Data Command Set

3.1 Command Guidelines

The commands used to control and report modem operation in data modem mode are defined in this section.

The Data Modem Mode commands and responses described in this section are applicable when command +FCLASS=0. (See Section 3.2.1 for the definition of the FCLASS command.)

The default values are typical of a fully configured modem supporting all data rates and options. The actual default value is dependent upon installed modem firmware and country specific parameters.

Commands are accepted by the modem once the previous command has been fully executed, which is normally indicated by the return of an appropriate result code. Execution of commands D and A, either as a result of a direct command or a re-execute command, will be aborted if another character is entered before completion of the handshake.

3.1.1 Escape Code Sequence

When the modem has established a connection and has entered on-line data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an on-line command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by register S2. The default character is '+'. The maximum time allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

3.2 Data Commands

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown for each configuration command are those used in the factory profile 0.

3.2.1 Generic Modem Control

Z—Soft Reset and Restore Profile

This command causes the modem to perform a soft reset and restore (recall) the configuration profile. If no <value> is specified, zero is assumed.

Syntax

Z<value>

Defined Values

<value>	Decimal number corresponding to the selected profile.	
	0	Soft reset and restore stored profile 0.
	1	Soft reset and restore stored profile 1.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

+FCLASS—Select Active Service Class

This command selects the active service class (mode).

Syntax

+FCLASS=<mode>

Defined Values

<mode>	Decimal number which corresponds to the selected service class.	
	0	Select Data Mode (Section 3). (Default).
	1	Select Facsimile Class 1 Mode. (Section 4).
	1.0	Select Facsimile Class 1.0 Mode. (Section 4).
	2	Select Facsimile Class 2 Mode. (Section 5).
	8	Select Voice Mode. (Section 6).
	10	Reserved.

Result Codes

OK	For <mode> = 0, 1, 1.0, 2, 8, and 10 (SmartSCM only).
OK	For <mode> = 0, 1, 1.0, 8, and 10 (other than SmartSCM).
ERROR	Otherwise.

Reporting Current or Selected Values

Command: +FCLASS?

Response: +FCLASS:
<mode>

Example: +FCLASS: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FCLASS=?

Response: +FCLASS: (<mode> range)

Example: +FCLASS: (0,1,1.0,2,8,10)

+VCID—Caller ID (CID)

This command controls the reporting and presentation of data associated with the Caller ID services in the Incoming Call Line ID (ICLID) data format for the next call.

Syntax

+VCID=<pmode>>

Defined Values

<pmode> Decimal number corresponding to the selected option.

0	Disable Caller ID reporting. (Default).
1	Enables Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Tag><Value> pair format. The expected pairs are date, time, name, and caller code (telephone number).
2	Enables Caller ID with unformatted presentation to the DTE.

Reporting Current or Selected Values

Command: +VCID?

Response: +VCID: <pmode>

Example: +VCID: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VCID=?

Response: +VCID: (<pmode> range)

Example: +VCID: (0-2)

+VRID—Report Retrieved Caller ID (CID)

This command reports the data associated with the Caller ID services in the Incoming Call Line ID (ICLID) data format for the last received call.

Syntax

+VRID=<pmode>

Defined Values

<pmode> Decimal number corresponding to the selected option.

0	Reports Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Tag><Value> pair format. The expected pairs are date, time, name, and caller code (telephone number).
1	Reports Caller ID with unformatted presentation to the DTE.

Reporting Supported Range of Parameter Values

Command: +VRID=?

Response: +VRID: (<pmode> range)

Example: +VRID: (0,1)

\N—Operating Mode

This command controls the preferred error correcting mode to be negotiated in a subsequent data connection. This command is affected by the OEM firmware configuration.

Syntax

\N<mode>

Defined Values

<mode> Decimal number which corresponds to the selected mode.

0	Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.)

1	Serial interface selected—Selects direct mode and is equivalent to &M0, &Q0 mode of operation. (Forces &Q0.) Parallel interface selected—Same as \N0.
2	Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=7.)
3	Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces &Q5, S36=7, and S48=7.)
4	Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces &Q5 and S48=0.) Note: The -K1 command can override the \N4 command.
5	Selects MNP error-correction mode. Failure to make an MNP error-correction connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=128.)

Result Codes

OK	<mode> = 0 to 5.
ERROR	Otherwise.

I—Identification

This command causes the modem to reports the requested result according to the command parameter.

Syntax

I<value>

Defined Values

<value> Decimal number corresponding to the selected information.

0	Reports product code, for example, “56000.”
1	Reports the least significant byte of the stored checksum in decimal. Reports 255 if the prestored checksum value is FFh.
2	Reports “OK.”

3	Reports identification codes. For the SmartACFL, SmartACF, and SC56D, the codes are in the form RevisionName-Modulation_Model, where: RevisionName = product family name_firmware version, i.e., ACF3. The firmware version is in the form VX.XXX. Example: ACF3_V1.000 Modulation = V90, V34, or V32 for V.92/V.90, V.34, or V.32bis, respectively. Model = Identifies RAM/ROM configuration. For the SmartSCM, the codes are in the form RevisionName-Modulation, where: RevisionName = masked firmware code version. Example: P2109 Modulation = V90, V34, or V32 for V.90, V.34, or V.32bis, respectively. Examples: ACF3_V1.000-V90_P21_FSH P2109-V90 **Note** If RPI+ is enabled (see +Hn), "ROCKWELL RPI (TM) MODEM+01" is appended.
5	Reports Country Code parameter (see +GCI).
6	Reports modem data pump model and internal code revision. Example: "RCV56DPF-PLL L8773A Rev 14.00/34.00."
6	Reports “OK.”

Result Codes

OK	<value> = 0 - 7.
ERROR	Otherwise.

+GMI—Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer.

Syntax

+GMI

Typical Response

+GMI: CONEXANT

OK

+GMI9—Request Conexant Identification

This command causes the modem to report CONEXANT ACF identification.

Syntax

+GMI9

Response

+GMI9: CONEXANT ACF

OK

+GMM—Request Model Identification

This command causes the modem to report the modem product.

Syntax

+GMM

Typical Response

+GMM: V90

+GMR—Request Revision Identification

This command causes the modem to report the modem version, revision level or date. This is the same as the I3 command.

Syntax

+GMR

Typical Response

+GMR: P2109-V90

OK

+GCAP—Request Complete Capabilities List

This extended-format command causes the modem to transmit one or more lines of information text listing additional capabilities command +<name>s, which is intended to permit the user to identify the overall capabilities of the modem. In particular, if the modem implements a particular modem control

standard that uses Extended Syntax Commands, and if that modem control standard includes command(s) that indicate general capabilities, the +<names>(s) of those commands will be reported to the modem in response to a +GCAP command.

Syntax

+GCAP

Example Response

+GCAP: +FCLASS, +MS, +ES, +DS, for a data modem that supports all capabilities listed

Where:

+FCLASS T.class1, +F (Class 1 Facsimile modem Control)

+MS +M commands (Modulation Control: +MS and +MR commands)

+ES +E commands (Error Control: +ES, +EB, +ER, +EFCS, +ETBM)

+DS +D commands (Data Compression: +DS and +DR)

+GCI—Country of Installation

This extended syntax command selects and indicates the country of installation for the modem. This parameter selects the settings for any operational parameters that need to be adjusted for national regulations or telephone networks.

Syntax

+GCI=<country_code>

Defined Values

<country_code> 8-bit country code from Annex A of T.35. The value is the hexadecimal equivalent of the T.35 code, with bit 8 treated as the most significant bit and bit 1 treated as the least significant bit.

The supported countries are:

Country	Code	Country	Code	Country	Code
Australia	09	Hong Kong	50	Norway	82
Austria	0A	Hungary	51	Philippines	89
Belgium	0F	India	53	Poland	8A
Brazil	16	Ireland	57	Portugal	8B
Bulgaria	1B	Israel	58	Russia	B8
Canada	20	Italy	59	Singapore	9C

Country	Code	Country	Code	Country	Code
China	26	Japan	00	South Africa	9F
Czech and Slovak Federal Republic	2E	Korea	61	Spain	A0
Denmark	31	Luxembourg	69	Sweden	A5
Finland	3C	Malaysia	6C	Switzerland	A6
France	3D	Mexico	73	Taiwan	FE
Germany	42	Netherlands	7B	United Kingdom	B4
Greece	46	New Zealand	7E	United States	B5

Default

If the modem is specified for use in only one country, that country code is the default. Otherwise, the default is defined by the OEM. Factory default is B5 (United States).

Reporting Current or Selected Values

Command: +GCI?

Response: +GCI: <current country_code>

Example: GCI: 3D The modem is set for France.

Reporting Supported Range of Parameter Values

Command: +GCI=?

Response: +GCI: (<country_code>[,<country_code>[,<country_code].....]]

Example: +GCI: (20,73,B5) The modem can be set for Canada, Mexico or the United States.

&F—Restore Factory Configuration (Profile)

The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Parameter descriptions. A configuration (profile) consists of a subset of S-Parameters.

Syntax

&F[<value>]

Defined Values

<value> Decimal number corresponding to the selected configuration.

0 Restore factory configuration 0.

1 Restore factory configuration 1.

Result Codes

OK

ERROR If the modem is connected.

&T—Local Analog Loopback Test

The modem will perform the local analog loopback test if &T1 is selected. The test can be run only when in an asynchronous operation in non-error-correction mode (normal), for example, AT&Q6. To terminate the test in progress, the escape sequence must be entered first (see Section 3.1.1).

Syntax

&T[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

0 Terminates test in progress. Clears S16.

1 Initiates local analog loopback, V.54 Loop 3. Sets S16 bit 0. If a connection exists when this command is issued, the modem hangs up. The CONNECT XXXX message is displayed upon the start of the test.

&Y—Designate a Default Reset Profile

This command selects which user profile will be used after a hard reset.

Syntax

&Y<value>

Defined Values

<value> Decimal number corresponding to the selected profile.

0 The modem will use profile 0.

1 The modem will use profile 1.

Result Codes

OK <value> = 0 to 1.

ERROR If <value> > 1, or if NVRAM is not installed or is not operational.

&W—Store Current Configuration

Saves the current (active) configuration (profile), including S-Parameters, in one of the two user profiles in NVRAM as denoted by the parameter value. This command will yield an ERROR message if the NVRAM is not installed or is not operational as detected by the NVRAM test.

The current configuration is comprised of a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving a Zn command or at power up (see &Yn command).

Syntax

&W<value>

Defined Values

<value>	Decimal number corresponding to the selected profile.	
	0	Store the current configuration as profile 0.
	1	Store the current configuration as profile 1.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&Zn=x—Store Telephone Number

The modem can store up to four telephone numbers and each telephone number dial string can contain up to 31 digits. (Requires 256-byte NVRAM installed.)

Syntax

&Z<value>

Defined Values

<value>	Decimal number from 0 to 3 corresponding to the selected telephone number.
<string>	Dial string from 0 to 31 characters.

Result Codes

OK	For <value> 3, and <string> 31 digits.
ERROR	If <value> > 3, <string> > 31 digits, or if NVRAM is not installed or is not operational.

%7—Plug and Play Serial Number

Sets and stores eight serial numbers in hex format used for serial Plug and Play and for ISA Plug and Play which use the Conexant 11596 Plug and Play device. Applicable to Desktop configuration only.

Syntax

%7<8 hex numbers><same 8 hex numbers>

Example

%7<8 hex numbers><same 8 hex numbers>

Result Codes

OK	<8 hex numbers><same 8 hex numbers>
ERROR	Otherwise.

To display the stored serial number, issue AT"?<cr>.

%8—Plug and Play Vendor ID and Product Number

Sets and stores Vendor ID and product number for serial Plug and Play and for ISA Plug and Play which use the Conexant 11596 Plug and Play device. Applicable to Desktop configuration only.

Syntax

&8<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers><cr>

Example

%8<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers><cr>

Result Codes

OK	<3 ASCII characters><4 hex numbers><same 3 ASCII characters><same 4 hex numbers>
ERROR	Otherwise.

To display the stored serial number, issue AT"?<cr>.

**- Load Flash Memory

The linear flash memory uploader allows flash memory connected to the modem external memory bus to be upgraded with revised modem firmware. This process transfers (uploads) the upgraded modem firmware (data) from the host computer to the modem which transfers the data to the flash memory device. The linear flash memory downloader allows the flash memory connected to the modem external

memory bus to read and saved. This process transfers (downloads) the current modem firmware (data) to the host computer. Uploading new firmware to the flash memory or downloading existing firmware from the flash memory device is a two-step process.

1. When the AT** command is issued, the modem firmware boot loader is invoked and the user will first load a flash load module (FLM) into the modem's RAM. If the user wishes to upload new firmware to the modem, he should load the uploader FLM. If the user wishes to download existing firmware from the modem, he should load the downloader FLM. In either case, the data transfer is done via an ASCII transfer. The FLM contains the programming algorithm for the flash memory device being programmed and any messages that may be sent during the load process.
2. If the user wishes to upload new firmware to the modem, then he will then load the new modem firmware which the uploader FLM will then program into the flash memory device. This transfer is done via XMODEM transfer. If the user wishes to download existing firmware from the modem, then he will set up the host PC for XMODEM receive and the downloader FLM will begin to send the existing firmware from the flash memory to the host PC.

Procedure

1. Install in the modem a flash memory programmed with the modem firmware or a blank flash memory.
2. Put the uploader FLM and downloader FLM files and the new modem firmware file (for example, XmUL003.s37, XmDL003.s37, and 206s4712.S37) in an appropriate directory on the computer's hard disk.
3. Configure the communications application program for a DTE rate of between 9600 bps and 115200 bps and RTS/CTS flow control.
4. Check the modem for response by typing AT.
5. Initiate the download process using the AT** command. The “Download flash code…” message appears upon issuing the AT** command.
6. Perform an ASCII transfer of the FLM file (for example, XmUL003.s37 for uploading new firmware to the modem or XmDL003.s37 for downloading existing firmware from the modem) from the host computer to the modem RAM using an industry standard communications software or an equivalent process (ensure that all ASCII translation or pacing is turned off).
7. After the FLM has been loaded, if uploading new firmware to the modem, perform an XMODEM upload of the new modem firmware hex file (for example, 206s4712.S37) from the host computer to the modem RAM using an industry standard communications software or an equivalent process. If downloading existing firmware from the modem, using an industry standard communications software or equivalent, put the host PC in XMODEM receive mode.

The messages described in Table 3-1 may occur during the uploading process:

Table 3-1 Upload Messages

Message	Description
Device not supported	Displayed if the FLM used does not support the flash memory that is installed on the board.
Wrong S37 format	Displayed if the modem firmware being uploaded is not in Motorola S3 format.
Record error	Displayed if there is an error while either uploading or downloading. If this occurs, the transfer should be aborted, and the user should restart at step 5.

Table 3-1 Upload Messages ***(continued)***

Message	Description
Download abort	Displayed if the transfer is aborted before it is finished. If this occurs, the user should restart at step 5.
Erase fail	Displayed if the FLM is unable to erase the flash memory. If this occurs, the user should restart at step 5.
Download error, Re-Load	Displayed if there was an error when uploading or downloading. If this occurs, the user should restart at step 5.
Error, No H/W flow ctl	Displayed if RTS-CTS flow control is not set. If this occurs, the user should restart at step 3.
DTE timeout	Displayed if the DTE has stopped the XMODEM transfer process before it is finished. If this occurs, the user should restart at step 5.
Code doesn't match hardware	Displayed if the user is attempting to upload a firmware that either not the same model (parallel, serial, etc.), crystal frequency, or size (1Mbit, 2Mbit, etc.) as the firmware that is currently on the board. If this occurs, the FLM will abort and not allow the user to continue.
Device successfully programmed	Displayed by the FLM at the completion of a successful upload or download then the modem will do a cold start.

The uploader and downloader flash load modules (FLM) have several built in safety mechanisms to reduce the risk of a failed flash upload/download. The FLM will not allow a user to upload a firmware of different model (serial, parallel, etc.) or crystal speed than what is currently in the flash memory. Also, it will not allow the user to upload a firmware that is larger in size than the flash memory itself (for example, a 2Mbit firmware onto a 1Mbit flash memory). It will, however, allow the user to upload a firmware that is smaller in size than the flash memory, and it will program the firmware with the appropriate offset in order for the firmware to function properly. In the instance that there is a failure during the download or upload process, the modem will be in a “flash rescue mode”. In this mode, the modem will respond “OK” to all AT commands, but will only take action on the AT** command, so a new attempt to upload or download can be initiated. When the modem is in the “flash rescue mode” it will only be able to respond to AT commands if the DTE rate has not been changed since the last AT** command was successfully issued, even if the modem is powered off and on.

3.2.2 DTE-Modem Interface commands

The parameters defined in this section control the operation of the interface between the DTE and modem.

E—Command Echo

The modem enables or disables the echo of characters to the DTE. The parameter value, if valid, is written to S14 bit 1.

Syntax

E<value>

Defined Values

<value>	Decimal number corresponding to the option.	
	0	Disables command echo.
	1	Enables command echo. (Default).

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

Q—Quiet Results Codes Control

The command enables or disables the sending of result codes to the DTE. The parameter value, if valid, is written to S14 bit 2.

Syntax

Q<value>

Defined Values

<value>	Decimal number corresponding to the option.	
	0	Enables result codes to the DTE. (Default).
	1	Disables result codes to the DTE.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

V—Result Code Form

This command selects the sending of short-form or long-form result codes to the DTE. The parameter, if valid, is written to S14 bit 3.

Syntax

V<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.
1	Enables long-form (verbose) result codes. (Default.)

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

W—Connect Message Control

This command, in conjunction with S95 bits 0, 2, 3, and 5 (bits 2, 3, and 5 can be written directly by the host or by the +MR, +ER, and +DR commands, respectively), control the format of CONNECT messages (see Section 3.5 and Table 3 16). The actual result code messages reported reflect the W command setting and the S95 bit settings. (Also see +MR, +ER, and +DR commands.)

The W parameter value, if valid, is written to S31 bits 2 and 3.

Syntax

W<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Upon connection, the modem reports only the DTE speed (for example, CONNECT 19200). Subsequent responses are disabled. (Default.)
1	Upon connection, the modem reports the modulation, line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.
2	Upon connection, the modem reports the DCE speed (for example, CONNECT 14400). Subsequent responses are disabled.

Result Codes

OK	<value> = 0, 1, or 2.
ERROR	Otherwise.

X—Extended Result Codes

This command selects the subset of the result code messages used by the modem to inform the DTE of the results of commands.

Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a “W” can be placed in the dial string (see D command). The information below is based upon the default implementation of the X results table. Table 3-2 indicates the messages which are enabled for each X value.

If the modem is in facsimile mode (+FCLASS=1, 1.0, or 2), the only message sent to indicate a connection is CONNECT without a speed indication.

Syntax

X<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. Blind dialing is enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively.

1 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX (XXXX = rate). Blind dialing enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 100b is written to S22 bits 6, 5, and 4, respectively.

2 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO DIAL TONE will be reported instead of NO CARRIER. The value 101b is written to S22 bits 6, 5, and 4, respectively.

3	Enables reporting of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX. Blind dialing is enabled/disabled by country parameters. If dial tone detection is enforced and dial tone is not detected, NO CARRIER will be reported. The value 110b is written to S22 bits 6, 5, and 4, respectively.
4	Enables reporting of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively. (Default.)

