SocketModem®

SocketModem®MT5600SMI
SocketModem®MT5656SMI

AT Commands
Fax Commands
Voice Commands

Reference Guide

MultiTech®
Systems

SocketModem® Reference Guide
MT5600SMI and MT5656SMI
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Revisions

Revision Level	Date	Description
A	09/04/03	First release.
B	06/04/04	Created a separate Universal Socket Hardware guide and a separate AT Command Reference Guide.
C	01/12/06	Added a chapter that covers setting country/regional codes. Clarified the default for Command B and S-Register S27 (bit 6).

Patents

This device covered by one or more of the following patents: 6,219,708; 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; 5,355,365; 5,309,562; 5,301,274
Other Patents Pending.

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

Introduction

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

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

To send AT commands to the modem, you must use a communications program, such as the HyperTerminal applet in Windows 98 and NT 4.0, or some other available terminal program. You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem, e.g., to turn autoanswer on or off.

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

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

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

Escape Code Sequence – +++

When the modem has established a connection and has entered online data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an online command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by S-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.

Data Commands

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description.

Generic Modem Control Commands

Command:	**Z**	**Soft Reset and Restore Profile**
Description:		Causes the modem to perform a soft reset and restore (recall) the configuration profile. If no value is specified, zero is assumed.
Default:		None
Values:		Number corresponding to the selected profile:
		Z0 Soft reset and restore stored profile 0.
		Z1 Soft reset and restores stored profile 1.
Result Codes:		OK
		Otherwise ERROR

Command:	**+FCLASS**	**Select Active Service Class**
Description:		Selects the active service class (mode).
Default:		0
Defined Values:		+FCLASS=0 Select Data Mode (Default).
		+FCLASS=1 Select Facsimile Class 1 Mode.
		+FCLASS=1.0 Select Facsimile Class 1.0 Mode.
		+FCLASS =2 Fax Service Class 2
		+FCLASS=2.0 Fax Service Class 2.0
		+FCLASS=2.1 Fax Service Class 2.1
		+FCLASS=8 Select Voice Mode.
		+FCLASS=10 Reserved.
		Note: Fax Class 2 and Voice Mode apply to MT5656SMI only
Result Codes:		OK
		Otherwise ERROR
Report Commands:		+FCLASS? Reports Current or Selected Values
		+FCLASS=? Reports Range of Parameters

Command:	**+VCID**	**Caller ID (CID)**
Description:		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. (U.S. only)
Default:		0
Defined Values:		+VCID0 Disable Caller ID reporting.
		+VCID1 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).
		+VCID2 Enables Caller ID with unformatted presentation to the DTE.
Report Commands:		+VCID? Reports the Mode
		+VCID=? Reports Range of Parameters

Command: +VRID	**Report Retrieved Caller ID (CID)**
Description:	Reports the data associated with the Caller ID services in the Incoming Caller Line (ICLID) data format for the last received call. U.S. only
Default:	None
Defined Values:	+VRID0 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).
	+VRID1 Reports Caller ID with unformatted presentation to the DTE.
Report Commands:	+VRID? Reports the Mode

Command: \N	**Operating Mode - Error Correction**
Description:	Controls the preferred error-correcting mode to be negotiated in a subsequent data connection. This command is affected by the OEM firmware configuration.
Default:	5
Defined Values:	\N0 Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.)
	\N1 Serial interface selected: Selects direct mode and is equivalent to &M0, Q0 mode of operation. (Forces &Q0.) Parallel interface selected: Same as \N0.
	\N2 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.)
	\N3 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.)
	\N4 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.
	\N5 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
	Otherwise ERROR

Command I	**Identification**
Description:	Causes the modem to reports the requested result according to the command parameter.
Default:	None
Defined Values:	I0 Reports product code (e.g., 56000).
	I1 Reports the least significant byte of the stored checksum (e.g., *12AB*).
	I2 Checks ROM and verifies the checksum. Reports OK or ERROR.
	I3 Reports ROM Code Revision-Modulation (e.g., 2109-V90).
	I4 Reports OEM defined identifier string in binary format (default) or ASCII formats. (e.g.: a007040284C6002F bC60000000 r1005111151012000 3000111170000000).
	I5 Reports Country Code parameter (see +GCI).
	I6 Reports modem data pump model and internal code revision.
Result Codes:	OK
	Otherwise ERROR

Command: +GMI **Request Manufacturer Identification**
Description: Causes the modem to report the modem product manufacturer.
Typical Response: +GMI: Multi-Tech
OK

Command +GMM **Request Model Identification**
Description: Causes the modem to report the modem product.
Typical Response: +GMM: V92

Command: +GMR **Request Revision Identification**
Description: Causes the modem to report the modem version, revision level, or date.
This is the same as the I3 command.
Typical Response: +GMR: P2109-V90
OK

Command: +GCAP **Request Complete Capabilities List**
Description: 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.
Example Responses: +GCAP: +FCLASS, +MS, +ES, +DS, for a data modem that supports all
capabilities listed. Where:
+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). Manual

Command: +GCI **Country/Region of Installation**
Description: This extended syntax command selects and indicates the country or region
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. The chapter *Setting Country Codes* for more
information.
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).
Report Commands: +GCI?   Reports the current country code.
+GCI=?   Displays the list of available country codes.

Command: &F **Restore Factory Configuration (Profile)**
Description: 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.
Default: None
Values: &F0   Restore factory configuration 0.
&F1   Restore factory configuration 1.
Result Codes: OK
ERROR if the modem is connected.

Command:	&T	**Local Analog Loopback Test**
Description:		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), e.g., AT&Q6. To terminate the test in progress, the escape sequence must be entered first.
Default:		None
Defined Values:		&T0 Terminates test in progress. Clears S16.
		&T1 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.

Command:	&Y	**Designate a Default Reset Profile**
Description:		Selects which user profile will be used after a hard reset.
Default:		None
Defined Values:		&Y0 The modem will use profile 0.
		&Y1 The modem will use profile 1.
Result Codes:		OK
		ERROR if <value> > is1 or if NVRAM is not installed or is not operational.

Command:	&W	**Store Current Configuration**
Description:		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 **Z** command or at power up (see **&Y** command).
Default:		0
Defined Values:		&W0 Store the current configuration as profile 0.
		&W1 Store the current configuration as profile 1.
Result Codes:		OK
		Otherwise ERROR

Command	&Z*n*=*x*	**Store Telephone Number**
Description:		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.)
Default:		None
Defined Values:		<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.

Command	%7	**Plug and Play Serial Number**
Description:		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.
Example:		%7<8 hex numbers><same 8 hex numbers>
Result Codes:		OK <8 hex numbers><same 8 hex numbers>
		Otherwise ERROR
Report Command:		AT"? Reports the stored serial number, issue.

Command   %8   Plug and Play Vendor ID and Product Number
Description: 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.
Default: None
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>
                            Otherwise ERROR

Command   **   Load Flash Memory
Description: 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 (e.g., 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 (e.g., 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 (e.g., 206s4712.S37) from the host computer to the modem RAM using 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.

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

Table 1-1. 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
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 (e.g., 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.

DTE-Modem Interface Commands

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

Command: E	**Command Echo**
Description:	The modem enables or disables the echo of characters to the DTE. The parameter value, if valid, is written to S14 bit 1.
Default:	1
Defined Values:	E0 Disables command echo.
	E1 Enables command echo.
Result Codes:	OK
	Otherwise ERROR

Command: Q	**Quiet Result Code Control**
Description:	Enables or disables the sending of result codes to the DTE. The parameter value, if valid, is written to S14 bit 2.
Default:	0
Defined Values:	Q0 Enables result codes to the DTE.
	Q1 Disables result codes to the DTE.
Result Codes:	OK
	Otherwise ERROR

Command: V	**Result Code Form**
Description:	Selects the sending of short-form or long-form result codes to the DTE. The parameter, if valid, is written to S14 bit 3.
Default:	1
Defined Values:	V0 Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.
	V1 Enables long-form (verbose) result codes.
Result Codes:	OK
	Otherwise ERROR

Command: W	**Connect Message Control**
Description:	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. 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.
Default:	0
Defined Values:	W0 Upon connection, the modem reports only the DTE speed (e.g., CONNECT 19200). Subsequent responses are disabled.
	W1 Upon connection, the modem reports the modulation, line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.
	W2 Upon connection, the modem reports the DCE speed (e.g., CONNECT 14400). Subsequent responses are disabled.
Result Codes:	OK
	Otherwise ERROR

Command: X   **Extended Result Codes**

Description: 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.

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. See the table of Result Codes at the end of this chapter.

Default: 4
Defined Values: X0   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.

X1   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.

X2   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 01b is written to S22 bits 6, 5, and 4, respectively.

X3   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.

X4   Enables reporting of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively.

Result Codes: OK
                        Otherwise ERROR

Command:	&C	**RLSD (DCD) Option**
Description:		The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5.
Default:		1
Defined Values:		&C0 RLSD remains ON at all times.
		&C1 RLSD follows the state of the carrier.
Result Codes:		OK
		Otherwise ERROR

Command:	&D	**DTR (Data Terminal Ready) Option**
Description:		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.
Default:		2
Defined Values:		&D0 DTR drop is interpreted according to the current &Q 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.

  &D1   DTR drop is interpreted according to the current &Q 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 causes the modem to hang up Auto-answer is inhibited.

  &D2   DTR drop is interpreted according to the current &Q setting as follows:

      &Q0 through &Q6 drop caused the modem to hang up. Auto-answer is inhibited.

  &D3   DTR drop is interpreted according to the current &Q 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.

Command:	&K	**Flow Control**
Description:		Defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.
Default:		3 (for data modem modes)
Defined Values:		0 Disables flow control.
		3 Enables RTS/CTS flow control.
		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
		Otherwise ERROR

Command: &R   **RTS/CTS (Request to Send/Clear to Send) Option**

Description: 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.

Default: None

Defined Values: &R0   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.

&R1   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
                            Otherwise ERROR

Command: &S   **DSR (Data Set Ready) Override**

Description: Selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.

Default: 0

Defined Values: &S0   DSR will remain ON at all times.

&S1   DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

Result Codes: OK
                            Otherwise ERROR

Command: +IPR   **Fixed DTE (Data Terminal Equipment) Rate**

Description: 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.

Default: None

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.

Report Commands: +IPR?   Reports current rates
                            +IPR=?   Reports current range   Example: +IPR: (0,300,1200,2400,4800,9600,19200,38400,57600,115200, 230400)

Command: +IFC   DTE-Modem Local Flow Control

Description: 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.

Default: 2

Defined Values: **Values defined by \<modem_by_DTE\>** Specifies the method to be used by the DTE to control the flow of received data from the modem.
+IFC0   None
+IFC1   XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.
+IFC2   Circuit 133 (Ready for Receiving).
+IFC3   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.

Values defined by \<DTE_by_modem\> Specifies the method to be used by the modem to control the flow of transmitted data from the DTE.
+IFC0   None.
+IFC1   XON/XOFF on received data.
+IFC2   CTS/RTS.

Report Commands: +IFC?   Reports the current or selected values
Response: +IFC: \<modem_by_DTE\>,\<DTE_by_modem\>
Example: +IFC: 2,2 For the defaults.
+IFC=?   Reports the supported range of parameter values
Response: +IFC: (\<modem_by_DTE\> range),(\<DTE_by_modem\> range)
Example: +IFC: (0-3),(0-2).

Command: +ILRR   DTE-Modem Local Rate Reporting

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

Default: 0

Defined Values: +ILRR0   Disables reporting of local port rate (+ILRR: is not transmitted).
+ILRR1   Enables reporting of local port rate (+ILRR: is transmitted).

Report Commands: +ILRR?   Reports current value
+ILRR=? Reports supported range of parameter values

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 (e.g., 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).

Call Control Commands

Command: **D**   **Dial**

Description: 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.

Defined Values: Character string <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 Dialing is used in the dialed numbers that follow until a **T** command is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.

T   Select tone dialing: Tone Dialing is used in the dialed 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.

Command: T   **Set Tone Dial Default**

Description: 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 Code: OK

Command: P   **Set Pulse Dial Default**

Description: 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 (e.g., 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 Code: OK

Command: A   **Answer**

Description: 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.)

Command: H   **Disconnect (Hang-Up)**

Description: Initiates a hang up sequence. This command may not be available for some countries due to PTT restrictions.

Default: None

Defined Values: H0   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.

H1   If on-hook, the modem will go off-hook and enter command mode. For US models, the modem will remain off-hook. For global models, the modem will return on-hook after a period of time determined by S7.

Result Codes: OK
                      Otherwise ERROR

Command: O   **Return to Online Data Mode**

Description: Determines how the modem will enter the online data mode. If in the online command mode, the modem enters the online data mode with or without a retrain. If in the off-line command mode (no connection), the modem reports ERROR.

Default: None

Defined Values: O0   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 (+++).

O1   Enters on-line data mode with a retrain before returning to on-line data mode.

O2   Fast retrain without speed change (used for diagnostic purpose only).

O3   Renegotiate rate without speed change (used for diagnostic purpose only.

O4   Renegotiate rate down one speed (used for diagnostic purpose only).

O5   Renegotiate rate up one speed (used for diagnostic purpose only).

Result Codes: OK
                      Otherwise ERROR (or if not connected)

Command:	**L**	**Speaker Volume**
Description:		Sets the speaker volume control. The parameter value, if valid, is written to S22 bits 0 and 1.
Default:		1
Defined Values:		L0 Low volume.
		L1 Low volume. (Default.)
		L2 Medium volume.
		L3 High volume.
Result Codes:		OK
		Otherwise ERROR

Command:	**M**	**Speaker Control**
Description:		Selects when the speaker will be on or off. The parameter value, if valid, is written to S22 bits 2 and 3.
Default:		1
Defined Values:		M0 Speaker is always off.
		M1 Speaker is on during call establishment, but off when receiving carrier. (Default.)
		M2 Speaker is always on.
		M3 Speaker is off when receiving carrier and during dialing, but on during answering.
Result Codes:		OK
		Otherwise ERROR

Command:	**&G**	**Select Guard Tone**
Description:		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.
		This command may not be permitted in some countries.
Default:		0
Defined Values:		&G0 Disables guard tone. (Default.)
		&G1 Disables guard tone.
		&G2 Selects 1800 Hz guard tone.
Result Codes:		<value> = 0 to 2
		Otherwise ERROR

Command:	**&P**	**Select Pulse Dial Make/Break Ratio**
Description:		Determines the make/break ratio used during pulse dialing. The default is country-dependent. The parameter value, if valid, is written to S28 bits 3 and 4.
Default:		0
Defined Values:		&P0 Selects 39%-61% make/break ratio at 10 pulses per second.
		&P1 Selects 33%-67% make/break ratio at 10 pulses per second.
		&P2 Selects 39%-61% make/break ratio at 20 pulses per second.
		&P3 Selects 33%-67% make/break ratio at 20 pulses per second.
Result Codes:		OK
		Otherwise ERROR

Command: &V   **Display Current Configuration and Stored Profiles**

Description: 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 Code: 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.

