
Syntax:	AT+GMM? or AT+GMM=?	
Reports:	+GMM?	Reports current or selected options.
	+GMM=?	Reports supported options.
Result Code:	OK	

+GMR**Revision Request**

Description:	Displays the version of the modem code.	
Syntax:	AT+GMR? or AT+GMR=?	
Reports:	+GMR?	Reports current or selected options.
	+GMR=?	Reports supported options.
Result Code:	OK	

+IFC**DTE-DCE Local Flow Control**

Description:	Use this command to select the local flow control method. The input parameters of the +IFC command overwrite the settings of the \IQ and \X<value> commands. The reverse is also true. By modifying the settings of the \IQ and \X<value> commands, the +IFC command parameters are overwritten.
Syntax:	AT+IFC=<DCE_by_DTE>,<DTE_by_DCE>
Values:	+IFC=0,0 No flow control. +IFC=1,1 Software flow control. +IFC=2,2 Hardware flow control. (Default)
Reports:	+IFC? Reports current or selected options. +IFC=? Reports supported options.
Result Codes:	OK ERROR

+ILRR**DTE-DCE Local Rate Reporting**

Description:	Use this command to display or hide the local rate report result code. If the rate report is enabled, the reported <rate> is the current DTE-DCE rate. The rate report is transmitted after any modulation, error control, or data compression reports, and before the final result code (e.g., CONNECT).
Syntax:	AT+ILRR=<value>
Values:	0 Disables the local rate report. (Default) 1 Enables the local rate report.
Reports:	+ILRR? Reports current or selected options. +ILRR=? Reports supported options.
Result Codes:	OK ERROR

+IPR**Fixed DTE Rate**

Description:	Use this command to set the DTE to DCE transmission rate. There are twelve fixed transmission rates used by the DTE to communicate with the DCE. These commands select one of the predefined transmission rates. If a rate is entered which is not supported, the transmission rate defaults to the next lower rate.
Syntax:	AT+IPR=<DTE rate>
Values:	+IPR=0 Automatic rate detection. (Default) +IPR=110 100 bits/s +IPR=300 300 bits/s +IPR=600 600 bits/s +IPR=1200 1200bits/s +IPR=2400 2400 bits/s +IPR=4800 4800 bits/s +IPR=9600 9600 bits/s +IPR=14400 14400 bits/s +IPR=19200 19200 bits/s +IPR=38400 38400 bits/s +IPR=57600 57600 bits/s +IPR=115200 115200 bits/s
Reports:	+IPR? Reports current or selected options. +IPR=? Reports supported options.
Result Code:	OK

+ITF**Transmit Flow Control Threshold**

Description: Use this command to set the flow control thresholds. The <off> parameter represent the off signal threshold in octets. When this threshold is reached the DCE generates a flow off signal. The <on> parameter represents the on signal threshold in octets. When the volume of data resident on the DCE goes below this value the DCE generates a flow on signal.

Syntax: AT+ITF=<off>,<on>

Reports: +ITF? Reports current or selected options.
+ITF=? Reports supported options.

Result Code: OK
ERROR

+MR**Modulation Reporting Control**

Description: Use this command to hide or display the modulation report. When the modulation report is enabled, the DCE transmits the +MRR: <rate>, <rx_rate> and the +MCR:<carrier> intermediate result codes to the DTE. The <carrier> reported is the current modulation; for example, V.34. The <rate> reported is the transmit rate in bits per second or is zero if negotiation fails. The <rx_rate> is the receive channel rate and is only reported when different receive and transmit rates have negotiated. The intermediate result codes are transmitted after the modulation and the rate have been determined and before any error control or data compression reports or the final result code (e.g., CONNECT) is transmitted.

Syntax: AT+MR=<value>

Values: +MR=0 Turns off the modulation report.
+MR=1 Turns on the modulation report.

Reports: +MR? Reports current or selected options.
+MR=? Reports supported options.

Result Code: OK
ERROR

+MS**Modulation Selection**

Description: Sets the modem's modulation, the modulation minimum and maximum transmission rates, and the status of automatic modulation negotiation (automode). The <carrier>, <min_rate>, and <max_rate> parameters define the modulation and its minimum and maximum transmission rates. <min_rx_rate> and <max_rx_rate> define the minimum and maximum reception rates. The minimum transmission and reception rates are always set to 0. The <automode> parameter enables or disables automatic modulation negotiation. If a subsequent **+MA** command is not provided, the automode parameters are constrained by the modulation set by the <carrier> parameter. The **+MA** command can further restrict the automatic modulation negotiation settings but it cannot set a modulation that is higher than the modulation set by the **+MS** command. Once a modulation is selected by the **+MS** command, the autorate in both directions and the automode is activated unless <max_rate> is specified by in the command. The settings of this command overwrite the settings of S28 and S37. Likewise, changes to these registers overwrite the settings of the **+MS** command.

Continued on next page

Syntax:	ATMS=<carrier>,<automode>,<min_rate>,<max_rate>,<min_rx_rate>, <max_rx_rate>	
<carrier> Values:	V92	V.92 (default)
	V90	V.90
	V34	V.34
	V32B	V.32bis
	V32	V.32
	V22B	V.22bis
	V.22	V.22
	Bell212A	Bell 212A*
	V23C	V.23, constant carrier, asymmetric FDM
	V21	V21
	Bell103	Bell 103*
	*The +MS command was standardized by ITU-T recommendation V.250. However, the standard command does not include the additional functionality provided by the Bell212A and Bell103 values of the <carrier> parameter.	
<automode> Values:	Automatic modulation negotiation is enabled or disabled by <automode>. However, if a value is specified for the <max_rate> then, automatic rate selection is disabled and the modem will attempt to connect at the specified rate.	
	0	Disables automode.
	1	Enables automode. (Default)
<max rate> Values:	The <max_rate> specifies the highest connections rate for the DCE.	
	31200	Determined by modulation selected in <carrier>. (Default)
	300-56000	Value limited by modulation selected <carrier>.
	<max rate> for each <carrier>.	
	V34	2400 bits/s—33600 bits/s in steps of 2400 bits/s.
	V32bis	4800 bits/s—19200 bits/s in steps of 2400 bits/s.
	V32	4800 bits/s—14400 bits/s in steps of 2400 bits/s.
	V22bis	2400 bits/s.
	V22	2200 bits/s.
	V23C, Bell212A	1200 bits/s.
	V.21, Bell103	300 bits/s.
	Valid <max rate> Range	
	56000	Determined by modulation selected in <carrier>. (Default)
	300-56000	Value limited by modulation selected <carrier>.
	Valid <max rx rate> Value for each <carrier>	
	V92	28000 bits/s—56000 bits/s in steps of 1333 bits/s
	V90	28000 bits/s—56000 bits/s in steps of 1333 bits/s
	V34	2400 bits/s—33600 bits/s in steps of 2400 bits/s
	V32bis	4800 bits/s—19200 bits/s in steps of 2400 bits/s
	V32	4800 bits/s—14400 bits/s in steps of 2400 bits/s
	V22bis	2400 bits/s
	V22	2200 bits/s
	V23C, Bell212A	1200 bits/s
	V.21, Bell103	300 bits/s
Reports:	+MS?	Reports current or selected options.
	+MS?	Reports supported options.
Result Code:	OK	
	ERROR	

\$D**DTR Dialing**

Description: Dials the number in a memory location.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT\$D<value>

Values: 0 Disables DTR dialing.
 1 Dials the number in memory location 0 when DTR goes high.

Default: 0

Result Codes: OK
 ERROR

\$EB**Asynchronous Word Length**

Description: Enables 10-bit or 11-bit mode.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT\$EB<value>

Values: 0 Enables 10-bit mode.
 1 Enables 11-bit mode.

Default: 0

\$FC**Quick Connect**

Description: Sets quick connect.

