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Venus® AT Command Reference Manual

Contents

Introduction

This document specifies the AT command set for the Lucent Technologies *Venus* chip set. Note that if a particular modem board does not support a feature, such as voice, then the corresponding commands are disabled for that mode.

AT Command Set

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in command mode. The format for entering commands is ATXn where X is the AT command and n is the specific value for that command.

Any command issued is acknowledged with a response in either text or numeric values. These responses are known as result codes. The result codes are listed in Table 59.

Commands may be executed while in COMMAND mode, which is entered under one of the following conditions:

- After powerup, at the termination of a connection, or after the execution of a command other than dial or answer.
- Upon the receipt of the escape sequence (three consecutive characters matching the contents of register S2) while in on-line mode.
- Upon the on-to-off transition of DTR if &D1, &D2, or &D3 has been set.

Table 1. AT Command Set Summary

Command	Description	Command	Description
A/	Repeat last command.	&Qn	Asynchronous communications mode.
A	Answer.	&Sn	Data set ready (DSR) option.
Bn	Communication standard setting.	&Tn	Self-test commands.
Cn	Carrier control.	&Vn	View active configuration.
Dn	Dial.	&Wn	Store current configuration.
En	Echo command.	&Yn	Select stored profile for hard reset.
Fn	On-line data character echo command.	&Zn	Store telephone number.
Hn	Hook control.	\An	Select *MNP** block size.
In	Request ID information.	\Bn	Send break.
Ln	Speaker volume.	\Gn	Modem port flow control.
Mn	Speaker control.	\Jn	Adjust bits/s rate control.
Nn	Modulation handshake.	\Kn	Set break control.
On	Return to on-line data mode.	\Nn	Select error control mode.
P	Select pulse dialing.	\Qn	Local flow control selection.
Qn	Result code control.	\Rn	Ring indicator off after answer.
T	Select tone dialing.	\Tn	Inactivity timer.
Vn	DCE response format.	\Vn	Protocol result code.
Wn	Result code option.	\Xn	XON/XOFF pass through.
Xn	Select result code and monitor call progress.	%Bn	View numbers in blacklist.
Yn	Long-space disconnect.	%Cn	Data compression control.
Zn	Reset and recall stored profile.	%En	Auto fallback/fallforward control.
&Bn	V.32 auto retrain.	)C	Enable Direct Connect.
&Cn	Data carrier detect (DCD) control.	&&C	Write to/read from DSP register.
&Dn	Data terminal ready (DTR) control.	&&L	Line-to-line loopback.
&Fn	Restore factory default configuration.	&&R	Write to/read from DSP RAM location.
&Gn	V.22bis guard tone control.	&&S	Speaker codec loopback.
&Jn	Auxiliary relay options.	%T94	Test external RAM.
&Kn	Local flow control selection.	%T124	Test DSP 56K version in external RAM.
&Mn	Asynchronous communications mode.	%T125	Test DSP 56K version in external RAM.
&Pn	Pulse dial make-to-break ratio selection.	#UD	Unimodem diagnostics.

* *MNP* is a trademark of Microcom, Inc.

AT Command Set (continued)

Escape Sequence

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line command mode, you may communicate directly to the modem using AT commands. Use the On command to return to data mode.

A pause, the length of which is set by the escape guard time (register S12), must be used before and after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data. The value of the escape sequence character may be changed using register S2.

A/—Repeat Last Command

The A/ command instructs the modem to repeat the last AT command. It will repeat the command already in the command buffer. This command does not require the AT prefix and does not have to be followed by the terminator character. It is primarily used to redial the last number in the case of a busy signal.

A—Answer

This command instructs the modem to go off-hook and answer an incoming call.

Bn—Communication Standard Setting

This command determines the communication standard used by the modem.

Result codes:

- OK if n = 0—3, 15, 16.
- ERROR if n ≠ 0—3, 15, 16.

Table 2. Bn Commands

Command	Function
B0	Selects CCITT V.22 mode when the modem is at 1200 bits/s.
B1	Selects Bell 212A when the modem is at 1200 bits/s (default).
B2	Deselects V.23 reverse channel (same as B3).
B3	Deselects V.23 reverse channel (same as B2).
B15	Selects V.21 when the modem is at 300 bits/s.
B16	Selects Bell 103J when the modem is at 300 bits/s (default).

Cn—Carrier Control

The modem will accept the C1 command without error in order to ensure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some other modems not to send carrier (i.e., it puts them in receive-only mode).

Result codes:

- OK if n = 1.
- ERROR if n ≠ 1.

AT Command Set (continued)

Table 3. Cn Commands

Command	Function
C0	Transmit carrier always off (not supported).
C1	Normal transmit carrier switching (default).

Dn—Dial

This command instructs the modem to go off-hook and begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after the ATD command.

A dial string can be up to sixty 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.

Table 4. Dial Modifiers

Modifier	Function
L	Dial the last number. This modifier is valid only if it is the first symbol of the dial string. All consecutive characters are discarded.
P	Use pulse dialing.
T	Use tone dialing (default).
W	Wait for dial tone. The modem will wait for a second dial tone before processing the dial string.
V	The modem switches to speakerphone mode and dials the number. The Hn command may be used to disconnect the voice call.
,	Dial pause. The modem will wait for the time specified by register S8 before continuing to dial.
!	Hook flash. The modem will go on-hook for 0.5 seconds and then return to off-hook.
@	Wait for quiet answer. The modem will 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.
;	Return to command mode. This modifier instructs the modem to return to command mode after it has finished dialing without disconnecting the call.
^	Disable data calling tone transmission.
$	Bong tone detection.
S=n	Dial a telephone number previously stored using the &Zn=x command. The range is 0—2.

En—Echo Command

This command controls whether or not the characters entered from the computer keyboard are echoed back to the monitor while in command mode.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 5. En Commands

Command	Function
E0	Disables echo command.
E1	Enables echo command (default).

AT Command Set (continued)

Fn—On-Line Data Character Echo Command

This command determines if the modem will echo data from the DTE. The modem does not support the F0 version of the command. However, to ensure backward compatibility, the modem will accept F1, which may be issued by older communication software.

Result codes:

- OK if n = 1.
- ERROR if n ≠ 1.

Table 6. Fn Commands

Command	Function
F0	On-line data character echo enabled (not supported by the modem).
F1	On-line data character echo disabled.

Hn—Hook Control

This command instructs the modem to go either on-hook to disconnect a call or off-hook to make the telephone line busy.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 7. Hn Commands

Command	Function
H0	The modem goes on-hook (default).
H1	The modem goes off-hook.

In—Request ID Information

This command displays specific product information about the modem.

Result codes:

- As described in Table 8 if n = 0—9, 11.
- ERROR if n ≠ 0—9, 11.

AT Command Set (continued)

Table 8. In Commands

Command	Function
I0, I3	Returns modem identity string and driver version number (default).
I1	Calculates a ROM checksum and displays it on the DTE.
I2	Performs a ROM check, calculates the checksum, and then verifies the checksum by displaying OK or ERROR.
I4	Returns firmware version for the data pump.
I5	Returns the code version, board ID, and country ID in hexadecimal.
I6, I7, I8	Returns OK for compatibility.
I9	Returns country ID in English.
I11	Displays connection information as described below.

The ATI11 results are listed on two screens. To get to the second screen, the user must hit any key. The following is an example of the ATI11 results.

```
    Description                      Status             Status
    -------------                    ------------------ ------------------
1   Last Connection                  56K                V.90
2   Initial Transmit Carrier Rate    28800              28800
3   Initial Receive Carrier Rate     50000              49333
4   Final Transmit Carrier Rate      28800              28800
5   Final Receive Carrier Rate       50000              49333
6   Protocol Negotiation Result      LAPM               LAPM
7   Data Compression Result          V42bis             V42bis
8   Estimated Noise Level            152                152
9   Receive Signal Poser Level (–dBm)  25               25
10  Transmit Signal Power Level (–dBm)  16              16
11  Round Trip Delay (msec)          4                  4
Press any key to continue; ESC to quit

    Description                      Status             Status
    -------------                    ------------------ ------------------
12  Near Echo Level (–dBm)           NA                 NA
13  Far Echo Level (–dBm)            NA                 NA
14  Transmit Frame Count             3                  3
15  Transmit Frame Error Count       0                  0
16  Receive Frame Count              0                  0
17  Receive Frame Error Count        0                  0
18  Retrain by Local Modem           0                  0
19  Retrain by Remote Modem          0                  0
20  Rate Renegotiation by Local Modem  0                0
21  Rate Renegotiation by Remote Modem  0               0
22  Call Termination Cause           0                  0
23  Robbed-Bit Signalling            00                 00
24  Digital Loss (dB)                6                  6
25  Remote Server ID                 4342C3             NA

26  Last PCM S PTR

OK
```

AT Command Set (continued)

The ATI11 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. The following table describes each of the results listed for the ATI11 command.

Table 9. ATI11 Command Results

Result	Description
Last Connection	V.90, 56K, V.34, or V.32, depending on the type of connection negotiated.
Initial Transmit Carrier Rate	Initial upstream rate.
Initial Receive Carrier Rate	Initial downstream rate.
Final Transmit Carrier Rate	Current or final upstream rate.
Final Receive Carrier Rate	Current or final downstream rate.
Protocol Negotiation Result	LAPM, *MNP*, or none, depending on V.42 negotiation.
Data Compression Result	LAPM, *MNP*, V.42bis, or none, depending on V.42 negotiation.
Estimated Noise Level	Mean-square error of received downstream signal. Difference between received constellation point and reference decision point. This is a dimensionless decimal number that is only valid during a call. Higher numbers are worse. There is no absolute threshold of goodness; it depends on the downstream data rate. The number varies during a call, so it is useful to sample it a few times.
Receive Signal Power Level (–dBm)	The received signal power, although labeled with units of -dBm, is only a relative measure for comparing calls to/from different locations. This value is valid only during a call.
Transmit Signal Power Level (–dBm)	Upstream transmit signal power.
Round Trip Delay (ms)	Round trip delay in milliseconds.
Near Echo Level (–dBm)	Echo levels are valid for V.34 only.
Far Echo Level (–dBm)	Echo levels are valid for V.34 only.
Transmit Frame Count	Number of LAPM frames sent upstream during this call. Count wraps around at 65535.
Transmit Frame Error Count	Number of REJ frames received at the analog client modem.
Receive Frame Count	Number of LAPM frames received by the client during this call. Count wraps around at 65535.
Receive Frame Error Count	Number of frames received in error by the client.
Retrain by Local Modem	Number of retrains or rate renegotiations requested by the modem.
Retrain by Remote Modem	Number of retrains or rate renegotiations requested by remote modem.
Rate Renegotiation by Local Modem	Number of rate renegotiations requested by the local modem.
Rate Renegotiation by Remote Modem	Number of rate renegotiations requested by the remote modem.
Call Termination Cause	Reason for call ending. Only valid after call ends. Result codes are as follows: ■ 0 = local modem command: ATH, DTR drop. ■ 1 = remote modem: cleardown, loss of signal. ■ 2 = no answer, busy, etc. ■ 3 = training failure V.90, K56flex, or V.34. ■ 4 = protocol failure if required by \N4, for example.
Robbed-Bit Signaling	For PCM connection only, a hexadecimal 6-bit pattern of T1 frames with robbed-bit signaling.
Digital Loss (dB)	For PCM connection only, the downstream digital loss.
Remote Server ID	For K56flex connection only, the V.8bis information sent by the server. Meaning is defined at the server and by convention.
Last PCM S PTR	Shows the last S pointer when the modem is expected to go to PCM mode.

AT Command Set (continued)

Ln—Speaker Volume

This command instructs the modem to use the specified speaker volume setting when the speaker is on. Result codes:

- OK if n = 0—3.
- ERROR if n ≠ 0—3.

Table 10. Ln Commands

Command	Function
L0	Low volume.
L1	Low volume.
L2	Medium volume (default).
L3	High volume.

Mn—Speaker Control

This command turns the speaker on and off.

Result codes:

- OK if n = 0—3.
- ERROR if n ≠ 0—3.

Table 11. Mn Commands

Command	Function
M0	Speaker is off.
M1	Speaker is on until the modem detects the carrier signal (default).
M2	Speaker is always on when the modem is off-hook.
M3	Speaker is on until the carrier is detected, except when dialing.

Nn—Modulation Handshake

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 12. Nn Commands

Command	Function
N0	When originating or answering, this is for handshake only at the communication standard specified by register S37 and the Bn command.
N1	When originating or answering, begin the handshake only at the communication standard specified by S37 and the Bn command. During handshake, fallback to a lower speed may occur (default).

AT Command Set (continued)

On—Return to On-Line Data Mode

Result codes:

- OK if n = 0—1, 3.
- ERROR if n ≠ 0—1, 3.

Table 13. On Commands

Command	Function
O0	Instructs the modem to exit on-line command mode and return to data mode (default).*
O1	Issues a retrain before returning to on-line data mode.
O3	Issues a rate renegotiation before returning to on-line data mode.

* See Escape Sequence section on page 3.

P—Select Pulse Dialing

This command configures the modem for pulse dialing. Dialed digits are pulsed until a T command or dial modifier is received. Tone dialing is the default setting.

Qn—Result Code Control

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. The Qn command allows the user to turn result codes on or off.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 14. Qn Commands

Command	Function
Q0	Enables result codes (default).
Q1	Disables result codes.

T—Select Tone Dialing

This command instructs the modem to send DTMF tones while dialing. Dialed digits are tone dialed until a P command or dial modifier is received. This is the default setting.

AT Command Set (continued)

Vn—DCE Response Format

This command controls whether result codes, including call progress and negotiation progress messages, are displayed as words or their numeric equivalents.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 15. Vn Commands

Command	Function
V0	Displays result codes as digits.
V1	Displays result codes as text (default).

Table 16. Vn Result Code Formats

Command	Result Code Format
V0	<numeric code><CR>
V1	<CR><LF><verbose code><CR><LF>

Wn—Result Code Option

This command controls the format of CONNECT messages.

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 17. Wn Commands

Command	Function
W0	CONNECT result code reports DTE receive speed. Disables protocol result codes.
W1	CONNECT result code reports DTE receive speed. Enables protocol result codes.
W2	CONNECT result code reports DCE receive speed. Enables protocol result codes (default).

AT Command Set (continued)

Xn—Select Result Code and Monitor Call Progress

This command enables tone detection options used in the dialing process. As these functions are 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.

Result codes:

- OK if n = 0—7.
- ERROR if n ≠ 0—7.