Command: &V1   Display Last Connection Statistics
Description: 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
PROTOCOL	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, e.g., 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 = 56K)
Second byte: Octet 14 (Licensee code: 81 = Conexant)
Third byte: Octet 15 (manufacturer's product capabilities)
Fourth byte: Octet 16 (56K 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/µ-Law
0 = Forced A-Law/µ-Law.
1 = Not forced A-Law/µ-Law.
Bit 5   Select A-Law or µ-Law
0 = Select A-Law.
1 = Select µ-Law.
Bit 4:0 Controller version

Command: \V   **Single Line Connect Message Enable**

Description: Enables or disables the single-line connect message format as follows:

Default: None

Defined Values: \V0   Connect messages are controlled by the command settings X, W, and S95.

                               \V1   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, e.g., 57600.
Modulation =	"V92" for V.92 modulation.
	"V90" for V.90 modulation.
	"K56" for 56K 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", e.g., /1200 TX/75 RX.
	Symmetric rates are displayed as a single DCE rate, e.g., 14400.

Command: %L   **Report Line Signal Level**

Description: 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

Command: %Q   **Report Line Signal Quality**

Description: 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.

Command: –STE=   Set Telephony Extension
Description: Enables/disables Line-In-Use, Extension Pickup, and Remote Hangup
                                detection features.
                                Note: Additional hardware may be required to support these features.
Defined Values: The <value> corresponds 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

Report Commands: -STE? Reports current values
                                Example: -STE: 4 Remote Hangup enabled, Extension
                                        Pickup disabled, and Line-In-Use disabled.
                                -STE=?   Reports available options

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, and 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>I 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, and 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.

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 remote modem goes on-hook
    AT-STE=4
    ATDT555-1212
    CONNECT
    NO CARRIER   Remote modem drops line
    ATS86=?
    025

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+VLS=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 phone
CONNECT

Modulation Control Commands

Command: **+MS** **Modulation Selection**

Description: 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 1-3.

Table 1-3. +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
56K	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
V.92 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 that 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 1-3.

<automode>   A numeric value which enables or disables automatic modulation negotiation (ITU-T V.32*bis* 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 1-3. 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 1-3.

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.).

Report Commands:	+MS?	Reports current rates

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.

+MS=? Reports supported range of parameter values:

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 Code: OK - Valid subparameter string
Otherwise ERROR

Command: +MR   **Modulation Reporting Control**

Description: 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 (e.g., 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).

Default: 0
Defined Values: +MR0   Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted).
                         +MR1   Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with TX rate, RX rate).
                         +MR2   Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with RX rate only).
Report Commands: +MR?   Reports the current value.
                         +MR=? Reports supported range of parameter values.
                         +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
                                    V90   For V.90
                                    K56   For K56flex
                         +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

Command: %E	**Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward**
Description:	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.
	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.32bis 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.
Default:	2
Defined Values:	%E0 Disable line quality monitor and auto-retrain. %E1 Enable line quality monitor and auto-retrain. %E2 Enable line quality monitor and fallback/fall forward. (Default.)
Result Codes:	OK Otherwise ERROR

Command: %U	**Select µ-Law or A-Law Codec Type**
Description:	Selects µ-Law or A-Law codec type for V.90 and 56K modulation. This command also stores the selected setting directly to NVRAM.
Default:	Default value is country specific
Defined Values:	0 Selects µ-Law. 1 Selects A-Law.
Result Codes:	OK Otherwise ERROR

Command: B	**Communication Standard Setting – CCITT or Bell**
Description:	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.
Default:	B0 (default for MT5600SMI) B1 (default for MT5656SMI)
Defined Values:	B0 Selects CCITT operation at 300 or 1200 bps during Call Establishment and a subsequent connection. (Default.) B1 Selects BELL operation at 300 or 1200 bps during Call Establishment and a subsequent connection.
Result Codes:	OK Otherwise ERROR

Error Control Commands

Command: +ES   **Error Control and Synchronous Mode Selection**
Description: 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; optionally specifies the acceptable fallback mode of operation when the modem is operating as the answerer. Accepts three numeric subparameters.
Default: Varies by request
Defined Values: **<orig_rqst>**
Decimal number specifies the initial requested mode of operation when the modem is operating as the originator. The options are:
+ES0   Initiate call with Direct Mode.
+ES1   Initiate call with Normal Mode (referred to as Buffered Mode) only.
+ES2   Initiate V.42 without Detection Phase. If V.8 is in use, disable V.42 Detection Phase.
+ES3   Initiate V.42 with Detection Phase. **(Default.)**
+ES4   Initiate MNP.
+ES6   Initiate V.80 Synchronous Access Mode when connection is completed and Data State is entered. (See +ESA and +ITF.)
+ES7   Initiate Frame Tunneling Mode when connection is complete and Data Mode is entered.

<orig_fbk>
Decimal number specifies the acceptable fallback mode of operation when the modem is operating as the originator.
+ES0   LAPM, MNP, or Normal Mode error control optional. **(Default.)**
+ES1   LAPM, MNP, or Direct Mode error control optional.
+ES2   LAPM or MNP error control required; disconnect if error control is not established.
+ES3   LAPM error control required; disconnect if error control is not established.
+ES4   MNP error control required; disconnect if error control is not established.

<ans_fbk>
Decimal number specifies the acceptable fallback mode of operation when the modem is operating as the answerer or specifies V.80 Synchronous Access Mode.
+ES0   Direct Mode.
+ES1   Error control disabled, use Normal Mode.
+ES2   LAPM, MNP, or Normal Mode error control optional. (Default.)
+ES3   LAPM, MNP, or Direct Mode error control optional.
+ES4   LAPM or MNP error control required; disconnect if error control is not established.
+ES5   LAPM error control required; disconnect if error control is not established.
+ES6   MNP error control required; disconnect if error control is not established.
+ES8   Initiate V.80 Synchronous Access Mode when connection is completed and Data State is entered (see +ESA and +ITF).
+ES9   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.

	+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.
Report Commands:	+ES?	Reports the current values
		Response: +ES: <orig_rqst>,<orig_fbk>,<ans_fbk>
		Example: +ES: 3,0,2 For the default setting.
	+ES=?	Reports supported range of parameter values
		Response: +ES: (<orig_rqst> range),(<orig_fbk> range), (<ans_fbk> range)
		Example: +ES: (0-4,6,7),(0-4),(0-6,8,9)

Command: +EB   **Break Handling in Error Control Operation**

Description:		This extended-format compound parameter controls the break handling in V.42 operation. It accepts three numeric subparameters:
Default:		None
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.
Report Commands:	+EB?	Reports current or selected values
		Response: +EB:
		<break_selection>,<timed>,<default_length><CR>
		Example: +EB: 0,0,0 For default settings.
	+EB=?	Reports supported range of parameter values
		Response: +EB: (<break_selection> range),(<timed> range), (default_length> range)
		Example: +EB: (0),(0),(0)

Command: +ESR   **Selective Reject**

Description:		This extended-format numeric parameter controls the use of the selective reject (SREJ) option in V.42.
		Decimal number 0 specifying that SREJ is not used.
Report Commands:	+ESR?	Reports Current or Selected Values:
		Response: +ESR: <value>
		Example: +ESR: 0 For default setting
	+ESR=?	Reports Supported Range of Parameter Values
		Response: +ESR: (<value>)
		Example: +ESR: (0)

Command: +EFCS   **32-bit Frame Check Sequence**

Description:		This extended-format numeric parameter controls the use of the 16-bit or 32-bit frame check sequence (FCS) option in V.42.
Defined Values:		<value> Decimal number 0 specifying the use of the 16-bit FCS specified in V.42.
Report Commands:	+EFCS?	Current or Selected Values:
		Response: +EFCS: <value>
		Example: +EFCS: 0 For default setting.
	+EFCS=?	Reporting Supported Range of Parameter Values
		Response: +EFCS: (<value> range)
		Example: +EFCS: (0)

Command: +ER   **Error Control Reporting**

Description: This extended-format numeric parameter controls whether or not the 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).

Default: 0

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

                             +ER1   Error control reporting enabled (+ER intermediate result code transmitted).

Report Commands: +ER?   Reports Current or Selected Values
                                        Response: +ER: <current value>
                                        Example: +ER: 0 for the default setting

                             +ER=?   Reporting Supported Range of Parameter Values.
                                        Response: +ER: (<value> range)
                                        Example: +ER: (0,1)

Command: +ER: <type> **Report the Current Error Control**

Description: The +ER: <type> reported represents the current (negotiated or renegotiated) modem-modem error control type. If enabled, the intermediate result code is transmitted during error control negotiation (handshaking) at which time the modem has determined the error control protocol will be used (if any), before the final result code (e.g., CONNECT) is transmitted. The +ER intermediate result code, if enabled, is issued after the Modulation report (+MCR and +MRR) and before the Data Compression Report (+DR).

Defined Values: NONE   Error control is not in use.
                             LAPM   V.42 LAPM protocol is in use.
                             ALT   MNP is in use.
                             Example: +ER: LAPM

Command: +ETBM   **Call Termination Buffer Management**

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

Default: None

Defined Values: <pending_TD>   Decimal number 0 specifies 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.

Report Commands: +ETBM?   Reports Current or Selected Values.
                            Response:
                            +ETBM: <pending_TD>,<pending_RD>,<timer>
                        Example: +ETBM: 0,0,0

                        +ETBM=?   Reports Supported Range of Parameter Values.
                        Response:
                        +ETBM: (<pending_TD> range),(<pending_RD> range), (<timer> range)
                        Example: +ETBM: (0),(0),(0)

Command: \B   **Transmit Break to Remote**

Description: 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.

Defined Values: 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.

Command: \K   Break Control

Description: 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.

Defined Values: 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:

\K0 Enter on-line command mode, no break sent to the remote modem.
\K1 Clear data buffers and send break to remote modem.
\K2 Same as 0.
\K3 Send break to remote modem immediately.
\K4 Same as 0.
\K5 Send break to remote modem in sequence with transmitted data.
      (Default.)

The second case is where the modem is in the online 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:

\K0 Clear data buffers and send break to remote modem.
\K1 Same as 0.
\K2 Send break to remote modem immediately.
\K3 Same as 2.
\K4 Send break to remote modem in sequence with data.
\K5 Same as 4. (Default.)

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

\K0 Clears data buffers and sends break to the DTE.
\K1 Same as 0.
\K2 Send a break immediately to DTE.
\K3 Same as 2.
\K4 Send a break in sequence with received data to DTE.
\K5 Same as 4. (Default.)

Result Codes: OK
                        Otherwise ERROR

Command: -K   MNP Extended Services

Description: 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.

Defined Values: -K0   Disables V.42 LAPM to MNP 10 conversion. (Default.)
                        -K1   Enables V.42 LAPM to MNP 10 conversion.
                        -K2   Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.

Result Codes: OK
                        ERROR

Data Compression Commands

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

Command: +DS   **Data Compression**
Description: This extended-format compound parameter controls the V.42bis data compression function if provided in the modem. It accepts four numeric subparameters:
Defined Values: **<direction>** Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

+DS0   Negotiated; no compression (V.42bis P0=0).
+DS3   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.

+DS0   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 code word 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).

Report Commands: +DS?   Reports Current or Selected Values.
Response: +DS:
<direction>,<compr_neg>,<max_dict>,<max_string>
Example: +DS:
3,0,2048,32 for the defaults and 2048 entry max dictionary.
+DS=?   Reports Supported Range of Parameter Values.
Response: +DS:
(<direction> range),(< compr_neg > range),
(<max_dict> range),(<max_string> range)
Example: +DS: (0,3),(0),(2048),(32)

Command: +DS44   **V.44 Compression Select**
Description: This extended-format compound parameter controls the V.44 data compression function.
Defined Values: **<direction>** Decimal number that specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

+DS440   Negotiated, no compression.
+DS441   Transmit only.
+DS442   Receive only.
+DS443   Both directions, accept any direction. (Default.)

<compress_negotiation> Decimal number that specifies whether or not the modem should continue to operate if the desired result is not obtained.

+DS440   Do not disconnect if V.44 is not negotiated by the remote DCE as specified in <direction>. (Default.)
+DS441   Disconnect if V.44 is not negotiated by the remote DCE as specified in <direction>.

<capability> Decimal number that specifies the use of stream method, packet method, multi-packet method.

+DS440   Stream method. (Default.)
+DS441   Packet method.
+DS442   Multi-packet method.

<max_codewords_tx> Decimal number 256 to 2048 that specifies the maximum number of codewords which should be negotiated in the transmit direction. (Default = 2048.)

<max_codewords_rx> Decimal number 256 to 2048 that specifies the maximum number of codewords which should be negotiated in the receive direction. (Default = 2048.)

<max_string_tx> Decimal number 32 to 255 that specifies the maximum string length to be negotiated in the transmit direction. (Default = 32.)

<max_string_rx> Decimal number 32 to 255 that specifies the maximum string length to be negotiated in the receive direction. (Default = 32.)

<max_history_tx> Decimal number 2048 to 4096 that specifies the maximum size of the history buffer to be negotiated in the transmit direction. (Default = 4096.)

<max_history_rx> Decimal number 2048 to 4096 that specifies the maximum size of the history buffer to be negotiated in the receive direction. (Default = 4096.)

Report Commands: +DS44? Reports Current or Selected Values.
Response:
+DS44:<direction>,<compression_negotiation>,<capability>, <max_codewords_tx>,<max_codewords_rx>,<max_string_tx>, <max_string_rx>,<max_history_tx>,<max_history_rx>
Example: +DS44:3,0,0,2048,2048,32,32,4096,4096 For the default setting.