Syntax: AT\$FC<value>

Values: 1 Sets quick connect at 1200 baud
 2 Sets quick connect at 2400 baud

Default: 1

\$LB**Long Break**

Description: Sets the length of a break sent to the DTE by the modem when received from the remote side.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT\$LB=<value>

Values: 0-255 in 10 ms increments

Default: 30 (300 ms break)

\$MB**Online BPS Speed**

Description: Selects speed in bits per second.

Syntax: AT\$MB<value>

Default: 28,800

Values: 75 Selects CCITT V.23 mode
 300 Selects 300 bps on-line
 1200 Selects 1200 bps on-line
 2400 Selects 2400 bps on-line
 4800 Selects 4800 bps on-line
 9600 Selects 9600 bps on-line
 14400 Selects 14400 bps on-line
 19200 Selects 19200 bps on-line
 28800 Selects 28800 bps on-line
 33600 Selects 33600 bps on-line

\$RP**Ring Priority vs. AT Command Priority**

Description: Sets the ring priority vs. the AT command priority.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT\$RP<value>

Values: 0 The AT command will have priority over the ring. S1 will be reset to 0 if an AT command is received. This command is storable to memory.
 1 The ring will have priority over the AT command. S1 will increment even if an AT command and ring are received together and the incoming call will be answered when S1 is equal to S0. Default.

Note: SocketModems do not detect ring cadence of TelTone telephone line simulators as a valid ring

\$SB**Serial Port Baud Rate**

Description: Sets the serial port baud rate.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT\$SB<value>

Values: \$SB300 Sets serial port to 300 bps
 \$SB1200 Sets serial port to 1200 bps
 \$SB2400 Sets serial port to 2400 bps
 \$SB4800 Sets serial port to 4800 bps
 \$SB9600 Sets serial port to 9600 bps
 \$SB19200 Sets serial port to 19200 bps
 \$SB38400 Sets serial port to 38400 bps
 \$SB57600 Sets serial port to 57600 bps (Default)
 \$SB115200 Sets serial port to 115200 bps
 \$SB230400 Sets serial port to 230400 bps

+VDR Distinctive Ring Report

Description: Enables reporting of ring cadence information to the DTE and specifies the minimum ring cadence that will be reported.
 The report format is one line per silence period and one line per ring period. The length of the silence period is in the form DROF=number in units of 100 ms<CR><LF>, and the length of the ring is in the form DRON=number in units of 100 ms<CR> <LF>. The modem may produce a Ring event code after the DRON message if enabled by the y parameter. The y parameter must be set to a value equal to or smaller than the expected ring cadence.

Syntax: AT+VDR=<value x>, <value y>

Values: x = 0, 1 Distinctive Ring report control. Default = 0.
 y = 0–255 Minimum ring interval in 100 ms units. Default = 0.
 +VDR=0, N/A Disables Distinctive Ring cadence reporting.
 +VDR=1, 0 Enables Distinctive Ring cadence reporting. Other call progress result codes (including RING) are reported as normal.
 +VDR=1, >0 Enables Distinctive Ring cadence reporting. The RING result code is reported after the falling edge of the ring pulse (i.e., after the DRON report).

Reports: +VDR=? Displays the allowed values.
 +VDR? Displays the current value.

#P Set 11-bit Parity

Description: Sets 11-bit parity.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT#P<value>

Values: 0 No parity.
 1 Odd parity.
 2 Even parity.

Default: 2

#S Enter Setup Password

Description: Sets the remote configuration password.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT#S<password>

Values: password (1–8 characters, case sensitive)

Default: MTSMODEM

#S Store Setup Password

Description: Stores a new remote configuration setup password.
Note: This command does not work with parallel, USB, PCI, PCIe.

Syntax: AT#S=x

Values: x= password (1–8 characters, case sensitive)

%%%ATMTSMODEM Remote Configuration Escape Sequence

Description: Initiates remote configuration mode while online with remote modem. The remote configuration escape character (%) is defined in register **S9**.

Syntax: %%%ATMTSMODEM<CR>

Values: N/A

+VCID Caller ID Selection

Description: Enables Caller ID detection and configures the reporting and presentation of the Caller ID data that is detected after the first ring. The reported data includes the date and time of the call, the caller's name and number, and a message. Set S0=2.

Syntax: AT+VCID=<value>

Values: +VCID=0 Disables Caller ID
 +VCID=1 Enables Caller ID with formatted data
 +VCID=2 Enables Caller ID with unformatted data
 +VCID=? Displays the allowed values
 +VCID? Displays the current value

Default: 0

Callback Security Commands

Note: Callback Security Commands do not work with parallel, USB, PCI, PCIe.

#CBA

Callback Attempts

Description: Sets the number of callback attempts that are allowed after passwords have been exchanged between modems.

Syntax: AT#CBA<value>

Values: 1–255

Default: 4

#CBD

Callback Delay

Description: Sets the length of time (in seconds) that the modem waits before calling back the remote modem.

Syntax: AT#CBD<value>

Values: 0–255

Default: 15

#CBF?

Callback Failed Attempts Display

Description: Requests the number of failed callback passwords since reset or power-up. This number can be stored to nonvolatile memory using the **&W** command.

Syntax: AT#CBF?

Values: N/A

#CBFR

Callback Failed Attempts Reset

Description: Resets the number of failed callback passwords to 0. This does not reset the number stored in nonvolatile memory.

Syntax: AT#CBFR

Values: N/A

#CBI

Local Callback Inactivity Timer

Description: Sets the time (in minutes) that the modem waits for a command before forcing the user to enter the setup password again.

Syntax: AT#CBI<value>

Values: 1–255

Default: 20

#CBN

Store Callback Password

Description: Sets the callback security password for the y memory location. The password must have 6 to 10 characters, and cannot include the + or - characters.

Syntax: AT#CBN<y=x>

Values: y = 0–29
x = password

Defaults: None

#CBP

Description:

Syntax:

Values:

Default:

Callback Parity

Sets parity for the callback security messages.

AT#CBP<value>

0	No parity.
1	Odd parity.
2	Even parity.

0

#CBR

Description:

Syntax:

Values:

Default:

Callback Security ResetClears the password and phone number in the **y** memory location.

AT#CBR<value>

0–29

None

#CBS

Description:

Syntax:

Values:

Callback Enable/Disable

Enables or disables callback.

AT#CBS<value>

0	Disables callback security. Default.
1	Enables local and remote callback security.
2	Enables remote callback security only.
3	Disables callback security until local hang-up or reset.

S-Registers

Certain modem values, or parameters, are stored in memory locations called S-Registers. Use the **S** command to read or to alter the contents of S-Registers (see previous section).

Register	Unit	Range	Default	Description
S0	1 ring	0, 1–255	1	Sets the number of rings until the modem answers. AT S0 =0 disables auto answer completely.
S1	1 ring	0–255	0	Counts the rings that have occurred.
S2	decimal	0–127	43 (+)	Sets ASCII code for the escape sequence character.
S3	decimal	0–127	13 (^M)	Sets the ASCII code for the carriage return character.
S4	decimal	0–127	10 (^J)	Sets the ASCII code for the line feed character.
S5	decimal	0–32 33–127	8 (^H)	Sets the ASCII code for the backspace character. Values greater than 32 disable backspace.
S6	seconds	2–65*	2*	Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number.
S7	seconds	35-65*	50*	Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier.
S8	seconds	0–65	2	Sets the length of a pause caused by a comma character in a dialing command.
S9	decimal	0, 1–127	37 (%)	Sets ASCII code for remote configuration escape character. S9=0 disables remote configuration.
S10	100 ms	1–254	20	Sets how long a carrier signal must be lost before the modem disconnects.
S11	1 ms	50–150*	95*	Sets spacing and duration of dialing tones.
S24	secs	0, 5-65	0	Sets the timer to control sleep mode. Default of 0 = Off.
S28	decimal	0, 1–255	1	0 disables, 1–255 enables V.34 modulation.
S30	1 minute	0, 1–255	0	Sets the length of time that the modem waits before disconnecting when no data is sent or received. A value of zero disables the timer. See also the \T command
S35	decimal	0–1	1	0 disables, 1 enables the V.25 calling tone, which allows remote data/fax/voice discrimination.
S36	decimal	0–7	7	Specifies the action to take in the event of a negotiation failure when error control is selected. (See S48 .)