Result Codes

OK	<value> = 0 to 4.
ERROR	Otherwise.

Table 3-2 Result Codes

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
+F4	+FCERROR	x	x	x	x	x	
0	OK	x	x	x	x	x	
1	CONNECT	x	x	x	x	x	
2	RING	x	x	x	x	x	
3	NO CARRIER	x	x	x	x	x	
4	ERROR	x	x	x	x	x	
5	CONNECT 1200	1	x	x	x	x	
6	NO DIAL TONE	3	3	x	x	x	
7	BUSY	3	3	3x	x	x	
8	NO ANSWER	x	x	x	x	x	
9	CONNECT 600	1	x	x	x	x	
10	CONNECT 2400	1	x	x	x	x	
11	CONNECT 4800	1	x	x	x	x	
12	CONNECT 9600	1	x	x	x	x	
13	CONNECT 7200	1	x	x	x	x	
14	CONNECT 12000	1	x	x	x	x	
15	CONNECT 14400	1	x	x	x	x	
16	CONNECT 19200	1	x	x	x	x	
17	CONNECT 38400	1	x	x	x	x	
18	CONNECT 57600	1	x	x	x	x	
19	CONNECT 115200	1	x	x	x	x	
20	CONNECT 230400	x	x	x	x	x	

Table 3-2 Result Codes (continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
22	CONNECT 75TX/1200RX	1	x	x	x	x	
23	CONNECT 1200TX/75RX	1	x	x	x	x	
24	DELAYED	4	4	4	4	x	
32	BLACKLISTED	4	4	4	4	x	
33	FAX	x	x	x	x	x	
35	DATA	x	x	x	x	x	
40	+MRR: 300	x	x	x	x	x	
44	+MRR: 1200/75	x	x	x	x	x	
45	+MRR: 75/1200	x	x	x	x	x	
46	+MRR: 1200	x	x	x	x	x	
47	+MRR: 2400	x	x	x	x	x	
48	+MRR: 4800	x	x	x	x	x	
49	+MRR: 7200	x	x	x	x	x	
50	+MRR: 9600	x	x	x	x	x	
51	+MRR: 12000	x	x	x	x	x	
52	+MRR: 14400	x	x	x	x	x	
53	+MRR: 16800	x	x	x	x	x	Note 2
54	+MRR: 19200	x	x	x	x	x	Note 2
55	+MRR: 21600	x	x	x	x	x	Note 2
56	+MRR: 24000	x	x	x	x	x	Note 2
57	+MRR: 26400	x	x	x	x	x	Note 2
58	+MRR: 28800	x	x	x	x	x	Note 2
59	CONNECT 16800	1	x	x	x	x	Note 2
61	CONNECT 21600	1	x	x	x	x	Note 2
62	CONNECT 24000	1	x	x	x	x	Note 2
63	CONNECT 26400	1	x	x	x	x	Note 2
64	CONNECT 28800	1	x	x	x	x	Note 2
66	+DR: ALT	x	x	x	x	x	
67	+DR: V42B	x	x	x	x	x	
69	+DR: NONE	x	x	x	x	x	
70	+ER: NONE	x	x	x	x	x	
77	+ER: LAPM	x	x	x	x	x	
78	+MRR: 31200	x	x	x	x	x	Note 2
79	+MRR: 33600	x	3	3x	x	x	Note 2
80	+ER: ALT	x	x	x	x	x	

Table 3-2 Result Codes (continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
81	+ER ALT-CELLULAR	x	x	x	x	x	
83	LINE-IN-USE	x	x	x	x	x	
84	CONNECT 33600	1	x	x	x	x	Note 2
91	CONNECT 31200	1	x	x	x	x	Note 2
134	+MCR: B103	x	x	x	x	x	
135	+MCR: B212	x	x	x	x	x	
136	+MCR: V21	x	x	x	x	x	
137	+MCR: V22	x	x	x	x	x	
138	+MCR: V22B	x	x	x	x	x	
139	+MCR: V23	x	x	x	x	x	
140	+MCR: V32	x	x	x	x	x	
141	+MCR: V32B	x	x	x	x	x	
142	+MCR: V34	x	x	x	x	x	Note 3
144	+MCR: K56	x	x	x	x	x	Note 3
145	+MCR: V90	x	x	x	4	x	Note 3
150	+MRR: 32000	x	x	x	x	x	Note 3
151	+MRR: 34000	x	x	x	x	x	Note 3
152	+MRR: 36000	x	x	x	x	x	Note 3
153	+MRR: 38000	x	x	x	x	x	Note 3
154	+MRR: 40000	x	x	x	x	x	Note 3
155	+MRR: 42000	x	x	x	x	x	Note 3
156	+MRR: 44000	x	x	x	x	x	Note 3
157	+MRR: 46000	x	x	x	x	x	Note 3
158	+MRR: 48000	x	x	x	x	x	Note 3
159	+MRR: 50000	x	x	x	x	x	Note 3
160	+MRR: 52000	x	x	x	x	x	Note 3
161	+MRR: 54000	x	x	x	x	x	Note 3
162	+MRR: 56000	x	x	x	x	x	Note 3
165	CONNECT 32000	x	x	x	x	x	Note 3
166	CONNECT 34000	x	x	x	x	x	Note 3
167	CONNECT 36000	x	x	x	x	x	Note 3
168	CONNECT 38000	x	x	x	x	x	Note 3
169	CONNECT 40000	x	x	x	x	x	Note 3
170	CONNECT 42000	x	x	x	x	x	Note 3
171	CONNECT 44000	x	x	x	x	x	Note 3

Table 3-2 Result Codes (continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
172	CONNECT 46000	x	x	x	x	x	Note 3
173	CONNECT 48000	x	x	x	x	x	Note 3
174	CONNECT 50000	x	x	x	x	x	Note 3
175	CONNECT 52000	x	x	x	x	x	Note 3
176	CONNECT 54000	x	x	x	x	x	Note 3
177	CONNECT 56000	x	x	x	x	x	Note 3
178	CONNECT 230400	x	x	x	x	x	
180	CONNECT 28000	x	x	x	x	x	Note 3
181	CONNECT 29333	x	x	x	x	x	Note 3
182	CONNECT 30667	x	x	x	x	x	Note 3
183	CONNECT 33333	x	x	x	x	x	Note 3
184	CONNECT 34667	x	x	x	x	x	Note 3
185	CONNECT 37333	x	x	x	x	x	Note 3
186	CONNECT 38667	x	x	x	x	x	Note 3
187	CONNECT 41333	x	x	x	x	x	Note 3
188	CONNECT 42667	x	x	x	x	x	Note 3
189	CONNECT 45333	x	x	x	x	x	Note 3
190	CONNECT 46667	x	x	x	x	x	Note 3
191	CONNECT 49333	x	x	x	x	x	Note 3
192	CONNECT 50667	x	x	x	x	x	Note 3
193	CONNECT 53333	x	x	x	x	x	Note 3
194	CONNECT 54667	x	x	x	x	x	Note 3
195	+MRR: 28000	x	x	x	x	x	Note 3
196	+MRR: 29333	x	x	x	x	x	Note 3
197	+MRR: 30667	x	x	x	x	x	Note 3
198	+MRR: 33333	x	x	x	x	x	Note 3
199	+MRR: 34667	x	x	x	x	x	Note 3
200	+MRR: 37333	x	x	x	x	x	Note 3
201	+MRR: 38667	x	x	x	x	x	Note 3
202	+MRR: 41333	x	x	x	x	x	Note 3
203	+MRR: 42667	x	x	x	x	x	Note 3
204	+MRR: 45333	x	x	x	x	x	Note 3
205	+MRR: 46667	x	x	x	x	x	Note 3
206	+MRR: 46667	x	x	x	x	x	Note 3
207	+MRR: 50667	x	x	x	x	x	Note 3

Table 3-2 Result Codes (continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
208	+MRR: 53333	x	x	x	x	x	Note 3
209	+MRR: 54667	x	x	x	x	x	Note 3

Note

1. An 'x' in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of 'n' (shown at the top of the column) has been selected by the use of ATXn. If the column is blank, then no message will be generated for that x option. A numeral indicates which less explicit message (verbose or short form) will be output for that X option. (Also, see 3.3 S-Parameters)
2. C336 and RC56 modems only.
3. RC56 modems only.

&C—RLSD (DCD) Option

The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5.

Syntax

&C<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	RLSD remains ON at all times.
	1	RLSD follows the state of the carrier. (Default.)

Result Codes

OK	0 or 1.
ERROR	Otherwise.

&D—DTR Option

This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see S25.

Syntax

&D<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q5, &Q6: DTR is ignored (assumed ON). Allows operation with DTEs which do not provide DTR. &Q1: DTR drop causes the modem to hang up. Auto-answer is not affected. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.
1	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q1, &Q5, &Q6: DTR drop is interpreted by the modem as if the asynchronous escape sequence had been entered. The modem returns to asynchronous command state without disconnecting. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.
2	DTR drop is interpreted according to the current &Qn setting as follows: &Q0 through &Q6: DTR drop causes the modem to hang up. Auto-answer is inhibited. (Default.)
3	DTR drop is interpreted according to the current &Qn setting as follows: &Q0, &Q1, &Q5, &Q6: DTR drop causes the modem to perform a soft reset as if the Z command were received. The &Y setting determines which profile is loaded. &Q2, &Q3: DTR drop causes the modem to hang up. Auto-answer is inhibited.

If &Q5, &Q6, +FCLASS=1 or +FCLASS=2 is in effect, the action taken is the same as for &Q0.

&K—Flow Control

This command defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.

Syntax

&K<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables flow control.
3	Enables RTS/CTS flow control. (Default for data modem modes.)
4	Enables XON/XOFF flow control.
5	Enables transparent XON/XOFF flow control.

Note Upon reset, both RTS/CTS and XON/XOFF flow control is enabled for fax modem and voice modes.

Result Codes

OK	<value> = 0, 3, 4, or 5.
ERROR	Otherwise.

&M—Asynchronous/Synchronous Mode Selection

This command determines the DTR operating mode. The modem treats the &M command as a subset of the &Q command.

Syntax

&M<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Selects direct asynchronous operation. The command sequence &M0\N0 selects normal buffered mode, but the command sequence \N0&M0 selects direct mode. This is because the \N0 command is analogous to the &Q6 command. The value 000b is written to S27 bits 3, 1, and 0, respectively. (See &Q).
1	Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.) (SmartACF and SmartACFL only.)
2	Selects synchronous connect mode with async off-line command mode. Same as &M1 except that &M2 enables DTR dialing of directory slot 0. The modem will disconnect if DTR is OFF for more than the period in S25 (in units of hundredths of a second): the data connection will be synchronous. The value 010b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.) (SmartACF and SmartACFL only.)

3	Selects synchronous connect mode. This mode allows DTR to act as a talk/data switch. The call is manually initiated while DTR is inactive. When DTR becomes active, the handshake proceeds in originate or answer mode according to S14 bit 7. The value 011b is written to S27 bits 3, 1, and 0, respectively. (Serial interface operation only.) (SmartACF and SmartACFL only.)

Result Codes

OK	<value> = 0 to 3 (SmartACF and SmartACFL)
OK	<value> = 0 (SmartSCM)
ERROR	Otherwise.

&Q—Sync/Async Mode

This command is an extension of the &M command and is used to control the connection modes permitted. It is used in conjunction with S36 and S48. (Also, see \N.)

Note When the &Q0 to &Q3 command is issued to select the mode, the subsequent connect message will report the DCE speed regardless of the W command and S95 settings.

Syntax

&Q<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See &M0.
1	Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. See &M1. (Serial interface operation only.) (SmartACF and SmartACFL only.)
2	Selects synchronous connect mode with async off-line command mode and enables DTR dialing of directory 0. The value 010b is written to S27 bits 3, 1, and 0, respectively. See &M2. (Serial interface operation only.) (SmartACF and SmartACFL only.)
3	Selects synchronous connect mode with async off-line command mode and enables DTR to act as Talk/Data switch. The value 011b is written to S27 bits 3, 1, and 0, respectively. See &M3. (Serial interface operation only.) (SmartACF and SmartACFL only.)

5	The modem will try to negotiate an error-corrected link. The modem can be configured using S36 to determine whether a failure will result in the modem returning on-hook or will result in fallback to an asynchronous connection. The value 101b is written to S27 bits 3, 1, and 0, respectively. (Default.)
6	Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.

Result Codes

OK	<value> = 0 to 3, 5, or 6 (SmartACF and SmartACFL only)
OK	<value> = 0, 5, or 6 (SmartSCM only)
ERROR	Otherwise.

&R—RTS/CTS Option

This selects how the modem controls CTS. CTS operation is modified if hardware flow control is selected (see &K command). The parameter value, if valid, is written to S21 bit 2.

Syntax

&R<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	In sync mode, CTS tracks the state of RTS; the RTS-to-CTS delay is defined by S26. In async mode, CTS is normally ON and will turn OFF only if required by flow control.
1	In sync mode, CTS is always ON (RTS transitions are ignored). tracks the state of RTS; In async mode, CTS is normally ON and will turn OFF only if required by flow control.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&S—DSR Override

This command selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.

Syntax

&S<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	&0	DSR will remain ON at all times. (Default.)
	&1	DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

&X—Select Synchronous Clock Source

Selects the source of the transmit clock for the synchronous mode of operation. The parameter value, if valid, is written to S27 bits 4 and 5.

In asynchronous mode, the transmit and receive clocks are turned OFF. In synchronous mode, the clocks are turned ON with the frequency of 1200 Hz or faster corresponding to the speed that is selected for modem operation.

Syntax

&X<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Selects internal timing. The modem generates the transmit clock signal and applies it to the TXCLK output at the serial interface.
	1	Selects external timing. The local DTE sources the transmit clock signal on the XTCLK input of the serial interface. The modem applies this clock to the TXCLK output at the serial interface.
	2	Selects slave receive timing. The modem derives the transmit clock signal from the incoming carrier and applies it to the TXCLK output at the serial interface.

Result Codes

OK <value> = 0 or 2.

ERROR Otherwise.

+IPR—Fixed DTE Rate

This numeric extended-format parameter specifies the data rate at which the modem will accept commands during online operation. It may be used to select operation at rates at which the modem is not capable of automatically detecting the data rate being used by the DTE. Specifying a value of 0 disables the function and allows operation only at rates automatically detectable by the modem. The specified rate takes effect following the issuance of any result code(s) associated with the current command line.

The <rate> specified does not apply in OnLine Data State if Normal Mode (Direct Mode) of operation is selected.

Syntax

+IPR=<rate>

Defined Values

<rate> Specifies the DTE-modem interface operation rate in bits/s. The available rates are: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400

If unspecified or set to 0, automatic detection is selected and the character format is also forced to autodetect, +ICF=0.

If the rate specified is not supported by the modem, an ERROR result code will be returned

Reporting Current or Selected Values

Command: +IPR?

Response: +IPR: <rate>

Example 1: +IPR: 0 For automatic rate detection.

Example 2: +IPR: 115200 For 115200 bps.

Reporting Supported Range of Parameter Values

Command: +IPR=?

Response: +IPR (<rate> range)

Example: +IPR: (0,300,1200,2400,4800,9600,19200,38400,57600,115200, 230400)

+IFC—DTE-Modem Local Flow Control

This extended-format compound parameter controls the operation of local flow control between the DTE and the modem during the data state when V.42 error control is used, or when fallback to non-error control mode is specified to include buffering and flow control. It accepts two numeric subparameters.

Syntax

+IFC=[<modem_by_DTE>[,<DTE_by_modem>]]

Defined Values

<modem_by_DTE> Specifies the method to be used by the DTE to control the flow of received data from the modem.

0	None.
1	XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.
2	Circuit 133 (Ready for Receiving). (Default.)
3	DC1/DC3 on circuit 103 (Transmitted Data) with DC1/DC3 characters being passed through to the remote DCE in addition to being acted upon for local flow control

<DTE_by_modem> Specifies the method to be used by the modem to control the flow of transmitted data from the DTE.

0	None.
1	XON/XOFF on received data.
2	CTS/RTS. (Default.)

Reporting Current or Selected Values

Command: +IFC?

Response: +IFC: <modem_by_DTE>,<DTE_by_modem>

Example: +IFC: 2,2 For the defaults.

Reporting Supported Range of Parameter Values

Command: +IFC=?

Response: +IFC: (<modem_by_DTE> range),(<DTE_by_modem> range)

Example: +IFC: (0-3),(0-2)

+ILRR—DTE-Modem Local Rate Reporting

This extended-format numeric parameter controls whether or not the extended-format +ILRR:<rate> information text is transmitted from the modem to the DTE.

Syntax

+ILRR=<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	.Disables reporting of local port rate (+ILRR: is not transmitted). (Default.)
	1	Enables reporting of local port rate (+ILRR: is transmitted).

Reporting Current or Selected Values

Command: +ILRR?

Response: +ILRR: <current value>

Example: +ILRR: 0 For the default setting

Reporting Supported Range of Parameter Values

Command: +ILRR=?

Response: +ILRR: (<value> range)

Example: +ILRR: (0,1)

Reported Rate

The <rate> reported represents the current (negotiated or renegotiated) DTE-modem rate. If enabled, the intermediate result code is transmitted after any modulation, error control or data compression reports are transmitted, and before any final result code (for example, CONNECT) is transmitted. The <rate> is applied after the final result code is transmitted.

The DTE-modem port rate will change only if neither buffered mode nor error controlled means are enabled (+ES=x,0) and if the negotiated carrier rate (+MRR) does not match the current DTE-modem port rate (autodetected from the previous command line).

Syntax

+ILRR: <rate>[,<rx_rate>]

Defined Values

<rate>	Decimal value representing the current (negotiated or renegotiated) DTE-modem rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400

<rx_rate> Optional decimal value reporting the RXD rate, if it is different from the TXD rate:

0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400

Example

+ILRR: 19200

3.2.3 Call Control

D—Dial

This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode.

Note If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.

If +FCLASS=0 is selected, the modem will behave as a data modem and will attempt to connect to another data modem. The modem will have up to the period of time specified by register S6 or S7 to wait for carrier and complete the handshake. If this time expires before the modem can complete the handshake, the modem will go on-hook with the NO CARRIER response. This command will be aborted in progress upon receipt of any DTE character before completion of the handshake.

If +FCLASS=1, 1.0, or 2 is selected, the modem will behave as a facsimile modem and attempt to connect to a facsimile machine (or modem) by entering the HDLC V.21 channel 2 receive state (as if +FRH=3 had been issued). This command will be aborted upon receipt of any DTE character if the modem has not finished dialing. In this case, the modem will go on-hook and return to command mode after displaying the NO CARRIER message. If the modem has finished dialing, it proceeds as if the +FRH=3 command has been issued. (Refer to the +FRH command to determine how the modem behaves following this stage.)

Dial Modifiers

The valid dial string parameters are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces being ignored.

Syntax

D<string>

Defined Values

<string> Character string corresponding to the selected option(s).

0-9	.DTMF digits 0 to 9.
*	The 'star' digit (tone dialing only).