+DS44=? Reports Supported Range of Parameter Values.
Response: +DS44:(list of supported <direction> values),(list of supported <compression_negotiation> values),(list of supported <capability> values),(list of supported <max_codewords_tx> values),(list of supported <max_codewords_rx> values),(list of supported <max_string_tx> values),(list of supported <max_string_rx> values),(list of supported <max_history_tx> values),(list of supported <max_history_rx> values)

Command:	**+DR**	**Data Compression Reporting**
Description:		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).
Defined Values:	+DR0	Data compression reporting disabled (no +DR result code transmitted).
	+DR1	Data compression reporting enabled (+DR result code transmitted). (Default.)
Report Commands:	+DR?	Reports Current or Selected Values.
		Response: +DR: <current value>
		Example: +DR: 1 For the default setting.
	+DR=?	Reports Supported Range of Parameter Values.
		Response: +DR: (<value> range)
		Example: +DR: (0,1)
Intermediate Result Code:	+DR:	<type>
		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 (e.g., CONNECT).

The format of this result code is:

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

Command:	**%C**	**Enable/Disable Data Compression**
Description:		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.
Defined Values:	%C0	Disables data compression. Resets S46 bit 1.
	%C1	Enables MNP 5 data compression negotiation. Resets S46 bit 1.
	%C2	Enables V.42 bis data compression. Sets S46 bit 1.
	%C3	Enables both V.42 bis and MNP 5 data compression. Sets S46 bit 1. (Default.)
Result Codes:	OK	
	ERROR	

V.8/V.8bis Commands

Command: +A8E   V.8 and V.8bis Operation Controls

Description: 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 (e.g., 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.

Defined Values: **<v8o>** Decimal number which enables/disables issuance of +A*8x* indications during modem-controlled V.8 origination negotiation.

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

<v8a>=   Decimal number which enables/disables issuance of +A*8x* 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.)

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.

Report Commands: +A8E?   Reports Current or Selected Values.
   Response: +A8E:
      <v8o>,<v8a>,<v8cf>[,<v8b>][,<cfrange>][,<protrange>]
   Example: +A8E: 1,1,00,1,0,0 For the defaults

+A8E=? Reports Supported Range of Parameter Values.
   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)

Command: +A8I: CI Signal Indication

Description:		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).
Defined Values:	<v8cf>	A hexadecimal code octet representation of the 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

Diagnostic Commands

Command: #UD   Last Call Status Report
Description: #UD is an action command requesting logged operation events reporting. 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:
                                  Power off.
                                  Hard reset (e.g., negate DTR with &D3 set; reset button).
                                  Soft reset = ATZ or AT&F.
                                  ATD command issued.
                                  ATA command issued.
                                  Automatic answer (e.g., 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:
                             1. Call Setup
                                 -Calling DCE: get dial tone, generate dial digits, and detect call
                                 progress signals.
                                 -Answering DCE: detect ringing, detect Caller ID, etc.
                             2. 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 (e.g., V.42, V.42bis).
                             3. Data Transfer
                                 -Bit-error rates, for each direction
                                 -Rate renegotiation
                                 -Retraining
                             4. 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 **OK**
                             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:

                             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 1-4)
                             =   Equal sign (3Dh)
                             Value   Any string as defined below (Table 1-4 - Table 1-9 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 1-13.

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 Online command state, issue the command, capture the responses and then issue an ATO command. For smoother online 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 (e.g., 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 (e.g., data compression), some are applicable only to call origination (e.g., busy, answering signal detection) and some are applicable only to the answering modem (e.g., 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 values are hex values, converted from decimal in V.58. callCleared codes are described in Table 5-12.

Table 1-4. AT#UD Last Call Status Report Format

Key	Value(s)	Definition
0	2 digits	Diagnostic Command Specification revision number, digit.digit
1	Table 1-5	Call Setup Result code
2	Table 1-6	Multi-media mode
3	Table 1-7	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 (e.g., 0-17)
12	0-64	Estimated noise level, in –dBm (e.g., 10-90)
17	0-FFF	Round Trip delay, in units of ms
18	Table 1-8	V.34 INFO bit map
20	Table 1-9	Transmit Carrier Negotiation Result
21	Table 1-9	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 1-10	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
44	Table 1-11	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 1-12	Termination Cause
61	0-FF Call	Waiting event count

Table 1-5. 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 (e.g., no signal, or nothing recognizable)
5	Voice detected * if this is a voice modem (e.g., V.253) operating in voice mode (e.g., +FCLASS=8.0)
7	Data Answering signal detected (e.g., V.25 ANS, V.8 ANSam)
8	Data Calling signal detected (e.g., V.25 CT, V.8 CI)
9	Fax Answering signal detected (e.g., T.30 CED, DIS)
A	Fax Calling signal detected (e.g., T.30 CNG)
B	V.8bis signal detected

Table 1-6. Multimedia Modes

Code	Definition
0	Data Only
1	Fax Only
2	Voice
9	Video-telephony, H.324
A	Other V.80 call

Table 1-7. DTE-DCE modes

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

Table 1-8. 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 1-9. 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	56K
84	Bell 212A
85	Bell 103

Table 1-10. 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 1-11. compressionActive from 3.2.2/V.58

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

Table 1-12. 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	e.g., S7 timeout
2D	IncomingCallDetected	If incoming call while sending dial command.
2E	LoopCurrentInterrupted	
2F	NoDial tone	
31	ReorderTone	Fast busy
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 1-13.

Table 1-13. 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
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

Compatibility Commands

Command: &L   **Leased Line Operation**
Description: 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.
Defined Values: &L0   Requests dial-up operation. Dial-up operation continues.
Result Codes: OK
                            ERROR

Command:)M   **Enable Cellular Power Level Adjustment**
Description: This command is included for compatibility only and has no effect other
                            than returning a result code.
Defined Values:)M0
)M1
)M2
Result Codes: OK
                            ERROR

Command: @M   **Initial Cellular Power Level Setting**
Description: This command is included for compatibility only and has no effect other than
                            returning a result code.
Defined Values: @M0
                            @M30
Result Codes: OK.
                            ERROR

Command: :E   **Compromise Equalizer Enable Command**
Description: This command is included for compatibility only and has no effect other than
                            returning a result code.
Defined Values: :E0
                            :E1
Result Codes: OK
                            ERROR

Fast Connect Commands

Command: $F   FastConnect Control

Description: 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.
                                Specifies the initial requested mode of operation when the modem is
                                operating as the originator. The options are:

Defined Values: $F0   Normal connection (Default)
                                $F1   FastConnect without answer tone
                                $F2   Reserved
                                $F3   FastConnect with answer tone

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.

Command: +PCW   **Call Waiting Enable**
Description: Controls the operation of the modem in the presence of call waiting.
Defined Values: +PCW0   Request modem-on-hold if enabled by +PMH and collect caller
                                       ID information if enabled by +VRID. Toggle V.24 circuit 125.
                                       (Default.)
                              +PCW1   Hang-up.
                              +PCW2   Ignore call waiting.
Result Codes: OK
                              ERROR
Report Commands: +PCW?   Reports Selected Value(s).
                                       Response: +PCW: <value>
                                       Example: +PCW: 0 For the default setting.
                              +PCW=?   Reports Supported Range of Parameter Values
                                       Response: +PCW: (<value> range)
                                       Example: +PCW: (0,1,2)

Command: +PMH   **Modem-on-Hold Enable**
Description: 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.
Defined Values: +PMH0   Modem-on-hold enabled in V.92 Mode. (Default.)
                              +PMH1   Disabled modem-on-hold.
Result Codes: OK 0 or 1 in V.92 Mode (see the +MS command)
                              ERROR
Report Commands: +PMH?   Reports Current or Selected Value.
                                       Response: +PMH: <current value>
                                       Example: +PMH: 0 For the default setting.
                              +PMH=?   Reports Supported Range of Parameter Values.
                                       Response: +PMH: (<value> range)
                                       Example: +PMH: (0,1)

Command: +PMHR   Initiate Modem-on-Hold

Description: 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.

Response: +PMHR:<value>
                            The value corresponds to the maximum hold time the server or hold-
                            granting modem will allow.
                            +PMHR0   V.92 MOH request denied or not available.
                            +PMHR1   MOH with 10-second timeout Granted.
                            +PMHR2   MOH with 20-second timeout Granted.
                            +PMHR3   MOH with 30-second timeout Granted.
                            +PMHR4   MOH with 40-second timeout Granted.
                            +PMHR5   MOH with 1-minute timeout Granted.
                            +PMHR6   MOH with 2-minute timeout Granted.
                            +PMHR7   MOH with 3-minute timeout Granted.
                            +PMHR8   MOH with 4-minute timeout Granted
                            +PMHR9   MOH with 6-minute timeout Granted.
                            +PMHR10   MOH with 8-minute timeout Granted.
                            +PMHR11   MOH with 12-minute timeout Granted.
                            +PMHR12   MOH with 16-minute timeout Granted.
                            +PMHR13   MOH with indefinite timeout Granted.

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

Command: +PMHT   Modem-on-Hold Timer

Description: Controls whether or not the modem will grant or deny a modem-on-hold
                            (MOH) request as well as setting the MOH Timeout value.

Defined Values: +PMHT0   Deny V.92 modem-on-hold Request (Default.)
                            +PMHT1   Grant MOH with 10-second timeout
                            +PMHT2   Grant MOH with 20-second timeout
                            +PMHT3   Grant MOH with 30-second timeout
                            +PMHT4   Grant MOH with 40-second timeout
                            +PMHT5   Grant MOH with 1 minute timeout
                            +PMHT6   Grant MOH with 2 minute timeout
                            +PMHT7   Grant MOH with 3 minute timeout
                            +PMHT8   Grant MOH with 4 minute timeout
                            +PMHT9   Grant MOH with 6 minute timeout
                            +PMHT10   Grant MOH with 8 minute timeout
                            +PMHT11   Grant MOH with 12 minute timeout
                            +PMHT12   Grant MOH with 16 minute timeout
                            +PMHT13   Grant MOH with indefinite timeout

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

Report Commands: +PMHT?   Reports Current or Selected Values.
                                      Response: +PMHT: <value>
                                      Example: +PMHT: 0 For the default setting.
                            +PMHT=?   Reports Supported Range of Parameter Values.
                                      Response: +PMHT: (<value> range)
                                      Example: +PMHT: (0,1,2,3,4,5,6,7,8,9,10,11,12,13)

Command: +PIG   **PCM Upstream Ignore**

Description: 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.

Defined Values: +PIG0   Enable PCM upstream negotiation.
                           +PIG1   Disable PCM upstream negotiation. (Default.)

Result Codes: OK 0 or 1 in V.92 Mode (+MS=V.92)
                           ERROR

Report Commands: +PIG?   Reports Selected Value(s).
                                        Response: +PIG: <value>
                                        Example: +PIG: 1 For the default setting.
                           +PIG=?   Reports Supported Range of Parameter Values.
                                        Response: +PIG: (<value> range)
                                        Example: +PCW: (0,1)

Command: +PMHF   **V.92 Modem-on-Hold Hook Flash**

Description: 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.

Result Code: OK   When the modem completes the flash hook sequence.
                           ERROR   If this command is initiated and the modem is not on hold.

Command: +PQC   **V.92 Phase 1 and Phase 2 Control**

Description: 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.

Defined Values: +PQC0   Enable Short Phase 1 and Short Phase 2. (Default.)
                           +PQC1   Enable Short Phase 1 only.
                           +PQC2   Not supported.
                           +PQC3   Disable Short Phase 1 and Short Phase 2.

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

Report Commands: +PQC?   Reports Selected Values.
                                        Response: +PQC: <value>
                                        Example: +PQC: 0
                           +PQC=?   Reports Supported Range of Parameter Values.
                                        Response: +PQC: (<value> range)
                                        Example: +PQC: (0,1,3)

Command: +PSS   **Use Short Sequence**

Description: 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.

Defined Values: +PSS0   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.)

                          +PSS1   Reserved.

                          +PSS2   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

Report Commands: +PSS?   Reports Selected Values.
                                     Response: +PSS: <value>
                                     Example: +PSS: 0 For the default <value>.

                          +PSS=?   Reporting Supported Range of Parameter Values:
                                     Response: +PSS: (<value> range)
                                     Example: +PSS: (0,1,2)

Command: -QCPC   **Force Full Startup Procedure on Next Connection**

Description: 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.

Result Code: OK In V.92 Mode (+MS=V.92)
                          ERROR

Command: -QCPS   **Enable Quick Connect Profile Save**

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

Defined Values: -QCPS0   Do not allow the quick connect profile to be saved.
                          -QCPS1   Allow the quick connect profile to be saved. (Default.)

Result Codes: OK in V.92 Mode (+MS=V.92) and quick connect is enabled (+PSS = 0)
                          ERROR

Report Commands: -QCPS?   Reports Selected Value(s).
                                     Response: -QCPS: <value>
                                     Example: -QCPS: 1 For the default setting.

                          -QCPS=?   Reports Supported Range of Parameter Values.
                                     Response: -QCPS: (<value> range)
                                     Example: -QCPS: (0,1)

S-Registers

Certain modem values, or parameters, are stored in memory locations called S-registers. Use the **S** command to read or to alter the contents of S-registers (see previous section). ***** Register value may be stored on one of two user profiles with the command **&W**.