S37	decimal	0–19	0	<p>Sets the maximum V.34 “upstream” speed at which the modem attempts to connect.</p> <p>0 = maximum speed 1 = reserved 2 = 1200/75 bps 3 = 300 bps 4 = reserved 5 = 1200 bps 6 = 2400 bps 7 = 4800 bps 8 = 7200 bps 9 = 9600 bps 10 = 12000 bps 11 = 14400 bps 12 = 16800 bps 13 = 19200 bps 14 = 21600 bps 15 = 24000 bps 16 = 26400 bps 17 = 28800 bps 18 = 31200 bps 19 = 33600 bps</p>
S38	decimal	0–23	1	<p>Sets “downstream” data rate where V.90 provides rates of 28,000 to 56,000 bps in increments of 1,333 bps.</p> <p>0 = V.90 disabled 1 = V.90 auto rate 2 = 28,000 bps 3 = 29,333 bps 4 = 30,666 bps 5 = 32,000 bps 6 = 33,333 bps 7 = 34,666 bps 8 = 36,000 bps 9 = 37,333 bps 10 = 38,666 bps 11 = 40,000 bps 12 = 41,333 bps 13 = 42,666 bps 14 = 44,000 bps 15 = 45,333 bps 16 = 46,666 bps 17 = 48,000 bps 18 = 49,333 bps 19 = 50,666 bps 20 = 52,000 bps 21 = 53,333 bps 22 = 54,666 bps 23 = 56,000 bps</p> <p>Upstream data rates: Upstream V.90 data rates are 4800 to 33,600 bps in 2400 bps increments.</p>
S43	decimal	0–1	1	<p>For testing and debugging only. Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.</p>

S48 decimal 7 or 128 7

Enables (7) or disables (128) LAPM negotiation . The following table lists the **S36** and **S48** configuration settings for certain types of connections.

	S48=7	S48=128
S36=0, 2	LAPM or hang up	Do not use
S36=1, 3	LAPM or async	Async
S36=4, 6	LAPM, MNP, or hang up	MNP or hang up
S36=5, 7	LAPM, MNP, or async	MNP or async

S89 seconds 0, 5–65 0

Sets the length of time in the off-line command mode before the modem goes into standby mode or “sleep mode”. A value of zero prevents standby mode; a value of 1–4 sets the value to 5. Standby mode (sleep mode or low power mode) is controlled by **S89**. It programs the number of seconds of inactivity before the modem will go to sleep. The default value is 0. A value of 0 disables standby mode. The modem will wake on an incoming ring or an AT command.

Result Codes

In command mode your modem can send responses called **Result Codes** to your computer. Result codes are used by communications programs and can also appear on your monitor.

<u>Terse</u>	<u>Verbose</u>	<u>Description</u>
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5 *	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
9	CONNECT 75	Connected at 75 bps
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
18	CONNECT 57600	Connected at 57600 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
26	CONNECT 16800	Connected at 16800 BPS
28	CONNECT 38400	Connected at 38400 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
60*	CONNECT 33600	Connected at 33600 bps
70	CONNECT 32000	Connected at 32000 bps
71	CONNECT 34000	Connected at 34000 bps
72	CONNECT 36000	Connected at 36000 bps
73	CONNECT 38000	Connected at 38000 bps
74	CONNECT 40000	Connected at 40000 bps
75	CONNECT 42000	Connected at 42000 bps
76	CONNECT 44000	Connected at 44000 bps
77	CONNECT 46000	Connected at 46000 bps
78	CONNECT 48000	Connected at 48000 bps
79	CONNECT 50000	Connected at 50000 bps
80	CONNECT 52000	Connected at 52000 bps
81	CONNECT 54000	Connected at 54000 bps
82	CONNECT 56000	Connected at 56000 bps
83	CONNECT 58000	Connected at 58000 bps
84	CONNECT 60000	Connected at 60000 bps
86	CONNECT 16800	Connected at 16800 bps
87	CONNECT 115200	Connected at 115200 bps
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full
91	CONNECT 230400	Connected at 230400 bps
100	CONNECT 28000	Connected at 28000 bps
101	CONNECT 29333	Connected at 29333 bps
102	CONNECT 30666	Connected at 30666 bps

103	CONNECT 33333	Connected at 33333 bps
104	CONNECT 34666	Connected at 34666 bps
105	CONNECT 37333	Connected at 37333 bps
106	CONNECT 38666	Connected at 38666 bps
107	CONNECT 41333	Connected at 41333 bps
108	CONNECT 42666	Connected at 42666 bps
109	CONNECT 45333	Connected at 45333 bps
110	CONNECT 46666	Connected at 46666 bps
111	CONNECT 49333	Connected at 49333 bps
112	CONNECT 50666	Connected at 50666 bps
113	CONNECT 53333	Connected at 53333 bps
114	CONNECT 54666	Connected at 54666 bps
115	CONNECT 25333	Connected at 25333 bps
116	CONNECT 26666	Connected at 26666 bps

When the extended result code configuration is enabled, one of the following codes is appended to the result code depending on the type of error control connection:

V42bis – V.42 error control (LAP-M) and V.42bis data compression

V42 – V.42 error control (LAP-M) only

MNP5 – MNP 4 error control and MNP 5 data compression

MNP4 – MNP 4 error control only

NoEC – No error control protocol.

Chapter 4 – Voice Commands

Introduction

Important Note:

Voice commands do not apply to the SMI build.

This chapter describes +V command support. The +V Command standard IS-101 Voice Control Interim Standard for Asynchronous DCE (prepared by the TIA Technical Subcommittee TR29.2 on Facsimile Digital Interface) defines the commands that a PC user may issue to configure and control a voice/fax/data modem and the responses (result codes) that the voice/fax/data modem may issue in response to those commands.

The +V commands and responses provide control of the following services:

- Recording and playback of digitized voice.
- Generation and detection of DTMF and other tones.
- Switching between voice, fax, and data modes.
- Control-related functions.

The Voice mode has three states, which correspond to the direction of voice data flow:

Voice command state (event reports only; no data transfers).

Voice transmit state (digitized, half-duplex voice data transfers from PC to modem).

Voice receive state, (digitized, half-duplex voice data transfers from modem to PC).

The modem supports three levels of voice service: Service Levels A, B, and C. Service Level A provides the lowest level of services. Service level A performs operations and detects events as follows: Voice transmit, Voice receive, and DTMF generation and Single tone generation. The following events (Result Codes) are reported: 3, 4, 5, 6, 9, 10, 18, 19, 23, 25.

Service Level B provides an optionally greater amount of services, providing DTMF and facsimile calling tone detection during voice transmits in addition to Service Level A. Service Level B provides event-reporting similar to Service Level A, but with added event reporting states (e.g., fax calling in transmit state in addition to reporting in command state).

Service Level C provides the highest service level with the addition of facsimile calling tone and Busy detection during receives, Dial Tone detection, and double-tone detection. An example of event detection in a Service Level C modem is shown below:

```
AT+VEM=?
"C"
0A000100
0E601800
1A803840
OK
```

Voice S-Register Summary

Voice mode S-Register changes are outlined below.

<u>S-Register</u>	<u>Description</u>
S0	Automatic answer is disallowed in Voice mode.
S7	Wait for Carrier After Dial. Default is 60 seconds. In Voice mode, S7 contains the maximum amount of time that the modem will wait during Call Origination, all the time detecting for ring backs, before assuming that the remote station will not go off hook.
S10	Automatic disconnect is disallowed in Voice mode.