#	The 'gate' digit (tone dialing only).
A-D	DTMF digits A, B, C, and D. Some countries may prohibit sending of these digits during dialing.
L	.Re-dial last number: the modem will re-dial the last valid telephone number. The L must be immediately after the D with all the following characters ignored).
P	Select pulse dialing: pulse dial the numbers that follow until a “T” is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
T	Select tone dialing: tone dial the numbers that follow until a “P” is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
R	This command will be accepted, but not acted on.
S=n	Dial the number stored in the directory (n = 0 to 3). (See &Z.)
!	Flash: the modem will go on-hook for a time defined by the value of S29. Country requirements may limit the time imposed.
W	Wait for dial tone: the modem will wait for dial tone before dialing the digits following “W”. If dial tone is not detected within the time specified by S7 (US) or S6 (W-class), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
@	Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If answer tone arrives during execution of this parameter, the modem handshakes.
&	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 (US models) or S6 (W-class models), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
,	Dial pause: the modem will pause for a time specified by S8 before dialing the digits following “,”.

;	Return to command state. Added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ";". This allows the user to issue additional AT commands while remaining off-hook. The additional AT commands may be placed in the original command line following the ";" and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the ";" terminator. Use "H" to abort the dial in progress, and go back on-hook.
^	Toggles calling tone enable/disable: applicable to current dial attempt only.
( )	Ignored: may be used to format the dial string.
-	Ignored: may be used to format the dial string.
<space>	Ignored: may be used to format the dial string.
<i>	Invalid character: will be ignored.
>	If enabled by country specific parameter, the modem will generate a grounding pulse on the EARTH relay output.

T—Set Tone Dial Default

This command forces DTMF dialing until the next P dial modifier or P command is received. The modem will set an S-Parameter bit to indicate that all subsequent dialing should be conducted in tone mode. The DP command will override this command. Clears S14 bit 5.

This command may not be permitted in some countries. (See P.)

Result Codes

OK

P—Set Pulse Dial Default

This command forces pulse dialing until the next T dial modifier or T command is received. Sets S14 bit 5.

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (for example, ATDT...), this command is overridden so that all future dialing will be tone dialed. (See T command.)

This command may not be permitted in some countries.

Result Codes

OK

A—Answer

The modem will go off-hook and attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode. This command may be affected by the state of Line Current Sense, if enabled. (Most countries do not require Line Current Sense.) Operation is also dependent upon +FCLASS command and country-specific requirements.

If +FCLASS=0 is selected, the modem will enter the connect state after exchanging carrier with the remote modem. If no carrier is detected within a period specified in register S7, the modem hangs up. Any character entered during the connect sequence will abort the connection attempt.

If +FCLASS=1, 1.0, or 2 is selected, the modem will go off-hook in V.21 answer mode. It will generate the V.21 2100 Hz answer tone for 3 0.5 seconds and, following a delay of 70 ms, will proceed as if the +FTH=3 command were issued. At any stage up to (but excluding) the +FTH=3 command state, any character will abort the communication. (See the description of the +FTH command for details.)

H—Disconnect (Hang-Up)

This command initiates a hang up sequence.

This command may not be available for some countries due to PTT restrictions.

Syntax

H<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	The modem will release the line if the modem is currently on-line, and will terminate any test (AT&T) that is in progress. Country specific, modulation specific, and error correction protocol specific (S38) processing is handled outside of the H0 command.
	1	If on-hook, the modem will go off-hook and enter command mode. For US models, the modem will remain off-hook. For W-class models, the modem will return on-hook after a period of time determined by S7.

Result Codes

OK	<value> = 0 or 1.
ERROR	Otherwise.

O—Return to On-Line Data Mode

This command determines how the modem will enter the on-line data mode. If in the on-line command mode, the modem enters the on-line data mode with or without a retrain. If in the off-line command mode (no connection), the modem reports ERROR.

Syntax

O<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).
	1	Enters on-line data mode with a retrain before returning to on-line data mode.
	2	Fast retrain without speed change (used for diagnostic purpose only).
	3	Renegotiate rate without speed change (used for diagnostic purpose only.
	4	Renegotiate rate down one speed (used for diagnostic purpose only).
	5	Renegotiate rate up one speed (used for diagnostic purpose only).

Result Codes

OK	<value> = 0 to 5 and a connection exists.
ERROR	Otherwise or if not connected.

L—Speaker Volume

This command sets the speaker volume control. The parameter value, if valid, is written to S22 bits 0 and 1.

Syntax

L<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Low volume.
	1	Low volume. (Default.)

	2	Medium volume.
	3	High volume.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

M—Speaker Control

This command selects when the speaker will be on or off. The parameter value, if valid, is written to S22 bits 2 and 3.

Syntax

M<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Speaker is always off.
	1	Speaker is on during call establishment, but off when receiving carrier. (Default.)
	2	Speaker is always on.
	3	Speaker is off when receiving carrier and during dialing, but on during answering.

Result Codes

OK	<value> = 0 to 3.
ERROR	Otherwise.

&G—Select Guard Tone

This command causes the modem to generate the guard tone selected by this command (DPSK modulation modes only). The parameter value, if valid, is written to S23 bits 6 and 7.

Syntax

&G<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disables guard tone. (Default.)
	1	Disables guard tone.
	2	Selects 1800 Hz guard tone.

This command may not be permitted in some countries.

Result Codes

OK	<value> = 0 to 2.
ERROR	Otherwise.

&V—Display Current Configuration and Stored Profiles

This command reports the current (active) configuration, the stored (user) profiles, and the first four stored telephone numbers. The stored profiles and telephone numbers are not displayed if the NVRAM is not installed or is not operational as detected by the NVRAM test during reset processing.

Result Codes

OK

Example: .

```
AT&V
ACTIVE PROFILE:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006
S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S38:020 S46:138
S48:007 S95:000

STORED PROFILE 0:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S36:007 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1:
B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S36:007 S40:168 S41:195 S46:138 S95:000

TELEPHONE NUMBERS:
0 = 1 =
2 = 3 =

OK
```

&V1—Display Last Connection Statistics

Displays the last connection statistics in the following format (shown with typical results):

```
TERMINATION REASON    LOCAL REQUEST

LAST TX rate          26400 BPS
HIGHEST TX rate       26400 BPS
LAST RX rate          49333 BPS
HIGHEST RX rate       49333 BPS
PROTOCOLLAPM          LAPM
COMPRESSION           V42Bis
Line QUALITY          038
Rx LEVEL              015
Highest Rx State      67
Highest TX State      67
EQM Sum               00B4
Min Distance          0000
RBS Pattern           00
Rate Drop             00
Digital Loss          2000
Local Rtrn Count      00
Remote Rtrn Count     00
Flex 9481814347C4
```

RBS Pattern: Shows which bits are being robbed in the least significant 6 bytes, for example, 03 indicates 2 robbed bits in bit positions 0 and 1.

Digital Loss: Shows if a pad was encountered and if so, what was the digital loss. 2000 means 0dB.

Flex: Shows V.8bis information as follows:

First byte: Octet 13 (second byte of manufacturer id, 94 = K56flex)

Third byte: Octet 15 (manufacturer's product capabilities)

Second byte: Octet 14 (Licensee code: 81 = Conexant)

Fourth byte: Octet 16 (K56flex version number)

Fifth byte: Octet 17 (Conexant pump code version number)

Sixth byte: Octet 18 (x-law and controller version number)

Bit 6	Forced/Not forced A-Law/ -Law	
	0=	Forced A-Law/ -Law.
	1=	Not forced A-Law/ -Law.
Bit 5	Select A-Law or -Law	
	0=	Select A-Law.
	1=	Select -Law.
B4:0	Controller version	

\V—Single Line Connect Message Enable

This command enables or disables the single line connect message format as follows:

Syntax

\V<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Connect messages are controlled by the command settings X, W, and S95.
1	Connect messages are displayed in the single line format described below subject to the command settings V (Verbose) and Q (Quiet). In Non-Verbose mode (V0), single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE.

When single line connect messages are enabled, there are no CARRIER, PROTOCOL (+ER:), or COMPRESSION (+DR:) messages apart from the fields described below.

The single line connect message format is:

CONNECT <DTE Speed>/<Modulation>/<Protocol>/<Compression>/<Line Speed>

Where:

DTE Speed = DTE speed, for example, 57600.

Modulation =
- "V92" for V.92 modulation.
- "V90" for V.90 modulation.
- "K56" for K56flex modulation.
- "V34" for V.34 modulation.
- "V32" for V.32 or V.32bis modulation.

Note Modulation is omitted for all other modulations.

Protocol =
- "NONE" for no protocol.
- "ALT" for Microcom Network Protocol.
- "LAPM" for LAP-M protocol.

Compression =
- "V44" for V.44 compression.
- "V42B" for V.42bis compression.
- "ALT" for Microcom MNP5 compression.

Note Compression is omitted if protocol is NONE.

Line Speed = Asymmetric rates are displayed as "/rate:TX/rate:RX", for example, /1200 TX/75 RX.

Symmetric rates are displayed as a single DCE rate, for example, 14400.

%L—Report Line Signal Level

Returns a value which indicates the received signal level. The value returned is a direct indication (DAA dependent) of the receive level at the MDP, not at the telephone line connector. For example, 009 = -9 dBm, 043 = -43 dBm, and so on.

Result Codes

OK

%Q—Report Line Signal Quality

Reports the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2.

Example

AT%Q

015

Result Codes

OK	If connected.
ERROR	If not connected, or connected in 300 bps, V.23, or fax modes.

*B—Display Blacklisted Numbers

This command requests the modem to return a list of blacklisted numbers to the DTE. The format of the response is shown by the example below. Permanently forbidden numbers as defined by country requirements will not appear on this list. If no numbers are blacklisted, only the OK result code is issued.

Syntax

*B

Example

```
NO.   PHONE NUMBER

1;    4175537660
2;    8288924961
3;    3887278862
4;    3124839442
5;    6284664

OK
```

*D—Display Delayed Numbers

This command causes the modem to send a list of the delayed numbers together with the delay associated with each. The modem will return a list of delayed telephone numbers as defined in the *B command. The format of the response is shown by the example below (delay times are shown as hours:minutes:seconds). If no numbers are delayed, only the OK result code is issued.

Syntax

*D

Example

```
NO.   PHONE NUMBER  DELAY

1;    8264734660    2:00:00
2;    7532634661    2:00:00
3;    2587334662    0:02:00
4;    7532651663    0:03:25
5;    7459931664    0:01:45

OK
```

-PPD=—Extension Pickup Notification through 16550 UART

The -PPD=1 command allows setting of the DDSR (bit 1 of register 6) when an extension pick-up is detected, and disables all DSR notification. The -PPD=0 command disables this feature.

This feature is available only on a SmartSCM that is configured for parallel operation.

-STE=—Set Telephony Extension

The -STE command enables/disables Line-In-Use, Extension Pickup, and Remote Hangup detection features.

Note Additional hardware may be required to support these features.

Syntax

-STE=<value>

Defined Values

<value> Decimal number corresponding to the selected bit-mapped options. The bit fields are defined as follows:

- Bit 0 Line-In-Use detection enable/disable.
- Bit 1 Extension Pickup detection enable/disable.
- Bit 2 Remote Hangup detection enable/disable.

<value> Dec	Remote Hangup	Extension Pickup	Line-In-Use
0 (default)	Disabled	Disabled	Disabled
1	Disabled	Disabled	Enabled
2	Disabled	Enabled	Disabled
3	Disabled	Enabled	Enabled
4	Enabled	Disabled	Disabled
5	Enabled	Disabled	Enabled
6	Enabled	Enabled	Disabled
7	Enabled	Enabled	Enabled

Reporting Current or Selected Values

Command: STE?

Response: STE: <value>

Example: STE: 4 Remote Hangup enabled, Extension Pickup disabled, and Line-In-Use disabled.

Reporting Supported Range of Parameter Values

Command: STE=? Show available options.

Response: STE: 0-7

Result Codes

OK <value> = 0-7

ERROR Otherwise.

Behavior in Data Mode (+FCLASS=0)

When on-hook, if the line is in use and an ATDT is issued, the modem will not go off-hook and will return with the message LINE-IN-USE.

When off-hook and either an extension is picked up or a line reversal is detected, the modem will drop the connection. The disconnect reason in register S86=25 (this is also defined for #UD). The user must flash the hook in order to get a dial tone due because the remote server will be retraining.

If the local handset is picked up while the modem is off-hook, the modem will do a link-disconnect, flash the hook for 1.5 seconds, then connect the local handset to the line. At this point, the user dial tone should be on the local handset. The disconnect reason in S86=25.

Behavior in Voice Mode (+FCLASS=8)

When in voice mode and an extension is picked-up, a <DLE>P is sent to the DTE. When the modem is off-hook, a line reversal may also be detected in which case a <DLE>l is sent to the DTE.

In voice mode, there is no blocking of ATDT when the line is in use. Also, there is no automatic hang-up in voice mode as in data mode. There is only the above stated <DLE> shielding event reporting.

Operation in Data Mode

Line-In-Use (Enabled by AT-STE=1, AT-STE=3, AT-STE=5, or AT-STE=7):

Case 1: Telephone Line is in Use

If an ATDT, ATDP or ATDL is issued while Line-In-Use detection is enabled and the telephone line is in use, the modem will immediately return the message LINE-IN-USE to the DTE without going off-hook, and then return to command mode.

Case 2: Telephone Line is in Use But Disconnected

If an ATDT, ATDP or ATDL is issued while Line-In-Use detection is enabled and the telephone line is NOT in use, the modem will go off-hook after a short pause, then respond with CONNECT or NO CARRIER message.

Case 3: Telephone Line is Not Connected to Modem

If an ATDT, ATDP or ATDL is issued while Line-In-Use detection is enabled and the telephone line is not connected, the modem will go off-hook momentarily, go back on-hook, then respond with NO DIAL TONE message.

Extension Pick-up (Enabled by AT-STE=2, AT-STE=3, AT-STE=6, or AT-STE=7):

Case 1: Modem off-hook, Local Handset Goes Off-Hook

If the local handset goes off-hook while the modem is in a data connection, the local handset will be muted. The modem will then send a GSTN Cleardown to the remote modem and then go on-hook. The modem will then send a NO CARRIER message to the DTE. A result code of 25 will be left in S86 register. After 2 seconds, the local handset will be connected to the telephone line so the user hears the dial tone.

Case 2: Modem off-hook, Extension Pick-up

If the modem is connected and another extension goes off-hook, the modem will send a GSTN Cleardown to the remote modem and then immediately hang-up. Due to the noise possibly being added to the line when a telephone extension is picked-up, a GSTN Cleardown may or may not successfully be received by the remote mode. If the GSTN Cleardown is not received successfully by the remote modem, the remote modem may attempt a retrain until the retrain fails and the remote modem drops the line. In any case, the modem will send a NO CARRIER message to the DTE immediately after sending the GSTN Cleardown. A result code of 25 will be left in the S86 register.

Because the extension is off-hook, the modem cannot flash the hook for the central office to generate a dial tone. In this case, the user must flash the extension handset to obtain a dial tone.

Remote Hang-up (enabled by AT-STE=4, AT-STE=5, AT-STE=6, or AT-STE=7):

Case 1: Modem off-hook, Remote Hang-up

If the modem is connected (off-hook) and the remote modem/server goes hangs up, the central office may issue a line polarity reversal. If a line polarity reversal is detected, the modem will drop the call and respond with NO CARRIER. The reason for hang-up can be determined by #UD or by S86=25. A line reversal can also be simulated by simply pulling out the telephone line during a connection.

Operation in Voice Mode

Line-In-Use (enabled by AT-STE=1, AT-STE=3, AT-STE=5, or AT-STE=7):

This feature does not apply in voice mode.

Extension Pickup (Enabled by AT-STE=2, AT-STE=3, AT-STE=6, or AT-STE=7):

If the modem is off-hook and an extension goes off-hook, the modem issues a <DLE>P to the DTE. The application software should then hang up the line (VLS=0).

Remote Hang-up (Enabled by AT-STE=4, AT-STE=5, AT-STE=6, or AT-STE=7):

If the modem is off-hook and the remote user goes on-hook, the modem issues a <DLE>P to the DTE. The application software should then hang up the line (VLS=0).

Examples

User is talking on an extension and the modem tries to dial

AT-STE=7

ATDT555-1212

LINE-IN-USE

The line is not in use and the modem tries to dial

AT-STE=7

ATDT555-1212

Modem goes off-hook

CONNECT

An extension is off-hook but there is silence on the line and the modem tries to dial

AT-STE=3

ATDT555-1212

Modem goes off-hook

NO DIAL TONE

Modem is connected in data mode and an extension goes off-hook

AT-STE=2

ATDT555-1212

CONNECT

NO CARRIER Extension is picked up, GSTN Cleardown sent

ATS86=?

025

Modem is connected in data mode and remote modem goes on-hook

AT-STE=4

ATDT555-1212

CONNECT

NO CARRIER Remote modem drops line

ATS86=?

025

Modem is connected in data mode and the LOCAL HANDSET goes off-hook

AT-STE=7

ATDT555-1212 5 sec delay

CONNECT

NO CARRIER Local handset goes off-hook, GSTN Cleardown sent, and remote modem goes on-hook

ATS86=?

025

500ms after no carrier a dial tone is heard on the local handset

Modem is in answer machine mode and an extension goes off-hook

AT-STE=2

AT+FCLASS=8

OK

<DLE>h	Local handset on-hook
<DLE>R	Ring
AT+BLS=1	
OK	
AT+VSM=1,7200,0,0	
AT+VTX	Starts to play greeting message
<DLE>P	User picks up extension
<DLE>!	DTE send abort to end playback
AT+VLS=0	DTE hangs up

Automated system that needs to periodically use the line while giving the voice user the highest priority

A common use for these features would be an automated system that needs to periodically use the line while giving the voice user the highest priority.

The automated system would make a connection when the line is free. It would do this without disturbing the line if the line is in use. The automated system would periodically retry the connection until the line is free. Once the line is free it would dial and make its connection. If a voice user wishes to use the line while the modem is connected. The modem will drop the line and give the line to the user. The modem will then try to regain control of the line by once again periodically retrying to establish a connection.

AT-STE=7	
OK	
ATDT5551212	
CONNECT	
	Sometime later, the user picks up phone
NO CARRIER	
ATS86?	
25	
OK	
	Delay 30 seconds
ATDT5551212	

LINE-IN-USE

Try again some time later user hangs up the phone

CONNECT

3.2.4 Modulation Control Commands

+MS—Modulation Selection

This extended-format compound parameter controls the manner of operation of the modulation capabilities in the modem. It accepts six subparameters.

Syntax

+MS=[<carrier>[,<automode>[,<min_tx_rate>[,<max_tx_rate>[,<min_rx_rate>

[,<max_rx_rate>]]]]]]

Where possible <carrier>, <min_tx_rate>, <max_tx_rate>, <min_rx_rate>, and <max_rx_rate> values are listed in Table 3-3.

Table 3-3 +MS Command Supported Rates

Modulation	<carrier>	Possible (<min_rx_rate>, <min_rx_rate>, (<min_tx_rate>), and <max_tx_rate>) Rates (bps)
Bell 103	B103	300
Bell 212	B212	1200 Rx/75 Tx or 75 Rx/1200 Tx
V.21	V21	300
V.22	V22	1200
V.22 bis	V22B	2400 or 1200
V.23	V23C	1200
V.32	V32	9600 or 4800
V.32 bis	V32B	14400, 12000, 9600, 7200, or 4800
V.34	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400
K56flex	K56	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000
V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000

Table 3-3 +MS Command Supported Rates (continued)

Modulation	<carrier>	Possible (<min_rx_rate>, <min_rx_rate>, (<min_tx_rate>), and <max_tx_rate>) Rates (bps)
V92 upstream	V92	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000

Note Some <carrier> values may not be supported by certain model models. For example, modem models supporting V92 may not support K56.