Register	*Unit*	*Range*	*Default*	*Description*
S0	1 *ring*	0–255	0	**Number of Rings to Auto-Answer:** Sets the number of rings until the modem answers. ATS0=0 disables autoanswer completely. *
S1	1 ring	0–255	0	**Ring Counter:** Counts the rings that have occurred. S1 is cleared if no rings occur over eight-second intervals.
S2	decimal	0–255	43 (+)	**Escape Character:** 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; e.g., no escape character will be recognized.*
S3	decimal	0–127	13 (^M)	**Carriage Return Character:** Sets the command line and result code terminator character. Pertains to asynchronous operation only.
S4	decimal	0–127	10 (^J)	**Line Feed Character:** 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.
S5	decimal	0–255	8 (^H)	**Backspace Character :** 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.
S6	seconds	2–255	2	**Wait Time Before Blind Dialing or for Dial Tone:** 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. (When configured for US). 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). Default is country-dependent. The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than 2 seconds. *
S7	seconds	1–255*	50	**Wait Time for Carrier, Silence, or Dial Tone:** 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 model.) The default is country dependent. *
S8	seconds	2–255	2	**Pause Time for Dial Delay**: Sets the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string. *

Register	Unit	Range	Default	Description
S9	0.1 s	1–255	6	**Carrier Detect Response Time:** Supported for backward compatibility only. No value can be written. Responds with default value. *
S10	0.1 s	1–255	14	**Lost Carrier to Hang Up Delay:** 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.
				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	0.001 s	50–255	95	**DTMF Tone Duration:** 1. For US models, S11 sets the duration of tones in DTMF dialing (has no effect on pulse dialing). 2. For W-class models, S11 is a country parameter. The default is country dependent. *
S12	0.02 s	0–255	50	**Escape Prompt Delay (EPD):** 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). *
S14			138 (8Ah)	**General Bit-Mapped Options Status:** Indicates the status of command options.

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

| S16 | | | 0 | **Test Mode Bit-Mapped Options Status:** Indicates the test in progress status. |

Bit 0   Local analog loopback
    0 = Disabled (Default.)
    1 = Enabled (&T1)
Bits 1-7   Not used

S19 and S20   **Reserved**

Register	*Unit*	*Range*	*Default*	*Description*
S21			52 (34h)	**V.24/General Bit-Mapped Options Status:** Indicates the status of command options.

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

Register	*Unit*	*Range*	*Default*	*Description*
S22			117 (75h)	**Speaker/Results Bit-Mapped Options Status:** 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

Register	*Unit*	*Range*	*Default*	*Description*
S23			0	**General Bit-Mapped Options Status:** Indicates the status of command options.

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

Register	*Unit*	*Range*	*Default*	*Description*
S24	seconds	0–255	0	**Sleep Inactivity Timer:** 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.
S25	0.01 s	0–255	5	**Delay to DTR OFF:** 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.
S26	0.01 s	0–255	1	**RTS-to-CTS Delay:** 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.

Register	Unit	Range	Default	Description
S27			73 (49Ah)	**General Bit-Mapped Options Status:** Indicates the status of command options.

S27 — Default: 73 (49h) (01001001b)