Voice Commands

The **+V** Voice enhancements are implemented with **AT+V** (for Voice) commands, as well as changes to several existing commands.

In general, the modem does not accept Data mode (+FCLASS=0) commands or Fax mode (+FCLASS=1, 1.0, 2, 2.0, 2.1) commands **when in Voice mode** (+FCLASS=8).

Commands That Change for Voice Mode Support

<u>Command:</u>	<u>Description</u>
A	Disallowed in Voice mode.
D	Causes the modem to Dial assuming +VLS=2 if +VLS=0 when the ATD command was entered.
H	Values greater than 0 disallowed in Voice mode.
I	Disallowed in Voice mode.
M	Disallowed in Voice mode.
O	Disallowed in Voice mode.
Q	Disallowed in Voice mode.
X	Disallowed in Voice mode.
Z	Reset modem.
&D	&D1 is disallowed in Voice mode.
+FCLASS=8	Places the modem in Voice mode.
+FCLASS=	New values are added for Voice mode.
+FCLASS=?	New values are added for Voice mode.

Voice +V Commands Detail

+FCLASS=8

Select Voice Mode

Description: The +FCLASS=8 command selects voice mode.

+VNH

Automatic Hang-Up Control

Description: Enables or disables automatic hang-up.

Syntax: AT+VNH=<hook>

Values:

<hook>

+VNH=0 Enables automatic hang-ups as in non-Voice modes (such as hanging up the phone when the modem does not detect a data carrier within a given time interval).

+VNH=1 Disables automatic hang-ups in non-Voice modes.

+VNH=2 Disables automatic hang-ups in non-Voice modes. The modem performs only a "logical" hang up (i.e., returns the OK result code).

Reports:

+VNH? Displays current or selected values.

+VNH=? Displays list of supported values.

Result Codes:

OK if command accepted.

ERROR if parameter is out of range.

+VIP

Initialize Voice Parameters

Description: The +VIP command causes the modem to initialize all Voice parameters to the factory default settings.

Syntax: AT+VIP

Values:

None

+VRX

Enter Voice Receive State

Description: Start voice reception.

Syntax: AT+VRX

Values: None

Result Codes:

OK

ERROR if not in voice mode.

+VTS**Send Voice Tone(s)**

Description:	This command causes the modem to send DTMF digit or hookflash tones with the duration specified by +VTD, to send DTMF digit or hookflash tone duration specified by this command, or to send single or dual tone frequencies with duration specified with this command.
Syntax:	AT+VTS=<string>
Values:	<p><string> The tone generation string consists of elements in a list where each element is separated by commas. Each element can be:</p> <ol style="list-style-type: none"> 1. A single character which the modem interprets as a DTMF digit (0–9, #, *, and A–D) or hookflash (!), with a duration given by the +VTD command. 2. A 3-element string enclosed in square brackets "[freq1,freq2,dur]", which the modem interprets as a general dual tone and duration (dur) selection. 3. A 2-element string enclosed in curly braces "{X,dur}", which the modem interprets as a DTMF digit ((0–9, #, *, and A–D) or hookflash (!), with a duration (dur) different than that given by the +VTD command. <p>Missing parameters are assumed to be the default value. Unspecified values always default to 0 for frequencies, DTMF * for DTMF tones, and +VTD for duration. The omission of commas (and associated subparameters) is valid.</p>
Result Codes:	<p>OK if the PC accepts the command. ERROR if the modem encountered an error in parsing the subparameter or if the selected frequency is out of range.</p>
Example:	<p>Using the +VTS command for tone generation without using any null elements: AT+VTS=1,2,[1000,1300,50],{*6},{800,1300,50},9</p> <p>The above string will perform as follows:</p> <ol style="list-style-type: none"> 1. Play DTMF 1 with a duration given by the +VTD command. 2. Play DTMF 2 with a duration given by the +VTD command. 3. Play tone pair at 1000 Hz and 1300 Hz with a duration of 500 ms. 4. Play DTMF * with a duration of 60 ms. 5. Play tone pair at 800 Hz and 1300 Hz with a duration of 500 ms. 6. Play DTMF 9 with a duration given by the +VTD command.
Reports:	<p>+VTS=? Reports Frequency Support. Reports the current frequency range in the form <freq1>,<freq2>,<dur> , where <freq1> is the first frequency range,<freq2> is the second frequency range, and<dur> is the duration range for the square brackets and curly braces constructs. The units are in 0.01 seconds. The range of valid <dur> values is that of the +VTD command.</p> <p>Example: In the lines below, the modem responds to the +VTS=? command by reporting that it supports two frequencies, both in the range of 200-3300 Hz, and supports a duration range from 0 to 5 seconds.</p> <pre>AT+VTS=? (200-3300), (200-3300), (0-500) OK</pre>

+VTX**Start Voice Transmission Process**

Description: Starts the voice transmission process. The PC sends the data in the format of the previously entered +VSM command, using the flow control method selected by the +FLO command. The voice data is buffered to withstand gaps of missing data from the PC. If the modem does not have any current voice data, the modem sends silence over to the analog destination until the PC provides more voice data. The modem returns the OK result code and returns to Command mode after the modem has completely transmitted its buffer contents. The Inactivity Timer can be used to terminate the transmit data state, after which the modem returns to Command mode.

Syntax: AT+VTS

Result Codes: OK on completion of transmission.
CONNECT if the modem accepts the command.
ERROR if the modem is not connected to at least one off-hook Telco line or one non-Telco device.

+VGR**Voice Gain for Received Voice Samples**

Description: Sets the gain for the received voice samples. Receive gain values larger than 128 indicate a larger gain than nominal, and values smaller than 128 indicate a gain smaller than nominal. The modem may limit the receive gain to a narrower range, such as from 120 to 136, or from 120 to 128. The value 0 is reserved for modem automatic gain control (AGC).

Syntax: +VGR=<gain>

Values: 0 (this is the only valid value) Selects automatic gain control.

Result Codes: OK if <gain>=0
ERROR if <gain> is not 0 or if not in voice mode.

Reports: +VGR? Displays current or selected values.
+VGR=? Displays list of valid values supported.

+VGT**Set the Volume for Transmitted Voice Samples**

Description: Sets the volume control, either by attenuating or amplifying the signal for the transmitted voice samples. Values larger than 128 indicate a larger gain than nominal, and values smaller than 128 indicate a gain smaller than nominal. The modem may limit the receive gain to a narrower range, such as from 120 to 136, or from 120 to 128. The value 0 is reserved for modem automatic volume control (AVC).

Note: The modem will limit the transmit level over the Telco lines, regardless of the current +VGT setting, to that permitted by CFR FCC Rules Part 68 – Subpart D.

Syntax: +VGT=<level>

Result Codes: OK if the modem accepts the command
ERROR if the parameter is out of range.

Reports: +VGT? Displays current or selected values.
+VGT=? Displays list of valid values supported.

+VIT**Set DTE/DCE Inactivity Timer**

Description:

Sets the modem's initial value for the PC/Modem Inactivity Timer. The units are in 1.0 seconds. The PC can disable the Inactivity Timer by using a value of 0 (+VIT=0).

The Inactivity Timer serves to ensure that the PC does not leave the modem in a state where it is not accessible by voice-unaware software. The Inactivity Timer is activated when the PC selects the voice fixed-rate. The timer expires if the flow of data from the PC to the modem stops (in both Voice Command mode and Data mode) for a specified amount of time.

When this timer expires, the modem switches to Data mode with autobauding. By switching to autobauding (and Data mode), the PC is allowed voice-unaware software to recover control of the modem in the event of catastrophic failure that does not result in a modem power down. It is recommended that the PC software leave the modem in autobauding (and Data mode), and use the Inactivity Timer only as needed. Leaving the modem in autobauding is an extra measure to prevent confusion from voice-unaware software accessing the modem in Voice mode at a fixed PC/modem interface rate. You can use the H command to switch to autobauding and Data mode automatically. In Voice mode, the modem does not allow the auto answer feature, since this feature does not allow the PC to set the modem in Voice mode before answering the phone.