Defined Values

<carrier> A string which specifies the preferred modem carrier to use in originating or answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters. <carrier> values for ITU standard modulations take the form: <letter><1-4 digits><other letters as needed>. Defined values are listed in Table 3-3.

<automode> A numeric value which enables or disables automatic modulation negotiation (for example, ITU-T V.32bis Annex A or V.8).

0 = Automode disabled.

1 = Automode enabled. (Default.)

<min_rx_rate> and <max_rx_rate> Numeric values which specify the lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate at which the modem may establish a receive connection. May be used to condition distinct limits for the receive direction as distinct from the transmit direction. Values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table 3-3. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate supported by the selected carrier.)

<min_tx_rate> and <max_tx_rate> Numeric values which specify the lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate at which the modem may establish a transmit connection. Non-zero values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table 3-3. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate supported by the selected carrier.)

Reporting Current or Selected Values

Command: +MS?

Response: +MS:<carrier>,<automode>,<min_tx_rate>, <max_tx_rate>, <min_rx_rate>,<max_rx_rate>

Note The current active settings are reported under control of the +MR parameter.

Example: +MS: K56, 1,300,33600,300,56000

For default values. This example allows maximum system flexibility to determine optimal receive and transmit rates during operation.

Reporting Supported Range of Parameter Values

Command: +MS=?

Response: +MS: (< carrier> range),(<automode> range),(<min_tx_rate> range), (<max_tx_rate> range), (<min_rx_rate> range), (<max_rx_rate> range)

Example 1: +MS:(B103,B212,V21,V22,V22B,V23C,V32,V32B,V34, K56,V90),(0,1),(300-33600),(300-33600),(300-56000),(300-56000)

Example 2: +MS:(B103,B212,V21,V22,V22B,V23C,V32,V32B,V34, V90,V92),(0,1),(300-33600),(300-33600),(300-56000),(300-56000)

Result Codes

OK Valid subparameter string

ERROR Otherwise.

+MR—Modulation Reporting Control

This extended-format numeric parameter controls whether or not the extended-format +MCR:<carrier> and +MRR:<rate> intermediate result codes are transmitted from the modem to the DTE. If enabled, +MCR:<carrier> and +MRR:<rate> intermediate result codes represent the current (negotiated or renegotiated) modulation <carrier> and <rate> that are transmitted at the point during connect negotiation (handshaking) at which the modem has determined which modulation and rate will be used, i.e., before any Error Control or Data Compression reports are transmitted, and before any final result code (for example, CONNECT) is transmitted.

S95 bit 2 is reset to 0 for +MR=0 and is set to a 1 for +MR=1 or +MR=2. The more recent setting of +MR or S95 bit 2, and the W command setting, determines modulation result code reporting (see S95 Parameter and W Command).

Syntax

+MR=[<value>]

Defined Values

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

0	Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted). (Default.)
1	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with tx rate, rx rate).
2	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with rx rate only).

Reporting Current or Selected Values

Command: +MR?

Response: +MR: <current value>

Example: +MR: 0

Reporting Support Range of Parameter Values

Command: +MR=?

Response: +MR: (<value>range)

Example: +MR: (0-2)

+MCR: Report Syntax

Response: +MCR: <carrier>

<carrier> Alphanumeric code corresponding to the reported carrier. Defined values are:

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
K56	For K56flex
V90	For V.90

V92	For V.92

+MRR: Report Syntax

Response:	+MRR: <tx_rate>,<rx_rate>
<tx_rate>	Decimal transmit rate in bits/s.
<rx_rate>	Decimal receive rate in bits/s.
Example:	+MRR: 28800, 48000

%E—Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward

Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back when line quality is insufficient or fall forward when line quality is sufficient (%E2). The parameter value, if valid, is written to S41 bits 2 and 6.

If enabled, the modem attempts to retrain for a maximum of 30 seconds.

Syntax

%E<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disable line quality monitor and auto-retrain.
	1	Enable line quality monitor and auto-retrain.
	2	Enable line quality monitor and fallback/fall forward. (Default.)

Results Codes

OK	<value>=0, 1, or 2
ERROR	Otherwise.

Fallback/Fall Forward. When %E2 is active, the modem monitors the line quality (EQM). When line quality is insufficient, the modem will initiate a rate renegotiation to a lower speed within the V.34/V.32 bis/V.32 (RC336) modulation speeds. The modem will keep falling back within the current modulation if necessary until the speed reaches 2400 bps (V.34) or 4800 bps (V.32). Below this rate, the modem will only do retrains if EQM thresholds are exceeded. If the EQM is sufficient for at least one minute, the modem will initiate a rate renegotiation to a higher speed within the current modulation speeds. The rate renegotiations will be done without a retrain if a V.32 bis connection is established.

Speeds attempted during fallback/fall forward are those shown to be available in the rate sequences exchanged during the initial connection. Fallback/fall forward is available in error correction and normal modes, but not in direct mode or synchronous mode with external clocks.

%U—Select -Law or A-Law Codec Type

This command selects -Law or A-Law codec type for V.90 and K56flex modulation. This command also stores the selected setting directly to NVRAM. The default value is country specific.

Syntax

%U<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Selects -Law
	1	Selects A-Law

Results Codes

OK	<value>=0 or 1
ERROR	Otherwise.

B—CCITT or Bell

When the modem is configured to allow either option, the modem will select Bell or CCITT modulation for a line speed connection of 300 or 1200 bps. Any other line speed will use a CCITT modulation standard. The parameter value, if valid, is written to S27 bit 6.

Syntax

B<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Selects CCITT operation at 300 or 1200 bps during Call Establishment and a subsequent connection. (Default.)
	1	Selects BELL operation at 300 or 1200 bps during Call Establishment and a subsequent connection.

Results Codes

OK	<value>=0 or 1
ERROR	Otherwise.

3.2.5 Error Control Commands

+ES—Error Control and Synchronous Mode Selection

This extended-format command specifies the initial requested mode of operation when the modem is operating as the originator, optionally specifies the acceptable fallback mode of operation when the modem is operating as the originator, and optionally specifies the acceptable fallback mode of operation when the modem is operating as the answerer. It accepts three numeric subparameters:

Syntax

+ES=[<orig_rqst>[,<orig_fbk>[,<ans_fbk>]]]

Defined Values

<orig_rqst> Decimal number which specifies the initial requested mode of operation when the modem is operating as the originator. The options are:

0	Initiate call with Direct Mode.
1	Initiate call with Normal Mode (also referred to as Buffered Mode) only.
2	Initiate V.42 without Detection Phase. If V.8 is in use, disable V.42 Detection Phase.
3	Initiate V.42 with Detection Phase. (Default.)
4	Initiate MNP.
6	Initiate V.80 Synchronous Access Mode when connection is completed, and Data State is entered. (See +ESA and +ITF commands.)
7	Initiate Frame Tunneling Mode when connection is complete, and Data Mode is entered.

<orig_fbk> Decimal number which specifies the acceptable fallback mode of operation when the modem is operating as the originator.

0	LAPM, MNP, or Normal Mode error control optional. (Default.)
1	LAPM, MNP, or Direct Mode error control optional.
2	LAPM or MNP error control required; disconnect if error control is not established.
3	LAPM error control required; disconnect if error control is not established.
4	MNP error control required; disconnect if error control is not established.

<ans_fbk> Decimal number which specifies the acceptable fallback mode of operation when the modem is operating as the answerer or specifies V.80 Synchronous Access Mode.

0	Direct Mode.
1	Error control disabled, use Normal Mode.
2	LAPM, MNP, or Normal Mode error control optional. (Default.)
3	LAPM, MNP, or Direct Mode error control optional.
4	LAPM or MNP error control required; disconnect if error control is not established.
5	LAPM error control required; disconnect if error control is not established.
6	MNP error control required; disconnect if error control is not established.
8	Initiate V.80 Synchronous Access Mode when connection is completed, and Data State is entered (see +ESA and +ITF commands).
9	Initiate Frame Tunneling Mode when connection is complete, and Data Mode is entered.

Examples

+ES=6	Enable V.80 Synchronous Access Mode originator.
+ES=6	Enable V.80 Synchronous Access Mode originator.
+ES=,,8	Enable V.80 Synchronous Access Mode answerer.
+ES=6,,8	Enable V.80 Synchronous Access Mode originator and answerer.
+ES=3	Enable V.42 with Detection Phase originator. Disable V.80 Synchronous Access Mode originator.
+ES=,,2	Allow LAPM, MNP, or Normal Mode connection answerer. Disable V.80 Synchronous Access Mode answerer.
+ES=3,,2	Enable V.42 with Detection Phase originator, allow LAPM, MNP, or Normal Mode connection answer. Disable Synchronous Access Mode originator and answerer.

Reporting Current or Selected Values

Command: +ES?

Response: +ES: <orig_rqst>,<orig_fbk>,<ans_fbk>

Example: +ES: 3,0,2 For the default setting.

+ES: 6,0,8 For V.80 Synchronous Access Mode originator and answerer.

Reporting Supported Range of Parameter Values

Command: +ES=?

Response: +ES: (<orig_rqst> range),(<orig_fbk> range), (<ans_fbk> range)

Example: +ES: (0-4,6,7),(0-4),(0-6,8,9)

+EB—Break Handling in Error Control Operation

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

Syntax

+EB=[<break_selection>[,<timed>[,<default_length>]]]

Defined Values

<break_selection>	Decimal number 0 specifying that break is to be ignored, i.e., not signaled to remote DCE.
<timed>	Decimal number 0 specifying that any transmitted V.42 L-SIGNAL will not indicate break signal length
<default_length>	Decimal number 0 specifying that break is not delivered to the DTE.

Reporting Current or Selected Values

Command: +EB?

Response: +EB: <break_selection>,<timed>,<default_length><CR>

Example: +EB: 0,0,0 For default settings.

Reporting Supported Range of Parameter Values

Command: +EB=?

Response: +EB: (<break_selection> range),(<timed> range), (default_length> range)

Example: +EB: (0),(0),(0)

+ESR—Selective Repeat

This extended-format numeric parameter controls the use of the selective repeat (SREJ) option in V.42.

Syntax

+ESR=[<value>]

Decimal number 0 specifying that SREJ is not used.

Reporting Current or Selected Values

Command: +ESR?

Response: +ESR: <value>

Example: +ESR: 0 For default settings.

Reporting Supported Range of Parameter Values

Command: +ESR=?

Response: +ESR: (<value>)

Example: +ESR: (0)

+EFCS—32-bit Frame Check Sequence

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

Syntax

+EFCS=[<value>]

Defined Values

<value> Decimal number 0 specifying the use of the 16-bit FCS specified in V.42.

Reporting Current or Selected Values

Command: +EFCS?

Response: +EFCS: <value>

Example: +EFCS: 0 For default settings.

Reporting Supported Range of Parameter Values

Command: +EFCS=?

Response: +EFCS: (<value> range)

Example: +EFCS: (0)

+ER—Error Control Reporting

This extended-format numeric parameter controls whether or not the extended-format +ER: intermediate result code is transmitted from the modem to the DTE.

S95 bit 3 is reset to 0 for +ER=0 and is set to a 1 for +ER=1. The more recent setting of +ER or S95 bit 3, and the W command setting, determines the actual error control result code reporting (see S95 Parameter and W Command).

Syntax

+ER=[<value>]

Defined Values

<value> A decimal number corresponding to the selected error control option:

- 0 = Error control reporting disabled (no +ER intermediate result code transmitted). (Default.)
- 1 = Error control reporting enabled (+ER intermediate result code transmitted).

Reporting Current or Selected Values

Command: +ER?

Response: +ER: <current value>

Example: +ER: 0 For default settings.

Reporting Supported Range of Parameter Values

Command: +ER=?

Response: +ER: (<value> range)

Example: +ER: (0,1)

+ER: <type>

The +ER: <type> reported represents the current (negotiated or renegotiated) modem-modem error control type. If enabled, the intermediate result code is transmitted at the point during error control negotiation (handshaking) at which the modem has determined which error control protocol will be used (if any), before the final result code (for example, CONNECT) is transmitted. The format of this result code is:

The +ER intermediate result code, if enabled, is issued after the Modulation report (+MCR and +MRR) and before the Data Compression Report (+DR).

Syntax

+ER: <type>

Defined Values

<type>	An alphanumeric code corresponding to the selected protocol.	
	NONE	Error control is not in use.
	LAPM	V.42 LAPM protocol is in use.
	ALT	MNP is in use.

Example: +ER: LAPM

+ETBM—Call Termination Buffer Management

This extended-format compound parameter controls the handling of data remaining in modem buffers upon call termination. It accepts three numeric subparameters:

Syntax

+ETBM=[<pending_TD>[,<pending_RD>[,<timer>]]]

Defined Values

<pending_TD>	Decimal number 0 specifying that disconnect will occur immediately and all buffered transmit data will be discarded when the local DTE requests call disconnection.
<pending_RD>	Decimal number 0 specifying that disconnect will occur immediately and all buffered receive data will be discarded when the local DTE requests call disconnection.
<timer>	Decimal number 0 specifying that the modem will not attempt to deliver the buffered data before abandoning the attempt and discarding remaining data.

Reporting Current or Selected Values

Command: +ETBM?

Response: +ETBM: <pending_TD>,<pending_RD>,<timer>

Example: +ETBM: 0,0,0

Reporting Supported Range of Parameter Values

Command: +ETBM=?

Response: +ETBM: (<pending_TD> range),(<pending_RD> range), (<timer> range)

Example: +ETBM: (0),(0),(0)

\B—Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command.

In error correction mode, the modem will signal a break through the active error correction protocol, giving no indication of the length.

Syntax

\B<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	1-9	Break length in 100 ms units. (Default = 3.) (Non-error corrected mode only.)

Result Codes

OK:	If connected in data modem mode.
NO CARRIER:	If not connected or connected in fax modem mode.

Note When the modem receives a break from the remote modem, break is passed to the DTE as follows: In non-error correction mode direct, the break length is passed; in non-error correction mode normal and in error correction mode, a 300 ms break is passed.

\K—Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The parameter value, if valid, is written to S40 bits 3, 4, and 5.

Syntax

\K<value>

Defined Values

<value>	Decimal number corresponding to the selected option. The response is different in three separate states. The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:	
	0	Enter on-line command mode, no break sent to the remote modem.
	1	Clear data buffers and send break to remote modem.

2 Same as 0.

3 Send break to remote modem immediately.

4 Same as 0.

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

The second case is where the modem is in the on-line command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

0 Clear data buffers and send break to remote modem.

1 Clear data buffers and send break to remote modem. (Same as 0.)

2 Send break to remote modem immediately.

3 Send break to remote modem immediately. (Same as 2.)

4 Send break to remote modem in sequence with data.

5 Send break to remote modem in sequence with data. (Same as 4.) (Default.)

The third case is where a break is received from a remote modem during a non-error corrected connection:

0 Clears data buffers and sends break to the DTE.

1 Clears data buffers and sends break to the DTE. (Same as 0.)

2 Send a break immediately to DTE.

3 Send a break immediately to DTE. (Same as 2.)

4 Send a break in sequence with received data to DTE.

5 Send a break in sequence with received data to DTE. (Same as 4.) (Default.)

Result Codes

OK: 0 to 5.

ERROR: Otherwise.

-K—MNP Extended Services

Enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection. The parameter value, if valid, is written to S40 bits 0 and 1.

Syntax

-K<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disables V.42 LAPM to MNP 10 conversion. (Default.)
	1	Enables V.42 LAPM to MNP 10 conversion.
	2	Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.

Result Codes

OK:	0 or 2.
ERROR:	Otherwise.

3.2.6 Data Compression Commands

This section contains parameters to condition modem use of standard ITU-T V.42bis Data Compression Procedures.

+DS—Data Compression

This extended-format compound parameter controls the V.42bis data compression function if provided in the modem. It accepts four numeric subparameters:

Syntax

+DS=[<direction>[,<compr_neg>[,<max_dict>[,<max_string>]]]]

Defined Values

<direction>	Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.	
	0	Negotiated; no compression (V.42bis P0=0).
	3	Both directions, accept any direction (V.42bis P0=11). (Default.)
<compr_neg>	Specifies whether or not the modem should continue to operate if the desired result is not obtained.	
	0	Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>.

<max_dict> Specifies the maximum number of dictionary entries (2048 entries) which should be negotiated (may be used by the DTE to limit the codeword size transmitted, based on its knowledge of the nature of the data to be transmitted).

<max_string> Specifies the maximum string length (32 bytes) to be negotiated (V.42bis P2).

Reporting Current or Selected Values

Command: +DS?

Response: +DS: <direction>,<compr_neg>,<max_dict>,<max_string>

Example: +DS: 3,0,2048,32 for the defaults and 2048 entry max dictionary.

Reporting Supported Range of Parameter Values

Command: +DS=?

Response: +DS: (<direction> range),(< compr_neg > range), (<max_dict> range),(<max_string> range)

Example: +DS: (0,3),(0),(2048),(32)

+DR—Data Compression Reporting

This extended-format numeric parameter controls whether or not the extended-format +DR: intermediate result code is transmitted from the modem to the DTE.

S95 bit 5 is reset to 0 for +DR=0 and is set to a 1 for +DR=1. The more recent setting of +DR or S95 bit 5, and the W command setting, determines the actual data compression result code reporting (see S95 Parameter and W Command).

Syntax

+DR=[<value>]

Defined Values

<value> decimal number corresponding to the selected option:

0	Data compression reporting disabled (no +DR result code transmitted).
1	Data compression reporting enabled (+DR result code transmitted). (Default.)

Reporting Current or Selected Values

Command: +DR?

Response: +DR: <current value>

Example: +DR: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +DR=?

Response: +DR: (<value> range)

Example: +DR: (0,1)

+DR: <type> Intermediate Result Code

The +DR: <type> reported represents the current (negotiated or renegotiated) modem-modem data compression type. If enabled, the intermediate result code is transmitted at the point after error control negotiation (handshaking) at which the modem has determined which data compression technique will be used (if any) and the direction of operation. The +DR intermediate result code, if enabled, is issued after the Error Control Report (+ER) and before the final result code (for example, CONNECT).

The format of this result code is:

Result Code Syntax

+DR: <type>

Defined Values

<type> An alphanumeric code corresponding to the selected option:

NONE	Data compression is not in use.
V42B	V.42bis is in use in both directions.
V42B RD	V.42 bis is in use in receive direction only
V42B TD	V.42 bis is in use in transmit direction only
V44	V.44 is in use in both directions
V44 RD	V.44 is in use in receive direction only
V44 TD	V.44 is in use in transmit direction only
ALT	MNP 5 compression.

Example

+DR: V42B

%C—Enable/Disable Data Compression

Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link. The parameter value, if valid, is written to S41 bits 0 and 1.