Table 18. Xn Commands

Command	Extended Result Codes	Dial Tone Detect	Busy Tone Detect
X0	Disabled. Displays only the following basic result codes: OK, CONNECT, RING, NO CARRIER, and ERROR.	Disabled. The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.	Disabled. The modem ignores any busy tones it receives.
X1	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Disabled. The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.	Disabled. The modem ignores any busy tones it receives.
X2	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Enabled. The modem dials only upon detection of a dial tone and disconnects the call if the dial tone is not detected within 10 seconds.	Disabled. The modem ignores any busy tones it receives.
X3	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Disabled. The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.	Enabled. The modem monitors for busy tones.
X4	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Enabled. The modem dials only upon detection of a dial tone and disconnects the call if the dial tone is not detected within 10 seconds.	Enabled. The modem monitors for busy tones (default).
X5	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Enabled. The modem dials only upon detection of a dial tone and disconnects the call if the dial tone is not detected within 10 seconds.	Enabled. The modem monitors for busy tones.
X6	Enabled. Displays basic result codes, connect message, data rate, and an indication of error correction and data compression operation.	Enabled. The modem dials only upon detection of a dial tone and disconnects the call if the dial tone is not detected within 10 seconds.	Enabled. The modem monitors for busy tones.
X7	Disabled. Displays only the following basic result codes: OK, CONNECT, RING, NO CARRIER, and ERROR.	Enabled. The modem dials only upon detection of a dial tone and disconnects the call if the dial tone is not detected within 10 seconds.	Enabled. The modem monitors for busy tones.

AT Command Set (continued)

Yn—Long-Space Disconnect

This command disconnects the modem from a call upon receiving a long-space signal from the distant end. This command is only valid in 1200 bits/s and 2400 bits/s modes.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 19. Yn Commands

Command	Function
Y0	Disables long-space disconnect (default).
Y1	Enables long-space disconnect.

Zn—Reset and Recall Stored Profile

This command will force the modem to go on-hook and restore the profile saved by the last &W command. Either Z0 or Z1 restores the same single profile.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 20. Zn Commands

Command	Function
Z0	Reset and restore stored profile.
Z1	Reset and restore stored profile.

&Bn—V.32 Auto Retrain

The modem always auto retrains.

Result codes:

- OK if n = 1.
- ERROR if n ≠ 1.

Table 21. &Bn Commands

Command	Function
&B0	Disable V.32 auto retrain (not supported).
&B1	Enable V.32 auto retrain (default).

AT Command Set (continued)

&Cn—Data Carrier Detect (DCD) Control

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. DCD normally turns off when the modem no longer detects the carrier signal.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 22. &Cn Commands

Command	Function
&C0	The state of the carrier from the remote modem is ignored. DCD remains on at all times.
&C1	DCD turns on when the remote modem's carrier signal is detected and off when the carrier signal is not detected (default).

&Dn—Data Terminal Ready (DTR) Control

This command informs the modem how to respond to the state of the DTR signal and changes to the DTR signal.

Result codes:

- OK if n = 0—3.
- ERROR if n ≠ 0—3.

Table 23. &Dn Commands

Command	Function
&D0	Ignore the true status of DTR and treats it as always on. This should be used only if the computer does not provide DTR to the modem.
&D1	If the DTR signal is not detected while in on-line data mode, the modem enters command mode, issues the OK result code, and remains connected.
&D2	If the DTR signal is not detected while in on-line data mode, the modem disconnects (default).
&D3	Reset modem on the on-to-off DTR transition.

&Fn—Restore Factory Default Configuration

This command loads the configuration stored and 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 &Fn command by itself.

Result codes:

- OK if n = 0 or 5.
- ERROR if n ≠ 0 or 5.

Table 24. &Fn Commands

Command	Function
&F0	Loads the configuration stored and programmed at the factory (default).
&F5	Loads the configuration stored and programmed at the factory for ETC mode.

AT Command Set (continued)

&Gn—V.22bis Guard Tone Control

This command determines which guard tone, if any, should be transmitted while transmitting in the high band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not used in North America; it is for international use only.

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 25. &Gn Commands

Command	Function
&G0	Disables guard tone (default).
&G1	Selects 550 Hz guard tone.
&G2	Selects 1800 Hz guard tone.

&Jn—Auxiliary Relay Option

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

Table 26. &Jn Commands

Command	Function
&J0	The auxiliary relay is never closed (default).
&J1	Not supported.

&Kn—Local Flow Control Selection

This command instructs the modem on which flow control method to use.

Result codes:

- OK if n = 0, 3, or 4.
- ERROR if n ≠ 0, 3, or 4.

Table 27. &Kn Commands

Command	Function
&K0	Disables flow control.
&K1, &K2	Reserved.
&K3	Enables RTS/CTS (hardware) flow control (default).
&K4	Enables XON/XOFF software flow control.

AT Command Set (continued)

&Mn—Asynchronous Communications Mode

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

Table 28. &Mn Commands

Command	Function
&M0	Asynchronous mode (default).
&M1, &M2, &M3, &M4	Reserved.

&Pn—Pulse Dial Make-to-Break Ratio Selection

This command is effective only for Japan.

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 29. &Pn Commands for Domestic Versions

Command	Function
&P0	Selects 39%—61% make/break ratio at 10 pulses per second.
&P1	Selects 33%—67% make/break ratio at 10 pulses per second (default).
&P2	Selects 33%—67% make/break ratio at 20 pulses per second.

&Qn—Asynchronous Communications Mode

Result codes:

- OK if n = 0, 5, 6, 8, or 9.
- ERROR if n ≠ 0, 5, 6, 8, or 9.

Table 30. &Qn Commands

Command	Function
&Q0	Asynchronous mode, buffered. Same as \N0.
&Q5	Error control mode, buffered (default). Same as \N3.
&Q6	Asynchronous mode, buffered. Same as \N0.
&Q8	*MNP* error control mode. If an *MNP* error control protocol is not established, the modem will fall back according to the current user setting in register S36.
&Q9	V.42 or *MNP* error control mode. If neither error control protocol is established, the modem will fall back according to the current user setting in register S36.

AT Command Set (continued)

&Sn—Data Set Ready (DSR) Option

This command controls DSR action.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 31. &Sn Commands

Command	Function
&S0	DSR is always on (default).
&S1	DSR comes on after establishing a connection and goes off when the connection ends.

&Tn—Self-Test Commands

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

Result codes:

- OK if n = 0.
- CONNECT if n = 1 or 3.
- ERROR if n ≠ 0—1 or 3.

Table 32. &Tn Commands

Command	Function
&T0	Abort. Terminates the test in progress.
&T1	Local analog loop. This test verifies modem operation as well as the connection between the modem and computer. Any data entered at the local DTE is modulated, demodulated, and then returned to the local DTE. To work properly, the modem must be off-line.
&T3	Local digital loopback test.

AT Command Set (continued)

&Vn—View Active Configuration

This command displays the active profiles.

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

An example of the results of the command are shown below:

```
      Option                          Selection            AT Cmd

      Comm Standard                   Bell                 B
      CommandCharEcho                 Enabled              E
      Speaker Volume                  Medium               L
      Speaker Control                 OnUntilCarrier       M
      Result Codes                    Enabled              Q
      Dialer Type                     Tone                 T/P
      ResultCode Form                 Text                 V
      ExtendResultCode                Enabled              X
      DialToneDetect                  Enabled              X
      Busy Tone Detect                Enabled              X
      LSD Action                      Standard RS232       &C
      DTR Action                      Standard RS232       &D
Press any key to continue; ESC to quit.
      Option                          Selection            AT Cmd

      V22b Guard Tone                 Disabled             &G
      Flow Control                    Hardware             &K
      Error Control Mode              V42, MNP, Buffer     \N
      Data Compression                Enabled              %C
      AutoAnswerRing#                 0                    S0
      AT Escape Char                  43                   S2
      CarriageReturnChar              13                   S3
      Linefeed Char                   10                   S4
      Backspace Char                  8                    S5
      Blind Dial Pause                2 sec                S6
      NoAnswer Timeout                50 sec               S7
      "," Pause Time                  2 sec                S8
Press any key to continue; ESC to quit.
      Option                          Selection            AT Cmd

      No Carrier Disc                 2000 msec            S10
      DTMF Dial Speed                 95 msec              S11
      Escape GuardTime                1000 msec            S12
      Data Calling Tone               Disabled             S35
      LineRate                        33600                S37
Press any key to continue; ESC to quit.

      Stored Phone Numbers
      &Z0=
      &Z1=
      &Z2=
OK
```

AT Command Set (continued)

&Wn—Store Current Configuration

This command stores certain command options and S-register values except S3, S4, and S5. The Zn command or a power-up reset of the modem restores this profiles.

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

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

Table 33. &Wn Commands

Command	Function
&W0	Stores the current configuration as profile 0.

&Yn—Select Stored Profile for Hard Reset

This command does not change the behavior of the modem but is included for compatibility with applications that issue the &Y0 command.

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

Table 34. &Yn Commands

Command	Function
&Y0	Select stored profile 0 on power-up.

&Zn=x—Store Telephone Number

This command is used to store up to three dialing strings for later use. The format for the command is &Zn=stored number, where n represents the location 0—2 to which the number should be written. The dial string may contain up to 40 characters. The ATDS=n command dials using the string stored in location n.

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

\An—Select Maximum *MNP* Block Size

The modem will operate an *MNP* error corrected link using a maximum block size controlled by the parameter supplied.

Result codes:

- OK if n = 0—3.
- ERROR if n ≠ 0—3.

AT Command Set (continued)

Table 35. \An Commands

Command	Function
\A0	64 characters.
\A1	128 characters.
\A2	192 characters.
\A3	256 characters (default).

\Bn—Send Break

In nonerror correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to the parameter specified. The command works in conjunction with the \K command. The default of n = 3 corresponds to a length of 300 ms.

Result codes:

- OK if connected in data modem mode.
- NO CARRIER if not connected or if connected in FAX modem mode.
- ERROR if n ≠ 1—9.

Table 36. \Bn Commands

Command	Function
\B1—\B9	Break length in 100 ms units (nonerror-control mode only).

\Gn—Modem Port Flow Control

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 37. \Gn Commands

Command	Function
\G0	The modem processes XON/XOFF flow control characters locally (default).
\G1	The modem passes XON/XOFF flow control characters.

\Jn—Adjust Bits/s Rate Control

This command determines whether or not the negotiated connect speed of the modem forces the adjustment of the speed of the DTE to the modem's speed.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

AT Command Set (continued)

Table 38. \Jn Commands

Command	Function
\J0	Buffer mode. Error control is set or disabled with the \Nn command (default).
\J1	Forces the maximum DCE rate to the DTE rate.

\Kn—Set Break Control

This command controls the response of the modem to a break received from the DTE, remote modem, or the \Bn command.

Result codes:

- OK if n = 0—5.
- ERROR if n ≠ 0—5.

The response is different in three separate cases. The first case is where the modem receives a break from the DTE when it is operating in data transfer mode. See Table 39.

Table 39. \Kn Commands When Modem Is Operating in Data Transfer Mode

Command	Function
\K0, \K2, K4	Enter on-line command mode. No break is sent to the remote modem.
\K1	Clear data buffers and send a break to the remote modem.
\K3	Send a break to the remote modem immediately.
\K5	Send a nondestructive, nonexpedited break to the remote modem (default).

The second case, shown in Table 40, occurs when the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \Bn command is received in order to send a break to the remote modem.

Table 40. \Kn Commands When Modem Is On-Line Command State During Data Connection

Command	Function
\K0, \K1	Clear data buffers and send a break to the remote modem.
\K2, \K3	Send a break to the remote modem immediately.
\K4, \K5	Send a break to the remote modem in sequence with data (default).

Finally, the third case occurs when a break is received from a remote modem during a connection. These commands are shown in Table 41.

Table 41. \Kn Commands When Break Is Received During Connection

Command	Function
\K0, \K1	Clear data buffers and send a break to the DTE.
\K2, \K3	Send a break to the DTE immediately.
\K4, \K5	Send a break to the DTE in sequence with received data (default).

AT Command Set (continued)

\Nn—Select Error Control Mode

This command determines the type of error control used by the modem when sending or receiving data.

Result codes:

- OK if n = 0—5, or 7.
- ERROR if n ≠ 0—5, or 7.

Table 42. \Nn Commands

Command	Function
\N0	Buffer mode. No error control (same as &Q6).
\N1	Direct mode.
\N2	*MNP* or disconnect mode. The modem attempts to connect using *MNP* 2—4 error control procedures. If this fails, the modem disconnects. This is also known as *MNP* reliable mode.
\N3	V.42, MNP, or buffered (default). The modem attempts to connect in V.42 error control mode. If this fails, it will attempt to connect in *MNP* mode. If this also fails, the modem connects in buffer mode and continues operation. This is also known as V.42/*MNP* auto reliable mode (same as &Q5).
\N4	V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the modem disconnects.
\N5	V.42, *MNP*, or buffered (same as \N3).
\N7	V.42, *MNP*, or buffered (same as \N3).

\Qn—Local Flow Control Selection

Result codes:

- OK if n = 0—1, or 3.
- ERROR if n ≠ 0—1, or 3.

Table 43. \Qn Commands

Command	Function
\Q0	Disable flow control (same as &K0).
\Q1	XON/XOFF software flow control (same as &K4).
\Q2	CTS-only flow control. This is not supported and the response is ERROR.
\Q3	RTS/CTS to DTE (same as &K3) (default).

\Rn—Ring Indicator Signal Off After Answer

Result codes:

- OK if n = 0.
- ERROR if n ≠ 0.

Table 44. \Rn Commands

Command	Function
\R0	Ring indicator signal is off after the telephone call is answered.

AT Command Set (continued)

\Tn—Inactivity Timer

This command specifies the length of time in minutes that the modem will wait before disconnecting when no data is sent or received. A setting of n = 0 disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable in buffer mode.

Result codes:

- OK if n = 0—255.
- ERROR if n ≠ 0—255.

Table 45. \Tn Commands

Command	Function
\T0	Inactivity timer disabled (default).
\T1—\T255	Specifies the length of time in minutes that the modem will wait before disconnecting when no data is sent or received.

\Vn—Protocol Result Code

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 46. \Vn Commands

Command	Function
\V0	Disables protocol result code appended to DCE speed.
\V1	Enables protocol result code appended to DCE speed (default).
\V2	Enables protocol result code appended to DCE speed (same as \V1).

\Xn—XON/XOFF Pass Through

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 47. \Xn Commands

Command	Function
\X0	The modem processes XON/XOFF flow control characters locally (default).
\X1	The modem passes XON/XOFF flow control characters.

%B—View Numbers in Blacklist

If blacklisting is in effect, this command displays the number of the last failed call, attempted in the past two hours. The modem returns an ERROR result code if your country does not support blacklisting.