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

```
3 1 0
0 0 0   &M0 or &Q0
0 0 1   &M1 or &Q1
0 1 0   &M2 or &Q2
0 1 1   &M3 or &Q3
1 0 0   Reserved
1 0 1   &Q5 (Default.)
1 1 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 – Default for MT5600SMI)
  1 =   Bell mode (B1 – Default for MT5656SMI)
Bit 7 - Reserved

Register	Unit	Range	Default	Description
S28			0	**General Bit-Mapped Options Status:** Indicates bit mapped options status.

S28 — 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)
  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)
Bit 5-7 Reserved

Register	Unit	Range	Default	Description
S29	10 ms	0–255	70	**Flash Dial Modifier Timer:** 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. Default: 70 (700 ms) for U.S.
S30	10 s	0–255	0	**Disconnect Inactivity Timer:** 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.
S31			192 (C0h)	**General Bit-Mapped Options Status:** Indicates bit mapped options status.

S31 — 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)

Register	Unit	Range	Default	Description
S36			7	**LAPM Failure Control:** 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. * Default: 7 (00000111b) Bits 0-2 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	seconds	0–255	20	**Delay Before Forced Hang Up:** 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. 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. 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.
S39			3	**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			104 (68h)	**General Bit-Mapped Options Status.** 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*

Register	*Unit*	*Range*	*Default*	*Description*
S41			195 (C3h)	**General Bit-Mapped Options Status.** 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)

<u>Bit 6</u>	<u>Bit 2</u>	<u>Meaning</u>
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
Bits 4-5 Reserved
Bit 7   Reserved

Register	*Unit*	*Range*	*Default*	*Description*
S46			138	**Data Compression Control.** Controls selection of compression. *

The following actions are executed for the given values:
S46=136 Execute error correction protocol with no compression.
S46=138 Execute error correction protocol with compression. (Default.)

Register	*Unit*	*Range*	*Default*	*Description*
S48			7	**V.42 Negotiation Control.** 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.
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.

Register	*Unit*	*Range*	*Default*	*Description*
S86		0–26	21	**Call Failure Indication.** 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:

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 SMI established.
S86=23   Disconnect after three retrains.
S86=24   Call Waiting tone detected.
S86=25   Extension pickup detected.
S86=26   Remote hangup detected.

Register	*Unit*	*Range*	*Default*	*Description*
S91	dBm	0–15	10	**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 and there are checks to prevent transmit attenuation level change. The default is country dependent.
S95			0	**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. *

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).

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.

Register	Unit	Range	Default	Description
S210		0–255	13 (0Dh)	**V.34 Symbol Rate.** The bits in this parameter control V.34 symbols rates and enable/disable V.34 asymmetric rates. This parameter is used for diagnostic purposes only.

Default: 13 (0Dh) (00001101b)
Bits 0 -2   Selects the range of allowed V.34 symbol rates.

2	1	0	Symbol Rates (baud)
0	0	0	2400 only
0	0	1	2400 only (no 2734)
0	1	0	2400, 2800
0	1	1	2400, 2800, 3000
1	0	0	2400, 2800, 3000, 3200
1	0	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.

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

Result Codes

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

Result Codes

Short Form	Long Form
+F4	+FCERROR
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	CONNECT1200
6	NO DIAL TONE
7	BUSY
8	NO ANSWER
9	CONNECT600
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 9600
13	CONNECT 7200
14	CONNECT 12000
15	CONNECT 14400
16	CONNECT 19200
17	CONNECT 38400
18	CONNECT 57600
19	CONNECT 115200
20	CONNECT 230400
22	CONNECT 75TX/1200RX
23	CONNECT 1200TX/75RX
24	DELAYED
32	BLACKLISTED
33	FAX
35	DATA
40	+MRR: 300
44	+MRR: 1200/75
45	+MRR: 75/1200
46	+MRR: 1200
47	+MRR: 2400
48	+MRR: 4800
49	+MRR: 7200
50	+MRR: 9600
51	+MRR: 12000
52	+MRR: 14400
53	+MRR: 16800
54	+MRR: 19200
55	+MRR: 21600
56	+MRR: 24000
57	+MRR: 26400
58	+MRR: 28800
59	CONNECT 16800
60	CONNECT 21600
62	CONNECT 24000
63	CONNECT 26400
64	CONNECT 28800
66	+DR: A LT
67	+DR: V 42B
69	+DR: N ONE
70	+ER: N ONE

Short Form	Long Form
77	+ER: L APM
78	+MRR: 31200
79	+MRR: 33600
80	+ER: A LT
81	+ER: A LT-CELLULAR
83	LINE-IN-USE
84	CONNECT 33600
91	CONNECT 31200
134	+MCR: B 103
135	+MCR: B 212
136	+MCR: V 21
137	+MCR: V 22
138	+MCR: V 22B
139	+MCR: V 23
140	+MCR: V 32
141	+MCR: V 32B
142	+MCR: V 34
144	+MCR: K 56
145	+MCR: V 90
150	+MRR: 32000
151	+MRR: 34000
152	+MRR: 36000
153	MRR: 38000
154	+MRR: 40000
155	+MRR: 42000
156	+MRR: 44000
157	+MRR: 46000
158	+MRR: 48000
159	+MRR: 50000
160	+MRR: 52000
161	+MRR: 54000
162	+MRR: 56000
165	CONNECT 32000
166	CONNECT 34000
167	CONNECT 36000
168	CONNECT 38000
169	CONNECT 40000
170	CONNECT 42000
171	CONNECT 44000
172	CONNECT 46000
173	CONNECT 48000
174	CONNECT 50000
175	CONNECT 52000
176	CONNECT 54000
177	CONNECT 56000
178	CONNECT 230400
180	CONNECT 28000
181	CONNECT 29333
182	CONNECT 30667
183	CONNECT 33333
184	CONNECT 34667
185	CONNECT 37333
186	CONNECT 38667
187	CONNECT 41333
188	CONNECT 42667
189	CONNECT 45333
190	CONNECT 46667
191	CONNECT 49333
192	CONNECT 50667
193	CONNECT 53333
194	CONNECT 54667
195	+MRR: 28000

Short Form	Long Form
196	+MRR: 29333
197	+MRR: 30667
198	+MRR: 33333
199	+MRR: 34667
200	+MRR: 37333
201	+MRR: 38667
202	+MRR: 41333
203	+MRR: 42667
204	+MRR: 45333
205	+MRR: 46667
206	+MRR: 49333
207	+MRR: 50667
208	+MRR: 53333
209	+MRR: 54667

Chapter 2 – Fax Class 1 Commands

Fax I/O Processing

The fax I/O interface supports asynchronous serial and parallel interfaces. The character format is 8 bit data, no parity, and 1 stop bit. Start and stop elements are removed from the transmit data and added to the receive data. Both transmit and receive data are buffered. Flow control using XON/XOFF or RTS/CTS is provided.

Unique control character strings are identified, filtered, or reinserted into the I/O data stream. These control characters and their resultant action are described below.

DTE-to-Modem Transmit Data Stream

Characters Detected	Action Taken
<DLE><data>	Delete <DLE><data> characters.
<DLE><ETX>	Recognize as a string terminator and take appropriate action.
<DLE><DLE>	Replace with single <DLE> character.

Modem-to-DTE Receive Data Stream

Characters Detected	Action Taken
<DLE>	Insert extra <DLE> ahead of <DLE>.

The modem also identifies the end of a frame by inserting <DLE><ETX> into the data stream after the FCS bytes.

Fax Mode Selection

Fax Class 1 and Fax Class 1.0 commands are identified in Table 2-1.

Table 2-1. Fax Class 1 and Fax Class 1.0 Commands

Command/Parameter	Function	Applicable in Fax Class 1	Applicable in Fax Class 1.0
+FCLASS=<class>	Select, read or test service class	X	X
+FAA=<value>	Auto answer enable	-	X
+FAE=<value>	Auto answer enable	X	X
+FTS=<time>	Stop transmission and pause	X	X
+FRS=<time>	Wait for silence	X	X
+FTM=<mod>	Transmit data with <mod> carrier	X	X
+FRM=<mod>	Receive data with <mod> carrier	X	X
+FTH=<mod>	Transmit HDLC data with <mod> carrier	X	X
+FRH=<mod>	Receive HDLC data with <mod> carrier	X	X
+FAR=<off/on>	Adaptive reception control	-	X
+FCL=<time>	Carrier loss timeout	-	X
+FDD=<value>	Double escape character replacement control	-	X
+FIT=<time>, <action>	DTE inactivity timeout	-	X
+FPR=<rate>	Fixed DTE Rate	-	X
+FMI?	Report manufacturer ID	-	X
+FMM?	Report model ID	-	X
+FMR?	Report revision ID	-	X
+FLO	Flow Control	-	X
&K	Local DTE-modem flow control (see Call Control Section)	X	X
A	Answer	X	X
D<string>	Dial	X	X
H	Hangup (see Call Control Section)	X	X
X stands for Applicable. - stands for Not Applicable.			

Fax Origination

Origination of fax calls is made using the ATD command. Upon completion of the dial function, a calling tone at 1100 Hz is transmitted, with a cadence of 0.5 seconds on and 3 seconds off. The modem automatically enters mode +FRH=3 and sends the CONNECT message to the DTE when FSK flags are detected from the remote.

Fax Answering

Answering of fax calls is identical to answering of data calls with the exception that the modem enters the fax handshaking mode instead of the data handshaking mode after going off-hook. If +FAE=0, the modem, after sending answer tone, automatically enters fax mode (+FTH=3), sends the CONNECT message to the DTE, and starts sending FSK flags. If +FAE=1, the modem determines whether the caller is a data modem or fax modem and sends the DATA or FAX result code, respectively, to the DTE.

Fax Control Transmission

Fax control transmission is initiated by the +FTH=<mod> command. After this command is issued, the modem generates the CONNECT message and transmits carrier in the modulation scheme specified by the parameter n. The modem then transmits HDLC flags for a minimum of 1 second. The modem continues to transmit the HDLC flags until it receives a character from the DTE.
When characters are received from the DTE, the modem adds start and end flags, performs zero-bit insertion, generates FCS, and deletes <DLE><chr> character pairs before transmitting the characters to the remote fax machine. Each <DLE><DLE> sequence is transmitted as a single <DLE>. <DLE><ETX> is considered as the end of frame marker and is not transmitted. All data received from the DTE after <DLE><ETX> is ignored by the modem until the modem generates either the CONNECT, OK, or ERROR result code.

If no more data is in the transmit buffer and the final bit was a 1 (bit 4 of the second byte received from the DTE), the modem generates the OK result code and returns to the command mode. If the final bit was a 0, the modem generates the CONNECT message and waits for further data from the DTE while transmitting HDLC flags. If no more data is received before 5 seconds elapse, the modem drops carrier, goes on-hook, and generates the ERROR result code.

Fax Control Reception

Fax control reception is initiated using the AT+FRH=<mod> command. After this command is issued, the modem looks for carrier in the modulation scheme specified by the parameter n. If no carrier is detected before the period of time specified by register S7 expires, the modem generates the NO CARRIER message and returns to command mode.

If a carrier is detected that is not the one specified by the parameter n, the modem generates the +FCERROR message and returns to the command mode. If the specified carrier is detected, the modem generates the CONNECT message and enters the HDLC receive mode.

In HDLC receive mode, the modem receives HDLC frames from the remote fax machine, strips the flags, performs zero-bit deletion, performs error checking, and handles <DLE><chr> character pairs before passing the data to the DTE. The modem prefixes each <DLE> character with another <DLE> character before sending it to the DTE. After the last byte in the frame, the modem sends <DLE><ETX> to the DTE marking the end of the frame. The modem then generates the OK message if no errors were detected or the ERROR message if errors were detected (FCS is incorrect) and returns to command mode.

While in command mode, the modem continues to receive data in the selected modulation scheme, and sends the data after sending the CONNECT message to the DTE when the DTE reissues the +FRH command with the same parameter. If the DTE issues the +FRH command with a different parameter, the modem clears all buffers and proceeds as described previously.

If carrier is lost while in command mode and the DTE reissues the +FRH command with the same parameter, and there is no data in the buffer, the modem sends the ERROR result code to the DTE and returns to the command mode. If there is data in the buffer, the modem sends the next frame of buffered data to the DTE, followed by <DLE><ETX>, and either the ERROR result code if errors were detected or the OK result code if no errors were detected. The modem then returns to command mode.

The modem concludes an error is detected if carrier is lost for any period of time during or before the reception of a frame. If carrier is lost for a time period longer than the time specified by the register S10, the modem finishes delivering the data in the receive buffer (if any) to the DTE, sends <DLE><ETX>, generates the ERROR message, and returns to command mode. All subsequent data received from the remote is discarded.

If the modem detects a frame abort sequence (seven consecutive ones with no zero insertion) while it is waiting for a frame beginning flag (it was receiving HDLC flags), it will wait for the HDLC flags again until either carrier is lost or the DTE aborts the process by sending an abort character or by dropping DTR with &D2 in effect. If the frame abort sequence is detected while the modem is receiving a frame it finishes delivering the data in the receive buffer (if any) to the DTE, sends <DLE><ETX>, generates the ERROR message, and returns to command mode. The modem keeps looking for HDLC flags followed by more data from the remote, with the selected modulation scheme.

If the modem detects a receive buffer overflow condition, it concludes that there was an FCS error in that frame. The modem will receive more frames only if a starting flag is detected and there is room in the receive buffer. If a starting flag is detected and there is no room in the buffer, the modem discards all data in that frame.

If the modem receives any character from the DTE after the +FRH command (except flow control characters if software flow control is in effect), or if the modem detects a high-to-low transition of the DTR signal while &D1 is in effect, it sends <DLE><ETX> to the DTE, generates OK result code, and returns to command mode. The receive buffer is cleared and all data received from the remote is discarded. If the modem detects a DTR drop while &D2 is in effect, it goes on-hook, sends <DLE><ETX> to the DTE, generates OK result code, and returns to command mode. If the modem detects a DTR drop while &D3 is in effect, the modem performs a warm reset.

Fax Data Transmission

Fax data transmission is initiated by the AT+FTM=<mod> command. After this command is issued, the modem generates the CONNECT message and transmits carrier in the modulation scheme specified by the parameter n. The modem then transmits constant 1 bits for a minimum of one second and continues to transmit constant 1 bits until it receives a character from the DTE.

When data is received from the DTE, the modem deletes start and stop bits and deletes all <DLE><chr> character pairs before transmitting the data to the remote. Each <DLE><DLE> sequence is transmitted as a single <DLE>. <DLE><ETX> is considered as the end of stream marker, and is not transmitted. All data received from the DTE after the <DLE><ETX> is ignored by the modem until the modem generates either the CONNECT, OK, or ERROR result code.

If no more data is in the transmit buffer, and the last transmitted character was not an ASCII NULL, the modem generates the OK result code and returns to the command mode. If the last character transmitted was an ASCII NULL, the modem generates the CONNECT message to the DTE and waits for further data from the DTE while transmitting NULLs to the remote. If more data is received before five seconds elapse, the modem continues to transmit the data as described in the previous paragraph. If five seconds elapse and no data is received from the DTE, the modem drops carrier, goes on-hook, and generates the ERROR result code.

Fax Data Reception