Syntax

%C<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Disables data compression. Resets S46 bit 1.
	1	Enables MNP 5 data compression negotiation. Resets S46 bit 1.
	2	Enables V.42 bis data compression. Sets S46 bit 1.
	3	Enables both V.42 bis and MNP 5 data compression. Sets S46 bit 1. (Default.)

Result Codes

OK	<value> = 0, 1, 2, or 3.
ERROR	Otherwise.

3.2.7 V.8/V.8bis Commands

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

This command is defined for two conditions: as a parameter while the modem is on-hook, and as an action command while the modem is off-hook. If enabled, V.8 negotiation does not preclude simultaneous implementation of other negotiation means (for example, V.8bis, V.18, V.32bis Annex A).

This command is a compound parameter if issued while the modem is on-hook, used to precondition V.8 and V.8bis originating and answering operation. It is issued by the DTE before the Dial (D) or Answer (A) command, regardless of the state of the +FCLASS parameter.

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

Syntax

+A8E=<v8o>,<v8a>,<v8cf>[,<v8b>][,<cfrange>][,<protrange>]

Defined Values

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

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

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

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

<v8cf>= Set the V.8 CI signal call function to the hexadecimal octet XY.

00	(Default.)
21	
C1	

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

0	Disable V.8bis negotiation.
1	Enable V.8bis negotiation. (Default.)

<cfrange>= "<string of values>". Applicable only for <v8a>=5. Not supported.

< protrange >= "<string of values>". Applicable only for <v8a>=5. Not supported.

Default values: 1,1,00,1,0,0

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

For subparameter values <v8o>=6 and <v8a>=5, the +A8I indications are issued during the course of the V.8 session to notify the DTE when the relevant V.8 signals are received.

Reporting Current or Selected Values

Command: +A8E?

Response: +A8E: <v8o>,<v8a>,<v8cf>[,<v8b>][,<cfrange>][,<protrange>]

Example: +A8E: 1,1,00,1,0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +A8E=?

Response: +A8E: (<v8o> range),(<v8a> range),(v8cf in octets), (<v8b> range),(<cfrange>),(<protrange>)

Example: +A8E: (1,6),(1,5),(0,21,C1),(0,1),(0),(0)

+A8I:—CI Signal Indication

This indication is issued by an answering modem, if +A8E,<v8a> 0, to indicate detection of a V.8 CI signal, and report the recovered Call Function octet(s).

Indication Syntax

+A8I:<v8cf><CR>

Defined Values

<v8cf> A hexadecimal code octet representation of those Call Function octet(s). +A8I:0 indicates that the modem timed out waiting for CI.

Example

+A8I:0 The modem timed out waiting for CI.

+A8I:X YYY

3.2.8 Synchronous Access Mode Commands

Three commands support Synchronous Access Mode:

+ES Enables and disables Synchronous Access Mode in the client or central site modem (see 0)

+ESA Configures the operation of the Synchronous Access Submode

+ITF Selects Transmit Flow Control Thresholds

Enabling Synchronous Access Mode enables the use of the 8-bit command characters defined in Table 9/V.80 of the Draft ITU-T Recommendation V.80 (DATA COMMUNICATION OVER THE TELEPHONE NETWORK; In-Band DCE Control and Synchronous Data Modes for Asynchronous DTE).

+ESA—Configure Synchronous Access Submode

The operation of the Synchronous Access sub-Mode is configured by the +ESA parameter.

This extended-format compound parameter is used to control the manner of operation of the Synchronous Access Mode in the modem. It accepts six numeric subparameters:

Syntax

+ESA=[<trans_idle>[,<framed_idle>[,<framed_un_ov>[,<hd_auto>[,<crc_type>[,<nrzi_en>[,<syn1>[,<syn2>]]]]]]]]

Defined Values

<trans_idle> Specifies the bit sequence transmitted by the modem when a transmit data buffer underrun condition occurs, while operating in Transparent sub-Mode. The options are:

0	In Transparent sub-Mode, modem transmits 8-bit SYN sequence on idle. Modem receiver does not hunt for synchronization sequence (default and fixed).

<framed_idle Specifies the bit sequence transmitted by the modem when a transmit data buffer underrun condition occurs immediately after a flag, while operating in Framed sub-Mode. The options are:

0	In Framed sub-Mode, modem transmits HDLC flags on idle (default and fixed).

<framed_un_ov Specifies the actions undertaken by the modem when a transmit data buffer underrun or overrun condition occurs immediately after a non-flag octet, while operating in Framed sub-Mode.

0	In Framed sub-Mode, modem transmits abort on underrun in middle of frame (default).
1	In Framed sub-Mode, DCE transmits a flag on underrun in middle of frame, and notifies DTE of underrun or overrun.

<hd_auto> Specifies whether or not, in V.34 half-duplex operation, additional procedures besides those specified in § 12/V.34 shall be performed by the modem when switching from primary channel to secondary channel operation, and vice versa. This subparameter should not be commanded.

<crc_type> Specifies the CRC polynomial used while operating in Framed sub-Mode. The options are:

0	CRC generation and checking disabled (default).
1	In Framed sub-Mode, the 16-bit CRC is generated by the modem in the transmit direction, and checked by the modem in the receive direction.

<nrzi_en> Specifies if Non Return to Zero Inverted (NRZI) encoding is to be used by the modem for transmit and receive data. The options are:

	0	NZRI encoding and decoding disabled (default and fixed).
<syn1>, <syn2>	Specifies the octet value(s) to be used while performing character-oriented framing. <syn1> is to be commanded to 255 (FFh); <syn2> is not to be commanded.	

Reporting Selected Options

The modem reports the selected options in response to the following command:

+ESA?

The response is:

+ESA: <trans_idle>,<framed_idle>,<framed_un_ov>,<hd_auto>,<crc_type>,<nrzi_en>,<syn1>,<syn2>

Example:

+ESA?

+ESA: 0,0,0, ,0,0,255, For the defaults.

Reporting Selected Options

The modem reports the supported options in response to the following command:

+ESA=?

The response is:

+ESA: (list of supported <trans_idle> values), (list of supported <framed_idle> values),(list of supported <framed_un_ov> values), (list of supported <hd_auto> values),(list of supported <crc_type> values), (list of supported <nrzi_en> values), (list of supported <syn1> values), (list of supported <syn2> values)

Example:

+ESA=?

+ESA: (0),(0),(0-1), ,(0-1),(0),(255),

+H—Enable/Disable RPI

This command enables or disables Protocol Interface (RPI) processing and sets the DTE speed.

Syntax

+H=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disable protocol interface and video ready mode.
1	Enable RPI mode and set DTE speed to 19200 bps.
2	Enable RPI mode and set DTE speed to 38400 bps.
3	Enable RPI mode and set DTE speed to 57600 bps.
11	Enable RPI+ mode. When in RPI+ mode, a link is established between the modem and the WinRPI or WinRPI95 host PC software driver to allow the modem to support protocol (V.42bis/LAP-M/MNP2-5) connections with a remote modem. This command should only be used when the WinRPI or WinRPI95 driver software is installed in the PC.
16	Reserved.
17	Reserved.

Result Codes

OK	0 to 3, 11, 16, 17
ERROR	Otherwise.

+ITF—Transmit Flow Control Thresholds

The +ITF command determines the flow control thresholds used by the modem for transmit data from the DTE.

This optional compound parameter allows the DTE to determine the input buffer size in the modem for data on circuit 103 (transmit data) from the DTE, to control the thresholds used for flow control of such data, and to control how often the modem reports to the DTE the number of octets in this buffer. The DTE can adjust its own thresholds for flow control of data on circuit 104 (received data) from the modem.

Syntax

+ITF=[<off>[,<on>[,<report_period>]]]

Defined Values

<off> Determines the threshold, in octets, above which the modem will generate a flow off signal. Applicable in Synchronous Access and Frame Tunneling modes. Default <off> value is 255.

For the <on> and <off> subparameters, the input buffer is assumed to reside between the modem's V.24 interface and the Synchronous Access protocol layer; i.e., the buffer count includes all octets, including EM codes, received from the DTE, with the exception of DC1 and DC3 if these are used to signal <modem-by-DTE> flow control.

The modem returns the ERROR result code if the DTE specifies that the <off> subparameter be set to a value less than or equal to the <on> subparameter; in this case, the current parameter value settings are not modified.

<on> Determines the threshold, in octets, below which the modem will generate a flow on signal. Applicable in Synchronous Access and Frame Tunneling modes. Default <on> value is 64.

<report_period> Not supported. A fixed value of zero is used and reported.

Reporting Selected Options

The modem sends a string of information text to the DTE consisting of selected options in response to the following command:

+ITF?

The response is:

+ITF: <off>,<on>,<report_period>

Example:

+ITF?

+ITF: 255,64,0 Default values

Reporting Selected Options

The modem sends a string of information text to the DTE consisting of supported options in response to the following command:

+ITF=?

The response is:

+ITF: (list of supported <off> values),(list of supported <on> values),(list of supported <report_period> values)

Example:

+ITF=?

+ITF: (0-255),(0-255),(0)

The maximum reported <off> value is the input transmit data buffer level at which the modem signals a transmit data overrun indication to the DTE.

3.2.9 Diagnostic Commands

#UD—Last Call Status Report

#UD is an action command requesting reporting of logged operation events. It does not take parameters and must be the last command in the command line.

The modem logs aspects of their operation for each call, and saves these results until cleared by one of the following events:

1. Power off.
2. Hard reset (for example, negate DTR with &D3 set; reset button).
3. Soft reset = ATZ or AT&F.
4. ATD command issued.
5. ATA command issued.
6. Automatic answer (for example, set register S0>0 and ring detected).

These results are NOT cleared by changing DTR, V.24 circuit 108.2, if &D0, &D1 or &D2.

Data Call State Model

For purposes of this command, there are four data call states, and associated status issues:

- Call Setup
  - Calling DCE: get dial tone, generate dial digits, detect call progress signals.
  - Answering DCE: detect ringing, detect CallerID, etc.
- Negotiation
  - V.25 calling tone/answer tone exchanges
  - V.8 or V.8bis call function negotiations
  - V-series modem carrier detection and training
  - Modem-to-modem protocols (for example, V.42, V.42bis).
- Data Transfer
  - Bit-error rates, for each direction
  - Rate renegotiation
  - Retraining
- Call Termination
  - protocol disconnect signals
  - carrier disconnect signals
  - loss of carrier
  - excessive error rates

Command Syntax

In response to this command, the modem will report one or more lines of information text as defined below. Information text format conforms to V.250; each line is preceded by a <CR><LF> pair, and terminated by <CR><LF>. (CR and LF characters may be changed by writing new values to the contents of registers S3 and S4, respectively.)

The modem may generate a single line or multiple lines, followed by a standard OK final result code. For example, if call setup failed, only that result is useful. Each information text line is formatted as follows, including one or more key=value pairs:

Syntax

#UD

Response

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

Defined Values

DIAG	5 hexadecimal characters (44h, 49h, 41h, 47h, 20h)
<	Left angle bracket (less than sign) (3Ch)
token	Unique 32-bit hexadecimal string 2A4D3263(32h, 4h1, 34h, 44h, 33h, 32h, 36h, 33h)
space	space character (20h)
Key	One- or two-digit hexadecimal number (see Key in Table 3 4)
=	Equal sign (3Dh)
Value	Any string as defined below (Table 3-4—Table 3-9 as appropriate)
>	Right angle bracket (greater than sign) (3Eh)

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multi-digit values are reported MSD first. Leading 0's may be deleted. See examples in Table 3-13.

Monitoring an active connection

This command is intended for use after call termination. However, codes are defined so that a modem can respond before the first call is placed, and during a call for live monitoring purposes. For example, key 60, call termination, has value 1 defined, indicating that the call is still in progress.

There are at least two ways to do this. First, the DTE could switch the modem to On-Line command state, issue the command, capture the responses and then issue an ATO command. For smoother on-line monitoring, in-band means defined in ITU V.80 are recommended if available in the modem. If V.80 methods are used, each response line shall be a separate extended in-band message.

Notes for Tables

1. The modem may insert a delay (for example, 10 ms) between information text lines.

2. The code tables include values for data and fax calls. Some of the codes are applicable only to data calls (for example, data compression), some are applicable only to call origination (for example, busy, answering signal detection) and some are applicable only to the answering modem (for example, calling signal detection).

callCleared codes from 3.6.4/V.58-1994

callCleared: indicates that the DCE has gone on-hook and that the previously existing network connection has been cleared. These value are hex, converted from decimal in V.58. callCleared codes are described in Table 3-12.

Table 3-4 AT#UD Last Call Status Report Format

Key	Value(s)	Definition
0	2 digits	Diagnostic Command Specification revision number, digit.digit
1	Table 3-5	Call Setup Result code
2	Table 3-6	Multi-media mode
3	Table 3-7	DTE-DCE interface mode
4	String	V.8 CM octet string, same format as V.250, in quotes
5	String	V.8 JM octet string, same format as V.250, in quotes
10	0-2F	Received signal power level, in -dBm (0-43)
11	0-1F	Transmit signal power level, in -dBm (for example, 0-17)
12	0-64	Estimated noise level, in -dBm (for example, 10-90)
17	0-FFF	Round Trip delay, in units of ms
18	Table 3-8	V.34 INFO bit map
20	Table 3-9	Transmit Carrier Negotiation Result
21	Table 3-9	Receive Carrier Negotiation Result
22	0-1F40	Transmit Carrier symbol rate (0-8000) in symbol/s
23	0-1F40	Receive Carrier symbol rate (0-8000) in symbol/s
24	0-FA0	Transmit Carrier frequency (0-4000) in Hz
25	0-FA0	Receive Carrier frequency (0-4000) in Hz
26	0-FA00	Initial transmit carrier data rate (0-64000) in bit/s
27	0-FA00	Initial receive carrier data rate (0-64000) in bit/s
30	0-FF	Temporary carrier loss event count
31	0-FF	Carrier Rate re-negotiation event count
32	0-FF	Carrier Retrains requested
33	0-FF	Carrier Retrain requests granted
34	0-FA00	Final transmit carrier data rate in bit/s
35	0-FA00	Final receive carrier data rate in bit/s
40	Table 3-10	Protocol Negotiation Result
41	0-400	Error Control frame size in bytes
42	0-FF	Error control link timeouts in transmission
43	0-FF	Error control link NAKs received

Table 3-4 AT#UD Last Call Status Report Format (continued)

Key	Value(s)	Definition
44	Table 3-11	Compression Negotiation Result
50	0-2	Transmit flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
51	0-2	Receive flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
52	0-FFFFFFFF	Transmit characters sent from DTE
53	0-FFFFFFFF	Received characters sent to DTE
54	0-FFFF	Transmit characters lost (data overrun errors from DTE)
55	0-FFFF	Received characters lost (data overrun errors to DTE)
56	0-FFFFFFFF	Transmit I- Frame count, if error control protocol running
57	0-FFFFFFFF	Received I-Frame count, if error control protocol running
58	0-FFFF	Transmit I-Frame error count, if error control protocol running
59	0-FFFF	Received I- Frame error count, if error control protocol running
60	Table 3-12	Termination Cause
61	0-FF	Call Waiting event count

Table 3-5 Call Setup Result Codes

Code	Definition
0	No previous call (modem log has been cleared since any previous calls)
1	No dial tone detected
2	Reorder signal detected, network busy
3	Busy signal detected
4	No recognized signal detected (for example, no signal, or nothing recognizable)
5	Voice detected * if this is a voice modem (for example, V.253) operating in voice mode (for example, +FCLASS=8.0)
7	Data Answering signal detected (for example, V.25 ANS, V.8 ANSam)
8	Data Calling signal detected (for example, V.25 CT, V.8 CI)
9	Fax Answering signal detected (for example, T.30 CED, DIS)
A	Fax Calling signal detected (for example, T.30 CNG)
B	V.8bis signal detected

Table 3-6 Multimedia Modes

Code	Definition
0	Data Only
1	Fax Only
2	Voice

Table 3-6 Multimedia Modes (continued)

Code	Definition
9	Video-telephony, H.324
A	Other V.80 call

Table 3-7 DTE-DCE Modes

Code	Definition
0	Async data
1	V.80 transparent synchronous mode
2	V.80 framed synchronous mode

Table 3-8 V.34 INFO Bit Report

Bits	Source Bits	Definition
31-30	INFO0 bit 20;0	
20-29	INFOc bits 79-88	
16-19	INFOc bits 26-29 or 35-38 or 44-47 or 53-56- or 62-65 or 71-74	Pre-emphasis field, selected by the symbol rate chosen
12-15	INFOa bits 26-29	
10-11	MP bit 50; 0	
0-9	INFOa bits 40-49	

Table 3-9 gstnModulationSchemeActive from 3.7.2/V.58

Value	Description
0	V.17 (G3 Fax call)
1	V.21
2	V.22
3	V.22bis
4	V.23 Constant Carrier (1200/75)
8	V.27ter (G3 Fax call)
9	V.29 HD (G3 Fax call)
A	V.32
B	V.32bis
C	V.34
E	V.90 and V.92
81	K56flex

Table 3-9 gstnModulationSchemeActive from 3.7.2/V.58 (continued)

Value	Description
84	Bell 212A
85	Bell 103

Table 3-10 errorControl Active from 3.5.2/V.58

Value	Description
0	Disable/none
1	V.42 LAPM
2	V.42 Alternative protocol (MNP™)
80	MNP10™

Table 3-11 compressionActive from 3.2.2/V.58

Value	Description
0	None
1	V.42bis and V.44
80	MNP5™

Table 3-12 callCleared codes from 3.6.4/V.58-1994

Value	Description	Notes
0	CauseUnidentified	Call setup issues
1	No Previous call	Not in V.58
2	Call is still in progress	Not in V.58
3	Call Waiting signal detected	Not in V.58, only if modem can detect it
4	Delayed	Same as value 2A, CallAttemptsLimitExceeded
19	InactivityTimerExpired	
1F	cct108isOffInhibitsDial	DTR low
20	cct108turnedOff	DTR drop
29	BlacklistedNumber	
2A	CallAttemptsLimitExceeded	Same as "Delayed", see ETS 300 001
2B	ExtensionPhoneOff-hook	If extension detection supported
2C	CallSetupFailTimerExpired	for example, S7 timeout
2D	IncomingCallDetected	If incoming call while sending dial command.
2E	LoopCurrentInterrupted	
2F	NoDial tone	
31	ReorderTone	Fast busy

Table 3-12 callCleared codes from 3.6.4/V.58-1994 (continued)

Value	Description	Notes
33	EngagedTone	Busy
34	LongSpaceDisconnect	And if modem program to abort on long space
3C	CarrierLost	Signal Converter
3D	TrainingFailed	
3E	NoModulationinCommon	
3F	RetrainFailed	
40	RetrainAttemptCountExceeded	
41	GstnCleardownReceived	
42	FaxDetected	If this was not a fax call attempt
46	InTestMode	Test
50	AnyKeyAbort	Call Control
51	DteHangupCommand	If ATH was used to terminate the previous call.
52	DteResetCommand	If ATZ was used to terminate the previous call.
5A	FrameReject	Error Control
5B	NoErrorControlEstablished	Error control was required
5C	ProtocolViolation	
5D	n400exceeded	LAPM retransmission Count Timer
5E	NegotiationFailed	
5F	DisconnectFrameReceived	
60	SabmeFrameReceived	
64	LossOfSynchronization	Data Compression

Example Modem Response and Usage

Example #UD commend response are shown in Table 3-13.