AT Command Set (continued)

%Cn—Data Compression Control

This command determines the operation of V.42bis and *MNP* class 5 data compression. On-line changes do not take effect until a disconnect occurs.

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 48. %Cn Commands

Command	Function
%C0	V.42bis/*MNP* 5 disabled. No data compression.
%C1	V.42bis/*MNP* 5 enabled. Data compression enabled (default).

%En—Auto Fallback/Fallforward Control

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

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 49. %En Commands

Command	Function
%E0	Disable fallback/fallforward.
%E1	Enable fallback and disable fallforward.
%E2	Enable fallback/fallforward (default).

)Cn—Enable Direct Connect

This command enables direct connect operation. After a phone is enabled, the modem will operate in cellular mode whenever the phone is detected. Otherwise, it will automatically switch to landline. *ETC* is automatically set when operating in cellular mode.

Result codes:

- OK if n = 0—3.
- ERROR if n ≠ 0—3.

Table 50. -Cn Commands

Command	Function
)C0	Select landline.
)C1	Select OKI/AT&T type phones.
)C2	Select Motorola phones.
)C3	Select NEC type phones.

Test and Debug AT Commands

The following commands are to be used for testing and debugging only. They are not meant for general use.

&&C—Write to/Read from DSP Register

AT&&C<loc>,<val> writes the value <val> to the DSP register at location <loc>. AT&&C<loc> reads location <loc>.

&&L—Line-to-Line Loopback

This command provides a loopback for line-to-line.

&&R—Write to/Read from DSP RAM Location

AT&&R<loc>,<val> writes the value <val> to the DSP RAM location <loc>. AT&&R<loc> reads from location <loc>.

&&S—Speaker Codec Loopback

This command provides a loopback from the microphone to the speaker.

%T88—Write to NVRAM

AT%T88,<loc>,<val> writes the value <val> to NVRAM location <loc>.

%T89—Read from NVRAM

AT%T89,<loc> reads NVRAM from location <loc>.

%T112,n—Debug Enable/Disable

Result codes:

- OK if n = 0—1.
- ERROR if n ≠ 0—1.

Table 51. \Tn Commands

Command	Function
%T112,1	Turn debug on.
%T112,0	Turn debug off.

Test and Debug AT Commands (continued)

#UD—Unimodem Diagnostics

This command is defined by *Microsoft*'s* unimodem diagnostics command specification. The modem implements a subset of the parameters in that specification.

#UD is an action command. It does not take parameters. It should be the last command in the command line. The modem logs aspects of its operation for each call and saves these results in volatile memory until cleared by one of the following events. These results are not cleared by changing DTR, V.24 circuit 108.2, &D0, &D1, or &D2.

- Power off (or D1 or D3 state entered).
- Hard reset (e.g., negate DTR with &D3 set, reset button).
- Soft reset = ATZ or AT&F.
- ATD or ATA command issued.
- Automatic answer (e.g., set register S0 > 0 and ring detected).

In response to this command, the modem reports one or more lines of information text. Information text format is defined in ITU V.25ter. Each line is both preceded and terminated by a <CR><LF> pair. Note that, as per V.25ter, CR and LF characters may be changed by writing new values to the contents of registers S2 and S3 respectively.

DIAG <token key=value [[key=value [key=value]]. . .>

where

DIAG = 5 characters, hexadecimal 44, 49, 41, 47, 20.

'<' = left angle bracket, hexadecimal 3C.

'=' = equal sign, hexadecimal 3D.

'>' = right angle bracket, hexadecimal 3E.

token = unique 32-bit hexadecimal string, i.e., 2A4D3263.

key = one or two digit hexadecimal number. See Table 52.

value = any string.

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multidigit values are reported MSD first. Leading zeros may be deleted.

The following table includes all items listed in *Microsoft*'s specification for the #UD command. The items that have an X in the Implemented column have been implemented in this release.

Please refer to *Microsoft*'s unimodem diagnostics command specification for more information.

* *Microsoft* is a registered trademark of Microsoft Corporation.

Table 52. #UD Last Call Status Report Format

Note: Refer to Table 1 in the *Microsoft* specification.

Key	Value(s)	Required	Definition	Implemented
0	2 digits	Yes	Diagnostic command specification revision number, digit.digit.	X
1	See Table 53	0—A	Call setup result code.	X
2	See Table 3*	0—1	Multimedia mode.	—
3	See Table 4*	0	DTE-DCE interface mode.	—
4	String	Yes	V.8 CM octet string. Same format as V.25ter Annex A, in quotes.	—

* Refers to notes or tables in the *Microsoft* specification.

Test and Debug AT Commands (continued)

Table 52. #UD Last Call Status Report Format (continued)

Key	Value(s)	Required	Definition	Implemented
5	String	Yes	V.8 JM octet string. Same format as V.25ter Annex A in quotes.	—
6—F	—	—	Reserved for call negotiation reports.	—
10	2 digits	Note 4*	Received signal power level in –dBm (0—43).	X
11	2 digits	Note 4*	Transmit signal power level in –dBm (0—17).	X
12	2 digits	Note 4*	Estimated noise level in –dBm (10—90).	X
13	2 digits	Note 4*	Normalized mean squared error. 100 (0x64) = minimum intersymbol distance.	—
14	2 digits	Note 4*	Near echo loss in dB.	X
15	2 digits	Note 4*	Far echo loss in dB.	X
16	4 digits	Note 4*	Far echo delay in ms.	—
17	—	Note 4*	—	X
18	—	Note 4*	—	—
19—1F	—	—	Reserved for modulation setup and training reports (see note 5*).	—
20	See Table 54	Note 6*	Transmit carrier negotiation result.	X
21	See Table 54	Note 6*	Receive carrier negotiation result.	X
22	4 digits	0-1F40	Transmit carrier symbol rate (0—8000).	X
23	4 digits	0-1F40	Receive carrier symbol rate (0—8000).	X
24	4 digits	0-FA0	Transmit carrier frequency (0—4000).	—
25	4 digits	0-FA0	Receive carrier frequency (0—4000).	—
26	4 digits	0-FA00	Initial transmit carrier data rate (0—64000).	X
27	4 digits	0-FA00	Initial receive carrier data rate (0—64000).	X
28—2F	—	—	Reserved.	—
30	2 digits	0-FF	Temporary carrier loss event count.	—
31	2 digits	0-FF	Carrier rate renegotiation event count.	—
32	2 digits	0-FF	Carrier retrains requested.	X
33	2 digits	0-FF	Carrier retrain requests granted.	X
34	4 digits	0-FA00	Final transmit carrier rate.	X
35	4 digits	0-FA00	Final receive carrier rate.	X
36—3F	—	—	Reserved.	—
40	See Table 55	0-2	Protocol negotiation result (see note 7*).	X
41	3 digits	0-400	Error control frame size.	—
42	2 digits	0-FF	Error control link time-outs.	X
43	2 digits	0-FF	Error control link NAKs.	—
44	See Table 56	0-1	Compression negotiation result (see note 7*).	X
45	4 digits	0-200	Compression dictionary size (see note 7*).	—
46—4F	—	—	Reserved.	—
50	1 digit	0-2	Transmit flow control. ■ 0 = off. ■ 1 = DC1/DC3. ■ 2 = V.24 ckt 106/133.	—

* Refers to notes or tables in the *Microsoft* specification.

Test and Debug AT Commands (continued)

Table 52. #UD Last Call Status Report Format (continued)

Note: Refer to Table 1 in the *Microsoft* specification.

Key	Value(s)	Required	Definition	Implemented
51	1 digit	0—2	Receive flow control. ■ 0 = off. ■ 1 = DC1/DC3. ■ 2 = V.24 ckt 106/133.	—
52	8 digits	0—FFFFFFFF	Transmit characters sent from DTE (see note 8*).	—
53	8 digits	0—FFFFFFFF	Receive characters sent to DTE (see note 8*).	—
54	8 digits	0—FFFF	Transmit characters lost (data overrun errors from DTE) (see note 9*).	—
55	8 digits	0—FFFF	Receive characters lost (data overrun errors from DTE) (see note 9*).	—
56	8 digits	0—FFFFFFFF	Transmit frame count, if error control protocol running (see note 9*).	X
57	8 digits	0—FFFFFFFF	Receive frame count, if error control protocol running (see note 9*).	X
58	8 digits	0—FFFF	Transmit frame error count, if error control protocol running (see note 9*).	X
59	8 digits	0—FFFF	Receive frame error count, if error control protocol running (see note 9*).	X
5A—5F	—	—	Reserved.	—
60	See Table 57 and Table 58	Note 10*	Termination cause.	X
61	2 digits	0—FF	Call waiting event count.	—
62—7F	—	—	Reserved for future versions of the specification.	—
80—FF	—	—	Reserved for manufacturer proprietary keys.	—

* Refers to notes or tables in the *Microsoft* specification.

Table 53. Call Setup Result Codes

Note: Refer to Table 2 in the *Microsoft* specification.

Code	Definition	Implemented
0	No previous call (modem log has been cleared since any previous call).	X
1	No dial tone detected.	X
2	Reorder signal detected. Network busy.	—
3	Busy signal detected.	X
4	No recognized signal detected.	X
5	Voice detected.	—
6	Text telephone signal detected (see V.18).	—
7	Data answering signal detected (e.g., V.25 ANS, V.8ANSam).	X
8	Data calling signal detected (e.g., V.25 CT, V.8 CI).	—
9	FAX answering signal detected (e.g., T.30 CED, DIS).	—
A	FAX calling signal detected (e.g., T.30 CNG).	—
B	V.8bis signal detected.	—
C—F	Reserved.	—

Test and Debug AT Commands (continued)

Table 54. gstnModulationSchemeActive from 3.7.2/V.58

Note: Refer to Table 6 in the *Microsoft* specification.

Value (hexadecimal)	Description	Implemented
0	V.17.	—
1	V.21.	—
2	V.22.	—
3	V.22bis.	—
4	V.23 constant carrier (1200/75).	—
5	V.23 switched carrier (half duplex).	—
6	V.26bis.	—
7	V.26ter.	—
8	V.27ter.	—
9	V.29 HD.	—
A	V.32.	X
B	V.32bis.	—
C	V.34.	X
D	V.34 HD.	—
E	V.pcm (asymmetric).	—
F	V.pcm (symmetric).	—
E—7F	Reserved (V.58).	—
80	X2.	—
81	K56flex.	X
82	V.FC.	—
83	V.32terbo.	—
80—FF	Reserved for mfgs.	—

Table 55. errorControl Active from 3.5.2/V.58

Note: Refer to Table 7 in the *Microsoft* specification.

Value	Description	Implemented
0	Disable/none.	X
1	V.42 LAPM.	X
2	V.42 alternative protocol (*MNP*).	X
3—7F	Reserved (V.58).	—
80	*MNP* Class 10.	—
81	Enhanced cellular protocol.	—
82	*ETC.**	—
82—FF	Reserved for mfgs.	—

* *ETC* is a registered trademark of Paradyne Corporation.

Test and Debug AT Commands (continued)

Table 56. compressionActive from 3.2.2/V.58

Note: Refer to Table 8 in the *Microsoft* specification.

Value	Description	Implemented
0	None.	X
1	V.42bis.	X
2—7F	Reserved (V.58).	—
80	*MNP* Class 5.	X
81—FF	Reserved for mfgs.	—

Table 57. Additional callCleared Codes (3.6.4/V.58)

Note: Refer to Table 9 in the *Microsoft* specification.

Code	Definition	Implemented
1	No previous call.	X
2	Call is still in progress.	X
3	Call waiting signal detected.	—
4	Delayed (see ETS 300 001).	X

Table 58. callCleared Codes from 3.6.4/V.58-1994

Note: callCleared indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These values are hexadecimal, converted from decimal in V.58. Refer to Table 10 in the *Microsoft* specification.

Value	Description	Notes	Implemented
0	CauseUnidentified.	Call setup issues.	X
1—3	See Table 57.	—	X
A	NMSinitiatedDialCall.	Network management system.	—
B	NMSinitiatedLeasedLineRestoral.	Network management system.	—
C	NMSinitiatedRedial.	Network management system.	—
D	NMSinitiatedDialDisconnect.	Network management system.	—
14	PowerLoss.	DCE.	—
15	EquipmentFailure.	—	—
16	FrontPanelDisconnectRequested.	—	—
17	FrontPanelLeasedLineRestoral.	—	—
18	AutomaticLeasedLineRestoral.	—	—
19	InactivityTimerExpired.	—	X
1E	cct116RestoralRequest.	DTE interface.	—
1F	cct108isOffInhibitsDial.	—	—
20	cct108turnedOff.	—	—
28	NoNumberProvided.	Line interface.	—
29	BlacklistedNumber.	—	X
2A	CallAttemptsLimitExceeded.	—	X
2B	ExtensionPhoneOffhook.	—	—

Test and Debug AT Commands (continued)

Table 58. callCleared Codes from 3.6.4/V.58-1994 (continued)

Note: callCleared indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These values are hexadecimal, converted from decimal in V.58. Refer to Table 10 in the *Microsoft* specification.

Value	Description	Notes	Implemented
2C	CallSetupFailTimerExpired.	—	X
2D	IncomingCallDetected.	—	X
2E	LoopCurrentInterrupted.	—	—
2F	NoDialTone.	—	X
30	VoiceDetected.	—	—
31	ReorderTone.	—	—
32	SitTone.	—	—
33	EngagedTone.	—	—
34	LongSpaceDisconnect.	—	—
3C	CarrierLost.	Signal converter.	X
3D	TrainingFailed.	—	X
3E	NoModulationinCommon.	—	—
3F	RetrainFailed.	—	X
40	RetrainAttemptCountExceeded.	—	—
41	GstnCleardownReceived.	—	—
42	FaxDetected.	—	—
46	InTestMode.	Test.	—
47	IntrusiveSelfTestInitiated.	—	—
50	AnyKeyAbort.	Call control.	X
51	DteHangupCommand.	—	X
52	DteResetCommand.	—	—
5A	FrameReject.	Error control.	—
5B	NoErrorControlEstablished.	—	X
5C	ProtocolViolation.	—	—
5D	n400exceeded.	—	X
5E	NegotiationFailed.	—	—
5F	DisconnectFrameReceived.	—	—
60	SabmeFrameReceived.	—	—
64	LossOfSynchronization.	Data compression.	—

Result Codes

The modem's AT command handler responds to commands from the caller and to activity on the line via result codes. Table 59 presents a summary of these result codes.

Two forms of each result code are available. The long-form, or verbose, response is given when V1 is selected, and the short-form, data-like numeric response is given when V0 is selected. The long-form code is preceded and terminated by the sequence <CR> <LF>. The short-form is also terminated by <CR>, but it has no preceding sequence. If result codes are suppressed, nothing is returned to the caller.