Fax data reception is initiated using the AT+FRM=<mod> command. After this command is issued, the modem looks for carrier in the modulation scheme specified by the parameter n. If no carrier is detected before the period of time specified by register S7 expires, the modem generates the NO CARRIER message and returns to command mode. If a V.21 carrier is detected when a high-speed carrier is expected, the modem generates the +FCERROR message and returns to the command mode. If the specified carrier is detected, the modem generates the CONNECT message and enters the data receive mode.

While in data receive mode, the modem receives data from the remote, adds start and stop bits, and handles <DLE><chr> character pairs before passing the data to the DTE. The modem prefixes each <DLE> character with another <DLE> character before sending it to the DTE.

If the modem detects a receive buffer overflow condition, it stops receiving from the remote until there is room in the receive buffer. The modem informs the DTE of the buffer overflow after it sends to the DTE the last character that was stored in the buffer before the overflow occurred.

If the modem receives any character from the DTE after the +FRM command (except flow control characters if software flow control is in effect), or if the modem detects a high-to-low transition of the DTR signal while &D1 is in effect, it sends <DLE><ETX> to the DTE, generates the OK result code, and returns to command mode. The receive buffer is cleared and all data received from the remote is discarded. If loss of DTR is detected while &D2 is in effect, the modem goes on-hook, sends <DLE><ETX> followed by OK result code to the DTE, and returns to command mode. If the modem detects a DTR drop while &D3 is in effect, the modem performs a warm reset.

Commands and Parameters

Mode Entry Commands

+FCLASS=1   Select Facsimile Class 1 Mode
+FCLASS=1 selects the Fax Class 1 Mode. The Fax Class 1 Mode commands and responses described in this section are applicable when command +FCLASS=1 as shown in Table 2-1.

+FCLASS=1.0 - Select Facsimile Class 1.0 Mode
+FCLASS=1.0 selects the Fax Class 1.0. The Fax Class 1.0 Mode commands and responses described in this section are applicable when command +FCLASS=1.0 as shown in Table 2-1.

Mode Commands

Command: +FAA   Auto Answer Enable - Class 1.0

Description: This command enables or disables fax adaptive answer. This command operates identically to the +FAE command.

Defined Values: <value> Decimal number corresponding to the selected option.
0 Disable data /fax auto answer mode. (Default.)
1 Enable data /fax auto answer mode. The modem determines the calling type and issues DATA result code (13) if the caller is a data modem or issues FAX result code (15) if the caller is a fax modem.

Command: +FAE   Auto Answer Enable - Class 1 and 1.0

Description: This command enables or disables fax adaptive answer. This command operates identically to the +FAA command.

Defined Values: <value> Decimal number corresponding to the selected option.
0 Disable data /fax auto answer mode. (Default.)
1 Enable data /fax auto answer mode. The modem determines the calling type and issues DATA result code (13) if the caller is a data modem or issues FAX result code (15) if the caller is a fax modem.

After a data (not fax) connection is achieved (indicated by the DATA result code), the DTE must issue an ATO command to cause the modem to go on-line.

Command: +FTS   Transmit Silence

Description: This command causes the modem to terminate a transmission and wait for <time> 10-ms intervals before responding with the OK result code.

Defined Values: <time> Decimal number from 0 (default) to 255 that specifies the length of time in 10-ms intervals to delay before responding with the OK result code after terminating the session.

Result Codes: OK Reported when transmission has been terminated for the specified amount of time.
ERROR <value> is invalid or this command is issued while the modem is on-hook.

Reporting Supported Range of Parameter Values:
Command: +FTS=?
Response: +FTS: <time> range
Example: +FTS: 0-255.

Command: +FRS   Receive Silence

Description:	This command causes the modem to listen and report an OK result code when silence has been detected on the line for the specified period of time. This command will terminate when the required period of silence is detected or when the DTE sends the modem another character other than XON or XOFF, which is discarded. In either event, the OK result code is returned. This command is aborted if any character is received from the DTE after receipt of the command but before the time delay elapses. In this case, the modem discards the aborting character and issues an OK result code.
Defined Values:	<time> Decimal number from 0 (default) to 255 which specifies the length of time in 10-ms intervals to delay before responding with the OK result code after detecting silence on the line.
Result Codes:	OK Reported when silence has been present on the line for the specified amount of time or when the DTE sends the modem a character other than XON or XOFF. ERROR <value> is invalid or this command is issued while the modem is on-hook.

Reporting Supported Range of Parameter Values:
> Command: +FRS=?
> Response: +FRS: <time> range
> Example: +FRS: 0-255

Command: +FTM   Transmit Facsimile

Description:	This command causes the modem to transmit data using the modulation defined below. When a valid <mod> value is entered, the modem transmits the proper training sequence in the selected mode, followed by constant 1 bits until data is received from the DTE. The modem also returns the CONNECT result code at the beginning of the training sequence.
Defined Values:	<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 2-2.

Table 2-2. Fax Class 1 and Fax Class 1.0 Modulation Modes and Rates

<mod>	Modulation	Training	Modulation Mode and Rate
3	V.21		300 bps
24	V.27 ter		2400 bps
48	V.27 ter		4800 bps
72	V.29		7200 bps
73	V.17	Long	7200 bps long
74	V.17	Short	7200 bps short
96	V.29		9600 bps
97	V.17	Long	9600 bps long
98	V.17	Short	9600 bps short
121	V.17	Long	12000 bps long
122	V.17	Short	12000 bps short
145	V.17	Long	14400 bps long
146	V.17	Short	14400 bps short

Result Codes:	CONNECT Reported when the modems begins the training sequence after receipt of a valid <mod> value. ERROR If the modem's transmit buffer becomes empty and the last transmitted character is NUL (00), the modem continues to transmit NULs until the DTE sends more data or five seconds elapses. After five seconds elapse with an empty transmit buffer, the modem will turn off the transmit carrier, return to the command state, and report the ERROR result code. OK If the modem's transmit buffer becomes empty and the last transmitted character is not NUL, the modem will turn off the transmit carrier, return to the command state, and report the OK result code.

Reporting Current or Selected Values:
> Command: +FTM?
> Response: +FTM: <mod>
> Example: +FTM: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values:
> Command: +FTM=?
> Response: +FTM: (<mod> range)
> Example: +FTM: 3,24,48,72,73,74,96,97,98,121,122,145,146

Command: +FRM   Receive Facsimile

Description:	This command causes the modem to enter the receiver mode using the modulation defined below.
Defined Values:	<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 2-2.

Reporting Current or Selected Values:
> Command: +FRM?
> Response: +FRM: <mod>
> Example: +FRM: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values:
> Command: +FRM=?
> Response: +FRM: (<mod> range)
> Example: +FRM: 3,24,48,72,73,74,96,97,98,121,122,145,146

Result Codes:	CONNECT Reported when the selected carrier is detected.
	+FCERROR Reported if another carrier is detected and FAR=0; the modem then returns to the command state.
	NO CARRIER Reported if loss-of-carrier is detected.
	OK Reported if the DTE sends any character to the modem other than XON or XOFF while operating in configured flow control from the DTE; the modem then returns to the command state.

Command: FTH   Transmit Data with HDLC Framing

Description:	This command causes the modem to transmit data using HDLC protocol and the modulation defined below.
Defined Values:	<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 2-2.
Result Codes:	CONNECT Reported for either of two conditions:
	1. At the beginning of transmission of the training pattern for the selected modulation.
	2. If the Final Frame bit is 0.
	OK Reported for either of two conditions:
	1. If the Final Frame Bit is 1.
	2. if the DTE sends only <DLE><ETX> (a null frame) while transmitting flags.
	ERROR Reported if five seconds elapse from the time when the modem reported the CONNECT result code without any additional data transmitted from the DTE; the modem then turns off carrier and returns to the command mode.

Reporting Current or Selected Values:
> Command: +FTH?
> Response: +FTH: <mod>
> Example: +FTH: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values:
> Command: +FTH?
> Response: +FTH?
> Example: +FTH: 98 For V.17 9600 bps.

Command: +FRH   Receive Data with HDLC Framing

Description:	This command causes the modem to receive frames using HDLC protocol and the modulation defined below. An ERROR response code results if this command is issued while the modem is on-hook.
Defined Values:	<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 2-2.

Reporting Current or Selected Values:

Command: +FRH?
Response: +FRH: <mod>
Example: +FRH: 98 For V.17 9600 bps.

Reporting Supported Range of Parameter Values:

Command: +FRH?
Response: +FRH?
Example: +FRH: 98 For V.17 9600 bps.

Result Codes:	CONNECT Reported for either of two conditions:

1. When the selected carrier is detected with an HDLC flag.
2. If the DTE sends another +FTH=<MOD> command after sending the result code indicating frame reception is complete.
+FCERROR Reported if a different carrier is detected and FAR=0.
NO CARRIER Reported if loss of carrier is detected.
OK Reported for either of two conditions:
1. If a frame was received correctly.
2. If the DTE sends any character other than XON or XOFF while the modem is in the configured flow control.
ERROR Reported if a frame was received in error.

Service Class 1 Commands

Command: +FAR   Adaptive Reception Control

Description: If Adaptive Reception is enabled, the modem adaptively detects the selected message carrier or V.21 control messages. If the expected carrier is detected, the modem operates as specified in the respective +FRM=<mod or +FRH=<mod commands. If V.21 flag preamble is detected instead, the modem issues a +FRH:3 intermediate result code, and then executes an implied +FRH=3 command.

Defined Values: <value> Decimal number corresponding to the selected option.
0 Disable Adaptive Reception. (Default.)
1 Enable Adaptive Reception.

Reporting Current or Selected Values:
                    Command: +FAR?
                    Response: +FAR: <value
                    Example: +FAR: 0 For the default setting.

Reporting Supported Range of Parameter Values:
                    Command: +FAR=?
                    Response: +FAR: (<value> range)
                    Example: +FAR: (0,1)

Command: +FCL   Carrier Loss Timeout

Description: This parameter allows the DTE to select the modem's loss-of-carrier delay between initial loss-of-carrier and qualified loss-of-carrier, when the modem will give up and exit a receive mode. Intermediate (less than FCL timeout) loss-of-carrier should be indicated by insertion of the SQ-BAD signal quality indicator in the received data stream.
In unframed receive modes, if the modem detects RTC as described in Recommendation T.30 prior to initial loss of the high speed carrier, or if the modem detects V.21 carrier after initial loss of high speed carrier, then the modem immediately accepts the loss-of-carrier as qualified, without waiting for the FCL timer to expire.
In HDLC receive modes, if the modem detects HDLC abort prior to initial loss of the high speed carrier, or if the modem detects V.21 carrier after initial loss of high speed carrier, then the modem l immediately accepts the loss-of-carrier as qualified, without waiting for the FCL timer to expire.

Defined Values: <value> Decimal number representing the loss-of-carrier delay time in units of 100 ms. The range is 0 - 255.

Reporting Current or Selected Values:
                    Command: +FCL?
                    Response: +FCL: <time
                    Example: +FCS: 0 For the default setting.

Reporting Supported Range of Parameter Values:
                    Command: +FCL=?
                    Response: +FCL: (time range)
                    Example: +FCL: (0-255)

Command: +FDD   Double Escape Character Replacement
Description: This parameter conditions the use of the ˜DLE˜˜˜SUB˜ pair to encode
                                    consecutive <1/0 €<1/0 in data. This may be used to prevent unbound
                                    expansion of data that contains many <1/0 patterns.
Defined Values: <value> Decimal number corresponding to the selected option. For modem
                                    decode of <DLE><SUB>, the defined range are:
                                    0 <DLE> <DLE> or discard (default and only)
                                    1 <DLE> <DLE> (not supported)
                                    For modem encoding of <1/0> <1/0>the defined values are:
                                    0 <DLE> <DLE> <DLE> <DLE> (default and only)
                                    1 <DLE> <SUB> (not supported)
Reporting Current or Selected Values:
                                    Command: +FDD?
                                    Response: +FDD: <value>
                                    Example: +FDD: 0 For the default setting.
Reporting Supported Range of Parameter Values:
                                    Command: +FDD=?
                                    Response: +FDD: (<value> range)
                                    Example: +FDD: (0)

Command: +FIT   DTE Inactivity Timeout
Description: This command specifies a DTE inactivity timeout value that allows the modem
                                    to break away from an unsuccessful connection attempt at any stage of a
                                    facsimile transfer. The DTE inactivity timer operates only while the modem is
                                    off-hook.
Defined Values: <time The <time parameter indicates the DTE inactivity timeout in seconds.
                                    The value of 0 indicates that timeout is disabled (default). The required
                                    timeout range is 1 to 255 seconds. The inactivity timer starts when the modem
                                    has taken some action that requires DTE response. If the DTE does respond,
                                    the modem resets the inactivity timer. Inactivity timer related events are listed
                                    in Table 2-3.
                                    <action The <action parameter has two meanings.
                                    0 Upon timeout, the modem will go on-hook, executing an implied ATH
                                    command; then reset to +FCLASS 0.
                                    1 Upon timeout, the DCE will only go on-hook.
Reporting Current or Selected Values:
                                    Command: +FIT?
                                    Response: +FIT: <time ,action
                                    Example: +FIT: 0,0 For the default settings.
Reporting Supported Range of Parameter Values:
                                    Command: +FIT?
                                    Response: +FIT: (<time> range), (<action> range)
                                    Example: +FIT: (0-255),(0-1)

Table 2-3. Inactivity Timer Start and Stop Events

On-line state	Start timer event	Stop timer event
Waiting for a command	modem sends final result code	DTE sends AT or "at"