Table 3-13 Completed Data Call, with some errors and rate retrain during the call

Modem Response Line	Description
DIAG <2A4D3263 0=09>	This is version 0.9
DIAG <2A4D3263 1=06 2=0 3=0>	Data Answer signal detected; Data only; Character async
DIAG <2A4D3263 5="C14513902A" 6="A145"	V.8 Call Menu indicates: V.8 Joint Menu selects:
DIAG <2A4D3263 10=1F 11=0C 12=52>	Receive level = -31 dBm; transmit level = -12 dBm; noise level = -82 dBm
DIAG <2A4D3263 14=03 15=05 16=10>	Far end echo delay in milliseconds; Far end echo loss in dB; Near end echo loss = 16 dB

Table 3-13 Completed Data Call, with some errors and rate retrain during the call (continued)

Modem Response Line	Description
DIAG <2A4D3263 20=C 22=780 24=0C80 26=79E0>	Transmitter: V.34 training completed; V.34 carrier frequency = 1920; V.34 symbol rate = 3200; initial transmit rate is 31200 bit/s
DIAG <2A4D3263 21=D 25=1F40 27=DAC0>	Receiver: V.90 training completed; V.90 symbol rate = 8000; initial receive rate is 56000 bit/s
DIAG <2A4D3263 30=00 31=03 32=01 33=01>	No carrier loss events, 3 carrier rate renegotiations attempted; 1 carrier retrain requested; 1 carrier retrain granted
DIAG <2A4D3263 34=7080 35=CB20>	Final transmit rate is 28800 bit/s; final receive rate is 52000 bit/s
DIAG <2A4D3263 40=1 41=100>	LAPM negotiation completed; frame size = 256
DIAG <2A4D3263 42=0 43=0>	No error control timeout or link NAKs
DIAG <2A4D3263 44=1 45=400>	V.42bis data compression used; dictionary size = 1024
DIAG <2A4D3263 50=2 51=2>	Hardware transmit and receive flow control
DIAG <2A4D3263 52=343CC 54=0>	213964 DTE characters transmitted, w/o underrun
DIAG <2A4D3263 53=7230E6 55=47>	7483622 DTE characters received, 71 characters lost due to receive data overrun
DIAG <2A4D3263 56=29D 58=0001>	597 (decimal) frames transmitted, with 1 frame error
DIAG <2A4D3263 58=2A4B 59=0004>	10827 (decimal) frames received, with 4 frame errors
DIAG <2A4D3263 60=51>	Local PC initiated hangup

3.2.10 Compatibility Commands

&L—Leased Line Operation

This command requests leased line or dial-up operation. This command is provided for compatibility only; no mode change is performed, dial-up operation continues. The OK response is returned for a valid parameter, but no other action is performed. The parameter value, if valid, is written to S27 bit 2.

Syntax

&L<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Requests dial-up operation. Dial-up operation continues.

Result Codes

OK	0.
ERROR	Otherwise.

)M—Enable Cellular Power Level Adjustment

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

)M<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	)M0 command.
	1	)M1 command.
	2	)M2 command.

Result Codes

OK	0 to 2.
ERROR	Otherwise.

@M—Initial Cellular Power Level Setting

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

@M<value>

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	@M0 command.
	.	
	.	

30 @M30 command.

Result Codes

OK 0 to 30.

ERROR Otherwise.

:E—Compromise Equalizer Enable Command

This command is included for compatibility only and has no effect other than returning a result code.

Syntax

:E<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0 :E0 command.

1 :E1 command.

Result Codes

OK 0 to 1.

ERROR Otherwise.

3.2.11 FastConnect Commands

$F—FastConnect Control

This command allows configuring of the client modem to connect to a central site modem that supports non-standard V.22 and V.22 bis FastConnect protocols.

Syntax

$F<n>

Defined Values

<n> Decimal number which specifies the initial requested mode of operation when the modem is operating as the originator. The options are:

0 Normal connection (Default)

1 FastConnect without answer tone

2	Reserved
3	FastConnect with answer tone

3.2.12 V.92 +P and -Q Commands

This section describes the +P (PCM DCE) and -Q commands and parameters used to control the V.92 Mode operation.

+PCW—Call Waiting Enable

This command controls the operation of the modem in the presence of call waiting.

Syntax

+PCW=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	Request modem-on-hold if enabled by +PMH and collect caller ID information if enabled by +VRID. Toggle V.24 circuit 125. (Default.)
1	Hang-up.
2	Ignore call waiting.

Result Codes

OK	<value> = 0, 1, or 2.
ERROR	Otherwise.

Reporting Current or Selected Values

Command: +PCW?

Response: +PCW: <value>

Example: +PCW: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PCW=?

Response: +PCW: (<value> range)

Example: +PCW: (0,1,2)

+PMH—Modem-on-Hold Enable

This command controls the selection of modem-on-hold in the modem. The action of the modem in response to modem-on-hold events is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92 Mode.

Syntax

+PMH=<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0 Modem-on-hold enabled in V.92 Mode. (Default.)

1 Disabled modem-on-hold.

Result Codes

OK 0 or 1 in V.92 Mode (see the +MS command)

ERROR Otherwise.

Reporting Current or Selected Values

Command: +PMH?

Response: +PMH: <current value>

Example: +PMH: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: =+PMH=?

Response: +PMH: (<value> range)

Example: +PMH: (0,1)

+PMHT—Modem-on-Hold Timer

This command controls whether or not the modem will grant or deny a modem-on-hold (MOH) request as well as setting the MOH Timeout value.

Syntax

+PMHT=<value>

Defined Values

<value> Decimal number corresponding to selected setting.

0	Deny V.92 modem-on-hold Request (Default.)
1	Grant MOH with 10 second timeout
2	Grant MOH with 20 second timeout
3	Grant MOH with 30 second timeout
4	Grant MOH with 40 second timeout
5	Grant MOH with 1 minute timeout
6	Grant MOH with 2 minute timeout
7	Grant MOH with 3 minute timeout
8	Grant MOH with 4 minute timeout
9	Grant MOH with 6 minute timeout
10	Grant MOH with 8 minute timeout
11	Grant MOH with 12 minute timeout
12	Grant MOH with 16 minute timeout
13	Grant MOH with indefinite timeout

Result Codes

OK	0-13 in V.92 Mode (+MS=V92)
ERROR	Otherwise.

Reporting Current or Selected Values

Command: +PMHT?

Response: +PMHT: <value>

Example: +PMHT: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PMHT=?

Response: +PMHT: (<value> range)

Example: +PMHT: (0,1,2,3,4,5,6,7,8,9,10,11,12,13)

+PMHR—Initiate Modem-on-Hold

This command requests the modem to initiate or to confirm a modem-on-hold procedure. The modem will return ERROR if modem-on-hold is not enabled or if the modem is in an idle condition. The modem will return the string response +PMHR: <value> where <value> is a decimal value corresponding to the status of the modem's hold exchange procedure as defined below. This response may be delayed depending upon the context under which the +PMHR command is made, i.e., if the +PMHR is in response to an incoming modem-on-hold or if it is initiating a request.

Note If modem-on-hold is enabled but the remote server does not support V.92 then the modem will always report 0 to show that the hold request is denied.

Syntax

+PMHR

Response

+PMHR:<value>

<value> Decimal number corresponding to the maximum hold time the server or hold-granting modem will allow.

0	V.92 MOH request denied or not available.
1	MOH with 10 second timeout Granted.
2	MOH with 20 second timeout Granted.
3	MOH with 30 second timeout Granted.
4	MOH with 40 second timeout Granted.
5	MOH with 1 minute timeout Granted.
6	MOH with 2 minute timeout Granted.
7	MOH with 3 minute timeout Granted.
8	MOH with 4 minute timeout Granted
9	MOH with 6 minute timeout Granted.
10	MOH with 8 minute timeout Granted.
11	MOH with 12 minute timeout Granted.
12	MOH with 16 minute timeout Granted.
13	MOH with indefinite timeout Granted.

Result Codes

OK	0-13 in V.92 Mode (+MS=V92)
ERROR	Otherwise.

+PIG—PCM Upstream Ignore

This command controls the selection of PCM upstream in the modem. The actual state of PCM upstream is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92 Mode.

Syntax

+PIG=<value>

Defined Values

<value>	Decimal number corresponding to selected operation.	
	0	Enable PCM upstream negotiation.
	1	Disable PCM upstream negotiation. (Default.)

Result Codes

OK	0 or 1 in V.92 Mode (+MS=V.92)
ERROR	Otherwise.

Reporting Current or Selected Values

Command:	+PIG?
Response:	+PIG: <value>
Example:	+PIG: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command:	+PIG=?
Response:	+PIG: (<value> range)
Example:	+PCW: (0,1)

+PMHF—V.92 Modem-on-Hold Hook Flash

This command causes the modem to initiate the flash hook sequence when in the modem-on-hold procedure. This enables switching to the second call (incoming or outgoing). This command applies only to V.92 modem-on-hold. There are no parameters associated with this command.

Syntax

+PMHF

Result Codes

OK When the modem completes the flash hook sequence.

ERROR If this command is initiated and the modem is not on hold.

+PQC—V.92 Phase 1 and Phase 2 Control

This command controls the global enabling or disabling of the V.92 shortened Phase 1 and Phase 2 startup procedures. This command is used in conjunction with the +PSS command.

Syntax

+PQC=<value>

Defined Values

<value> Decimal number corresponding to selected setting.

- 0 Enable Short Phase 1 and Short Phase 2. (Default.)
- 1 Enable Short Phase 1 only.
- 2 Not supported.
- 3 Disable Short Phase 1 and Short Phase 2.

Result Codes

OK 0, 1, or 3 in V.92 Mode (+MS=V.92)

ERROR Otherwise.

Reporting Current or Selected Values

Command: +PQC?

Response: +PQC: <value>

Example: +PQC: 0

Reporting Supported Range of Parameter Values

Command: +PQC=?

Response: +PQC: (<value> range)

Example: +PQC: (0,1,3)

+PSS—Use Short Sequence

This command causes a calling modem to force either a V.92 short or full startup sequence as defined by the +PQC command on the next and subsequent connections.

Syntax

+PSS=<value>

Defined Values

<value> Decimal number corresponding to the selected sequence.

0	The modems decide whether or not to use the short startup procedures. The short startup procedures can only be used if enabled by the +PQC command. (Default.)
1	Reserved.
2	Forces the use of the full startup procedures on the next and subsequent connections independent of the setting of the +PQC command.

Result Codes

OK 0 - 2 in V.92 Mode (+MS=V.92)

ERROR Otherwise.

Reporting Current or Selected Values

Command: +PSS?

Response: +PSS: <value>

Example: +PSS: 0 For the default <value>.

Reporting Supported Range of Parameter Values

Command: +PSS=?

Response: +PSS: (<value> range)

Example: +PSS: (0,1,2)

-QCPC—Force Full Startup Procedure Next Connection

This command causes the modem to use full startup procedures on the next connection attempt regardless of the setting of the +PQC command. After this attempt, the modem will select the startup procedure as defined by the +PQC command. If a shortened startup procedure is enabled by the +PQC command, then the quick connect profile will also be updated on the next connection attempt.

Syntax

-QCPC

Result Codes

OK	In V.92 Mode (+MS=V.92)
ERROR	Otherwise.

-QCPS—Enable Quick Connect Profile Save

This command controls whether or not the modem will save the generated quick connect profile.

Syntax

-QCPS=<value>

Defined Values

<value>	Decimal number corresponding to the desired operation.	
	0	Do not allow the quick connect profile to be saved.
	1	Allow the quick connect profile to be saved. (Default.)

Result Codes

OK	0 or 1 in V.92 Mode (+MS=V.92) and quick connect is enabled (+PSS = 0)
ERROR	Otherwise.

Reporting Current or Selected Values

Command:	-QCPS?
Response:	-QCPS: <value>
Example:	-QCPS: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: -QCPS=?

Response: -QCPS: (<value> range)

Example: -QCPS: (0,1)

3.3 S-Parameters

The S-Parameters are summarized in Table 3 14 along with their default values; registers denoted with an '*' may be stored in one of the two user profiles by entering the &W command. One of these profiles may be loaded at any time by using the Z command. Registers or register fields quoted as “reserved” are reserved for current or future use by the firmware, or are permanently overridden by PTT limitations.

All bit-mapped registers are read-only. The appropriate AT command which controls the relevant bits in the S-Parameter should be used to change the value.

S—Read/Write S-Parameter

The modem selects an S-Parameter, performs an S-Parameter read or write function, or reports the value of an S-Parameter.

n Establishes S-Parameter n as the last register accessed.

n=v Sets S-Parameter n to the value v.

n? Reports the value of S-Parameter n.

The parameter n can be omitted, in which case the last S-Parameter accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Parameter accessed will be assumed. For example:

ATS7 establishes S7 as the last accessed register.

AT=40 sets the contents of the last register accessed to 40.

ATS=20 sets the contents of the last register accessed to 20.

If the number “n” is outside the range of the S-Parameters available, the modem will return the ERROR message. If the value “v” is outside the range permitted for a given S-Parameter, the modem will return the ERROR message. Input and output are always in decimal format. Note that some S-Parameters are read-only.

In some cases, writing to the S-Parameter will appear to be accepted but the value will not actually be written.

Due to country restrictions, some commands will be accepted, but the value may be limited and replaced by a maximum or minimum value.

3.3.1 FACTORY DEFAULTS

The factory default values are stored in ROM and are loaded into the active configuration at power up or by the ATZ command. In addition, the designated default profile is subsequently loaded, and may change some of the factory default values. The designated default profile can be changed by entering the &Y command where n is one of the two possible user profiles.

The defaults shown are those used in factory profiles zero and one.

The default values shown in Table 3-14 may vary by modem firmware configuration. Consult the MCU firmware release notes for exact configuration.

The factory default values may be loaded at any time by entering the &Fn command.

Table 3-14 S-Parameter Summary

Register	Function	Range	Units	Saved	Default**
S0	Rings to Auto-Answer	0-255	rings	*	0
S1	Ring Counter	0-255	rings		0
S2	Escape Character	0-255	ASCII	*	43
S3	Carriage Return Character	0-127	ASCII		13
S4	Line Feed Character	0-127	ASCII		10
S5	Backspace Character	0-255	ASCII		8
S6	Wait Time before Blind Dialing or for Dial Tone	2-255	s	*	2
S7	Wait Time for Carrier, Silence, or Dial Tone	1-255	s	*	50
S8	Pause Time for Dial Delay Modifier	2-255	s	*	2
S9	Carrier Detect Response Time	1-255	0.1 s	*	6
S10	Lost Carrier To Hang Up Delay	1-255	0.1 s	*	14
S11	DTMF Tone Duration	50-255	0.001 s	*	95
S12	Escape Prompt Delay (EPD)	0-255	0.02 s	*	50
S14	General Bit Mapped Options Status	-	-		138 (8Ah)
S16	Test Mode Bit Mapped Options Status	-	-		0
S19	Reserved	-	-		0
S20	Reserved	-	-		0
S21	V.24/General Bit Mapped Options Status	-	-		52 (34h)
S22	Speaker/Results Bit Mapped Options Status	-	-		117 (75h)
S23	General Bit Mapped Options Status		-		0
S24	Sleep Inactivity Timer	0-255	s		0
S25	Delay to DTR Off	0-255	s or 0.01 s		5
S26	RTS-to-CTS Delay	0-255	0.01 s		1
S27	General Bit Mapped Options Status	-	-		117 (75h)
S28	General Bit-Mapped Options Status	-	-		0
S29	Flash Dial Modifier Time	0-255	10 ms		70
S30	Disconnect Inactivity Timer	0-255	10 s		0
S31	General Bit-Mapped Options Status	-	-		192 (C0h)
S36	LAPM Failure Control	-	-	*	7
S38	Delay Before Forced Hangup	0-255	s		20
S39	Flow Control Bit Mapped Options Status	-	-		3
S40	General Bit-Mapped Options Status	-	-	*	104 (68h)

Table 3-14 S-Parameter Summary (continued)

Register	Function	Range	Units	Saved	Default**
S41	General Bit-Mapped Options Status	-	-	*	195 (C3h)
S46	Data Compression Control	-	-	*	138
S48	V.42 Negotiation Control	-	-		7
S86	Call Failure Indication	0-26	-		21
S91	PSTN Transmit Attenuation Level	0-15	dBm		10 (Country dependent)
S92	Fax Transmit Attenuation Level	0-15	dBm		10 (Country dependent)
S95	Extended Result Codes Control	-	-	*	0
S210	V.34 Symbol Rate	0-255	-		13 (0Dh)

* Register value may be stored in one of two user profiles with the &W command.

3.3.2 S-PARAMETER DEFINITIONS

S0—Number of Rings to Auto-Answer

S0 sets the number of the rings required before the modem automatically answers a call. Setting this parameter to zero disables auto-answer mode.

Range: 0-255 rings

Default: 0

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 an eight second interval.

Range: 0-255 rings

Default: 0

S2—Escape Character

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e., no escape character will be recognized.

Range: 0-255, ASCII decimal

Default: 43 (+)

S3—Carriage Return Character

S3 sets the command line and result code terminator character. Pertains to asynchronous operation only.

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

S4—Line Feed Character

S4 sets the character recognized as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used.

Range: 0-127, ASCII decimal

Default: 10 (Line Feed)

S5—Backspace Character

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; this means a total of three characters are transmitted each time the modem processes the Backspace character.

Range: 0-32, ASCII decimal

Default: 8 (Backspace)

S6—Wait Time before Blind Dialing or for Dial Tone

S6 operation is country dependent.

1. Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some ATX options according to country restrictions. The “Wait for Dial Tone” call progress feature (W dial modifier in the dial string) will override the value in register S6. (US models.)
2. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a “W” dial modifier before returning NO DIAL TONE result code. (W class.)

The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than 2 seconds.

Range: 2-255 seconds

Default: 2

S7—Wait Time for Carrier, Silence, or Dial Tone

S7 operation is country dependent.

1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone if allowed by country restrictions.
2. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter.
3. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before continuing with the next dial string parameter. (US models.)

Range: 1-255 seconds

Default: 50

S8—Pause Time For Dial Delay

S8 sets the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string.

Range: 2-255 seconds

Default: 2

S9—Carrier Detect Response Time

S9 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: 6 tenths of a second

Default: 6 (0.6 second)

S10—Lost Carrier To Hang Up Delay

S10 sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier.

Range: 1-255 tenths of a second

Default: 14 (1.4 seconds)

Note For Call Waiting detection, if the modem is set to US country code and S10 >=16, then the modem will detect the Call Waiting tone and hang-up the line. If S10 <16, the modem will not detect Call Waiting tone.

S11—DTMF Tone Duration

S11 operation is country dependent.

1. For US models, S11 sets the duration of tones in DTMF dialing (has no effect on pulse dialing).

Range: 50-255 milliseconds

Default: 95 (95 milliseconds)

S12—Escape Prompt Delay (EPD)

S12 defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Sending of the OK result code does not affect entry into command mode. (See 3.1.3.)

Range: 0-255 1/50 of a second

Default: 50 (1 second)

S14—General Bit Mapped Options Status

S14 indicates the status of command options.