Table 59. Result Code Summary

Result Code	Numeric Code	Description
OK	0	Acknowledges the execution of a command line.
CONNECT	1	Modem connected to line.
RING	2	Incoming ring signal has been detected.
NO CARRIER	3	Modem lost carrier signal, does not detect carrier signal, or does not detect answer tone.
ERROR	4	Invalid command.
CONNECT 1200 EC*	5	Connection at 1200 bits/s.
NO DIALTONE	6	No dial tone detected.
BUSY	7	Busy signal detected.
NO ANSWER	8	Remote end never answered.
CONNECT 2400 EC*	10	Connection at 2400 bits/s.
CONNECT 4800 EC*	11	Connection at 4800 bits/s.
CONNECT 9600 EC*	12	Connection at 9600 bits/s.
CONNECT 14400 EC*	13	Connection at 14400 bits/s.
CONNECT 19200 EC*	14	Connection at 19200 bits/s.
CONNECT 7200 EC*	24	Connection at 7200 bits/s.
CONNECT 12000 EC*	25	Connection at 12000 bits/s.
CONNECT 16800 EC*	86	Connection at 16800 bits/s.
CONNECT 300 EC*	40	Connection at 300 bits/s.
CONNECT 21600 EC*	55	Connection at 21600 bits/s.
CONNECT 24000 EC*	56	Connection at 24000 bits/s.
CONNECT 26400 EC*	57	Connection at 26400 bits/s.
CONNECT 28800 EC*	58	Connection at 28800 bits/s.
CONNECT 31200 EC*	59	Connection at 31200 bits/s.
CONNECT 33600 EC*	60	Connection at 33600 bits/s.
CONNECT 38400 EC*	28	Connection at 38400 bits/s (DTE rate).
CONNECT 57600 EC*	18	Connection at 57600 bits/s (DTE rate).
CONNECT 115200 EC*	87	Connection at 115200 bits/s (DTE rate).

* EC only appears when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending on the error control method used:
  V42bis—V.42 error control and V.42bis data compression.
  V42—V.42 error control only.
  MNP 5—*MNP* class 4 error control and *MNP* class 5 data compression.
  MNP 4—*MNP* class 4 error control only.
  NoEC—no error control protocol.

Result Codes (continued)

Table 59. Result Code Summary (continued)

Result Code	Numeric Code	Description
DELAYED	88	Delay is in effect for the dialed number.
BLACKLISTED	89	Dialed number is blacklisted.
BLACKLIST FULL	90	Blacklist is full.
CONNECT 32000 EC*	70	Connection at 32000 bits/s (K56flex mode or V.90).
CONNECT 34000 EC*	71	Connection at 34000 bits/s (K56flex mode).
CONNECT 36000 EC*	72	Connection at 36000 bits/s (K56flex mode or V.90).
CONNECT 38000 EC*	73	Connection at 38000 bits/s (K56flex mode).
CONNECT 40000 EC*	74	Connection at 40000 bits/s (K56flex mode or V.90).
CONNECT 42000 EC*	75	Connection at 42000 bits/s (K56flex mode).
CONNECT 44000 EC*	76	Connection at 44000 bits/s (K56flex mode or V.90).
CONNECT 46000 EC*	77	Connection at 46000 bits/s (K56flex mode).
CONNECT 48000 EC*	78	Connection at 48000 bits/s (K56flex mode or V.90).
CONNECT 50000 EC*	79	Connection at 50000 bits/s (K56flex mode).
CONNECT 52000 EC*	80	Connection at 52000 bits/s (K56flex mode or V.90).
CONNECT 54000 EC*	81	Connection at 54000 bits/s (K56flex mode).
CONNECT 56000 EC*	82	Connection at 56000 bits/s (K56flex mode).
CONNECT 28000 EC*	100	Connection at 28000 bits/s (V.90 mode).
CONNECT 29333 EC*	101	Connection at 29333 bits/s (V.90 mode).
CONNECT 30666 EC*	102	Connection at 30666 bits/s (V.90 mode).
CONNECT 33333 EC*	103	Connection at 33333 bits/s (V.90 mode).
CONNECT 34666 EC*	104	Connection at 34666 bits/s (V.90 mode).
CONNECT 37333 EC*	105	Connection at 37333 bits/s (V.90 mode).
CONNECT 38666 EC*	106	Connection at 38666 bits/s (V.90 mode).
CONNECT 41333 EC*	107	Connection at 41333 bits/s (V.90 mode).
CONNECT 42666 EC*	108	Connection at 42666 bits/s (V.90 mode).
CONNECT 45333 EC*	109	Connection at 45333 bits/s (V.90 mode).
CONNECT 46666 EC*	110	Connection at 46666 bits/s (V.90 mode).
CONNECT 49333 EC*	111	Connection at 49333 bits/s (V.90 mode).
CONNECT 50666 EC*	112	Connection at 50666 bits/s (V.90 mode).
CONNECT 53333 EC*	113	Connection at 53333 bits/s (V.90 mode).
CONNECT 54666 EC*	114	Connection at 54666 bits/s (V.90 mode).

* EC only appears when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending on the error control method used:
  V42bis—V.42 error control and V.42bis data compression.
  V42—V.42 error control only.
  MNP 5—*MNP* class 4 error control and *MNP* class 5 data compression.
  MNP 4—*MNP* class 4 error control only.
  NoEC—no error control protocol.

S-Registers

The following table provides a summary of the S-registers.

The current setting of each S-register may be displayed by the ATS<n>? command, where <n> is the S-register whose setting is to be displayed.

Table 60. S-Register Summary

Register	Description	Range	Unit	Default
S0	Auto-answer ring number.	0—255	Rings	0
S1	Ring counter.	0—255	Rings	0
S2	AT escape character (user defined).	0—255	ASCII	43
S3	Command line termination character (user defined).	0—127	ASCII	13
S4	Response formatting character.	0—127	ASCII	10
S5	Command line editing character.	0—8	ASCII	8
S6	Wait before dialing.	2—255	s	2
S7	Connection completion time-out.	1—255	s	50
S8	Pause time for comma (,) modifier.	0—65	s	2
S10	Automatic disconnect delay.	1—255	100 ms	20
S11	DTMF tone duration.	50—150	ms	95
S12	Escape guard time.	0—255	20 ms	50
S14	General bit-mapped options status.	—	—	8
S21	V.24/general bit-mapped options status.	—	—	48
S22	Results bit-mapped options status.	—	—	112
S24	Timer to sleep control mode.	0, 5—65	s	60
S28	V.34 modulation enable/disable.	0—1	—	1
S30	Inactivity timer.	0—255	Minutes	0
S32	Synthetic ring volume.	0—255	dB	10
S33	Synthetic ring frequency.	0—5	—	0
S35	Data calling tone.	0—1	—	0
S36	Negotiation fallback.	—	—	7
S37	Dial line rate.	0, 2—19	—	0
S38	56K downstream rate.	0—23	—	1
S42	Auto rate.	0—1	—	1
S43	Auto mode.	0—1	—	1
S48	LAPM error control and feature negotiation.	7, 128	—	7
S89	Timer to control sleep mode.	0, 5—65	s	60
S90	Read-only local phone.	0—1	—	0
S91	Line transmit level.	6—25	dB	10
S109	V.PCM connection options.	0—2	—	1

S-Registers (continued)

S-Register Definitions

Note: The current setting of each S-register may be displayed by the ATS<n>? command, where <n> is the S-register whose setting is to be displayed.

S0—Auto-Answer Ring Number

This register determines the number of rings the modem will count before automatically answering a call. The user can disable auto-answer by entering zero. When auto-answer is disabled, the modem can answer only with the A command.

- Range: 0—255
- Default: 0
- Units: rings

S1—Ring Counter

S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over a six second interval. This register is read-only.

- Range: 0—255
- Default: 0
- Units: rings

S2—Escape Character (User-Defined)

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII +. The escape sequence allows the modem to exit data mode and enter command mode when on-line. A value over 127 disables the escape process, i.e., no escape character will be recognized.

- Range: 0—255
- Default: 43 (+)
- Units: ASCII

S3—Command Line Termination Character (User-Defined)

S3 sets the character used to terminate command line and result codes.

Note: This register value is not stored with the &W command.

- Range: 0—127
- Default: 13 (carriage return)
- Units: ASCII

S-Registers (continued)

S4—Response Formatting Character (User-Defined)

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

Note: This register value is not stored with the &W command.

- Range: 0—127
- Default: 10 (line feed)
- Units: ASCII

S5—Command Line Editing Character (User-Defined)

S5 sets the character recognized as a backspace (pertains to asynchronous operation only). The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the backspace character, an ASCII space character, and a second backspace character. Therefore, a total of three characters are transmitted each time the modem processes the backspace character.

Note: This register value is not stored with the &W command.

- Range: 0—32
- Default: 8 (backspace)
- Units: ASCII

S6—Wait Time Before Dialing

This register sets the length of time in seconds that the modem must pause after going off-hook before dialing the first digit of the telephone number. The modem always pauses for a minimum of two seconds, even if the value of S6 is less than two seconds. The wait for dial tone progress feature (W dial modifier in the dial string) will override the value in register S6. This operation, however, may be affected by some Xn command options according to country restrictions.

Note: This register default value may vary based on country selection.

- Range: 2—255
- Default: 2
- Units: seconds

S7—Connection Completion Time-Out

S7 sets the length of time, in seconds, that the modem will wait for a carrier before hanging up. The timer starts when the modem finishes dialing (originate) or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by country restrictions. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

Note: This register default value may vary based on country selection.

- Range: 1—255
- Default: 50
- Units: seconds

S-Registers (continued)

S8—Pause Time for Comma Dial Modifier

S8 sets the time, in seconds, that the modem will pause when the comma (,) dial modifier is encountered in the dial string.

Note: This register default value may vary based on country selection.

- Range: 0—65
- Default: 2
- Units: seconds

S10— Automatic Disconnect Delay

This register sets the length of time in tenths of a second that the modem will wait before hanging up after loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. The actual interval the modem waits before disconnecting is the value in register S10.

Note: This register default value may vary based on country selection.

- Range: 1—255
- Default: 20
- Units: 0.1 s

S11—DTMF Dialing Speed

This register determines the dialing speed which is prefixed for each country.

Note: This register default value may vary based on country selection.

- Range: 50—150
- Default: 95
- Units: milliseconds

S12—Escape Guard Time

This register sets the value in 0.02 s increments for the required pause after the escape sequence.

- Range: 0—255
- Default: 50
- Units: 0.02 seconds

S14—General Bit-Mapped Options Status

S14 indicates the status of command options. Only bits 3 and 6 are used; they are read-only.

- Default: 8 (00001000b)

Table 61. Register S14 Bits

Bit	Description	Value
3	Result codes (Vn).	0 = Numeric (V0). 1 = Verbose (V1) (default).
6	Pulse dial pulses/s selection (&Pn).	0 = 10 pulses/s (&P0 and &P1) (default). 1 = 20 pulses/s (&P2).

S-Registers (continued)

S21—V.24/General Bit-Mapped Options Status

S21 indicates the status of command options. Only bits 3, 4, and 5 are used; they are read only.

Default: 48 (00110000b)

Table 62. Register S21 Bits

Bit	Description	Value
3—4	DTR behavior (&Dn).	0 = &D0. 1= &D1. 2= &D2 (default). 3= &D3.
5	DCD behavior (&Cn).	0 = &C0. 1 = &C1 (default).

S22—Results Bit-Mapped Options Status

S22 indicates the status of command options. Only bits 4, 5, 6, and 7 are used; they are read-only.

- Default: 112 (01110000b)

Table 63. Register S22 Bits

Bit	Description	Value
4—6	Result codes (Xn).	0 = X0. 4 = X1. 5 = X2. 6 = X3. 7 = X4 (default).
7	Pulse dial make/break ration (&Pn).	0 = 33/67 make/break ratio (&P1 and &P2) (default). 1 = 39/61 make/break ratio.

S24—Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from the DTE or no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode. S24 is an alias for S89.

Note: If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 s. This is done for compatibility with previous products which allowed time-outs down to 1 s.

- Range: 0, 5—65
- Default: 60
- Units: seconds

S28—V.34 Modulation Enable/Disable

This register enables/disables V.34 modulation.

- Values: 0 = disabled
  1 = enabled (default)
- Range: 0—1
- Default: 1

S-Registers (continued)

S30—Inactivity Timer

This register specifies the length of time in minutes that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

Note: This register's default value may vary based on country selection.

- Range: 0—255
- Default: 0 (disabled)
- Units: minutes

S32—Synthetic Ring Volume

S32 specifies a synthetic ring volume.

- Range: 0—255 (allowed, but not meaningful)
- Default: 10
- Units: dB

S33—Synthetic Ring Frequency

This register specifies a synthetic ring frequency. Register values from one to five select a unique ring frequency.

- Range: 0—5
- Default: 0 (disabled)

S35—Data Calling Tone

Data calling tone is a tone of a certain frequency and cadence as specified in V.25 which allows remote data/FAX/voice discrimination. The frequency is 1300 Hz with a cadence of 0.5 s on and 2.0 s off. The setting of the homologation parameter 1f, calling tone flag, determines if S35 is enabled. If the calling tone flag is set to 1, this register is valid. Otherwise, this register has no effect.

Note: This register's default value may vary based on country selection.

- Range: 0—1
- Default: 0

S36—Negotiation Fallback

S36 specifies the action to take in the event of negotiation failure when error control is selected.

S36 is used in conjunction with S48, LAPM error control and feature negotiation, to negotiate certain connection types. Refer to Table 71, Register S36 and S48 Configuration Settings for the settings of each connection type.

Table 64. Register S36 Values

Values	Description
0, 2	Hang up.
1, 3	Fall back to an asynchronous connection.
4, 6	Attempt *MNP*. If *MNP* fails, hang up.
5, 7	Attempt *MNP*. If *MNP* fails, fall back to asynchronous connection.

- Default: 7

S-Registers (continued)

S37—Dial Line Rate

This register sets the maximum line data rate. In K56flex and V.90 mode, S37 controls the upstream V.34 rate.

- Default: 0

Table 65. Register S37 Values

Value	Rate	Value	Rate
0	Auto rate (default).	10	12000 bits/s.
1	Reserved.	11	14400 bits/s.
2	1200/75 bits/s (V.23).	12	16800 bits/s.
3	300 bits/s.	13	19200 bits/s.
4	Reserved.	14	21600 bits/s.
5	1200 bits/s.	15	24000 bits/s.
6	2400 bits/s.	16	26400 bits/s.
7	4800 bits/s.	17	28800 bits/s.
8	7200 bits/s.	18	31200 bits/s.
9	9600 bits/s.	19	33600 bits/s.