Syntax:

AT+VIT=<timer>

Values:

<timer>

0 Disables the timer. Default.

0-255 Timer set in units of 1.0 seconds.

Result Codes:

OK if <timer> = 0-255.

ERROR if the parameter is out of range or if not in voice mode.

Reports:

+VIT? Displays current or selected values.

+VIT=? Displays list of valid values supported.

+VLS**Select Analog Source/Destination**

Description:

Selects one or more source/destination devices for the analog data to be transmitted. The parameter <label> identifies each of the supported analog source/destination hardware devices. Codes, called "primitives", are provided to describe which voice I/O device(s) are components in a possible hardware configuration. The codes are grouped to help define and label 16 common hardware configurations. Each code, except "L" and "T" is followed by an ASCII 0 code (20 hex). Two codes can be concatenated to define a possible analog source/destination hardware configuration.

Syntax:

AT+VLS=<label>

Values:

<label> A decimal number corresponding to the selected analog source/destination hardware configuration:

<u><label></u>	<u>Code(s)*</u>	<u>Description</u>
0	none	Modem on-hook. Local phone connected to Telco. Default.
1	T	Modem off-hook, and connected to Telco. Local phone provided with power to detect hook condition.
2	L	Modem off-hook. Local phone connected to modem.
3	LT	Modem off-hook. Local phone connected to Telco. Modem connected to Telco.
4	S	Internal speaker connected to the modem. Modem is on-hook. Local phone connected to Telco.
5	ST	Internal speaker connected to Telco. Modem off-hook. Modem connected to Telco. Local phone provided with power to detect hook condition.
6	M	Internal microphone connected to modem. Modem is on-hook. Local phone connected to Telco.
7	MST	Internal microphone and internal speaker connected to Telco. Squelching active. Modem is off-hook, and connected to Telco. Local phone provided with power to detect hook condition.

***Codes:** L Local Phone
 T Telephone Line
 M Internal Microphone
 M1 External Microphone
 S Internal Speaker
 S1 External Speaker
 H External Microphone and Microphone combination (handset or headset)

Result Codes:

OK if command accepted.
 ERROR if the <label> parameter is out of range or if the modem cannot service the <label> parameter requested.

Reports:

+VLS? Displays current or selected values.
 +VLS=? +VLS=? displays the modem's current source and destination device information for the analog data to be transmitted. Refer to the +VLS=<label> command for label code and description information. Note that the +VEM command contains more information about event reporting.

Example:

Shows the modem reporting that it supports only a Telco line at Service Level C:
 AT+VLS=?

```
0, "", 0A0001000, 0E601800, 1A803840
```

```
1, "T", 0A0001000, 0E601800, 1A803840
```

Response: <label>,<devices>,<transmit event>,<receive event>,<idle event>
 where

<label> Identifies the modem analog source/destination hardware configuration

<devices> a <string constant> made up of Primitives.

<xxxx event> <transmit event>,<receive event>, and <idle event> subparameters are the DCE event reporting capabilities for the Voice Transmit State, Voice Receive State, and the Voice Command State respectively. Each of the event reporting subparameters is a hex number that represents an event bit field.

+VRA**Ringback Goes Away Timer**

Description:	Sets the length of time the modem will wait between ringbacks during a call origination before the modem can assume that the remote device has gone off-hook.
Syntax:	AT+VRA=<interval>
Values:	<interval> A decimal number (0–255) specifying the silence interval time in units of 0.10 seconds between the end of one ring interval and the start of the next ring interval. A value of 0 forces the modem to report the OK result code and immediately after the first ringback. The range is 0.1 to 25.5 seconds for <interval>=1 to 255.
Default:	50
Result Codes:	OK if the <interval> is 0-255. ERROR if the <interval> parameter entered is out of range or if not in voice mode.
Reports:	+VRA? Displays current or selected values. +VLS=? Displays a list of the supported values.

+VRN**Ringback Timer**

Description:	Sets the length of time that the modem will wait for ringback. If the modem does not detect a ringback within the time period <interval>, the modem assumes that the remote device has going off-hook and returns the OK result code. The modem only uses this command in call origination transactions. A +VRN setting greater than the S-Register S7 setting means that only the S7 timer is in effect.
Syntax:	AT+VRN=<interval>
Values:	<interval> A decimal number specifying the time period in units of 1.0 seconds that the modem will wait for ringback during a call origination. A value of 0 forces the modem to report the OK result code immediately after dialing. The range is 1 to 25 seconds for <interval>=1 to 25.
Values:	0–10 (in 1.0 second increments)
Default:	10 (10 seconds)
Result Codes:	OK if <interval> = 0-25. ERROR if the <interval> parameter entered is out of range or the modem is not in voice mode.
Reports:	+VRN? Displays current or selected values. +VLN=? Displays a list of the supported values.

+VSD**Silence Detection Sensitivity**

Description:

Sets the silence detection sensitivity and the required period of silence before the modem reports silence detected at the end of a voice receive, either with the Presumed End of Message (Quiet) or Presumed Hang Up (Silence) event reports. The table below outlines the possible combinations of the +VSD and +VSM commands using the <sds> parameter. An <sdi> parameter value of 0 means that long-term silence detection is disabled. (Note that long-term silence detection refers to the use of this function to detect the end of a voice receive (i.e., the user stops talking).

The parameter <sds> is used by the PC to select greater amounts of modem silence detection activity; larger values imply that the PC wants the modem to treat noisier conditions as silence. The value entered for <sds> has no actual unit of measure. The modem may limit silence detection sensitivity to a more narrow range (e.g., from 120 to 136). A setting of 0 has no meaning.

The parameter <sdi> sets the required period of silence before the modem can report silence detected either with the Presumed End of Message (Quiet) or Presumed Hang Up (Silence) event reports. A value of 0 disables modem silence detection, in which case the modem will not report the Presumed End of Message (Quiet) or Presumed Hang Up (Silence) event reports.

Syntax:

AT+VSD=<sds>,<sdi>

Values:

<sds> A decimal number corresponding to the selected parameter:

0 Use +VSM silence compression setting and algorithm for long-term silence detection if +VSM is in use

OR

Use default long-term setting silence detection level and algorithm if +VSM is not in use.

127 Sets less aggressive long-term silence detection independent of presence or use of silence compression.

128 Sets nominal long-term silence detection independent of presence or use of silence compression.

129 Sets more aggressive long-term detection independent of presence or use of silence compression.

<sdi> A decimal number specifying the required period of silence in units of 0.1 seconds, before the modem can report silence detected at the end of a voice receive either with the Presumed End of Message (QUIT) or Presumed Hang up (SILENCE) event reports. A value of 0 disables the modem silence detection. The range is 0.1 to 25.5 seconds for <sdi>=1 to 255.

Result Codes:

OK if values are valid.

ERROR if one or more of the following apply: 1) the <sds> or <sdi> parameter entered is out of range, or 2) either of the two parameters is missing from the command string. If an error occurs, modem retains the previous <sds> and <sdi> parameter values.

Reports:

+VSD? Displays current or selected values.

+VSD=? Displays a list of the supported values.

+VSM**Select Voice Compression Method**

Description:

Sets the modem to a specified voice compression method, silence compression sensitivity, and voice sampling rate. The modem can maintain a different event detection capability for each compression method. For example, you may want to record your welcome message with the lowest amount of silence removal, with the goal of reducing distortion. For other messages you may want a more assertive silence removal, to limit disk space used for recording purposes.

Syntax:

AT+VSM=<cml>,<vsr>,<scs>,<sel>

Values:

<cml> A decimal number identifying the compression method. The valid values are 1, 129, 130, 140, 141.

<vsr> A <range of values> containing the supported range of for voice samples per second of the analog signal (8000).