Default: 138 (8Ah) (10001010b)

Bit 0	This bit is ignored.	
Bit 1	Command echo (En)	
	0=	Disabled (E0)
	1=	Enabled (E1) (Default.)
Bit 2	Quiet mode (Qn)	
	0=	Send result codes (Q0) (Default.)
	1=	Do not send result codes (Q1)
Bit 3	Result codes (Vn)	
	0=	Numeric (V0)
	1=	Verbose (V1) (Default.)

Bit 4 Reserved

Bit 5 Tone (T)/Pulse (P)

0= Tone (T) (Default.)

1= Pulse (P)

Bit 6 Reserved

Bit 7 Originate/Answer

0= Answer

1= Originate (Default.)

S16—Test Mode Bit Mapped Options Status

S16 indicates the test in progress status.

Default: 0

Bit 0 Local analog loopback

0= Disabled (Default.)

1= Enabled (&T1)

Bits 1-7 Not used

S19—Reserved

S19 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S20—Reserved

S20 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S21—V.24/General Bit Mapped Options Status

S21 indicates the status of command options.

Default: 52 (34h) (00110100b)

Bits 0-1 Reserved (0)

Bit 2 CTS behavior (&Rn)

- 0= CTS tracks RTS (&R0)
- 1= CTS always on (&R1) (Default.)

Bits 3-4 DTR behavior (&Dn)

- 0= &D0 selected
- 1= &D1 selected
- 2= &D2 selected (Default.)
- 3= &D3 selected

Bit 5 RLSD (DCD) behavior (&Cn)

- 0= &C0 selected
- 1= &C1 selected (Default.)

Bit 6 DSR behavior (&Sn)

- 0= &S0 selected (Default.)
- 1= &S1 selected

Bit 7 Long space disconnect (Yn)

- 0= Y0 (Default.)
- 1= Y1

S22—Speaker/Results Bit Mapped Options Status

S22 indicates the status of command options.

Default: 117 (75h) (01110101b)

Bits 0-1 Speaker volume (Ln)

- 0= Off (L0)

	1=	Low (L1) (Default.)
	2=	Medium (L2)
	3=	High (L3)
Bits 2-3	Speaker control (Mn)	
	0=	Disabled (M0)
	1=	Off on carrier (M1) (Default.)
	2=	Always on (M2)
	3=	On during handshake (M3)
Bits 4-6	Limit result codes (Xn)	
	0=	X0
	4=	X1
	5=	X2
	6=	X3
	7=	X4 (Default.)
Bit 7	Reserved	

S23—General Bit Mapped Options Status

S23 indicates the status of command options.

Default:	0	
Bits 0-6	Not used	
Bits 6-7	Guard tone (&Gn)	
	0=	None (&G0) (Default.)
	1=	None (&G1)
	2=	1800 Hz (&G2)

S24—Sleep Inactivity Timer

S24 sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode.

Range: 0-255 seconds

Default: 0

S25—Delay To DTR Off

S25 sets the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are seconds for synchronous modes and one hundredths of a second for other modes.

Range: 0-255 (1 second for synchronous modes 1; 0.01 second otherwise)

Default: 5

S26—RTS to CTS Delay

S26 sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Pertains to synchronous operation only.

Range: 0-255 hundredths of a second

Default: 1

S27—Bit Mapped Options Status

S27 indicates the status of command options.

Default: 73 (49h) (01001001b)

Bits 0, 1, 3 Synchronous/asynchronous selection (&Mn/&Qn)

31 0 =

00 0 = &M0 or &Q0

00 1 = &M1 or &Q1

01 0 = &M2 or &Q2

01 1 = &M3 or &Q3

10 0 = Reserved

10 1 = &Q5 (Default.)

11 0 = &Q6

Bit 2 Leased line control (&Ln)

0= Dial up line (&L0) (Default.)

Bits 4-5	Internal clock select (&Xn)	
	0=	Internal clock (&X0) (Default.)
	1=	External clock (&X1)
	2=	Slave clock (&X2)
Bit 6	CCITT/Bell mode select (Bn)	
	0=	CCITT mode (B0)
	1=	Bell mode (B1) (Default.)
Bit 7	Reserved	

S28—Bit Mapped Options Status

S28 indicates bit mapped options status.

Default:	0	
Bits 0-1	Reserved	
Bit 2	Reserved (always 0).	
Bits 3-4	Pulse dialing (&Pn)	
	0=	39%-61% make/break ratio at 10 pulses per second (&P0) (Default.)
	1=	33%-67% make/break ratio at 10 pulses per second (&P1)
	2=	39%-61% make/break ratio at 20 pulses per second (&P2)
	3=	33%-67% make/break ratio at 20 pulses per second (&P3)
Bits 5-7	Reserved	

S29—Flash Dial Modifier Time

S29 sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string. S29 is a country dependent parameter. The S29 value cannot be changed using S29=XX.

Range: 0-255 10 ms intervals

Default: 70 (700 ms) for U.S.

S30—Disconnect Inactivity Timer

S30 sets the length of time, in tens of seconds, that the modem will stay online before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The timer is inoperative in synchronous mode.

Range: 0-255 tens of seconds (0-2550 seconds)

Default: 0 (disabled)

S31—Bit Mapped Options Status

S31 indicates bit mapped options status.

Default: 192 (C0h) (11000000b)

Bit 0 Single line connect message enable/disable (\Vn)

- 0= Messages controlled by S95, Wn and Vn (\V0) (Default.)
- 1= Single line connect message (\V1)

Bit 1 Reserved (0)

Bits 2-3 Error correction progress messages (Wn)

- 0= DTE speed only (W0) (Default.)
- 1= Full reporting (W1)
- 2= DCE (line) speed only (W2)

Bits 4-5 Caller ID (+VCID)

- 0= Caller ID disabled (+VCID=0) (Default.)
- 1= Short (formatted) Caller ID enabled (+VCID=1)
- 2= Long (unformatted) Caller ID enabled (+VCID=2)

Bits 6-7 Reserved (Default = 11b)

S36—LAPM Failure Control

Default: 7 (00000111b)

Bits 0-2 This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered.

0=	Modem disconnects.
1=	Modem stays on-line and a Direct mode connection is established.
2=	Reserved.
3=	Modem stays on-line and a Normal mode connection is established.
4=	An MNP connection is attempted and if it fails, the modem disconnects.
5=	An MNP connection is attempted and if it fails, a Direct mode connection is established.
6=	Reserved.
7=	An MNP connection is attempted and if it fails, a Normal mode connection is established. (Default.)

Bits 3-7 Reserved

S38—Delay Before Forced Hang Up

S38 specifies the delay between the modem's receipt of the H command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applicable to error-correction connection only. This parameter can be used to ensure that data in the modem buffer is sent before the modem disconnects.

1. If S38 is set to a value between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to time-out, the response to the H0 command will be OK.
2. If S38 is set to 255, the modem does not time-out and continues to attempt to deliver data in the buffer until the connection is lost or the data is delivered.

Range: 0-255 seconds

Default: 20

S39—Flow Control Bit Mapped Options Status

Default: 3 (00000011b)

Bits 0-2 Status of command options

- 0= No flow control
- 3= RTS/CTS (&K3) (Default.)
- 4= XON/XOFF (&K4)
- 5= Transparent XON (&K5)
- 6= Both methods (&K6)

Bits 3-7 Reserved

S40—General Bit Mapped Options Status

S40 indicates the status of command options.

Default: 104 (68h) (01101000b)

Bits 0-1 MNP Extended Services (-Kn)

- 0= Disable extended services (-K0) (Default.)
- 1= Enable extended services (-K1)
- 2= Enable extended services (-K2)

Bit 2 Reserved

Bits 3-5 Break Handling (\Kn)

- 0= \K0
- 1= \K1
- 2= \K2
- 3= \K3
- 4= \K4
- 5= \K5 (Default.)

Bits 6-7 Reserved

S41—General Bit Mapped Options Status

S41 indicates the status of command options.

Default: 13 (C3h) (00001101b)

Bits 0-1 Compression selection (%Cn)

0=	Disabled (%C0)
1=	MNP 5 (%C1)
2=	V.42 bis (%C2)
3=	MNP 5 and V.42 bis (%C3) (Default.)

Bits 2, 6 Auto retrain and fallback/fall forward (%En)

Bit 6	Bit 2
0	0 = Retrain and fallback/fall forward disabled (%E0)
0	1= Retrain enabled (%E1)
1	0 = Fallback/fall forward enabled (%E2) (Default.)

Bit 3 Reserved

Bit 4-5 Reserved

Bit 7 Reserved

S46—Data Compression Control

S46 controls selection of compression. The following actions are executed for the given values:

Range: 136 or 138

Default: 138

S46=136 Execute error correction protocol with no compression.

S46=138 Execute error correction protocol with compression. (Default.)

S48—V.42 Negotiation Control

The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if so desired.

Range: 0, 7, or 128 If an invalid number is entered, it is accepted into the S-Parameter, but S48 will act as if 128 has been entered.

Default: 7

S48=0 Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM.

S48=7 Enable negotiation. (Default.)

S48=128 Disable negotiation; bypass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.

S86—Call Failure Reason Code

When the modem issues a NO CARRIER result code, a value is written to S86 Register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. The code definitions are:

Range: 0-26

Default: 21

S86=0 Normal hangup, no error occurred.

S86=1 Reserved

S86=2 Reserved

S86=3 Call Waiting caused disconnect.

S86=4 Physical carrier loss.

S86=5 No error correction at the other end.

S86=6 No response to feature negotiation.

S86=7 This modem is async only; the other modem is sync only.

S86=8 No framing technique in common.

S86=9 No protocol in common.

S86=10 Bad response to feature negotiation.

S86=11 No sync information from the remote modem.

S86=12 Normal hangup initiated by the remote modem.

S86=13 Retransmission limit reached.

S86=14 Protocol violation occurred.

S86=15 Lost DTR.

S86=16 Received GSTN cleardown.

S86=17 Inactivity timeout.

S86=18 Speed not supported.

S86=19 Long space disconnect.

S86=20 Key abort disconnect.

S86=21 Clears previous disconnect reason.

S86=22 No connection established.

S86=23 Disconnect after three retrains.

S86=24 Call Waiting tone detected.

S86=25 Extension pickup detected.

S86=26 Remote hangup detected.

S91—PSTN Transmit Attenuation Level

In non-PCM modes (V.90 or K56flex are PCM modes), S91 sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode, resulting in a transmit level from 0 to -15 dBm. In some countries, the transmit level may not be changed.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level.)

Default: 10 (-10 dBm transmit level.)

S92—Fax Transmit Attenuation Level

S92 sets the transmit attenuation level from 0 to 15 dBm for the fax mode, resulting in a transmit level from 0 to -15 dBm. In some countries, the transmit level may not be changed.

Range: 0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level.)

Default: 10 (-10 dBm transmit level.)

S95—Extended Result Codes Control

A bit set to a 1 in this parameter, in conjunction with the W command, will enable the corresponding extended result code (see Section 3.5 and Table 3 16).

The +MR, +ER, and +DR settings also control S95 bits 2, 3, and 5, respectively. The more recent settings of +MR, +ER, and +DR, or host writing of S95 bits 2, 3, and 5, along with the W command setting, determine the corresponding actual result code reporting (see +MR, +ER, DR, and W commands).

Default: 0

Bit 0 CONNECT result code indicates DCE speed instead of DTE speed.

Bit 1 Append/ARQ to CONNECT XXXX result code in error-correction mode (XXXX = rate).

Bit 2 Enable +MCR: XXXX result code (XXXX = modulation) and +MRR: XXXX result code (XXXX = rate). (Also, see +MR.)

Bit 3 Enable +ER: XXXX result code (XXXX = protocol identifier).

Bit 4 Reserved

Bit 5 Enable +DR: XXXX result code (XXXX = compression type).

Bits 6-7 Reserved

S210—V.34 Symbol Rates

The bits in this parameter control V.34 symbols rates and enables/disables V.34 asymmetric rates. This parameter is used for diagnostic purpose only.

Default: 13 (0Dh) (00001101b)

Bits 0-2 Selects the range of allowed V.34 symbol rates.

21 0	**Symbol Rates (baud)**
00 0 =	2400 only
00 1 =	2400 only (no 2734)
01 0 =	2400, 2800
01 1 =	2400, 2800, 3000
10 0 =	2400, 2800, 3000, 3200
10 1 =	2400, 2800, 3000, 3200, 3429 (Default.)

Bit 3 Enable/disable V.34 asymmetric rates.

0= Disable asymmetric rates

1= Enable asymmetric rates (Default.)

Bits 4-7	Reserved

Examples

S210=13	Enable asymmetric rates with all symbol rates available (Default.).
S210=5	Disable asymmetric rates with all symbol rates available.
S210=8	Enable asymmetric rates with only 2400 baud available.
S210-11	Enable asymmetric rates with 2400 to 3000 baud available.

3.4 Cellular Commands

Cellular direct connect, supported by portable application modems, allows a direct interface to most cellular telephones eliminating the need for other intelligent interfaces.

Landline modems operate with the telephone system by either going off-hook detecting dial tone and the dialing the telephone number using pulses or DTMF digits, or detecting the RING signal and answering the call. Intelligent cellular phone interfaces connect between the modems RJ-11 socket and the cellular phone's data interface. The interface provides landline features to the modem (line current, dial tone, ringing, etc.), and translates the modem's signals (off-hook, DTMF digits, etc.) into signals that the cellular phone understands. Once connected the interface acts as a transparent link between the modem and the cellular telephone.

The Direct Connect Modem interfaces directly to the cellular phone's data interface and provides direct control over the cellular phones operation. For example if the user were to instruct the modem to dial using the ATDTnnnn command the modem would relay the telephone number and the SEND command to the cellular phone over the data interface.

The modem connects to the cellular phone using a special cable which must be purchased separately. A different cable is required for each cellular phone or make of cellular phones.

3.4.1 Cellular Phone Drivers

The data interface to cellular phones differs between manufacturers and models and requires a unique cellular phone driver for each phone or group of phones. Therefore the particular phone driver needs to be downloaded from the PC into the modem's RAM before the modem can be used directly with the cellular phone. If a driver is not loaded the modem will operate as a normal landline modem.

3.4.2 Cellular Commands

^C2—Download Cellular Phone Driver

The ^C2 command initiates the cellular phone driver download function. Upon receipt of the command, the modem issues the “OK” message. The user then performs an ASCII download of the driver (in .S37 format) from the host to the modem, typically using a communications software package (with transmit pacing turned off).

^C2 Download Cellular Phone command

Result Codes

OK In V.92 Mode (+MS=V.92)

[Download Process]

OK Cellular phone driver download completed successfully

ERROR Cellular phone driver download not completed successfully, for example, checksum of record (in S37 file) is not correct, driver size is larger than 2k bytes, or an invalid driver is downloaded, or modem is connected.

^I—Identify Cellular Phone Driver

The modem reports the identification of the loaded cellular phone driver in response to the ^I command. The response is dependent upon the driver.

Result Codes (Typical)

CELLULAR DRIVER: OKI 900/910

(c) Copyright 1999, Conexant Systems, Inc.

Version 1.00 Thu Jan 10:29:52 1998

OK

or

ERROR Cellular phone driver is not loaded

^T6—Indicate Status of Cellular Phone

The status of the cellular phone connected to the modem is reported in response to the ^T6 command. The status is reported in a single byte formatted as a decimal number. The individual status signals assigned to the status byte bits are:

Bit 0	1=	Cellular phone is receiving an incoming call
Bit 1	1=	Cellular phone is in use
Bit 2	1=	Cellular phone is locked (cannot be used)
Bit 3	1=	There is no service for cellular phone (does not indicate signal strength)
Bit 4	1=	Cellular phone is powered on

Bit 5	1=	Cellular driver is initialized
Bit 6	0=	Reserved (0)
Bit 7	1=	Cellular cable detected

Result Codes (Typical)

128 (Cellular cable detected)

OK

Application of ^T6 Status Byte

The information obtained by issuing a AT^T6 can be used to determine if the loading of the cellular phone driver is necessary by the host software. A download is not necessary if landline (or no cable) is connected to the modem, in which ^T6 will return a value of 0 (bit 7=0). A download is necessary when a cellular cable is detected (implied cellular phone is also connected), in which ^T6 will return a value of 128 (bit 7=1). Once a driver is downloaded to the modem, it will be able to operate in landline or cellular mode based on detection of a cellular cable.

3.4.3 Operation

Once the driver is loaded and the modem is connected to the cellular phone, and the phone is powered on dial/answer functions will be routed through the phone instead of the landline DAA, i.e., no special commands are needed to place or answer calls, the same AT commands and software packages that are used for landline communication sessions can be used. If the cellular phone is not connected or is powered off dial/answer functions will be routed through the landline DAA, and if V.42 bis connection is established the cellular phone driver will be purged so that the V.42 bis dictionaries can be increased to their normal size.

While the modem is being used with a cellular phone it will respond with normal result messages with the following differences in meaning:

NO DIAL TONE	Indicates that cellular service is not currently available.
RING	Indicates that the cellular phone is receiving an incoming call.

Modem Configuration

Modem performance will be improved by modification of your standard configuration; it is recommended that the landline modem also be EC compatible for reliable communications.

Cell Site	AT&F
Base Site	AT&F -SEC=1,18

MNP10-EC is automatically enabled on the cell side when a cellular phone driver is loaded and the modem firmware detects that the cellular phone is attached, also in the V.34 mode the modem is automatically configured to force the connection in V.32bis mode.

On the cell side the transmit level is defined in the cellular driver, therefore it is not necessary to set the level using the AT-SEC command.

In the V.34 mode, on the landline side, if MNP10-EC is disabled (AT-SEC=0), it will automatically be enabled if another V.34 modem is calling (V.8 bis/V.8 signal indicates cellular capability). No particular modulation will be chosen on the land line side. Therefore if a landside V.34 modem is NOT going to receive any calls from a V.32bis MNP10-EC modem it can be configured using AT&F -SEC=0,18, otherwise use the configuration above.

If MNP10-EC is enabled manually (using AT-SEC=1) no particular modulation will be chosen, therefore if the user wishes to force V.32bis modulation they should use the AT+MS=10,1,minspeed,maxspeed command (for example, AT+MS=10,1,4800,12000 would force V.32bis and limit the speed between 4800 and 12000 bps). To allow V.34 modulation use AT+MS=11,1,minspeed,maxspeed (for example, AT+MS=11,1,4800,19200 would allow V.34 speeds between 4800 and 19200).

When MNP10-EC is enabled in V.34 modes the symbol rate is limited to 3000, therefore the maximum speed would be 26.4K however the initial connect speed is limited to 21600.

If an AXCELL™ solution is used, a transmit level of -10dBm is required, therefore the following initialization string should be used:

Cell Site AT &F -SEC=1,10

It is recommended that systems be set up if possible with separate modems to receive calls from other land based modems and cellular modems. This is so that land based users that experience high network attenuation do not have connection problems when communicating to modems configured for cellular operation.

The above configurations are the minimum additional AT commands may be issued to change the result messages etc., AT&F is used to ensure that the modem is in a know state.

Table 3-15 summarizes the mode and resulting transmit levels for both modems depending on their configuration.

Fax Configuration

It is recommended that fax transmissions be configured to operate at 9600 bps in V.17 mode or 7200 bps in V.29 mode.