S38—56K Downstream Rate

Once a connections type*, K56flex or V.90, is determined, use register S38 to force a particular downstream rate. A value of zero disables both connection types and allows a more reliable V.34 connection. The default value of one allows the modem to select the downstream rate automatically. Other values of S38 force the downstream rate, with fallback to V.34 if unsuccessful at the configured rate.

- Default: 1

Table 66. Register S38 Values

Value	INF File's HKR Value	V.90 Downstream Rate	K56Flex Downstream Rate
0	—	V.90 disabled	K56Flex disabled
1	—	Automatic rate selection (default)	Automatic rate selection (default)
2	60,6d,00,00	28 kbits/s	32 kbits/s
3	95,72,00,00	29.333 kbits/s	34 kbits/s
4	CA,77,00,00	30.666 kbits/s	36 kbits/s
5	—	32 kbits/s	38 kbits/s
6	35,82,00,00	33.333 kbits/s	40 kbits/s
7	6A,87,00,00	34.666 kbits/s	42 kbits/s
8	—	36 kbits/s	44 kbits/s
9	D5,91,00,00	37.333 kbits/s	46 kbits/s
10	0A,97,00,00	38.666 kbits/s	48 kbits/s
11	—	40 kbits/s	50 kbits/s
12	75,A1,00,00	41.333 kbits/s	52 kbits/s
13	AA,A6,00,00	42.666 kbits/s	54 kbits/s
14	—	44 kbits/s	56 kbits/s
15	15,B1,00,00	45.333 kbits/s	—
16	4A,B6,00,00	46.666 kbits/s	—

* Refer to register S109 to determine connection type.

S-Registers (continued)

Table 66 Register S38 Values (continued)

Value	INF File's HKR Value	V.90 Downstream Rate	K56flex Downstream Rate
17	—	48 kbits/s	—
18	B5,C0,00,00	49.333 kbits/s	—
19	EA,C5,00,00	50.666 kbits/s	—
20	—	52 kbits/s	—
21	55,D0,00,00	53.333 kbits/s	—
22	8A,D5,00,00	54.666 kbits/s	—
23	—	56 kbits/s	—

The number of robbed-bit signaling (RBS) frames detected decreases the true DCE rate as shown in Table 67.

Table 67. RBS Frames Detected

RBS Links	Rate Hit	RBS Links	Rate Hit
0	0 kbits/s	4	6 kbits/s
1	2 kbits/s	5	8 kbits/s
2	4 kbits/s	6	8 kbits/s
3	4 kbits/s		

For example, if S38 = 10 and there are three RBS links, the K56flex downstream rate will be 44 kbits/s (48 kbits/s – 4 kbits/s). The exception to this is for 32 kbits/s and 34 kbits/s rates, which are the true rates regardless of the number of RBS frames detected.

S42—Auto Rate

This command is used for testing and debugging only.

V.32bis and V.22bis auto rates are disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode. In K56 flex mode, S42 = 0 forces connection at the rate specified by S38, even if the rate cannot be sustained, without fallback to V.34.

- Range: 0—1
- Default: 1

Table 68. Register S42

Value	Function
S42 = 0	Auto rate disabled.
S42 = 1	Auto rate enabled (default).

S-Registers (continued)

S43—Auto Mode

This command is used for testing and debugging only.

V.32bis start-up auto mode operation is disabled.

- Range: 0—1
- Default: 1

Table 69. Register S43

Value	Function
S43 = 0	Auto mode disabled.
S43 = 1	Auto mode enabled (default).

S48—LAPM Error Control and Feature Negotiation

- Default: 7

Table 70. Register S48

Value	Description
S48 = 7	Enable negotiation (default).
S48 = 128	Disable negotiation. Forces immediate fallback options specified in S36.

The following table lists the S36 and S48 configuration settings necessary to negotiate certain types of connections.

Table 71. Register S36 and S48 Configuration Settings

Register S36 Settings	S48 = 7	S48 = 128
S36 = 0, 2	LAPM or hang-up.	Do not use.
S36 = 1, 3	LAPM or asynchronous.	Asynchronous.
S36 = 4, 6	LAPM, *MNP*, or hang-up.	*MNP* or hang-up.
S36 = 5, 7	LAPM, *MNP*, or asynchronous.	*MNP* or asynchronous.

S89—Timer to Control Sleep Mode

This register displays the number of seconds of inactivity (i.e., no characters sent from the DTE or no RING) in the off-line command state before the modem places itself into standby mode. A value of zero disables standby mode.

If a number between 1 and 4 is entered for this register, the value will be set to 5, and inactivity before standby will be 5 seconds. This is done for compatibility with previous products which allowed time-outs down to 1 s.

- Range: 0, 5—65
- Default: 60
- Unit: seconds

S-Registers (continued)

S90—Read-Only Local Phone

This register tells the status of the local phone. It is read-only.

- 0 = on-hook.
- 1 = off-hook.

S91—Line Transmit Level

Register S91 is effective only for Japan. It specifies the line transmit level in dBm with an implied minus sign.

- Range: 6—25 (corresponding to –6 dBm to –25 dBm transmit level)
- Default: 10 (–10 dBm transmit level)
- Units: –dBm

S109—V.PCM Connection Options

This register controls the connection type. Either V.90, K56flex, or both may be enabled.

Note:

The downstream connection rate is determined by the S38.

- Range: 0—2
- Default: 1

Table 72. Register S109

Value	Description
S109 = 0	K56flex connections possible (V.90 is disabled).
S109 = 1	Either V.90 or K56flex connections are possible (default).
S109 = 2	V.90 connections only.

FAX Commands

The modem supports FAX commands conforming to *EIA** standard 578. These commands are given here with short descriptions; complete explanations are given in the standard, available from the Electronic Industries Association.

Table 73. FAX Class 1 Commands Summary

Command	Function
+FCLASS?	Service class indication.
+FCLASS=?	Service class capabilities.
+FCLASS=n	Service class selection.
+FTS=n	Transmission silence.
+FRS=n	Receive silence.
+FTM=n	Transmit FAX data with n carrier.
+FRM=n	Receive FAX data with n carrier.
+FTH=n	Transmit HDLC data with n carrier.
+FRH=n	Receive HDLC data with n carrier.
+FTM=?	Transmit FAX modulation.
+FRM=?	Receive FAX modulation.
+FTH=?	Transmit HDLC data modulation.
+FRH=?	Receive HDLC data modulation.
+FMI?	Manufacturer identification.
+FMM?	Product identification.
+FMR?	Version/revision information.
+FPR=n	Set DTE-DCE FAX port rate.
+FPR=?	Reports all FAX port rates that DCE supports.
+FPR?	Reports the current FAX port rate of DTE-DCE.
+FAA=n	Set DCE adaptive answer mode.
+FAA=?	Display valid adaptive answer values the DCE supports.
+FAA?	Display current set value of adaptive answer mode.

Commands

+FCLASS?—Service Class Indication

This command causes the modem to display the current setting. Typical responses include the following:

- 0 if in data mode.
- 1 if in FAX Class 1 mode.
- 8 if in voice mode.
- 2 if in FAX Class 2 mode.
- 2.0 if in FAX Class 2.0 mode.

* *EIA* is a registered trademark of Electronic Industries Association.

FAX Commands (continued)

+FCLASS=?—Service Class Capabilities

This command causes the modem to display supported classes. Typical responses include 0, 1, 2, 2.0, and 8.

+FCLASS=n—Service Class Selection

This command sets the modem for class n operation.

Result codes:

- OK if n = 0, 1, 2, 2.0, or 8
- ERROR if n ≠ 0, 1, 2, 2.0, or 8

Table 74. +FCLASS=n Commands

Command	Function
+FCLASS=0	Select data mode (default).
+FCLASS=1	Select FAX Class 1.
+FCLASS=2	Select FAX Class 2.
+FCLASS=2.0	Select FAX Class 2.0.
+FCLASS=8	Select voice mode.

+FTS=n—Transmission Silence

+FTS=n causes the modem to terminate a transmission and wait for n * 10 ms intervals before responding with the OK result code. For example, an n value of 5 results in a 50 ms interval. The value of n has a range of 0—255.

Result codes:

- OK if n = 0—255.
- ERROR if n ≠ 0—255.

+FRS=n—Receive Silence

+FRS=n causes the modem to listen and wait for n * 10 ms intervals of silence to be detected on the line. For example, an n value of 5 results in a 50 ms interval. At the end of this period the modem responds with the OK result code. The value of n has a range of 0—255.

Result codes:

- OK if n = 0—255.
- ERROR if n ≠ 0—255.

FAX Commands (continued)

+FTM—Transmit FAX Data with n Carrier

+FTM=n causes the modem to transmit data using the modulation defined below.

+FTM=? causes the modem to display the supported values as defined in Table 75.

Table 75. +FTM=n Commands

Command	Modulation	Speed
+FTM=3	V.21 Channel 2.	300 bits/s.
+FTM=24	V.27ter.	2400 bits/s.
+FTM=48	V.27ter.	4800 bits/s.
+FTM=72	V.29.	7200 bits/s.
+FTM=96	V.29.	9600 bits/s.
+FTM=73	V.17.	7200 bits/s.
+FTM=74	V.17 (short train).	7200 bits/s.
+FTM=97	V.17.	9600 bits/s.
+FTM=98	V.17 (short train).	9600 bits/s.
+FTM=121	V.17.	12000 bits/s.
+FTM=122	V.17 (short train).	12000 bits/s.
+FTM=145	V.17.	14400 bits/s.
+FTM=146	V.17 (short train).	14400 bits/s.

+FRM—Receive Data

+FRM=n causes the modem to enter the receiver mode using the modulation defined below.

+FRM=? causes the modem to display the supported values as defined in Table 76.

Table 76. +FRM=n Commands

Command	Modulation	Speed
+FRM=3	V.21 Channel 2.	300 bits/s.
+FRM=24	V.27ter.	2400 bits/s.
+FRM=48	V.27ter.	4800 bits/s.
+FRM=72	V.29.	7200 bits/s.
+FRM=96	V.29.	9600 bits/s.
+FRM=73	V.17.	7200 bits/s.
+FRM=74	V.17 (short train).	7200 bits/s.
+FRM=97	V.17.	9600 bits/s.
+FRM=98	V.17 (short train).	9600 bits/s.
+FRM=121	V.17.	12000 bits/s.
+FRM=122	V.17 (short train).	12000 bits/s.
+FRM=145	V.17.	14400 bits/s.
+FRM=146	V.17 (short train).	14400 bits/s.

FAX Commands (continued)

+FTH—Transmit HDLC Data with n Carrier

+FTH=n causes the modem to transmit data framed in the HDLC protocol at the modulation defined below.

+FTH causes the modem to display the supported values as defined in Table 77.

Table 77. +FTH=n Commands

Command	Modulation	Speed
+FTH=3	V.21 Channel 2.	300 bits/s.
+FTH=24	V.27ter.	2400 bits/s.
+FTH=48	V.27ter.	4800 bits/s.
+FTH=72	V.29.	7200 bits/s.
+FTH=96	V.29.	9600 bits/s.
+FTH=73	V.17.	7200 bits/s.
+FTH=74	V.17 (short train).	7200 bits/s.
+FTH=97	V.17.	9600 bits/s.
+FTH=98	V.17 (short train).	9600 bits/s.
+FTH=121	V.17.	12000 bits/s.
+FTH=122	V.17 (short train).	12000 bits/s.
+FTH=145	V.17.	14400 bits/s.
+FTH=146	V.17 (short train).	14400 bits/s.

+FRH—Receive HDLC Data with n Carrier

+FRH=n causes the modem to receive data framed in the HDLC protocol at the modulation specified below.

+FRH causes the modem to display the supported values as defined in Table 78.

Table 78. +FRH=n Commands

Command	Modulation	Speed
+FRH=3	V.21 Channel 2.	300 bits/s.
+FRH=24	V.27ter.	2400 bits/s.
+FRH=48	V.27ter.	4800 bits/s.
+FRH=72	V.29.	7200 bits/s.
+FRH=96	V.29.	9600 bits/s.
+FRH=73	V.17.	7200 bits/s.
+FRH=74	V.17 (short train).	7200 bits/s.
+FRH=97	V.17.	9600 bits/s.
+FRH=98	V.17 (short train).	9600 bits/s.
+FRH=121	V.17.	12000 bits/s.
+FRH=122	V.17 (short train).	12000 bits/s.
+FRH=145	V.17.	14400 bits/s.
+FRH=146	V.17 (short train).	14400 bits/s.

FAX Commands (continued)

+FPR=n—Select FAX Port Rate

This command sets the DTE to DCE FAX port rate.

Table 79. +FPR=n Commands

DTE Command	DCE Action	Description
+FPR=0	Execute +IPR=0.	Select automatic rate detection.
+FPR=1	Execute +IPR=2400.	Set DTE-DCE to 2400 bits/s.
+FPR=2	Execute +IPR=4800.	Set DTE-DCE to 4800 bits/s.
+FPR=4	Execute +IPR=9600.	Set DTE-DCE to 9600 bits/s.
+FPR=8	Execute +IPR=19200.	Set DTE-DCE to 19200 bits/s.
+FPR=10	Execute +IPR=38400.	Set DTE-DCE to 38400 bits/s.
+FPR=18	Execute +IPR=57600.	Set DTE-DCE to 57600 bits/s.
+FPR=? (if all values listed above are supported)	Report (0, 1, 2, 4, 8, 10, 18).	DCE supports 2400 bits/s, 4800 bits/s, 9600 bits/s, 19200 bits/s, 38400 bits/s, and 57600 bits/s.
+FPR? (if +IPF=0)	Report 0.	DTE-DCE rate is automatically detected.
+FPR? (if +IFC=2400)	Report 1.	DTE-DCE rate is 2400 bits/s.
+FPR? (if +IFC=4800)	Report 2.	DTE-DCE rate is 4800 bits/s.
+FPR? (if +IFC=9600)	Report 4.	DTE-DCE rate is 9600 bits/s.
+FPR? (if +IFC=19200	Report 8.	DTE-DCE rate is 19200 bits/s.
+FPR? (if +IFC=38400)	Report 10.	DTE-DCE rate is 38400 bits/s.
+FPR? (if +IFC=57600)	Report 18.	DTE-DCE rate is 57600 bits/s.
+FPR? (all other +IPR setting)	Report 255.	Indicates current setting. 255 indicates invalid setting.