<scs> A <range of values> containing the supported range of sensitivity settings for voice receives.

Has different meanings in voice transmit and voice receive modes.

In receive, the PC uses <scs> to select greater amounts of compression activity; larger <scs> values mean that the PC wants the modem to treat noisier conditions as silence. There is no unit of measure for this parameter; it merely represents a number in a range.

In voice transmit mode, the PC signals the modem that the data stream was recorded with silence compression by selecting a non-zero value from within the valid range (the same value as receive).

Unpredictable results can occur if you 1) enable silence compression for transmitting a voice data stream that was not recorded with silence compression enabled, or 2) you disable silence compression for transmitting a voice data stream that was recorded with silence compression enabled

<sel> A <range of values> containing the supported range of expansion values for voice transmit. This parameter represents the minimum amount of silence that the modem will expand a period of silence that was previously deleted with a non-zero <sel> parameter. **A setting of <sel>=0 means the modem will not modify the silence expansion.** The valid range of values is ____ - ____ in 0.1second increments. The modem ignores the <sel> parameter if the <scs> parameter is 0 (silence compression disabled).

You can modify the silence expansion with the <sel> parameter. The range of valid values is 0–255. The modem may limit silence compression sensitivity to a narrower range (e.g., 120–128). **A setting of <scs>=0 disables silence compression.**

Result Codes:

OK if the modem accepts the command.

ERROR if one or more of the following apply: 1) the any parameter entered is out of range, or 2) any of the four parameters are missing from the command string. If an error occurs, the modem retains the previous <sds> and <sdi> parameter values.

Reports:

+VSM? Displays current or selected values.

Reports <cml>,<vsr>,<sds>,<sel>

Example: 1,8000,0,0. This is the default.

+VSM=? The +VSM=? command reports several compression method identifiers in one of two ways: either 1) a compression method (for PCM coding) from the table below, or 2) a co-operative identifier (non-PCM coding) used with other manufacturer's equipment.

Reports the following:

<cml> See above

<cmid> An alphanumeric string describing the compression method (UNSIGNED PCM, IMA ADPCM, 2-Bit ADPCM, or 4-Bit ADPCM)

Continued on next page.

- <bps> A decimal number defining the average number of bits in the compressed sample not including silence compression (2, 4, or 8)
- <tm> A decimal number (0) reporting the time interval in units of 0.1 seconds between timing marks. 0 reports timing marks are not supported.
- <vsr> See above. A report of 0 indicates not supported.
- <scs> See above. A report of 0 indicates not supported.
- <sel> See above. A report of 0 indicates not supported.

Example: The following shows an inquiry about the modem support of compression and other data. In this example, the modem reports that it supports two compression methods.

```
AT+VSM=?
128,"SIGNED PCM",12,0,(7200-8000,11025),(127-129),(0-50)
132,"ADPCM/AQ",2,40,(7200),(128),(0-50)
```

+VTD

Beep Tone Duration Timer (DTMF/Tone Generation Duration)

- Description:** Sets the default DTMF/tone generation duration used with the +VTS command. This command does not affect the ATD command settings. The <dur> parameter range is given by the +VTD=? command, in units of 0.01 seconds. A setting of +VTD=0 specifies a manufacturer-specific time interval.
- Syntax:** AT+VTD=<dur>.
- Values:** <dur> A decimal number specifying the default DTMF/tone generation duration in units of 0.01 seconds.
A value of 0 specifies the value entered by the S11 parameter (50 to 255 ms). the range is 0.01 to 2.55 seconds for <dur> 1 to 255. Default = 100.
- Result Codes:** OK if <dur> = 0-255.
ERROR if the parameter is out of range or if not in Voice mode.
- Reports:** +VTD? Displays current or selected values.
+VTD=? Displays a list of the supported values.

+VDR**Distinctive Ring (Ring Cadence Reporting)**

Description: Enables or disables reporting of the ring cadence information and controls the timing of the Ring event code report if ring cadence reporting is enabled.

This report format is one line per silence period, and one line per ring period. The length of the silence period is in the form DROF=<number in units of 0.1 seconds><CR><LF>, and the length of the ring in the form DRON=<number in units of 0.1 seconds>. The <LR> character is optional. The modem may produce a Ring event code after the DRON message if enabled by the <report> parameter. The <report> parameter should be set to a value larger than the expected off-times within a single pattern so that the Ring event reports are issued only during the off-times between the complex patterns.

Syntax:

AT+VDR=<enable>,<report>

Values:

<enable> A decimal number corresponding to the selected option:

- 0 The modem will not generate ring cadence reports. Other call progress event codes (including Ring) are reported as normal.
- 1 The modem will report ring cadence information as specified for the <report> subparameter. Default.

<report> A decimal number specifying ring cadence information report when enabled by the <enable> subparameter.

- 0 The modem will produce only DROF and DRON messages. The modem will not produce a RING event codes. The modem will report other call progress event codes as normal.
- Other The modem will produce only DROF and DRON messages. The modem will produce a RING event code after <report>/10 seconds after the falling edge of the ring pulse (i.e., after the DRON report).. The modem will report other call progress event codes as normal.

Example: The lines below shows a cadence with an off time of 4.0 seconds, an on time of 0.8 seconds, an off time of 0.4 seconds, and an on time of 0.8 seconds. The RING result code is displayed 0.5 seconds after the last DRON message. The command to enable this sample sequence is +VDR-1,5 , as shown below:

```
<DLE><X>
DROF=40
DRON=8
DROF=4
DRON=8
RING
<DLE>< . >
<DLE><X>
DROF=40
DRON=8
DROF=4
DRON=8
RING
<DLE>< . >
```

Reports:

+VDR? Displays current or selected values.

+VDR=? Displays a list of the supported values.

Result Codes:

OK if the modem accepts the command

ERROR if the parameter is out of range or not in voice mode.

+VEM**Event Reporting and Masking**

Description:	The +VEM= command can be used to disable an event report, regardless of the modem's state, or of the modem's analog signal source or destination's configuration. The <mask> parameter is a bit field where bit 0 is the most significant bit of an eight-digit hex number. The PC setting of a bit enables event reporting for that event. Bit 0 in the bit field corresponds to Event number 0 (Caller ID). This mask effects the reporting of the specified event in all modes (Fax, On-line data, AT Command and Voice modes). Events cannot be masked by modes; however, the PC can change the mask each time it changes modes. The modem-detectable events depend on the compression method selected by the +VSM command. The +VEM command may effect the reporting capabilities of other +V commands. The detection of an event may not be possible at all times and for all compression methods. Use the +VLS=? command to ask which times and for which compression methods (as well as for which analog source/destination selections) events can be detected and reported when not disabled by the +VEM command.
Syntax:	AT+VEM=<mask>
Values:	bits 0–32 on (i.e., FFFFFFFF8) Example: In the lines below, only the RING and the DTMF event detection reporting: AT+VEM=18000000 OK
Reports:	+VEM? Displays current or selected values. +VEM=? The +VEM=? command returns four lines of modem event reporting/masking capability information, followed by the OK result code. The first line indicates the Service Level supported by the modem (though the modem may support more than the capabilities displayed). The next three lines report the capability of the Voice Transmit mode, Voice Receive mode, and the Voice Command mode, respectively. Each line is a hex value that is the bit-wise OR function across all of the supported compression methods and across all analog source/destination hardware configurations (i.e., all +VLS settings) for the specified mode. Note that the displayed hex values are not connected to the <mask> parameter in the +VEM and +VEM? commands.
Result Codes:	OK if the modem accepts this command ERROR if the bit field contains illegal characters.

Interface Configuration Commands

The commands in this section are used to define the interface between the PC and the modem.