Cellular Phone Configuration

To achieve the best operational performance, a cellular data connection should be attempted in a location where adequate signal strength is observed for the cellular phone. This condition can be easily monitored on some phones with signal strength indicator. In locations where even voice calls are unreliable, data connections should not be attempted. Under some circumstances a special high gain antenna may improve performance.

Additional information regarding the use of the cellular phone and cellular network should be obtained from the service provider and or cellular phone manufacturer.

Table 3-15 Remote Modem Configuration and Resulting Transmit Levels

Remote Modem Configuration		Base Site Configuration (Connected to PSTN)			
		AT&F-SEC=0,x		AT&F-SEC=1,x	
		V.34	V.32bis	V.34	V.32bis
V.34 Direct Connect	AT&F	Mod = V.32bis Mode = -EC RTxlv = Driver BTxlv = x	Mod = V.32bis Mode = Single -EC RTxlv = Driver BTxlv = -10	Mod = V.32bis Mode = -EC RTxlv = Driver BTxlv = x	Mod = V.32bis Mode = -EC RTxlv = Driver BTxlv = x
	AT&F-SEC=1,x	Mod = V.34 Mode = -EC RTxlv = x BTxlv = x	Mod = V.32bis Mode = Single -EC RTxlv = x BTxlv = -10	Mod = V.34 Mode = -EC RTxlv = x BTxlv = x	Mod = V.32bis Mode = -EC RTxlv = x BTxlv = x
V.32bis Direct Connect	AT&F	Mod = V.32bis Mode = Single -EC RTxlv = Driver BTxlv = -10	Mod = V.32bis Mode = Single -EC RTxlv = Driver BTxlv = -10	Mod = V.32bis Mode = -EC RTxlv = Driver BTxlv = x	Mod = V.32bis Mode = -EC RTxlv = Driver BTxlv = x
	AT&F-SEC=1,x	Mod = V.32bis Mode = Single -EC RTxlv = x BTxlv = -10	Mod = V.32bis Mode = Single -EC RTxlv = x BTxlv = -10	Mod = V.32bis Mode = -EC RTxlv = x BTxlv = x	Mod = V.32bis Mode = -EC RTxlv = x BTxlv = x
V.34 PSTN	AT&F	Mod = V.34 Mode = non -EC RTxlv = -10 BTxlv = -10	Mod = V.32bis Mode = non -EC RTxlv = -10 BTxlv = -10	Mod = V.34 Mode = Single -EC RTxlv = -10 BTxlv = x	Mod = V.32bis Mode = Single -EC RTxlv = -10 BTxlv = x
V32bis PSTN	AT&F	Mod = V.32bis Mode = non -EC RTxlv = -10 BTxlv = -10	Mod = V.32bis Mode = non -EC RTxlv = -10 BTxlv = -10	Mod = V.32bis Mode = Single -EC RTxlv = -10 BTxlv = x	Mod = V.32bis Mode = Single -EC RTxlv = -10 BTxlv = x

Key:

Mod =	Modulation negotiated (V.32bis or V.34)
Mode =	-EC = Both ends in MNP10-EC mode Single -EC = one end in MNP10-EC mode non -EC = neither end in MNP10-EC mode
RTxlv =	Transmit level of Remote side modem in dBm
BTxlv =	Transmit level of Base side modem in dBm
x =	User defined transmit level
Driver =	Transmit level defined in cellular phone driver.

3.5 Result Codes

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes. The result codes that the modem can send are described in Table 3-16.

Two forms of each result code are available: long-form, an English-like “verbose” response, and short-form, a data-like numeric response (included in parentheses following the long-form). The long-form code is preceded and terminated by the sequence < CR> < LF>. The short-form is terminated by < CR>, only with no preceding sequence.

If result messages are suppressed, nothing is returned to the DTE. The long-form results codes can be modified by the OEM through the .INF file.

Table 3-16 Result Code Definitions

Code	Message	Meaning
+F4	+FCERROR	High speed fax data (V.27, V.29, V.33, OR V.27) is expected by a V.21 signal is received.
0	OK	A command line has been executed.
1	CONNECT	For X command values specifying no speed reporting, the modem has connected to the line and either the line speed is 300 bps and line speed is enabled, or the DTE speed is 300 bps and DTE speed reporting is enabled.
2	RING	An incoming ring signal is detected on the line. What qualifies as a ring signal is determined by country-dependent parameters. When cellular interface is selected, RING indicates that the cellular phone is receiving an receiving an incoming call.
3	NO CARRIER	Sent when attempting to establish a call if: 1. Ringback is detected and later ceases but no carrier is detected within the period of time determined by register S7, or 2. No ringback is detected within the period of time determined by register S7. Also sent when the modem auto-disconnects due to loss of carrier. For X0, sent for the following conditions: 1. If busy tone detection is enforced, busy or circuit busy has been detected. 2. If dial tone detection is enforced or selected, dial tone has not been detected.
4	ERROR	Sent during an attempt to execute a command line if any of the following conditions occur: 1. The command line contains a syntax error. 2. The modem cannot execute a command contained in the command line, i.e., the command does not exist or is not supported. 3. A command parameter within the command line is outside the permitted range. For X0, X1, X2, and X3, this message is sent instead of DELAYED and BLACKLISTED.
5	CONNECT 1200	The modem has connected to the line and either the line speed is 1200 bps and DCE speed reporting is enabled, or the DTE speed is 1200 bps and DTE speed reporting is enabled.

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
6	NO DIAL TONE	For X2 and X4, the modem has been instructed to wait for dial tone during dialing but none is received. When cellular phone interface is selected, indicates that cellular service is not currently available.
7	BUSY	For X3 and X4, if busy tone detection is enforced, the busy (engaged) signal is detected on the line when the modem is attempting to originate a call.
8	NO ANSWER	The modem is attempting to originate a call if a continuous ringback signal is detected on the line until the expiration of the timer S7.
9	CONNECT 600	The modem has connected to the line, the DTE speed is 600 bps, and DTE speed reporting is enabled.
10	CONNECT 2400	The modem has connected to the line and either the line speed is 2400 bps and DCE speed reporting is enabled, or the DTE speed is 2400 bps and DTE speed reporting is enabled.
11	CONNECT 4800	The modem has connected to the line and either the line speed is 4800 bps and DCE speed reporting is enabled, or the DTE speed is 4800 bps and DTE speed reporting is enabled.
12	CONNECT 96000	The modem has connected to the line and either the line speed is 9600 bps and DCE speed reporting is enabled, or the DTE speed is 9600 bps and DTE speed reporting is enabled.
13	CONNECT 7200	The modem has connected to the line at 7200 bps and DCE speed reporting is enabled.
14	CONNECT 12000	The modem has connected to the line at 12000 bps and DCE speed reporting is enabled.
15	CONNECT 14400	The modem has connected to the line at 14400 bps and DCE speed reporting is enabled.
16	CONNECT 19200	The modem has connected to the line and either the line speed is 19200 bps and DCE speed reporting is enabled, or the DTE speed is 19200 bps and DTE speed reporting is enabled.
17	CONNECT 38400	The modem has connected to the line, the DTE speed is 38400 bps, and DTE speed reporting is enabled.
18	CONNECT 57600	The modem has connected to the line, the DTE speed is 57600 bps, and DTE speed reporting is enabled.
19	CONNECT 115200	The modem has connected to the line, the DTE speed is 115200 bps, and DTE speed reporting is enabled.
22	CONNECT 75TX/1200RX	The modem has established a V.23 originate connection and line speed reporting is enabled.
23	CONNECT 1200TX/74RX	The modem has established a V.23 answer connection and line speed reporting is enabled.
24	DELAYED	For X4, sent when a call fails to connect and the number dialed is considered 'delayed' due to country blacklisting requirements.
32	BLACKLISTED	For X4, sent when a call fails to connect and the number dialed is considered 'blacklisted'.

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
33	FAX	A fax modem connection is established in a facsimile mode.
35	DATA	A data modem connection is established in a facsimile mode.
40	+MRR: 300	The modem has connected to the line at 300 bps and carrier reporting is enabled. (See S95 and Xn.)
44	+MRR: 1200/75	The V.23 backward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
45	+MRR: 75/1200	The V.23 forward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
46	+MRR: 1200	The modem has connected to the line at 1200 bps and carrier reporting is enabled. (See S95 and Xn.)
47	+MRR: 2400	The modem has connected to the line at 2400 bps and carrier reporting is enabled. (See S95 and Xn.)
48	+MRR: 4800	The modem has connected to the line at 4800 bps and carrier reporting is enabled. (See S95 and Xn.)
49	+MRR: 7200	The modem has connected to the line at 7200 bps and carrier reporting is enabled. (See S95 and Xn.)
50	+MRR: 9600	The modem has connected to the line at 9600 bps and carrier reporting is enabled. (See S95 and Xn.)
51	+MRR: 12000	The modem has connected to the line at 12000 bps and carrier reporting is enabled. (See S95 and Xn.)
52	+MRR: 14400	The modem has connected to the line at 14400 bps and carrier reporting is enabled. (See S95 and Xn.)
53	+MRR: 16800	The modem has connected to the line at 16800 bps and carrier reporting is enabled. (See S95 and Xn.)
54	+MRR: 19200	The modem has connected to the line at 19200 bps and carrier reporting is enabled. (See S95 and Xn.)
55	+MRR: 21600	The modem has connected to the line at 21600 bps and carrier reporting is enabled. (See S95 and Xn.)
56	+MRR: 24000	The modem has connected to the line at 24000 bps and carrier reporting is enabled. (See S95 and Xn.)
57	+MRR: 26400	The modem has connected to the line at 26400 bps and carrier reporting is enabled. (See S95 and Xn.)
58	+MRR: 28800	The modem has connected to the line at 28800 bps and carrier reporting is enabled. (See S95 and Xn.)
59	CONNECT 16800	The modem has connected to the line, the DTE speed is 16800 bps and DTE speed reporting is enabled.
61	CONNECT 21600	The modem has connected to the line, the DTE speed is 21600 bps and DTE speed reporting is enabled.
62	CONNECT 24000	The modem has connected to the line, the DTE speed is 24000 bps and DTE speed reporting is enabled.
63	CONNECT 26400	The modem has connected to the line, the DTE speed is 26400 bps and DTE speed reporting is enabled.

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
64	CONNECT 28800	The modem has connected to the line and either the line speed is 28800 bps and DCE speed reporting is enabled, or the DTE speed is 28800 bps and DTE speed reporting is enabled.
66	+DR: ALT	The modem has connected to the line in MNP Class 5 and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
67	+DR: V.42B	The modem has connected to the line in V.42 bis and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
69	+DR: NONE	The modem has connected to the line without data compression and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
70	+ER: NONE	The modem has connected to the line without any form of error correction and the +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
77	+ER: LAPM	The modem has connected to the line in V.42 LAPM error correction mode and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
78	+MRR: 31200	The modem has connected to the line at 31200 bps and carrier reporting is enabled. (See S95 and Xn.)
79	+MRR: 33600	The modem has connected to the line at 33600 bps and carrier reporting is enabled. (See S95 and Xn.)
80	+ER: ALT	Sent when the modem has connected in the MNP mode of error correction, and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
81	+ER: ALT-CELLULAR	The modem has connected in the MNP 10 mode and cellular power level adjustment is enabled (“)M1 or)M2”).(See S95, Wn, and Xn.)
83	LINE-IN-USE	The modem attempted to go off-hook when an extension was already occupying the line.
84	CONNECT 33600	The modem has connected to the line, the DTE speed is 33600 bps and the DTE speed reporting is enabled.
91	CONNECT 31200	The modem has connected to the line DTE speed is 31200 bps and the modem is to report the DTE speed upon connecting.
134	+MCR: B103	The modem has connected to the line with Bell 103 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
135	+MCR: B212	The modem has connected to the line with Bell 212 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
136	+MCR: V21	The modem has connected to the line with ITU-T V.21 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
137	+MCR: V22	The modem has connected to the line with ITU-T V.22 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
138	+MCR: V22B	The modem has connected to the line with ITU-T V.22 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
139	+MCR: V23	The modem has connected to the line with ITU-T V.23 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
140	+MCR: V32	The modem has connected to the line with ITU-T V.32 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
141	+MCR: V32B	The modem has connected to the line with ITU-T V.32 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
142	+MCR: V34	The modem has connected to the line with ITU-T V.34 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
144	+MCR: K56	The modem has connected to the line with K56flex modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
145	+MCR: V90	The modem has connected to the line with ITU-T V.90 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
150	+MRR: 32000	The modem has connected to the line at 32000 bps and carrier reporting is enabled. (See S95 and Xn.)
151	+MRR: 34000	The modem has connected to the line at 34000 bps and carrier reporting is enabled. (See S95 and Xn.)
152	+MRR: 36000	The modem has connected to the line at 36000 bps and carrier reporting is enabled. (See S95 and Xn.)
153	+MRR: 38000	The modem has connected to the line at 38000 bps and carrier reporting is enabled. (See S95 and Xn.)
154	+MRR: 40000	The modem has connected to the line at 40000 bps and carrier reporting is enabled. (See S95 and Xn.)
155	+MRR: 42000	The modem has connected to the line at 42000 bps and carrier reporting is enabled. (See S95 and Xn.)
156	+MRR: 44000	The modem has connected to the line at 44000 bps and carrier reporting is enabled. (See S95 and Xn.)
157	+MRR: 46000	The modem has connected to the line at 46000 bps and carrier reporting is enabled. (See S95 and Xn.)
158	+MRR: 48000	The modem has connected to the line at 48000 bps and carrier reporting is enabled. (See S95 and Xn.)
159	+MRR: 50000	The modem has connected to the line at 50000 bps and carrier reporting is enabled. (See S95 and Xn.)
160	+MRR: 52000	The modem has connected to the line at 52000 bps and carrier reporting is enabled. (See S95 and Xn.)
161	+MRR: 54000	The modem has connected to the line at 54000 bps and carrier reporting is enabled. (See S95 and Xn.)
162	+MRR: 56000	The modem has connected to the line at 56000 bps and carrier reporting is enabled. (See S95 and Xn.)
165	CONNECT 32000	The modem has connected to the line at 32000 bps and DCE speed reporting is enabled.
166	CONNECT 34000	The modem has connected to the line at 34000 bps and DCE speed reporting is enabled.
167	CONNECT 36000	The modem has connected to the line at 36000 bps and DCE speed reporting is enabled.
168	CONNECT 38000	The modem has connected to the line at 38000 bps and DCE speed reporting is enabled.

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
169	CONNECT 40000	The modem has connected to the line at 40000 bps and DCE speed reporting is enabled.
170	CONNECT 42000	The modem has connected to the line at 42000 bps and DCE speed reporting is enabled.
171	CONNECT 44000	The modem has connected to the line at 44000 bps and DCE speed reporting is enabled.
172	CONNECT 46000	The modem has connected to the line at 46000 bps and DCE speed reporting is enabled.
173	CONNECT 48000	The modem has connected to the line at 48000 bps and DCE speed reporting is enabled.
174	CONNECT 50000	The modem has connected to the line at 50000 bps and DCE speed reporting is enabled.
175	CONNECT 54000	The modem has connected to the line at 52000 bps and DCE speed reporting is enabled.
176	CONNECT 54000	The modem has connected to the line at 54000 bps and DCE speed reporting is enabled.
177	CONNECT 56000	The modem has connected to the line at 56000 bps and DCE speed reporting is enabled.
178	CONNECT 230400	The modem has connected to the line, the DTE speed is 230400 bps, and DTE speed reporting is enabled.
180	CONNECT 28000	The modem has connected to the line at 28000 bps and DCE SPEED reporting is enabled.
181	CONNECT 29333	The modem has connected to the line at 29333 bps and DCE SPEED reporting is enabled.
182	CONNECT 30667	The modem has connected to the line at 30667 bps and DCE SPEED reporting is enabled.
183	CONNECT 33333	The modem has connected to the line at 33333 bps and DCE SPEED reporting is enabled.
184	CONNECT 34667	The modem has connected to the line at 34667 bps and DCE SPEED reporting is enabled.
185	CONNECT 37333	The modem has connected to the line at 37333 bps and DCE SPEED reporting is enabled.
186	CONNECT 38667	The modem has connected to the line at 38667 bps and DCE SPEED reporting is enabled.
187	CONNECT 41333	The modem has connected to the line at 41333 bps and DCE SPEED reporting is enabled.
188	CONNECT 42667	The modem has connected to the line at 42667 bps and DCE SPEED reporting is enabled.
189	CONNECT 45333	The modem has connected to the line at 45333 bps and DCE SPEED reporting is enabled.
190	CONNECT 46667	The modem has connected to the line at 46667 bps and DCE SPEED reporting is enabled.

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
191	CONNECT 49333	The modem has connected to the line at 49333 bps and DCE SPEED reporting is enabled.
192	CONNECT 50667	The modem has connected to the line at 50667 bps and DCE SPEED reporting is enabled.
193	CONNECT 53333	The modem has connected to the line at 53333 bps and DCE SPEED reporting is enabled.
194	CONNECT 54667	The modem has connected to the line at 54667 bps and DCE SPEED reporting is enabled.
195	+MRR: 28000	The modem has connected to the line at 28000 bps and carrier reporting is enabled. (See S95 and Xn.)
196	+MRR: 29333	The modem has connected to the line at 29333 bps and carrier reporting is enabled. (See S95 and Xn.)
197	+MRR: 30667	The modem has connected to the line at 30667 bps and carrier reporting is enabled. (See S95 and Xn.)
198	+MRR: 33333	The modem has connected to the line at 33333 bps and carrier reporting is enabled. (See S95 and Xn.)
199	+MRR: 34667	The modem has connected to the line at 34667 bps and carrier reporting is enabled. (See S95 and Xn.)
200	+MRR: 37333	The modem has connected to the line at 37333 bps and carrier reporting is enabled. (See S95 and Xn.)
201	+MRR: 38667	The modem has connected to the line at 38667 bps and carrier reporting is enabled. (See S95 and Xn.)
202	+MRR: 41333	The modem has connected to the line at 41333 bps and carrier reporting is enabled. (See S95 and Xn.)
203	+MRR: 42667	The modem has connected to the line at 42667 bps and carrier reporting is enabled. (See S95 and Xn.)
204	+MRR: 45333	The modem has connected to the line at 45333 bps and carrier reporting is enabled. (See S95 and Xn.)
205	+MRR: 46667	The modem has connected to the line at 46667 bps and carrier reporting is enabled. (See S95 and Xn.)
206	+MRR: 49333	The modem has connected to the line at 49333 bps and carrier reporting is enabled. (See S95 and Xn.)
207	+MRR: 50667	The modem has connected to the line at 50667 bps and carrier reporting is enabled. (See S95 and Xn.)
208	+MRR: 53333	The modem has connected to the line at 53333 bps and carrier reporting is enabled. (See S95 and Xn.)

Table 3-16 Result Code Definitions (continued)

Code	Message	Meaning
209	+MRR: 54667	The modem has connected to the line at 54667 bps and carrier reporting is enabled. (See S95 and Xn.)

Note

1. See Vn for result code selection, i.e., short form (result code) or verbose/extended (result message).
2. See Wn for extended connect message control.
3. See S95 for extended result code enabling options (which override some Wn commands).
4. See Xn for extended result code subset enabling options.
5. See \Vn for single line connect message enable options.
6. See +MR for modulation reporting control.