+FAA=n—Adaptive Answer

A service Class 1 FAX DCE may have the ability to answer as a data modem DCE or as a FAX DCE. It also may be able to change from Class 1 FAX mode to data modem operation in response to an incoming call.

Note: This command controls automatic switching from Class 1 to Class 0 for call answering only. It does not affect call origination, switching to Class 1 from other classes, or switching to classes other than Class 0.

- Range: 0—1
- Default: 0
- Mandatory value: 0

Table 80. +FAA=n Commands

Command	Function
+FAA=0	The DCE will answer only as a Class 1 FAX device. No automatic switching of service class will occur based on the calling device type.
+FAA=1	The DCE can answer and automatically determine whether to answer as a facsimile DCE or as a data modem. If a data modem is detected, the DCE will operate as described in 8.3.2.4.

FAX Commands (continued)

+FMI?—Manufacturer Identification

This command returns one of the following results, depending on the product.

- Lucent Data/FAX
- Lucent Data/FAX/Voice

+FMM?—Product Identification

This command returns one of the following results, depending on the product.

- Data/FAX
- Data/FAX/Voice

+FMR?—Version/Revision Information

This command returns the modem version code.

+FLO—Flow Control Selection

Result codes:

- OK if n = 0—2.
- ERROR if n ≠ 0—2.

Table 81. +FLO Commands

Command	Function
+FLO=0	Disables flow control.
+FLO=1	Enables software flow control.
+FLO=2	Enables hardware flow control.
+FLO?	Causes the modem to display the flow selected.

V.25ter Commands

In order to comply with the PC 99 specification, the V.25ter commands listed below are implemented in *Venus* modem controller firmware. For details of these commands, please refer to the ITU-T V.25ter specification. No extra space is allowed in the commands; otherwise, the modem will return an error response. All the settings of these commands can overwrite, or be overwritten by the results of the related commands in the current modem command set.

Commands

+GMI—Manufacturer Identification

This command returns the manufacturer of the modem, which is Lucent Technologies.

Valid Parameter Syntax:

- +GMI
- +GMI?
- +GMI=?

+GMM—Modem Identification

This command returns the model of the modem, which is the same string returned by the ATI0 command.

Valid Parameter Syntax:

- +GMM
- +GMM?
- +GMM=?

+GMR—Version/Revision Information

This command returns the version of the modem code.

Valid Parameter Syntax:

- +GMR
- +GMR?
- +GMR=?

+GCAP—Request Complete Capabilities List

This command returns the list of supported capabilities. The valid responses are shown in Table 82.

Valid Parameter Syntax:

- +GCAP
- +GCAP?
- +GCAP=?

V.25ter Commands (continued)

Table 82. Valid +GCAP Responses

Response	Description
+FCLASS	Class 1 or Class 2 Facsimile DCE control.
+MS	Modulation Control: +MS, +MR commands.
+ES	Error Control: +ES,+EB,+ER,+EFCS,+ETBM commands.
+DS	Data Compression: +DS, +DR commands.

+GCI—Country of Installation

This command indicates or selects the country code. Recommendation T.35 defines the country codes and the country names. This command will accept and indicate the country codes in hexadecimal.

Valid Parameter Syntax:

- +GCI=<T.35 country code>
- +GCI=?
- +GCI?

+IPR—Fixed DTE Rate

This command can be used to set up the DTE rate. The following combinations are accepted by the modem.

If an invalid combination is selected, the next lower valid value will be used.

Valid Parameter Syntax:

- +IPR=<rate>
- +IPR=?
- +IPR?

Table 83. +IPR Combinations

Combination	DTE Rate
+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.

V.25ter Commands (continued)

+IFC—DTE-DCE Local Flow Control

This command will determine the local flow control method. The following combinations are accepted by the modem.

The setting of the +IFC command can overwrite the settings of the \Q and \Xn commands. The reverse is also true. By modifying the settings of the \Q and \Xn commands, the +IFC command can be overwritten.

Valid Parameter Syntax:

- +IFC=<DCE_by_DTE>,<DTE_by_DCE>
- +IFC=?
- +IFC?

Table 84. +IFC Combinations

Combination	Data Format
+IFC=0,0	No flow control.
+IFC=1,1	Software flow control.
+IFC=2,2	Hardware flow control (default).

+ILRR—DTE-DCE Local Rate Reporting

This command will turn on/off the local rate report.

If the rate report is enabled, the <rate> reported is the current DTE-DCE rate. The intermediate result code is transmitted after any modulation, error control, or data compression reports, and before the final result code (e.g., CONNECT).

Valid Parameter Syntax:

- +ILRR=<value>
- +ILRR=?
- +ILRR?

Table 85. +ILRR=x Commands

Command	Function
+ILRR=0	Disables the local rate report (default).
+ILRR=1	Enables the local rate report.

+MS—Modulation Selection

Valid Parameter Syntax:

- +MS=<carrier>,<automode>,<0>,<max_rate>,<0>,<max_rx_rate>
- +MS=?
- +MS?

V.25ter Commands (continued)

This command can be used to set the modulation capabilities of the modem. The following combinations are accepted by the modem. Also, any optional field defined in the V.250 specification can be discarded or left blank, which means that this value is not going to be changed. The value of the optional field will be the same as the current setting except for the one specified. The command is issued in the following format:

+MS=<carrier>,<automode>,<0>,<max_rate>,<0>,<max_rx_rate>.

The valid values for carrier parameter are given in Table 86.

The valid values for max_rate are given in Table 88, and the valid values for max_rx_rate are given in Table 90.

Table 86. Valid Carrier Values

Value	Meaning
V90	V.90
K56	K56flex
V34	V.34
V32	V.32
V32B	V.32bis
V22	V.22
V.22B	V.22bis
V23C	V.23, constant carrier, asymmetric FDM
V21	V21
Bell212A	Bell 212A
Bell103	Bell 103

Automatic modulation negotiation is enabled or disabled by <automode>. However, if values are specified for the <max_rate> and the <max_rx_rate> parameters, automatic rate selection will be disabled and the modem will attempt to connect at the specified rates.

Table 87. Valid Range of <automode> Values

Value	Meaning
0	Disables.
1	Enabled (default).

The <max_rate> specifies the highest value at which the DCE may establish a connection.

Table 88. Valid Range of <max_rate> Values

Value	Meaning
0	Determined by modulation selected in <carrier> (default).
75 - 33600	Value limited by modulation selected in <carrier>.

V.25ter Commands (continued)

Table 89. Valid <max_rate> Values for each <carrier>

Value	Meaning
V90,K56,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.

The <max_rx_rate> specifies the highest rate limit which may be used in the receive direction

Table 90. Valid <max_rx_rate> Values

Value	Meaning
0	Determined by modulation selected in <carrier> (default).
75—56000	Value limited by modulation selected in <carrier>.

Table 91. Valid <max_rx_rate> Values for each <carrier>

Value	Meaning
V90	28000 bits/s—56000 bits/s in steps of 1333 bits/s.
K56	32000 bits/s—56000 bits/s in steps of 2000 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.
V22bis	240 bits/s.
V22	2200 bits/s.
V23C,Bell212A	1200 bits/s.
V21,Bell103	300 bits/s.

Once a modulation is selected by the +MS command, the auto rate at both directions and the auto mode will be activated unless either parameter, <max_rate> or <max_rx_rate> is specified by the same command.

The settings of this command can overwrite the settings of S28, S37, S38, S109. Likewise changes to these registers can overwrite the settings of the +MS command.

+MR Modulation Reporting Control

This command will turn on/off the modulation report.

- Range: 0—1

Valid Parameter Syntax:

- +MR=<value>
- +MR=?
- +MR?

V.25ter Commands (continued)

Table 92. +MR=x Commands

Command	Function
+MR=0	This command turns off the modulation report.
+MR=1	This command turns on the modulation report.

If the modulation report is enabled, the +MRR:<rate>,<rx_rate> and the +MCR:<carrier> intermediate result codes are transmitted from the DCE 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 rate on the receive channel 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 errorcControl or data compression reports or the final result code (e.g., CONNECT) is transmitted.

+ES—Error Control Selection

This command will determine the error correction mode. The following combinations are accepted by the modem.

Valid Parameter Syntax:

- +ES:<orig_rqst>,<orig_fbk>,<ans_fbk>
- +ES=?
- +ES?

Table 93. +ES Combinations

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).

All of these +ES commands are also used for V.80.

If the modem is operated 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 \N command. However, the +ES command is overwritten by the setting on a \N command.

+EB—Break Handling In Error Control Operation

This command can be used to set the modem behavior when a BREAK is received. Table 94 lists the valid break_selection values. The valid values for default_length are 10—90 in steps of 10, with a default for this field of 30.

V.25ter Commands (continued)

Valid Parameter Syntax:

- +EB:<break_selection>,<0>,<default_length>
- +EB=?
- +EB?

Table 94. Valid break_selection Values

Value	Meaning
0	Ignore break (default).
1	Nonexpedited, nondestructive.
2	Expedited, nondestructive.
3	Expedited and destructive.

+ESR—Selective Repeat

This command can be used to set the modem into select-reject mode. However, this mode is not supported by *Venus*, so the only valid combination is +ESR=0.

Valid Parameter Syntax:

- +ESR:<value>
- +ESR=?
- +ESR?

+EFCS—32-bit Frame Check Sequence

This command can be used to control the use of the 32-bit frame check sequence option in V.42. The only valid combination is +EFCS=0, 16-bit frame check sequence.

Valid Parameter Syntax:

- +EFCS=<value>
- +EFCS=?
- +EFCS?

+ER—Error Control Reporting

This command will turn on/off the error control report.

Valid Parameter Syntax:

- +ER:<value>
- +ER=?
- +ER?

Table 95. +ER=x Control Reporting Commands

Command	Function
+ER=0	This command turns off the error control report.
+ER=1	This command turns on the error control report.

V.25ter Commands (continued)

If the compression report is enabled, the +ER:<type> intermediate result code reports the current DCE-DCE error control type. It is issued after the determination of the error control protocol to be used and before the final result code (e.g., CONNECT). Specifically, the +ER intermediate result code is issued after the modulation report (+MCR and +MRR) and before the data compression report (+DR).

The format is shown in Table 96.

Table 96. +ER=x Error Control Reporting Intermediate Result Codes

Command	Function
+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.

+ETBM—Call Termination Buffer Management

This command can be used to set up 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.

Valid Parameter Syntax:

- +ETBM=<pending_TD>,<pending_RD>,<timer>
- +ETBM=?
- +ETBM?

+DS—Data Compression

This command will determine the data compression method used by the modem. The following combinations are accepted by the modem.

Valid Parameter Syntax:

- +DS=<direction>,<compression_negotiation>,<max_dict>,<max_string>
- +DS=?
- +DS?

Table 97. +DS Combinations

Combination	Method
+DS=3,0,1024,32	V.42bis on both directions. Do not disconnect if it fails to negotiate it (default).
+DS=0,0,1024,32	No compression.

The setting of this command can overwrite the setting of a %Cn command. However, it can also be overwritten by the setting of a %Cn command.

V.25ter Commands (continued)

+DR—Data Compression Reporting

This command will turn on/off the compression report.

- Range: 0—1

Valid Parameter Syntax:

- +DR=<value>
- +DR?
- +DR=?

Table 98. DR=x Data Compression Report Value

Command	Function
+DR=0	This command turns off the compression report.
+DR=1	This command turns on the 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). The format is shown in Table 99.

Table 99. +DR=x Data Compression Reporting Intermediate Result Codes

Command	Function
+DR: NONE	Data compression not in use.
+DR: V42B	V.42 bis is in use in both directions.

+ATSO—Store Telephone Number

This command stores up to three dialing strings for later use. The format for the command is:

+ATSO=<location>,<dial_string>

<location> is a value of 0 to 2, which represents the three locations where the number may be written.

<dial_string> is the dialing string to be stored.

Valid Parameter Syntax:

- +ATSO=<location>,<dial_string>
- +ATSO?
- +ATSO=?

V.25ter Commands (continued)

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

Valid Parameter Syntax:

- +A8E=<v80>,<v8a>,<v8cf>,<v8b>
- +A8E?
- +A8E=?

The following values are supported when V.80 is enabled.

Table 100. Valid <v8o> Values

Value	Meaning
1	Enable DCE-controlled V.8 origination negotiation (default).
6	Enable DCE-controlled V.8 origination negotiation, issue +A8x indications.

Table 101. Valid <v8a> Values

Value	Meaning
1	Enable DCE-controlled V.8 answer negotiation (default).
5	Enable DCE-controlled V.8 answer negotiation, issue +A8x indications.

Table 102. Valid <v8cf> Values

Value	Meaning
1	Enable DCE-controlled V.8 origination negotiation.
6	Enable DCE-controlled V.8 origination negotiation, issue +A8x indications.

The <a8cf> parameter sets the V.8 CI signal call function to the value specified. The valid range for this parameter is 0 — FF, with a default of 0xC1.

Table 103. Valid <v8b> Values

Value	Meaning
0	Disable V.8 negotiation.
1	Enable DCE-controlled V8bis negotiation (default).
2	Enable DTE-controlled V.8 negotiation.

The following values are supported when V.80 is disabled.

Table 104. A8E=x, when V.80 is disabled (will be supported in future release)

Command	Function
+A8E=,,,0	Disables K56flex — parameters 0,1 are forced to 0 to disable V.80.
+A8E=,,,1	Enables K56flex — parameters 0,1 are forced to 0 to disable V.80.

V.25ter Commands (continued)

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

This command instructs the DCE to send a V.8bis signal or message. This command is only supported when V.80 is enabled.

Valid Parameter Syntax:

- +A8T=<signal>,<1st message>,<2nd message>,<sig_en>,<msg_en>,<supp_delay>
- +A8T?
- +A8T=?

Table 105. Valid <signal> Values

Value	Meaning
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.

Table 106. Valid <sig_en> Values

Value	Meaning
0	Enable detection of initiation signals (default).
1	Enable detection or responding signals.

Table 107. Valid <msg_en> Values

Value	Meaning
0	Disable detection of messages (default).
1	Enable detection of V.8bis messages.

Table 108. Valid <supp_delay> Values

Value	Meaning
0	No delay inserted (default).
1	Insert 1.5 second delay between transmitted V.8bis signal and the subsequent V.8bis message.

V.80 AT Commands

The chip set supports the synchronous access mode and most of the commands specified in V.80 standards. The commands are either AT commands issued in the command mode or in-band commands transmitted in the data stream. The in-band commands are delimited by the hexadecimal characters EM (or numerically, 19h.)