+VBT

Set Modem Flow Control Assert and Deassert Points

Description:

The +VBT= command is used to set the flow control assert and deassert points inside the modem's internal transmit buffer. As data is sent from the PC to the modem and is stored in the modem's buffer, when the number of octets in the buffer equals the <assert> value, the modem asserts flow control to the PC (e.g., turns off CTS circuits, or sends an XOFF character). As the modem removes data from the buffer and processes the data, when the number of octets in the buffer equals the <deassert> value, the modem de-asserts flow control (e.g., turns on CTS circuits, or sends an XON character). The modem may inform the PC (using the +VBT=? command) that the PC does not permit the modifying of the flow control assert and deassert points by returning a single value, not in the range of values, for each control point.

The +VBT= command controls the amount of "skid" in the modem's voice buffer, where "skid" is the amount of octets that the modem could accept before losing data after the modem asserts an off flow control signal to the PC.

You can use the +VBT= command to balance performance versus robustness. For example, if the PC knows there are only 16450 UARTs present, a small "skid" is probably sufficient. If there are 16550 UARTs present, a larger "skid" is probably required.

Syntax:

AT+VBT=<deassert>,<assert>

Values:

<assert> and <deassert> are buffer offsets from the start of the buffer. The buffer's first position is 0. The offset units are octets.

Reports:

+VBT? Displays current or selected values.
+VBT=? Displays the possible <assert> and <deassert> values set by the +VBT= command, followed by the OK result code.

Example:

In the lines below, the +VBT=? command is used to ask about the modem's flow control and buffer size ranges. The modem reports the deassert point is adjustable between 20 and 100 octets, the assert point is adjustable between 150 and 180 octets, and the transmit buffer size is 200 octets.

```
AT+VBT=?
(20-100) , (150-180) , (200)
OK
```

Result Codes:

OK if the modem accepts the command
ERROR if either the <assert> or <deassert> parameter is greater than the buffer size, or if the <de-assert> parameter is greater than or equal to the <assert> value.

+VPP**Enable or Disable Voice Mode Packet Protocol**

Description: The +VPP command enables and disables the Packet protocol for Voice mode operation, and handles the new unsolicited Voice mode result codes. The Packet protocol is used to detect lost octets on the modem-to-PC serial link, and to recover the lost octets by requesting retransmission. The Packet protocol assumes that the data corruption is not a problem on the communications link, the last octet sent will never be lost due to data overrun (i.e., that the newer octets always overwrite previous octets in the communications input buffer, a common UART design feature). Several PC processes can cause serial input channel neglect for longer than the Protocol time between asynchronous characters (typically less than 521 microseconds), and data loss can occur. If a character is lost in the received data, the playback of the voice data may be impaired or lost. If a character is lost in the final result code, the connection may fail. The Packet protocol permits recovery from such data loss.

Syntax: AT+VPP=<enable>

Values: 0, 1; (2–255 reserved for future standards)

Result Codes: OK if the modem accepts the command.
ERROR if the <enable> value is out of range.

+VPR**Select DTE/DCE Interface Rate (Turn Off Autobaud)**

Description: The +VPR command causes the modem to select between various fixed modem-to-PC interface rates and autobauding. The selected fixed interface rate stays in effect until the modem selects another interface rate or autobauding, or until the modem returns to autobauding on the expiration of the Inactivity Timer. The newly selected rate takes effect after the modem returns the OK result code.

Syntax: AT+VPR=<rate>

Values:

+VPR=0	select autobauding
+VPR=1	select 2400 bps
+VPR=2	select 4800 bps
+VPR=3	select 7200 bps
+VPR=4	select 9600 bps
+VPR=5	select 12000 bps
+VPR=6	select 14400 bps
+VPR=7	select 16800 bps
+VPR=8	select 19200 bps

If the modem claims support for autobauding (+VPR=0), it means that the modem can accept AT commands at 2400 bps at all times while in Voice command mode and with +VPR=0.

Result Codes: OK if the modem accepts the command.
ERROR if the <rate> value is out of range.

Flow Control

XON/XOFF flow control is used by the modem to match the PC-to-modem data rate to the line-signaling rate, as well as to the requirements of analog conversion of the voice signals and voice data.

In-band, uni-directional XON/XOFF flow control is mandatory. RTS/CTS (V.24 circuits 106 and 133) flow control is optional per the IS-101 standard.

Voice Mode Result Codes

In Voice mode, the modem can detect and report DTMF, detect call progress tone and cadence events, evaluate voice quality, and can monitor Telco-related activities. Events can be reported as a single character (Simple or "Terse" reporting), a full-text message (Message or "Verbose" reporting), or as a repeating pattern (Pattern reporting).

<u>Terse</u>	<u>Verbose</u>
0	Caller ID Report
1	DID Report
2	Distinctive Ringing
3	RING
4	DTMF Received
5	Receive Buffer Overrun
6	Facsimile Calling (e.g., 1100 Hz)
7	Data Calling (e.g., 1300 Hz)
8	Local Phone On/Off Hook
9	Presumed Hang Up (SILENCE) Time-out
10	Presumed End of Message (QUIET) Time-out
11	SIT Tone (CO Standard Information Tones, sent to pay phones)
12	Bong Tone (Calling Card Tone)
13	Loop Current Interruption
14	Loop Current Polarity Reversal
15*	Call Waiting Beep/Interrupt*
16*	Distinctive Call Waiting*
17*	TDD Detected (e.g., 1400/1800 Hz)*
18	Ring Back/Remote Ring
19	BUSY
20	DIALTONE
21	Reorder/Fast Busy
22	V.21 Channel 2 7E Flags
23	Transmit Buffer Under Run
24	Extension Phone On/Off Hook
25	Facsimile or Data Answer (e.g., 2100 Hz)
26	Data Answer (e.g., 2225 Hz)
27	Voice Detect
28	Call Waiting Plus Caller ID
29	Stuttered Dial Tone
30	Invalid Voice Data Format
31	Lost Data Detected Event
32	Facsimile Answer
33-63	Reserved for future standard
above 63	Manufacturer specific

* Further study required for final specification.

The TIA/EIA-602 CONNECT result code is disallowed in voice mode.

Unsolicited Voice Mode Result Codes

The form of the unsolicited result codes for voice mode is different from standard modem Command mode result codes. The **+V** specification refers to these voice mode result codes as "event detection reports". Event detection reports are provided in simple report format when one character is enough to report an event, such as *RING*. A complex report format is used when one character is not enough to report an event; generally, all multi-character responses. Complex event reports are in the format <tag> <=> <data> <cr>, where <tag> is the data type, = is the ASCII = sign, <data> is a specific data instance, and <cr> is ASCII 13 decimal.

Valid Complex Event Report Tags

<u>Tag</u>	<u>Description</u>
TIME	Caller ID Tag in the form TIME=HHMM, where HH is the hour (00-23) and MM is the minute (00-59). All numbers are in ASCII and numbers less than 10 have a leading 0.
DATE	The current date in the format MMDD (where MM is the month 0-12 and DD is the day 01-31). All numbers are in ASCII and numbers less than 10 have a leading 0.
NMBR	The telephone number of the caller, in the format NMBR=<Number> or P or O (ASCII 4F hex). The P indicates that the calling number information is not available since the originating caller has requested Private service. The O indicates that the calling number information is not available since the caller is outside of the area code.
NAME	The caller's name in the format NAME=<Listing Name>.
MESG	Indicates a data item not listed above in Multiple Message Format: MESG=<Data Tag><Length of Message><Data><Checksum> in printable ASCII (to avoid confusion with binary output).
ERRM	Error Tag (used for Caller ID and other uses). Refer to the +VCID command.
DRON	Distinctive Ring Cadence On time
DROF	Distinctive Ring Cadence Off time
CPON	Control Tone Cadence On time
CPOF	Control Tone Cadence Off time
CWON	Call Waiting Cadence On time
CWOF	Call Waiting Cadence Off time
ASTB	See Voice Mode Shielded Codes
SITT	The data value for the SITT tag, in the format <SITT><=><data><cr>, where <data> can mean: ICNT Intercept Tone VCCT Vacant Code Tone REOT Reorder Tone NCDT No Circuit Detected Tone TON4 Fourth SIT Tone Number TON5 Fifth SIT Tone Number TON6 Sixth SIT Tone Number TON7 Seventh SIT Tone Number