Table 109. V.80 AT Commands

Command	Subparameters	Values	Description
+ES=[<orig_rqst>[,,<ans_fbk>]]	Orig_rqst	6—Initiate synchronous access mode when the data state is entered.	Controls the manner of operation of the V.42 protocol in the DCE.
	ans_fbk	8—Initiate synchronous access mode when connection is completed and the data state is entered.	
+ES?	—	—	Read syntax command to query the current values of the +ES subparameters. The DCE will transmit a string of information text to the DTE consisting of +ES:<orig_rqst>,,<ans_fbk>.
+ES=?	—	—	Test syntax command to obtain all defined values of the +ES subparameters. The DCE will transmit a string of information text to the DTE consisting of +ES:(list of supported <orig_rqst> values), ,(list of supported <ans_fbk> values).
+ESA=[<trans_idle>[,<framed_idle>[,,,<crc_type>[,<nrzi_en>]]]]	trans_idle	0—In transparent submode, DCE transmits marks (ones) on idle.	—
	framed_idle	0—In framed submode, DCE transmits HDLC flags on idle. 1—In framed submode, DCE transmits marks (ones) on idle.	
	crc_type	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.	
	nrzi_en	0—Disable NZRI encoding and decoding.	

V.80 AT Commands (continued)

Table 109. V.80 AT Commands (continued)

Command	Subparameters	Values	Description
+ESA?	—	—	Read syntax command to query the current values of the +ESA subparameters.
+ESA=?	—	—	Test syntax command to obtain all supported values of the +ESA subparameters.
+ITF= [<off>[,<on>]]	<off>	Determines the threshold, in octets, above which the DCE will generate a flow off signal.	Transmit flow control thresholds. This command allows the DTE to determine the input buffer size in the DCE for data on circuit 103 from the DTE, to control the thresholds used for flow control of such data.
	<on>	Determines the threshold, in octets, below which the DCE will generate a flow on signal.	
+ITF?	—	—	Read syntax command to query the current value of the +ITF subparameters.
+ITF=?	—	—	The DCE will transmit a string of information to the DTE consisting of:ITF:(list of supported<off> values),(list of supported <on> values).

AT Voice Commands

The AT Voice Command set follows a modified IS-101 architecture. The commands are sent through the comm port, but the data path is sent either through the comm port or through a DMA channel using the wave driver. Table 110 and Table 111 show a summary of the AT Voice Command Set.

Table 110. AT Voice Commands Summary

Command	Description
AT+FCLASS=8	Enter voice mode.
AT+VIP	Initialize voice parameters.
AT+VCID	Caller-ID.
AT+VDR	Distinctive ring.
AT+VGT	Speaker volume control.
AT+VIT	DTE/DCE inactivity timer.
AT+VNH	Automatic hang-up control.
AT+VLS	Analog source/destination selection and DTMF/tone reporting.
AT+VTD	Set beep tone duration timer.
AT+VSD	Set silence detection timer.
AT+VRA	Set ringback goes away timer.
AT+VRN	Set ringback never came timer.
AT+VTS	DTMF/tone generation.
AT+VTR	Start full-duplex voice transmission and reception process.
AT+VTX	Enter voice transmit state (see examples).
AT+VRX	Enter voice receive state (see examples).
AT+VSM	Voice compression method.
AT+VEM	Event reporting and masking.
AT+VGR	Receive gain selection.
AT+VPR	Select DTE/DCE interface rate.
AT+VSP	Speakerphone on/off.
AT+VGM	Microphone gain.
AT+VGS	Speaker gain.

Table 111. AT Voice Commands Not Defined In IS-101 Specification

Command	Description
ATS32	Synthetic ring volume.
ATS33	Synthesized ring frequency.

AT Voice Commands (continued)

AT+FCLASS=8—Enter Voice Mode

The command AT+FCLASS=8 puts the modem in voice mode. Speakerphone and TAD modes are subsumed under the more general heading of voice mode and use a particular subset of voice mode commands to implement their respective features and functions.

The modem controller will maintain the overall state of the system so as to know when voice commands are issued in the context of using the speakerphone versus TAD or other voice contexts.

Table 112. Other +FCLASS Commands

Command	Function
AT+FCLASS?	Returns the current DCE mode.
AT+FCLASS=?	Queries the DCE for the range of modes supported. The DCE returns the following: 0, 1, 8, 2, 2.0 (data, FAX, voice, FAX class 2 and FAX class 2.0).

AT+VIP—Initialize Voice Parameters

The command AT+VIP causes the modem to initialize all the voice parameters to their default values. The command has no effect on the +FCLASS setting.

AT+VCID=<pmode>—Caller-ID

This command enables/disables caller-ID.

Table 113. +VCID Commands

Command	Function
<pmode>=0	Disable caller-ID (default).
<pmode>=1	Enable formatted caller report.
<pmode>=2	Enable unformatted caller report.
AT+VCID?	Returns the current caller-ID pmode.
AT+VCID=?	Queries the DCE for the range of supported caller-ID report formats. The DCE returns 0, 1, 2.

AT+VDR=<enable>,<report>—Distinctive Ringing and Cadence Report

This command will enable the distinctive ringing feature. This will allow a report of DROF/DRON to follow an exact ring cadence coming over the phone line. The default for each parameter is zero.

Table 114. +VDR Commands

Command	Function
AT+VDR?	Returns the current values of <enable> and <report>.
AT+VDR=?	Queries the DCE for the range of supported distinctive ring configurations. The DCE returns (0, 1),(0—255).

AT Voice Commands (continued)

AT+VGT=<level>—Speaker Volume Control

This command will enable the speaker volume control.

- <level> range: 0—255.

Table 115. +VGT Commands

Command	Function
<level> = 128	Nominal volume level for sending to speaker (default).
<level> = a value >128	Increase volume above nominal level.
<level> = a value < 128	Decrease volume below nominal level.
AT+VGT?	Returns current value.
AT+VGT=?	Returns range of supported values.

AT+VGR=<gain>—Receive Gain Selection

This command will enable the receive microphone gain control.

Note: While in TAD mode, this command may be used in TAD local recording to control the recording level from the microphone. While in speakerphone mode, this command controls the gain to the remote caller.

- <gain> range: 0—255 (the only useful range is 121—134).

Table 116. +VGR Commands

Command	Function
<gain> = 128	Nominal level for receive gain from microphone (default).
<gain> = a value greater than 128	Increase gain above nominal level.
<gain> = a value less than 128	Decrease gain below nominal level.
AT+VGR?	Returns current value of receive gain.
AT+VGR=?	Returns range of supported gain values.

AT+VEM=<mask>—Event Reporting and Masking

The DTE can use this command to disable an event report regardless of the DCE state or of the analog signal source or destination configuration. <mask> is bits 0—33 (i.e., FFFFFFFFC). See the IS-101 specification for defined bit values.

Table 117. +VEM Commands

Command	Function
AT+VEM?	Returns the current values of the <mask>.
AT+VEM=?	Queries the DCE for the range of supported service level events.

AT Voice Commands (continued)

AT+VIT=<Timer>—DTE/DCE Inactivity Timer

This command sets the DCE's value for the DTE/DCE inactivity timer. The units are in one seconds.

Table 118. +VIT Commands

Command	Function
AT+VIT?	Returns the current value of the timer.
AT+VIT=?	Queries the DCE for the range of supported values (0—255).

AT+VNH = <Hook>—Automatic Hang-up Control

This command causes the DCE to enable or disable automatic hang-ups in the data and facsimile modes. See the IS-101 specification for the detailed description of this command and its interaction with the +FCLASS and ATH commands.

Table 119. +VNH Commands

Command	Function
<hook> = 0	The DCE retains automatic hang-ups (as in the other nonvoice modes).
<hook> = 2	The DCE disables automatic hang-ups in the other nonvoice modes. The DTE only performs a logical hang-up (returns the OK result code).
AT+VNH?	Returns the current value.
AT+VNH=?	Returns the supported values.

AT Commands for Speakerphone Operation

AT+VLS=<label>—Analog Source/Destination Selection

This is a general-purpose analog source/destination command that attaches various analog devices to the system in voice mode.

Table 120. +VLS Commands

Command	Function
AT+VLS=0	Speakerphone off.
AT+VLS=5	Disables/detaches microphone analog source (leaving speaker only) when speakerphone is in operation (phone mute feature).
AT+VLS=7	Speakerphone on. Attach internal speaker and internal microphone, DCE off-hook. Restores/attaches microphone along with speaker (normal speakerphone operation).
AT+VLS?	Reports the current analog source/destination configuration, along with a listing of all event codes reported from the modem to the DTE under that configuration.
AT+VLS=?	Queries the DCE for the range of supported configurations and the list of unsolicited event codes that the modem will report to the DTE under each configuration. For speakerphone, the configurations supported are 0, 5, and 7 (as explained above).

AT Voice Commands (continued)

AT Commands for Telephone Answering Device

AT+VTD=<dur>—Beep Tone Duration Timer

This command sets the default duration for DTMF/tone generation in 0.01 s increments. For DTMF digits, beep tone duration is the interdigit time. For tone generation, this number is the actual tone duration.

Table 121. +VTD Commands

Command	Function
AT+VTD?	Returns the current beep tone duration timer.
AT+VTD=?	Returns the range of supported values (0—400).

AT+VTS=<string>—DTMF and Tone Generation in Voice Mode

This command will produce a sequence of DTMF tones (or other tones, such as dial tone, busy, silence, etc.) as specified in the string parameter. Specifications for the format of tone strings are detailed in IS-101.

Table 122. +VTS Commands

Command	Function
AT+VTS=?	Reports the range of frequencies supported for tone generation, as well as tone duration, for example (300—3300), (300—3300), (0—400).

AT+VTR—Start Voice Transmission and Reception Process

This command will cause the DCE to start full-duplex voice mode. In this mode, the DTE selects the analog source and sink through the +VLS command; the selections can be microphone and speaker or GSTN. The DCE is not required to perform any acoustic echo cancellation or line echo cancellation.

AT+VLS=?—Analog Source/Destination Selection and DTMF/Tone Reporting

Requests for the modem's DTMF/tone reporting capabilities are made using this command. For each system configuration in voice mode (i.e., speakerphone and answering machine), the modem reports the capabilities that are enabled for the configuration.

For each configuration, the modem indicates tone-reporting capabilities for each of the three different voice states, voice transmit data, voice receive data, and voice command state (voice idle).

TAD supports each of the following IS-101 analog source/destination configurations.

Table 123. Analog Source/Destination Configurations

Label #	Description
0	DCE on-hook, local phone connected to Telco.
1	DCE off-hook, DCE connected to Telco.
2	DCE off-hook, local phone connected to DCE.
3	DCE off-hook, local phone connected to Telco, DCE to local phone.
4	Speaker connected to DCE, DCE on-hook (playback messages).
5	Speaker connected to DCE, DCE off-hook (call screening).
6	Microphone connected to DCE, DCE on-hook (record greeting).
7	Microphone and speaker connected, DCE off-hook (speakerphone).

AT Voice Commands (continued)

AT+VSD=<sds, sdi>—Silence Detection (QUIET and SILENCE)

This command sets both the silence detection sensitivity (<sds>) and silence detection interval (<sdi>). Larger values of <sds> indicate that the modem is to treat noisier line conditions as silence (see Table 124). The valid range for each field is 0—255.

Table 124. <sds> Values

Value	Function
<sds> = 128	Nominal level of sensitivity; –40 dBm (default).
<sds> > 128	More aggressive; <sds>=129 is –39 dBm.
<sds> < 128	Less aggressive; <sds>=127 is –41 dBm.
AT+VSD?	Returns the current silence detection sensitivity and silence detection interval.
AT+VSD=?	Returns the range of supported values for the silence detection sensitivity (0—255) and silence detection interval (0—255).

The <sdi> parameter specifies the amount of time the modem waits before reporting silence to the DTE. It is used for determining the presumed hang-up (SILENCE), after which the modem sends <DLE>-s to DTE. The default is 50 (5 seconds).

AT+VTX—Enter Voice Transmit Data State

This command causes the modem to begin the voice transmission process with the voice stream sent through the comm port. Applications using the wave interface do not use the AT+VTX command.

There are two ways for the DCE to leave the voice transmit state:

1. Modem receives <DLE>-<EXT>in voice stream.
2. DTE/DCE inactivity timer expires.

AT+VRX—Enter Voice Receive Data State

This command enables the modem to begin voice receive state with the voice stream received through the comm port. Applications using the wave interface do not use the AT+VRX command. The modem returns the CONNECT result code to the DTE.

There are two ways for the DCE to leave the voice receive state:

1. Modem receives <DLE>-! from the DTE.
2. Upon expiration of the silence detection timer, the modem passes <DLE> shielded event codes indicating a presumed hang-up (<DLE>-s) or presumed end-of-message (<DLE-q>).

AT Voice Commands (continued)

AT+VSM=<cml>,<vsr>—Compression Method and Sampling Rate Specifications

This command enables the compression method and sampling specifications where <cml> represents the compression method label and <vsr> represents the voice sampling rate.

Table 125. +VSM Commands

Command	Function
AT+VSM?	Returns the numeric and string labels of the compression method currently in use, and the sampling rate currently in use.
AT+VSM=?	Reports the voice compression methods supported by the DCE and the voice sampling rates at which they are supported. The default is 129,8000 (16-bit linear, 8.0 kHz). ■ 128, 8-bit linear, (7200, 8000, 11025) ■ 129, 16-bit linear, (7200, 8000, 11025) ■ 130, 8-bit A-law, (8000) ■ 131, 8-bit μ-law, (8000) ■ 132, IMA ADPCM, (8000) ■ 133, G.729, (8000)

AT+VRA=<interval>—Ringback-Goes-Away Timer

The modem uses the ringback-goes-away timer when originating a call. This command sets this timer to the amount of time the modem will wait between ringbacks before assuming that the remote station has gone off-hook. The default is 50.

Table 126. +VRA Commands

Command	Function
AT+VRA?	Returns the current value.
AT+VRA=?	Returns the range of supported values (0—255).

AT+VRN=<interval>—Ringback-Never-Appeared Timer

The modem uses the ringback-never-appeared timer when originating a call. This command sets this timer to the amount of time that the modem will spend looking for an initial ringback. If ringback is not detected within this interval, the modem will assume that the remote station has gone off-hook. The default is 10.

Table 127. +VRN Commands

Command	Function
AT+VRN?	Returns the current value.
AT+VRN=?	Returns the supported values (0—255).

AT+VPR=<rate>—Select DTE/DCE Interface Rate

The AT+VPR command returns an OK for any rate but has no action.

AT Voice Commands (continued)

Events Reported to the DTE

The modem will return OK when going off-hook in voice mode (+FCLASS=8). After answering in voice mode, the modem may send any of the following <DLE> shielded event codes to the DTE, as appropriate.

Table 128. <DLE> Shielded Codes Sent from DCE to DTE

Code Character	Description
0—9, A—D, #, *	DTMF tones.
a	Answer tone.
b	Busy tone.
c	FAX calling tone.
d	Dial tone.
e	Data calling tone.
h	Local phone on-hook.
H	Local phone off-hook.
R	Ring.
s	Silence timer has expired.
<ETX>	End of voice data transmission.
@	CAS tone detected.

<DLE> Codes Sent to DCE

For simple actions in voice mode, the modem may send any of the following <DLE> shielded event codes (in ASCII) to the DTE, as appropriate.

Table 129. <DLE> Shielded Codes Sent from DTE to DCE

Code Character	Description
u	Raise the volume by 1 dB.
d	Lower the volume by 1 dB.
<ETX>	End of voice data transmission.
!	End receive data state.

<DLE> Codes Sent to DCE

+VSP—Speakerphone On/Off

This command turns the speakerphone function on/off.

- Range: 0—1
- Default: 0 (off)

Table 130. +VSP Commands

Command	Function
+VSP=0	Speakerphone function off.
+VSP=1	Speakerphone function on.

AT Voice Commands (continued)

+VGM=<gain>—Microphone Gain

This command sets the microphone gain of the speakerphone function. <gain> is an unsigned octet where values greater than 128 indicate a gain larger than nominal, and values smaller than 128 indicate a gain smaller than nominal.

- Range: 0—255
- Default: manufacturer-specific

+VGS=<gain>—Speaker Gain

This command sets the speaker gain of the speakerphone function. <gain> is an unsigned octet where values greater than 128 indicate a gain larger than nominal, and values smaller than 128 indicate a gain smaller than nominal.

- Range: 0—255
- Default: 128

AT Voice Command Set Not Defined in IS-101 Specifications

S32—Synthetic Ring Volume

This register will provide a synthetic ring volume in dB with an implied minus sign. The default is 10. A range of 0—255 is allowed but is not meaningful.

S33—Synthetic Ring Frequency

This register will provide a synthetic ring frequency. The valid values are 0—5, with 0 = disabled and 1—5 = five varying ring frequencies. The default is 0.

AT+VTS=!

This command does a flash hook.

AT Voice Commands (continued)

Voice Modem Command Examples

The application issues AT commands to request actions by the modem, and the modem responds with standard TIA-602 result codes to tell the application that the requested action has been completed.

Notes for Speakerphone Examples

1. If the user decides to pick up his local (parallel) phone while in the middle of a speakerphone call, the DCE will sense the transition and send the application a <DLE>-H sequence. The application, which should always be screening for DLE-shielded codes in the background when the modem is in the voice mode, can then respond to the <DLE>-H (for example, by resetting speakerphone buttons or doing whatever else needs to be done with the speakerphone interface).
2. DLE-shielded codes that the modem will send to the application while in speakerphone mode are as follows.

Table 131. DLE-Shielded Codes

Command	Description
DLE - c	FAX calling tone detect.
DLE - e	Data calling tone detect.
DLE - h	Local phone went on-hook (hung up).
DLE - H	Local phone went off-hook (picked up).

3. When the user is in the middle of a speakerphone call, call waiting (hold operation) can be initiated when the user hears the call-waiting signal through the speaker. Call waiting entails the following communication between the application and the modem.

Command/Response	Description
ATD!	Put the current call on hold, and answer the new incoming call.
OK	DCE responds. Original call is on hold, and the speakerphone user is connected to the second call.

To terminate the second call and return to the first, the application should again send the modem the ATD! command.

Command/Response	Description
ATD!	Terminate the second call and return to the original call.
OK	DCE responds. Second call is terminated and the user is again connected to the original call.

AT Voice Commands (continued)

Example #1: Initiating a Speakerphone Call (with Phone Muting During Conversation)

The speakerphone application is loaded. The modem is initially idle in data mode. The user then decides to pick up the phone to place a speakerphone call. Picking up the phone should initiate the following chain of events.

Command/Response	Description
AT+FCLASS=8	The modem enters voice mode.
OK	DCE responds. Now in voice mode.
AT+VGT=128	Set speaker volume to normal level.
OK	DCE responds. Volume level is set.
AT+VLS=7	Attach internal speaker and microphone, DCE off-hook.
OK	DCE responds. Now in speakerphone mode. Phone off hook, dial tone audible, speaker and microphone ready to use.
ATD5551234	Provide dial string for DCE to place the call.
OK	DCE responds. Number is dialed.

The call is placed through the phone network. The caller can hear ringback or busy signal from the phone being called. If the person at the other end picks up the phone, the caller and the person at the other end converse. If the speakerphone user decides to mute his speakerphone, the application sends the following to mute the speaker-phone.

Command/Response	Description
AT+VLS=5	Enter mute mode. Microphone is disconnected from the line, leaving the speaker only.
OK	DCE responds. The microphone is no longer connected to the line, and the speakerphone is mute.

After a while, the speakerphone user decides to turn the microphone back on (mute off). This is done when the application issues the following command.

Command/Response	Description
AT+VLS=7	No mute. Microphone is reattached to system along with speaker.
OK	DCE responds. Speakerphone with both microphone and speaker is operational.

The conversation ends, and the user hangs up.

Command/Response	Description
ATH	Application tells the modem to terminate the call with standard AT command.
OK	DCE responds.

The speakerphone is now on-hook. The speaker and microphone have been detached from the system, and the modem is now in data mode (+FCLASS=0).

AT Voice Commands (continued)

Example #2: Initiating a Stored Number Speakerphone Call

The speakerphone application is loaded. The modem is initially idle in data mode. The user then decides to place a speakerphone call either by entering the number without going off-hook first or by selecting a number previously stored in the application. When the user tells the application to dial, the following events occur:

Command/Response	Description
ATD5551234;	Provide a dial string appended with a semicolon (;) for the DCE to place the call and go to command mode.
OK	The DCE responds, and the number is dialed.

The call is placed through the phone network in data mode. The modem stays in command mode, and the application should wait for the OK before sending next command.

Command/Response	Description
AT+FCLASS=8	Put the modem into voice mode.
OK	DCE responds: The modem is now in voice mode.
AT+VGT=128	Set the speaker volume to normal level.
OK	DCE responds: The volume level is set.
AT+VLS=7	Start the speakerphone by attaching the internal speaker and microphone to the line; DCE off-hook.
OK	DCE responds: Speakerphone mode is active. The phone is off hook; dial tone is audible, and the speaker and microphone are ready to use.

The caller can hear ringback or busy signal from the phone being called. If the person at the other end picks up, the caller and the person on the other end converse. The conversation then ends, and the speakerphone user hangs up.

Command/Response	Description
ATH	The application tells the modem to terminate the call with a standard AT command.
OK	DCE responds: The speakerphone is now on-hook. The speaker and microphone have been detached from the system, and the modem is now in data mode (+FCLASS = 0).

AT Voice Commands (continued)

Example #3: Answering a Speakerphone Call

The speakerphone application is loaded. The modem is initially idle in data mode. In this mode, the modem is always screening for incoming calls.

Command/Response	Description
RING	DCE reports ringing from remote station. The user decides to pick-up the phone, which should initiate the following:
AT+FCLASS=8	Modem enters voice mode.
OK	DCE responds. Now in voice mode.
AT+VGT=128	Speaker volume set to normal.
OK	DCE responds. Volume level is set.
AT+VLS=7	Call is answered. Attach internal speaker and microphone to the line, DCE off-hook.
OK	DCE responds. Now in speakerphone mode, connected to the line (call is answered).

The speakerphone user picks up the phone and hears the caller from the other end. Conversation continues for awhile. When it ends, the speakerphone user hangs up.

Command/Response	Description
ATH	DTE issues standard command to terminate call.
OK	DCE responds. Speakerphone goes on-hook. Speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).

Note: When the local phone goes off-hook in the middle of a speakerphone call, the speakerphone disconnects, and the DCE returns <DLE>-H to the DTE.

When the speakerphone is on, call waiting (hold operation) is initiated by the following:

Command/Response	Description
ATD!	DTE sends hold command to DCE.
OK	DCE responds.

Example #4: Receiving an Incoming FAX Call in Speakerphone or TAD Mode and Switching to FAX Mode

In this example, the sequence begins at the point of the user or telephone answering device (TAD) taking the speakerphone off-hook and detecting a FAX calling tone from the other end.

Command/Response	Description
<DLE>-c	DCE detects FAX calling tone from the remote FAX and informs the application by sending DLE-c sequence.
AT+FCLASS=1	Application switches modem out of voice mode and into FAX mode.
OK	DCE responds. Now in FAX mode, still off-hook and connected to incoming call.
ATA	Application instructs modem to answer FAX call using standard AT commands.
OK	DCE responds. The call is answered, and modem continues with procedures to establish connection and receive FAX transmission. The application software will then take care of disconnecting the call when the FAX is done, and returns to data mode (+FCLASS=0).

AT Voice Commands (continued)

Example #5: Receiving an Incoming Data Call in Speakerphone or TAD Mode and Switching to Data Mode

In this example, the sequence begins at the point of the user or telephone answering device (TAD) taking the speakerphone off-hook and detecting a data calling tone from the other end.

Command/Response	Description
<DLE>-e	DCE detects data calling tone from the remote modem and informs the application by sending DLE-e sequence.
AT+FCLASS=0	Application switches modem out of voice mode and into data mode.
OK	DCE responds. Now in data mode, still off-hook and connected to incoming call.
ATA	Application instructs modem to answer data call using standard AT commands.
CONNECT	DCE responds. The call is answered, and modem continues with procedures to establish connection.

Example #6: Switching from Speakerphone Mode to TAD Mode

In this example, the sequence begins at the point of the user in speakerphone mode and at some point in time wants to put the other end in hold. The application may switch to TAD mode in hold state and play some music wave file to the line.

Command/Response	Description
AT+VLS=1	Applications switches modem out of speakerphone mode and into TAD mode.
OK	DCE responds. Now in TAD mode.
AT+VTX	DTE selects voice transmit mode.
CONNECT	DCE responds.
<Data>	DTE plays music through modem to remote caller.
<DLE><ETX>	DTE indicates end of voice transmit data.
OK	DCE acknowledges switch back to voice command state.

The application may switch back to speakerphone mode by following the example to switch from TAD mode to speakerphone mode.

AT Voice Commands (continued)

Example #7: Call Screening and Recording a Message using TAD—IS101 <dle> Shielded Method

The TAD application is loaded. The modem is initially idle in data mode (+FCLASS=0).

Command/Response	Description
RING	DCE reports ringing from remote station.
AT+FCLASS=8	The modem enters voice mode.
OK	DCE responds.
AT+VGT=128	Set speaker volume to normal.
OK	DCE responds.
AT+VSM=132,8000	DTE selects IMA ADPCM with 8.0 kHz sampling rate.
OK	DCE responds.
AT+VSD=128,0	DTE selects normal silence detection sensitivity, and a silence detection interval of 0 seconds. Disable silence detection.
OK	DCE responds.
<DLE>-R	DCE detects another ring and notifies DTE.
AT+VLS=1	The modem answers the call.
OK	DCE is off-hook.

The TAD next plays its greeting message, issues a beep, and records the caller's message.

Command/Response	Description
AT+VTX	DTE selects voice transmit mode.
CONNECT	DCE responds.
<Data>	DTE plays greeting through modem to remote caller.
<DLE><ETX>	DTE indicates end of voice transmit data.
OK	DCE acknowledges switch back to voice command state.
AT+VTS=[933,0,120]	DTE annotates greeting message with a 1.2 second beep.
OK	DCE responds.
AT+VSD=128,50	DTE selects normal silence detection sensitivity and a silence detection interval of 5 seconds. Enable silence detection.
OK	DEC responds.
AT+VLS=5	The speaker is attached to the system, and the modem is off-hook.
OK	DCE is off-hook.
AT+VRX	DTE selects voice receive mode.
CONNECT	DCE agrees.
<Data>	DCE delivers <DLE> shielded voice message to DTE.

AT Voice Commands (continued)

The caller leaves a message and hangs up. The modem detects silence for a specified period of time, and then notifies the DTE that the message being recorded has ended.

Command/Response	Description
<DLE>-s	DCE issues presumed end of message after silence detection interval has elapsed.
<DLE>-!	DTE signals end of voice receive state.
<DLE><ETX>	DCE ends voice transmission to DTR, with this code, and returns back to voice command state.
ATH	DTE issues standard command to terminate call. Speakerphone goes on-hook, speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).
OK	DCE responds.

Example #8: Call Screening and Recording a Message with TAD Using the Wave Driver to Transmit and Receive Voice Samples

The TAD application is loaded. The modem is initially idle in data mode (+FCLASS=0).

Command/Response	Description
RING	DCE reports ringing from remote station.
AT+FCLASS=8	The modem enters voice mode.
OK	DCE responds.
AT+VGT=128	Set speaker volume to normal.
OK	DCE responds.
AT+VSD=128,0	DTE selects normal silence detection sensitivity and a silence detection interval of 0 seconds. Disable silence detection.
OK	DCE responds.
AT+VSM=129,8000	DTE selects 16-bit linear voice compression with 8.0 kHz sampling rate.
OK	DCE responds.
<DLE>-R	DCE detects another ring and notifies DTE.
AT+VLS=1	The modem answers call.
OK	DCE is off-hook.

The TAD next plays its greeting message, issues a beep, and records the caller's message. The application may transmit voice samples using the wave driver. The application may issue WAVE_OUT_OPEN and WAVE_OUT_WRITE messages to the wave driver. At the end of the greeting message, the application may issue the WAVE_OUT_STOP message to the wave driver.

Command/Response	Description
AT+VTS=[933,0,120]	DTE annotates greeting message with a 1.2 second beep.
OK	DCE responds.

AT Voice Commands (continued)

The application may receive voice samples using the wave driver. The application may issue WAVE_IN_OPEN and WAVE_IN_START messages to the wave driver.

Command/Response	Description
AT+VSD=128,50	DTE selects normal silence detection sensitivity and a silence detection interval of 5 seconds. Enable silence detection.
OK	DCE responds.
AT+VLS=5	Speaker is attached to system, and modem is off-hook.
OK	DCE is off-hook.

The caller leaves a message and hangs up. The modem detects silence for a specified period of time, and then notifies the DTE.

Command/Response	Description
<DLE>-s	DCE issues presumed end of message after silence detection interval has elapsed.

At the end of the message, the application may issue the WAVE_IN_STOP message to the wave driver.

Command/Response	Description
ATH	DTE issues standard command to terminate call. DCE goes on-hook, speaker and microphone are detached from system, and modem returns to data mode (+FCLASS=0).
OK	DCE response.

Notes

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