In the event of an unrecognized data tag, the SocketModem presents the data item information as printable hex ASCII numbers following the MESG tag. For example:

```

RING
DATE=0321
TIME=1405
NMBR=5045551234
NAME=DOE JOE
MESG=060342424231
RING
RING
```

Voice Mode Shielded Codes

These codes can be sent in either Command mode or Data mode. The DCE may return the event detection reports after the OK result code from the +FCLASS command. One or more simple event detection reports may be embedded within the data portion of a complex event detection report. Table 3 describes voice mode shielded codes. The number in the first column is the ASCII equivalent (in hex).
Voice Mode Shielded Codes Detail

Shielded Code	Hex	Event Report Description
<DLE>	(10)	Two contiguous <DLE><DLE> codes indicate a single <DLE> in the data stream.
<SUB>	(1A)	<DLE><DLE> in the data stream.
<ETX>	(3)	End Data State; signifies the end of voice data. Can end with Event 9 (Presumed Hang Up Timeout), Event 10 (Presumed End of Message), Event 13 (Loop Current Interruption), Event 14 (Loop Current Polarity Reversal), Event 19 (BUSY), or Event 20 (DIALTONE).
Q	(51)	Data stream shielded Xon character. Used in the +VXT command to shield XON characters in the full-duplex data stream and in the Packet Protocol.
S	(53)	Data stream shielded Xoff character. Used in the +VXT command to shield XOFF characters in the full-duplex data stream and in the Packet Protocol.
M	(4D)	Data stream shielded SOH code used for the Packet Protocol.
W	(57)	Data stream shielded ETB code used for the Packet Protocol.
F	(46)	Data stream shielded ACK code used for the Packet Protocol.
U	(55)	Data stream shielded NAK code used for the Packet Protocol.
G	(47)	Data stream shielded ENQ code used for the Packet Protocol.
T	(54)	Timing Mark.
X	(58)	Packet Header for the "Complex Event Detection Report" (additional event data transfers to the DTE).
.	(2E)	Packet Terminator for the "Complex Event Detection Report" (additional event data transfers to the DTE).
/	(2F)	Start of DTMF tone shielding.
~	(7F)	DTMF transitions to off.
R	(52)	Event Number 3 (RING). The <DLE> shielded version of the RING result code.
1	(31)	Event Number 4 (DTMF 1).
2	(32)	Event Number 4 (DTMF 2).
3	(33)	Event Number 4 (DTMF 3).
4	(34)	Event Number 4 (DTMF 4).
5	(35)	Event Number 4 (DTMF 5).
6	(36)	Event Number 4 (DTMF 6).
7	(37)	Event Number 4 (DTMF 7).
8	(38)	Event Number 4 (DTMF 8).
9	(39)	Event Number 4 (DTMF 9).
0	(30)	Event Number 4 (DTMF 0).
A	(41)	Event Number 4 (Extended Keypad DTMF A).
B	(42)	Event Number 4 (Extended Keypad DTMF B).
C	(43)	Event Number 4 (Extended Keypad DTMF C).
D	(44)	Event Number 4 (Extended Keypad DTMF D).
*	(2A)	Event Number 4 (Extended Keypad DTMF E).
#	(23)	Event Number 4 (Extended Keypad DTMF E).
o	(6F)	Event Number 5 (Receive Buffer Overrun).
c	(63)	Event Number 6 (Facsimile Calling).
e	(65)	Event Number 7 (Data Calling).
h	(68)	Event Number 8 (line current break). Local phone goes on hook.
H	(48)	Event Number 8 (line current detected). Local phone goes off hook.
s	(73)	Event Number 9 (Presumed Hang Up "SILENCE" Timeout).
q	(71)	Event Number 10 (Presumed End of Message "QUIET" Timeout).
J	(4A)	Event Number 11 (SIT Tone).
\$	(24)	Event Number 12 (Bong Tone).

I	(6C)	Event Number 13 (Loop Current Interruption). Usually indicates a remote hang up.
L	(4C)	Event Number 14 (Loop Current Polarity Reversal). May indicate a hang up or a receive, depending on CO implementation.
w	(77)	Event Number 15 (Call Waiting/Beep Interrupt).
t	(74)	Event Number 17 (TDD Detected - 1400/1800).
r	(72)	Event Number 18 (Ring Back).
b	(62)	Event Number 19 (BUSY). May be repeatedly sent.
d	(64)	Event Number 20 (DIALTONE). May be repeatedly sent.
K	(4B)	Event Number 21 (Reorder/Fast Busy).
F	(46)	Event Number 22 (V.21 Channel 2 7E flags).
u	(75)	Event Number 23 (Transmit Buffer Under run).
p	(70)	Event Number 24 (Line voltage increase - extension phone goes on hook).
P	(50)	Event Number 24 (Line voltage increase - extension phone goes off hook).
a	(61)	Event Number 25 (Facsimile or Data Answer).
f	(66)	Event Number 26 (Data Answer).
V	(56)	Event Number 27 (Voice Detection). A high confidence of voice.
v	(76)	Event Number 27 (Voice Detection). A low confidence of voice.
i	(69)	Event Number 29 (Stuttered Dial tone).
E	(45)	Event Number 30 (Invalid Voice Data Format. Voice data is incompatible with selected Voice Compression Methods.
Y	(59)	Event Number 31 (Lost Data Detected Event).
m	(6d)	Event Number 32 (Facsimile Answer).
%	(25)	Event Number 63 (manufacturer specific).
&	(26)	Event Number 48 (manufacturer specific).
'	(27)	Event Number 49 (manufacturer specific).
((28)	Event Number 50 (manufacturer specific).
)	(29)	Event Number 51 (manufacturer specific).
all other		7-bit ASCII Reserved for future use.

DTE/DCE Interface Rates

The table below indicates the anticipated modem-to-computer interface rates for both the 7.2 bits-per-sample rate and the 8 bits-per-sample rate.

Projected DTE/DCE Interface Rates for 7.2/8K Hz Sample Rates

Bits per Sample	Projected DTE/DCE I/F Rate @ 7.2K Hz	Projected DTE/DCE I/F Rate @ 8K Hz
0.5	4800	9600
1	9600	19200
2	19200	19200
3	38400	38400
4	38400	57600
5	57600	57600
6	57600	115200
7	115200	115200
8	115200	115200
9	115200	115200
10	115200	115200
11	115200	115200
12	115200	Fast
13	Fast	Fast

Chapter 5 – Country/Regional Code Configuration

Different countries/regions have different requirements for how modems must function. Therefore, before you use the modem, you must configure it to match the defaults of the country/region in which you are using it.

To configure the modem for a specific country/region, execute the following AT commands:

1. Type **AT%T19,0,nn** (*nn* stands for the country/region code). Press **Enter**. **OK** is displayed.
2. Then save the changes by issuing the following command: **AT&F&W**
3. To verify that the correct code has been configured, issue the following command:

AT19

The country/region code is then displayed in decimal format.

The following is an example of country/region, AT commands, and result codes.

Country/Region	AT Command (Hexadecimal)	Result Code (Decimal)
Euro/NAM*	At%T19,0,34 (default)	52
Australia	At%T19,0,01	1
Czech Republic	At%T19,0,25	37
Japan	At%T19,0,10	16
New Zealand	At%T19,0,9	9

Countries/Regions Supported

See the list on the Multi-Tech Web site for countries and regions supported.

<http://www.multitech.com/PRODUCTS/Info/approvals/>

Then click on [global modems](#). The Global Modem Country/Region Approvals page displays. On this page you can view approvals, configuration strings (includes the country/regional code) and responses available in list form by selecting country/region and/or product.

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