Waiting for transmit data	modem sends CONNECT after +FTM or +FTH command	DTE sends data
Waiting for transmit data	modem sends <XON or sets CTS ON	DTE sends data
Waiting to deliver received data	modem sends <XOFF after +FRM or +FRH command	DTE sends <XON
Waiting to deliver received data	DTE sets V.24 Ckt 133 OFF after +FRM or +FRH command	DTE sets V.24 Ckt 133 ON

Command: +FPR   Fixed DTE Rate
Description: This numeric extended-format parameter specifies the data rate at which the
                             modem will accept commands during on-line 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: +FPR=<rate code>
Defined Values: <rate code> Specifies the DTE-modem interface operation rate in bits/s with a
                             rate code. The available rate codes are:
                             0 Automatic detection (default)
                             1 2400 bits/s (executes +IPR=2400)
                             2 4800 bits/s (executes +IPR=4800)
                             4 9600 bits/s (executes +IPR=9600)
                             8 19200 bits/s (executes +IPR=19200)
                             10 38400 bits/s (executes +IPR=38400)
                             18 57400 bits/s (executes +IPR=57400)
                             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: +FPR?
                             Response: <rate code>
                             Example 1: 0 For automatic rate detection.
                             Example 2: 18 For 57600 bits/s.
Reporting Supported Range of Parameter Values:
                             Command: +FPR=?
                             Response: (<rate code> range)
                             Example: (0,1,2,4,8,10,18)

Command: +FMI?   Request Manufacturer Identification
Description   This command causes the modem to report the modem product manufacturer.
Syntax: +FMI?
Typical Response: Multi-Tech
                             OK

Command: +FMM?   Request Model Identification
Description: This command causes the modem to report the modem product model.
Syntax: +FMM?
Typical Response: V90
                             OK

Command: +FMR?   Request Revision Identification
Description: This command causes the modem to transmit one or more lines of information
                             text identifying the modem version, revision level, or date.
Syntax: +FMR?
Typical Response: V3.001-V90_2M_DLS
                             OK

Command: +FLO   Flow Control

Description: This parameter allows the DTE to identify and select the type of flow control used.

Syntax: +FLO=<method>

Defined Values: <method> Decimal number corresponding to the selected option.
0 XON/XOFF and RTS/CTS flow control turned off.
1 Use XON/XOFF flow control in either direction.
2 Use RTS for flow control of the modem by the DTE; use CTS for flow control of the DTE by the modem.

Reporting Current or Selected Values:
Command: +FLO?
Response: +FLO: <method>
Example: +FLO: 0 For the default setting.

Reporting Supported Range of Parameter Values:
Command: +FLO=?
Response: +FLO: (<method>range)
Example: +FLO: (0-2)

Result Codes: OK <method> = 0-2.
ERROR Otherwise.

Examples

Examples of calling (transmitting) and answering (receiving) one page using Fax Class 1 commands are shown in Table 2-4 and Table 2-5, respectively. The examples show the interchange between the DTE and the modem for various cases. Comments are included to explain how to handle various situations. Commands and responses are in upper case and comments are in lower case. All streams of data denoted by <..frame> are terminated by the <DLE><ETX> characters.

Table 2-4. Fax Class 1 Calling Sequence (Transmitting a Single Page)

DTE Commands	Modem Responses	Local Modem Action	Remote Station Action	Notes
AT+FCLASS=1	OK	Set Class 1		
ATDT<string>	CONNECT <NSF frame> <DLE><ETX> OK	Dial and send CNG Look for V.21 Detect flags	Answer send CED, V.21 Send HDLC flags Send NSF frame	AT+FRH=3 implied by dialing with +FCLASS=1.0
AT+FRH=3	CONNECT <CFI frame data> <DLE><ETX> OK	Detect flags get CSI get FCS accept FCS	send CSI frame check FCS	Frame status OK
AT+FRH=3	CONNECT <DIS frame data> <DLE><ETX> OK	Detect flags get DIS get FCS accept FCS	send DIS frame check FCS	DTE must detect final frame bit to anticipate loss of carrier
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <TSI frame data> <DLE><ETX> <DCS frame data> <DLE><ETX>	CONNECT CONNECT OK	send V.21 carrier send flags send TSI frame send FCS send flags send DCS frame send FCS, flags drop carrier	detect carrier detect flags get TSI frame get DCS frame	Final frame bit clear tells the modem to expect another frame. Final frame bit set tells the modem not to expect another frame
AT+FTS=8; +FTM=96 <TCF data pattern> <DLE><ETX>	CONNECT OK	wait 80 ms send V.29 carrier send TCF data drop carrier	detect carrier get TCF data	
AT+FRH=3	CONNECT <CFR frame data> <DLE><ETX> OK	detect carrier detect flags get CFR frame check FCS accept FCS	send V.21 carrier send flags get CRF frame send FCS	Final frame bit set. frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FTM=96 <page image data> <DLE><ETX>	CONNECT OK	send V.29 carrier send page data drop carrier	detect carrier receive page	
AT+FTS=8; +FRH=3 <EOP frame data> <DLE><ETX>	CONNECT OK	wait 80 ms send V.21 carrier send flags send EOP frame send FCS drop carrier	detect carrier detect flags receives EOP	final frame
AT+FRH=3	CONNECT <MCF frame data> <DLE><ETX> OK	detect carrier detect flags get MCF frame check FCS accept FCS	send V.21 carrier send flags get MCF frame send FCS	Final frame bit set. frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <DNC frame> <DLE><ETX>	CONNECT OK	send V.21 carrier send flags send DNC frame send FCS drop carrier	detect carrier detect flags receive DC|NC	final frame
ATH0	OK	hang up	hang up	

Table 2-5. Fax Class 1 Answering Sequence (Receiving a Single Page)

DTE Commands	Modem Responses	Local Modem Action	Remote Station Action	Notes
AT+FCLASS=1	OK	Set Class 1		
	RING<-	detect ringing	dials [,send CNG]	
ATA <CSI frame data> <DLE><ETX> <DIS frame data> <DLE><ETX>	CONNECT CONNECT OK	off-hook, send CED, send V.21 carrier send flags send CSI frame send FCS send flags send DIS data send FCS and flags drop carrier	get CED, detect carrier detect flags receive CSI get FCS get flags get DIS get flags	AT+FRH=3 implied by answering with +FCLASS=1.0. not final frame final frame
AT+FRH=3	CONNECT <TSI frame data> <DLE><ETX> OK	detect carrier detect flags receive TSI receive FCS accept FCS	send V.21 carrier send flags send TSI frame send FCS	 frame OK
AT+FRH=3	CONNECT <DCS frame data> <DLE><ETX> OK	receive DCS receive FCS accept FCS	send DCS frame send FCS	final frame bit set frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	DTE did not check final frame bit and issued +FRH=3
AT+FTM=96	CONNECT <TCF data> <DLE><ETX> OK	detect carrier receive TCF detect loss-of-carrier	wait 75 ms send V.29 carrier send TCF data drop carrier	
AT+FRH=3 <CFR frame data> <DLE><ETX>	CONNECT OK	send V.21 carrier send flags get CRF frame send FCS drop carrier	detect carrier detect flags receive CFR	 final frame
AT+FTM=96	CONNECT <page image data> <DLE><ETX> NO CARRIER	detect carrier receive page detect loss-of-carrier	send V.29 carrier send page data drop carrier	
	CONNECT <EOP frame data> <DLE><ETX> NO CARRIER	detect carrier detect flags receive EOP receive FCS accept FCS	wait 75 ms send V.21 carrier send flags send EOP frame send FCS	 frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	
AT+FRH=3 <MCFame data> <DLE><ETX> 	CONNECT OK	send V.21 carrier send flags get MCF frame send FCS accept FCS	detect carrier detect flags receive MCF frame	 final frame
AT+FRH=3	CONNECT <DCN frame data> <DLE><ETX> OK	detect carrier detect flags receive DCN receive FCS accept FCS	send V.21 carrier send flags send DCN frame send FCS	 frame OK
AT+FRH=3	NO CARRIER	detect loss-of-carrier	drop carrier	end of session
ATH0	OK	hang up		

Chapter 3 – Fax Class 2 Commands

Fax Class 2 commands apply to the MT5656SMI only and are summarized in Table 3-1.

Table 3-1. Fax Class 2 Commands

Command	Function
Service Class ID	
+FCLASS=	Service Class
Class 2 Action Commands	
D	Originate a Call
A	Answer a Call
+FDT	Data Transmission
+FET=N	Transmit Page Punctuation
+FDR	Begin or Continue Phase C Receive Data
+FK	Session Termination
Class 2 DCE Responses	
+FCON	Facsimile Connection Response
+FDCS:	Report Current Session
+FDIS:	Report Remote Identification
+FCFR	Indicate Confirmation to Receive
+FTSI:	Report the Transmit Station ID
+FCSI:	Report the Called Station ID
+FPTS:	Page Transfer Status
+FET:	Post Page Message Response
+FHNG	Call Termination with Status
Class 2 Session Parameters	
+FMFR?	Identify Manufacturer
+FMDL?	Identify Model
+FREV?	Identify Revision
+FDCC=	DCE Capabilities Parameters
+FDIS=	Current Sessions Parameters
+FDCS=	Current Session Results
+FLID=	Local ID String
+FCR	Capability to Receive
+FPTS=	Page Transfer Status
+FCR=	Capability to Receive
+FAE	Adaptive Answer
+FBUF?	Buffer Size (Read Only)
+FPHCTO	Phase C Time Out
+FAXERR	Fax Error Value
+FBOR	Phase C Data Bit Order

Command and Syntax Guidelines

Mode Entry Commands

+FCLASS=2 - Select Facsimile Class 2 Mode
+FCLASS=2 selects the Fax Class 2 Mode (see Generic Modem Control).

DTE Commands

The ISO 646 character set (CCITT T.50 International Alphabet 5, American Standard Code for Information Interchange) is used for the issuance of commands and responses. Only the low-order 7 bits of each character are used for commands or parameters; the high order bit is ignored. Upper case characters are equivalent to lower case characters. For Phase C data transmission or reception, all 8 bits are needed.

DTE Command Lines

A command line is a string of characters sent from a DTE to the modem (DCE) while the modem is in a command state. A command line has a prefix, a body, and a terminator. Each command line (with the exception of the A/ command) must begin with the character sequence AT and must be terminated by a carriage return. Commands entered in upper case or lower case are accepted, but both the A and T must be of the same case, i.e., "AT" = ASCII 065, 084 or "at" = ASCII 097, 116. The body is a string of commands restricted to printable ASCII characters (032 - 126). Space characters (ASCII 032) and control characters other than CR (ASCII 013) and BS (ASCII 010) in the command string are ignored. The default terminator is the ASCII <CR> character. Characters that precede the AT prefix are ignored. The command line interpretation begins upon receipt of the carriage return character.

Facsimile Command Syntax

After the "AT" or "at" prefix, facsimile commands use extended syntax. Each command is preceded by the "+F" character and consists of single characters and a decimal parameter (if applicable) terminated by the semicolon ":" character (ASCII 059) or by the <CR> that terminated the command line. A missing decimal parameter is evaluated as 0.

For example, the command to instruct the modem to automatically answer a data or fax call and also enable reception is:
  AT+FAE=0; +FCR 1 <CR>

Basic data mode and fax service class mode select commands are:
  AT+FCLASS=0 <CR> for Data Mode
  AT+FCLASS=1 <CR> for Service Class 1 Fax
  AT+FCLASS=1.0 <CR> for Service Class 1.0 Fax
  AT+FCLASS=2 <CR> for Service Class 2 Fax

In Class 2, the DCE makes and terminates calls, manages the communication session and negotiates (T.30 protocol) and transports the image date to DTE. The T.4 protocol management of image data, etc., is done by DTE.

The response to
  AT+FCLASS= 0<CR> in Data Mode
  or
  AT+FCLASS=2<CR>   in Service Class 2 Fax
  is
  OK

The service class may be set by the DTE from the choices available using the "+FCLASS=<VALUE>" command.

General Rules

1. +Fnnn commands must be entered completely, otherwise an ERROR response is sent.
2. All response messages are preceded and followed by <CR><LF>. Multiple response commands (e.g., +FDIS: +FCSI: and +FDCS:) will, therefore, appear to a have a blank line between them.
3. Fax Class 2 commands can be separated by the ":" character. The ";" character can be omitted if desired. Non-data commands cannot be separated by the ";" which is allowed as a dial modifier.
4. All Class 2 commands are assumed to be the final command on a command line. Additional characters will be ignored.
5. An ERROR message will be generated if any of the following conditions occur:
   a. A Class 1 command is received while in Class 2.
   b. A Class 2 command is received while in Class 1.
   c. A Class 1 or Class 2 action command is received while in data modem mode.
   d. A Class 2 read-only parameter is given the "=" form of a +F command (e.g., AT+FAXERR=5).
   e. A Class

Serial Port Speed and Flow Control

During fax mode, the DTE-DCE port speed is 19200 bps.

The DCE provides a speed buffer of 1024 bytes and provides the DC1/DC3 (XON/XOFF) or RTS/CTS method of controlling the data into the buffer. This flow control is controlled by the &K3 or &K4 command.

This method of data flow control is available only for DTE to DCE direction of data.

There is no provision for data flow control from DCE to DTE.

Data Stream Termination

The DCE exchanges streams of data with the DTE while executing data transfer commands. These data streams use the termination described in Section 3.2/ISO 2111.

The ASCII <DLE> character (016) is used as a special character to shield special characters. The <DLE><ETX> character pair (<106><003>) is used to mark the end of a stream. The following patterns are used:

> any data...<DLE><ETX> end of stream
> any data...<DLE><DLE> single <DLE> in data
> any data...<DLE><any byte> delete <DLE><any byte>

DTE to DCE Streams

The DCE filters the data stream from the DTE, and removes all character pairs beginning with <DLE>. The DCE recognizes <DLE><ETX> as the stream terminator. The DCE recognizes <DLE><DLE> and reinserts a single <DLE> in its place.

The DTE must filter stream data to the DCE, and insert extra <DLE> characters ahead of data.

DCE to DTE Streams

The DTE must filter the data stream from the DCE, and remove all character pairs beginning with <DLE>. The DTE must recognize <DLE><ETX> as the stream terminator. The DTE must recognize <DLE><DLE> and reinsert a single <DLE> in its place.

The DCE filters stream data to the DTE, and inserts extra <DLE> characters ahead of data.

Auto Answer

The DCE can answer as a data DCE or as a fax DCE. It can answer the call adaptively, i.e., it can determine whether the call is 'data' or 'fax'. The +FAA parameter controls this feature. Fax adaptive answer operates only when +FCLASS=0.

> AT+FAA=1 ; Auto answer as a facsimile or a data modem depending on the call
> CONNECT XXXX ; DCE status response if data call
> +FCON ; DCE status response if fax call

Identification of T.30 Options

Group 3 devices negotiate session parameters in DIS, DCS, and DTC frames.

Session Status Reporting

The DCE provides reports to the DTE on the status of a session. The DCE provides the following status reports:

> **1.** Connection and hang up status:
> +FCON
> +FHNG:<0-255>
> **2.** Requested DIS session parameters +FDIS: <string> reports remote facsimile
>   capabilities.
>   Syntax: +FDIS: VR, BR, WD, LN, DF, EC, BF, ST
> **3.** +FDCS: <string> reports the negotiated parameters
> **4.** Phase C prompts:
>   XON, XOFF, DC2
> **5.** Phase C base status reports: depending upon copy quality and related end-of page
>   status:
>   +FPTS: <1-5>

Procedure Interrupt Negotiation

CCITT allows a station to request a procedure interruption at the end of a page. This request is passed between stations by the PIP, PIN, and PRI-Q messages.

Service Class 2 Identification and Selection

Three commands report identification and selection information. Each of these three commands cause the DCE to send a message to the DTE.

+FMFR? - Request Manufacturer Identification

The +FMFR? command causes the DCE to send a message identifying the DCE product manufacturer. The default message is:

```
CONEXANT
OK
```

+FMDL? - Identify Product Model

The +FMDL? command causes the DCE to send a message identifying the DCE product model.

+FREV? - Identify Product Revision

The +FREV? command causes the DCE to send a message identifying the DCE product model revision number. The message format is the same as the ATI3 message, e.g.:

```
VX.X-F_A
OK
```

Service Class 2 Action Commands

These commands transfer data, and punctuate sessions. They also release specific T.30 messages. All action commands must be the last command on a command line as indicated by the terminating <CR>.

All action commands initiate processes. The modem will not accept other commands from the DTE until the modem issues a final result code (e.g., OK, CONNECT). The modem will abort the process if it receives any character before the final result code is issued.

Command: ATD   Originate a Call
Syntax: ATD....<CR>
                     The DCE can support a DTE command to originate a call using the ATD
                     command (see Data Commands).
If this command is unsuccessful, the DCE reports an appropriate failure or error type result code such as NO CARRIER, NO DIAL TONE, or BUSY (see S-Parameters).

If this call is successful, the typical DCE response is:
                     ATDnn..nn (go off-hook, dial, get CED)
                     +FCON (DCE detects flags)
                     [+FCSI:<remote ID string>]
                     +FDCS:<T.30 subparameter string>
                     OK

The DCE dials, detects call progress, and generates the CNG tone. It then waits for a DIS frame. On detection of the first Phase B preamble (V.21 ch. 2 modulated by 300 bps HDLC flags), it reports the "+FCON" message to the DTE. The DCE then switches to 19200 bps.

The DCE generates a DCS frame based on the received DIS frame and on the previously set +FDIS parameter. A +FDT command from the DTE releases the DCE to transmit that DCS frame.

The DCE reports the initial received T.30 negotiation messages, including the DIS frame and the optional CSI ID string. The +FDIS: report is followed by the OK final result code.

Command: ATA - Answer a Call
The DCE can support a DTE command to answer an incoming call using the ATA command (see Data Commands).

The DTE may issue an Answer command in response to an incoming ring.

If the Answer command is unsuccessful, the DCE will report an appropriate failure or error type result code, such as NO CARRIER (see S-Parameters).

Manual Call Answer
If this call is successful, the typical DCE response (answer and receive) is:
        +FCON
                [+FTSI:<remote ID string>]
                +FDCS:<T.30 subparameter string>
                OK
                (DTE should issue +FDR command here)

Upon receipt of an Answer command from the DTE, the DCE answers and generates the CED tone. The DCE then generates a DIS frame (derived from the +FDIS parameter) and hunts for the first T.30 negotiation frames. Upon detection of the first Phase B preamble (V.21 ch 2 modulated by 300 bps HDLC flags), it reports the "+FCON" message to the DTE.

The DTE should report the initial received T.30 negotiation messages, including the DCS frame. The +FDCS: report will be followed by the OK final result code.

Automatic Answer
The modem provides for automatic answering of incoming calls. If configured for automatic answer, the modem answers an incoming call in compliance with T.30, and reports the same messages as described for manual answer.
Connection as a Data Modem

If configured to do so by the +FAA parameter, the DCE will adaptively answer as a facsimile DCE or as a data DCE. If the DCE answers as a data DCE, it resets the +FCLASS parameter to 0 and issues the appropriate final result code (e.g., CONNECT, or NO CARRIER) to the DTE.

Command: +FDT   Data Transmission
Syntax: +FDT <CR>
The +FDT command prefixes Phase C data transmission. When the DCE is ready to accept Phase C data, it issues the negotiation responses and the CONNECT result code to the DTE.

In Phase B, the +FDT command releases the DCE to proceed with negotiation, and releases the DCS message to the remote station. In Phase C, the +FDT command resumes transmission after the end of a prior transmit data stream.

Initiate Page Transmission
Phase B DCE polled response:
        [+FCSI:<remote ID string>] - if new CSI received
        [+FDIS:<subparameters from remote station>] - if new DIS received
        +FDCS:<T.30 subparameter string>
        CONNECT
        <XON> - when ready for data
After placing a call, or after finishing a document exchange, the DTE may command the DCE to re-enter T.30 Phase B to attempt to negotiate a document transmission.

Continue a Page
        CONNECT
        <XON>
The DTE may issue more than one +FDT command for a given page, so that different files may be concatenated together. These files must have the same format.

Phase C Data Framing
Phase C data must be presented to the DCE in stream mode. The DCE expects Phase C data to follow until it detects <DLE><ETX> termination characters. The DCE will filter the stream.

The DCE will acknowledge the end of the data by returning the OK result code to the DTE.

If there is data underrun before the next +FDT or +FET= command, the DCE will zero-fill the pad as per T.4 until the Phase C timeout (+FPHCTO) is reached, or until more data is received. The DCE appends an RTC pattern to the transmit data after an +FET= command is received from the DTE.

Phase C Data Format
The Phase C data will be of the format specified by the negotiated T.30 DCS frame.

The DCE will use the negotiated minimum Scan Time parameter from the DCS frame, and insert sufficient fill bits to pad each line to the minimum scan time. This is reported in the +FDCS:ST subparameter.

If the DCE finds more than one consecutive EOL in Phase C data (e.g., RTC), it will send only one EOL.

1. Phase C data must conform to T.4 specifications.
2. The DTE need not include a final RTC, since the DCE will append an RTC in response to an FET= command.
3. Some facsimile machines may treat two EOLs as an RTC.

<CAN> - Escape from Transmission

The DCE may request the DTE to halt Phase C transmission, by sending a cancel <CAN> character (024) to the DTE. In this case, the DTE should terminate Phase C transmission, issue <CAN>, and wait for the OK response code from the DCE.

Table 3-2. T.30 Session Subparameter Codes

Label	Function	Value	Description	
VR	Vertical Resolution	0	Normal, 98 lpi	
		1	Fine, 196 lpi	
BR	Bit Rate (See Note 1)		+FDCS (originate)	+FDIS (answer)
		0	2400 bps/V.27 ter	V.27 ter (2400 only)
		1	4800 bps/V.27 ter	V.27 ter
		2	7200 bps/V.29	V.29, V.27 ter
		3	9600 bps /V.29 or V.17	V.29, V.27 ter
		4	12000 bps/V.33 or V.17	V.17, V.33, V.29, V.27 ter
		5	14400 bps/V.33 or V.17	V.17, V.33, V.29, V.27 ter
WD	Page Width	0	1728 pixels in 215 mm	
		1	2048 pixels in 255 mm	
		2	2432 pixels in 303 mm	
		3*	1216 pixels in 151 mm	
		4*	4864 pixels in 107 mm	
LN	Page Length	0	A4, 297 mm	
		1	B4, 364 mm	
		2	unlimited length	
DF	Data Compression Format	0	1-D modified Huffman	
		1*	2-D modified Read	
		2*	2-D uncompressed mode	
		3*	2-D modified modified Read	
EC	Error Correction	0	Disable ECM	
	(Annex A/T.30)	1*	Enable ECM, 64 bytes/frame	
		2*	Enable ECM, 256 bytes/frame	
BF	Binary File Transfer	0	Disable BFT	
		1*	Enable BFT	
ST	Scan Time/Line		VR = normal	VR = fine
		0	0 ms	0 ms
		1	5 ms	5 ms
		2	10 ms	5 ms
		3	10 ms	10 ms
		4	20 ms	10 ms
		5	20 ms	20 ms
		6	40 ms	20 ms
		7	40 ms	40 ms
Notes: 1. CCITT T.30 does not provide for the answering station to specify all speeds exactly using the DIS frame. Implementation of some BR codes (e.g., code 2) by an answering DCE is manufacturer specific. * Not supported.				

Command: +FET   Transmit Page Punctuation

Description: This command is used to punctuate page and document transmission after one or more +FDT commands. This command generates T.30 Post Page Messages selected by the <ppm> code.

The +FET=<ppm> command indicates that the current page is complete; no more data will be appended to it. The value indicates whether there are any additional pages are to be sent and, if so, whether there is a change in any of the document parameters.

The DTE can command the DCE to generate PRI-Q messages with the +FET=<ppm> command using ppm codes 4-6.

This command must be sent within the time out specified by +FPHCTO after sending Phase C data, or else the DCE will end the page and document transmission. If the Phase C timeout is reached, the DCE sends an EOP post page message and terminates the session.

The remote facsimile station should respond to the post page message with a post page response. The DCE will report this using the +FPTS:<ppr> response.

Syntax: +FET=<ppm>[,<pc>,<bc>,<fc>]
DCE response: +FPTS:<ppr> - when receive from remote OK

End a Page

The +FET= command causes the DCE to append an RTC (6 EOL) pattern as needed and enter Phase D by sending the selected T.30 Post Page message.

The +FET=1 (EOM) command signals the remote station that the next document will have a new DCS negotiated; this causes the session to re-enter Phase B.

Table 3-3. T.30 Post Page Message Codes

ppm Code	Mnemonic	Description
0	[PPS-]MPS	Another page next, same document
1	[PPS-]EOM	Another document next
2	[PPS-]EOP	No more pages or documents
3	PPS-NULL	Another partial page next
4	[PPS-]PRI-MPS	Another page, procedure interrupt
5	[PPS-]PRI-EOM	Another doc., procedure interrupt
6	[PPS-]PRI-EOP	All done, procedure interrupt
=8+ppm		Post Page Message (ppm code)

Table 3-4. T.30 Post Page Response Messages

ppr Code	Mnemonic	Description
1	MCF	Page good
2	RTN	Page bad; retrain requested
3	RTP	Page good; retrain requested
4	PIN	Page bad; interrupt requested
5	PIP	Page good; interrupt requested

Command: +FDR   Begin or Continue Phase C Receive Data

Description: The +FDR command initiates transition to Phase C data reception. This can occur after answering, dialing, a document is received, or a page is received.

The DCE reports the negotiated T.30 parameters, with the remote ID information if available. When the DCE is ready to commence data transfer, it issues a CONNECT response code. If the DCE cannot resume data transfer because there is no more data, it responds OK. When the DTE is ready to accept data, it issues an <DC2> character (018) to the DCE.

If the DTE issues an <XOFF> character to the DCE for flow control, the DCE signals the DTE when its buffers are empty by sending a <DLE><DC2> (<016><018>) character pair.

When the DCE delivers the last byte of a page, the DCE reports the Page Transfer Status via the +FPTS:<ppr> response.

After a Page Transfer Status Report, the DCE reports the post page message from the remote facsimile station via the +FET:<ppm> response which signals the intentions of the remote station.

The DCE holds the post page response message to the remote facsimile station (MCF, etc.), represented in the +FPTS parameter until the next +FDR command. The DTE may modify the +FPTS parameter before issuing the +FDR command which releases that message. The DTE must issue a +FDR command to release Post Page Messages.

Syntax: +FDR <CR>
Default value: 3 seconds in some places

Initiate Document Reception
The +FDR command may be issued in Phase B after an answer command, or in Phase B after a previous document.
The DCE response in stream mode is:
    +FCFR when CFR sent
    [+FTSI:<remote ID string>] if new TSI received
    +FDCS:<T.30 subparameter string>] if new DCS
    CONNECT
    (<DC2> needed from DTE here)
    <Phase C data stream>
    <DLE><ETX>
    +FPTS:<ppr>, <lc> [,<blc>, <cblc>]
    +FET:<ppm>
    OK
    (DTE must issue +FDR command to release post page response)

Continue Document Reception
The DTE may issue a +FDR command in Phase D, which releases the post page message, and indicates readiness to receive another page after receipt of a Multipage (+FET:0) or PPS-NULL (+FET:3) message.
The DCE response will be:
    CONNECT
    (<DC2> needed from DTE here)
    <Phase C data stream)
    <DLE><ETX>
    +FPTS:<ppr>, <lc> [,<blc>, <cblc>]
    +FET:<ppm>
    OK
    (DTE must issue +FDR command to release post page response)
    If done receiving:
        +FHNG: <hangup cause code>
        OK
        Continue page reception

Phase C Data Framing

Phase C data may be presented to the DTE in stream mode. The DCE will transfer a stream of data to the DTE, followed by the <DLE><ETX> stream termination characters.

The DCE will filter the stream as described in Voice Commands -- <DLE> Shielded Codes Sent to the Modem (DCE).

Phase C Data Format

The received data format is negotiated under T.30 reported by the +FDCS:VR,BR,WD,LN,DF,EC,BF,ST response.

The DCE will delete the terminating RTC (6 EOLs) patterns.

<CAN> - Escape from Reception

From the +FDR command until the end of Phase D Date, the DCE is in a data transfer state, and will not respond to DTE command characters. The DCE will respond to three ASCII control characters: <DC1> (017) and <DC3> (019) flow control characters, and cancel <CAN> (024).

Upon receipt of the <CAN> character, the DCE will terminate the reporting of received data by sending trailing <DLE><ETX> characters to the DTE, and will then execute an implied +FK command in order to conduct an orderly disconnection.

Command: +FK   Session Termination

Description:	The +FK command causes the DCE to terminate the session in an orderly manner. In particular, the DCE will send a DCN message at the next opportunity and hang up. At the end of the termination process, the DCE will report the +FHNG response with result code.
	This operation can be invoked by using the cancel <CAN> character during Phase C data reception (see prior section).
	The DCE will wait until the current page completes, unless the reception is of unlimited length; in that case, the DCE may halt reception and terminate the session at any time.
Syntax:	+FK

Command: +FCIG   Set Polling ID

Description:	This command allows setting the Local Polling ID string used in a CIG frame. The syntax of this command is identical to +FLID.
Write syntax:	+FCIG="<local ID string>"
Valid value:	20-character ASCII string
Default value:	Empty

Command: +FLPL   Indicate a Document for Polling

Description:	This command allows setting up an answering modem to know that it has a document available for polling. This allows a calling modem to receive this fax from the answerer.
Syntax:	AT+FLPL=?
	0,1
	OK
	AT+FLPL=1
	OK
	AT+FLPL?
	1

Command: +FSPL   Enable Polling

Description: This command allows setting up an originating modem to be able to request to receive a document from a polled station.

Syntax: AT+FSPL=?
0,1
OK
AT+FSPL=1
OK
AT+FSPL?
1

Table 3-5. Hang Up Status Codes

Code	Cause Description
0-9	**Call Placement and Termination**
0	Normal and proper end of connection
1	Ring Detect without successful handshake
2	Call aborted, from +FK or AN
3	No Loop Current
10-19	**Transmit Phase A & Miscellaneous Errors**
10	Unspecified Phase A error
11	No Answer (T.30 T1 timeout)
20-39	**Transmit Phase B Hangup Codes**
20	Unspecified Transmit Phase B error
21	Remote cannot receive or send
22	COMREC error in transmit Phase B
23	COMREC invalid command received
24	RSPEC error
25	DCS sent three times without response
26	DIS/DTC received 3 times; DCS not recognized
27	Failure to train at 2400 bps or +FMINSP value
28	RSPREC invalid response received
40-49	**Transmit Phase C Hangup Codes**
40	Unspecified Transmit Phase C error
43	DTE to DCE data underflow
50-69	**Transmit Phase D Hangup Codes**
50	Unspecified Transmit Phase D error
51	RSPREC error
52	No response to MPS repeated 3 times
53	Invalid response to MPS
54	No response to EOP repeated 3 times
55	Invalid response to EOP
56	No response to EOM repeated 3 times
57	Invalid response to EOM
58	Unable to continue after PIN or PIP
70-89	**Receive Phase B Hangup Codes**
70	Unspecified Receive Phase B error
71	RSPREC error
72	COMREC error
73	T.30 T2 timeout, expected page not received
74	T.30 T1 timeout after EOM received
90-99	**Receive Phase C Hangup Codes**
90	Unspecified Receive Phase C error
91	Missing EOL after 5 seconds
92	Unused code
93	DCE to DTE buffer overflow
94	Bad CRC or frame (ECM or BFT modes)
100-119	**Receive Phase D Hangup Codes**
100	Unspecified Receive Phase D errors
101	RSPREC invalid response received
102	COMREC invalid response received
103	Unable to continue after PIN or PIP
120-255	**Reserved Codes**
Note: Some codes are not implemented.	

Service Class 2 DCE Responses

The DCE sends information responses to the DTE as a facsimile session proceeds. They indicate the state of the facsimile session and convey needed information. These messages are solicited messages generated in execution of DTE action commands.

The DCE precedes and follows the information responses with <CR><LF>.

The DCE provides the on-line status of several session parameters when they are available during T.30 handshaking. These include the remote ID string and the DIS/DCS parameters. These responses report the T.30 session parameter frames.

Command: +FCON   Facsimile Connection Response

+FCON indicates connection with a fax machine. It is released by detection of HDLC flags in the first received frame. +FCON is generated in response to an Originate or Answer command.

Command: +FDCS: Report Current Session Capabilities

Description:	+FDCS:<string> reports the negotiated parameters. Phase C data will be formatted as described by the subparameters. This message may be generated in execution of +FDT or +FDR commands before the CONNECT result code if new DCS frames are generated or received.
Syntax:	+FDCS:VR,BR,WD,LN,DF,EC,BF,ST

Command: +FDIS: Report Remote Station Capabilities

Description:	+FDIS:<string> reports remote facsimile station capabilities and intentions. The parameters are provided in ASCII notation. This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.
Syntax:	+FDIS:VR,BR,WD,LN,DF,EC,BF,ST

Command: +FCFR   Indicate Confirmation to Receive

Description:	The DCE sends a +FCFR response to the DTE upon reception of an acceptable TCF training burst and a valid DCS signal from the remote machine. This indicates that the DCE will receive Phase C data after the remote station receives the local DCE's CFR message. The +FCFR message is generated in execution of a +FDR command.
Syntax:	+FCFR

Command: +FTSI: Report the Transmit Station ID

Description:	This response reports the received transmit station ID string, if any. This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.
Syntax:	+FTSI: "<TSI ID string>" Transmit Station ID

Command: +FCSI: Report the Called Station ID

Description:	This response reports the received called station ID string, if any. This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.
Syntax:	+FCSI: "<CSI ID string>" Called Station ID

Command: +FPTS: Receive Page Transfer Status

Description:
The +FPTS:<ppr> is generated by the DCE at the end of Phase C data reception in execution of a +FDR command.
The <ppr> is generated by the DCE; it depends on the DCE capabilities at T.4 error checking.
The receiving DCE will count the lines. These values are;
  <lc> = line count
  <blc = bad line count
  <cblc> = <consecutive bad line count
A receiving DTE may inspect <ppr> and write a modified value into the +FPTS parameter. The DCE will hold the corresponding Post Page Response message until released by a +FDR command from the DTE.

Syntax:
+FPTS:<ppr>, <lc> [,<blc>, <cblc>]

Command: +FET: Post Page Message Response

Description:
The +FET:<post page message> response is generated by a receiving DCE after the end of Phase C reception on receipt of the post-page message from the transmitting station. The +FET:<ppm> response is generated in execution of a +FDR command. The <ppm> codes respond to the T.30 post page messages.

Syntax:
+FET:<ppm>

Command: +FPTS: Transmit Page Transfer Status

Description:
The +FPTS: response reports a <ppr> number representing the copy quality and related post-page message responses received from the remote DCE.
The +FPTS:<ppr> response is generated in execution of a +FET=<ppm> command.

Syntax:
+FPTS:<ppr>

Command: +FHNG: Call Termination with Status

Description:
+FHNG indicates that the call has been terminated. The hangup cause is reported and stored in the +FAXERR parameter for later inspection.
+FHNG:<hsc> is a possible intermediate result code to any DTE action command. It is always followed by the OK final result code.
Upon termination of a call, the DCE determines the cause of termination and reports it as part of the FHNG:<hsc> response. It also stores this <hsc> code in the +FAXERR parameter for later inspection.
The hangup values are organized according to the phases of the facsimile transaction as defined by T.30. In the Figure A/T.30 flow charts, there are decision boxes labeled "Command Received?"; this is referred to as COMREC in the table. Similarly, decision boxes labeled `Response Received?' are referred to as RSPREC in the table. A COMREC error or RSPREC error indicates that one of two events occurred: 1) a DCN (disconnect) signal was received, or 2) an FCS error was detected and the incoming signal was still present after 3 seconds.
The table values are in decimal notation. Leading zero characters are optional.

Syntax:
+FHNG:<hangup status code>

Command: +FCIG: Report the Polled Station ID

Description: This response reports the received transmit station ID string, if any. This message is generated in execution of Originate, Answer, +FDT, or +FDR commands.

Syntax: +FCIG: "< ID string>" Polled Station ID

Command: +FDTC: Report the Polled Station Capabilities

Description: If the answerer has a document to poll, it would be communicated to the originator in bit 9 of the DIS frame. The originating station may elect to transmit a fax, and later, send SIG and DTC frames to pick up the polled document. The answering station would report the incoming DTC frame via the +FDTC: response message after command mode is canceled with the AT+FDR command.

Syntax: +FDTC: "< string>" Polled Station Capabilities

Command: +FPOLL Indicate Polling Request

Description: This message is sent to the DTE if the received DIS message indicates that the remote station has a document to poll (by bit 9 in the DIS) and polling has been enabled with the AT+FSPL command. The DTE may then decide to receive rather than transmit.

Syntax: +FPOLL:

Service Class 2 Parameters

All Service Class 2 parameters can be read, written, and tested for range of legal values by the DCE. The general syntax is described in the Voice Commands Overview section.

Group 3 FAX devices negotiate session parameters in DIS, DCS, and DTC frames. The following parameters are provided to condition the facsimile DCE for the capabilities it will offer and to report the session settings negotiated.

The three primary T.30 session parameters are +FDCC, +FDIS and +FDCS. They are compound parameters.

Figure 3-2. T.30 Session Parameter Relationships
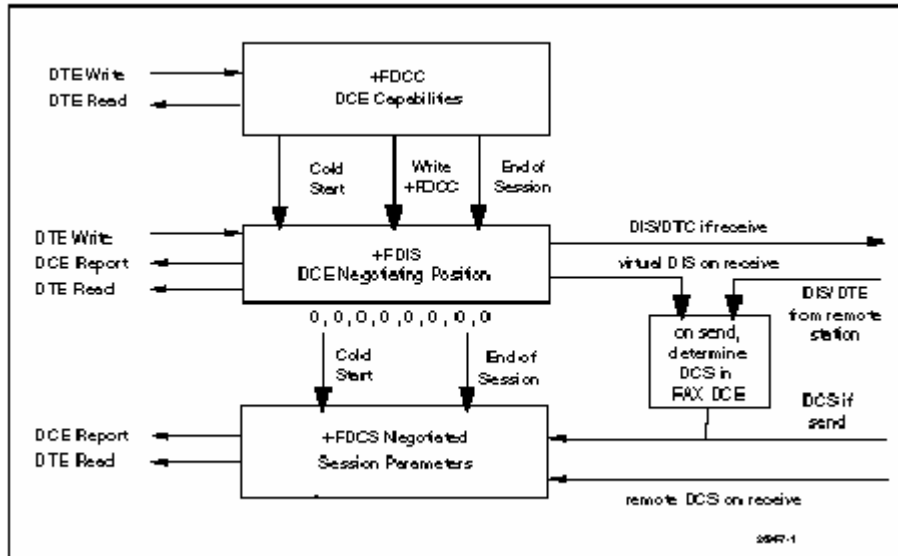
Command: +FDCC   DCE Capabilities Parameters

Description:	+FDCC allows the DTE to sense and constrain the capabilities of the facsimile DCE from the choices defined in CCITT T.30 Table 2. When +FDCC is modified by the DTE, the DCE copies +FDCC into +FDIS.
Write syntax:	+FDCC=VR,BR,WD,LN,DF,ED,BF,ST
Valid values:	See Table 3-2.
Default values:	0,3,0,2,0,0,0,0 (9600 bps fax models) or 0,5,0,2,0,0,0,0 (14400 bps fax models)

Command: +FDIS   Current Sessions Capabilities Parameters

Description:	The +FDIS parameter allows the DTE to sense and constrain the capabilities used for the current session. The DCE uses +FDIS to generate DIS or DTC messages directly, and uses +FDIS and received DIS messages to generate DCS messages.
	The DCE initializes the +FDIS parameter from the +FDCC parameter on initialization, when +FDCC is written, and at the end of a session.
Write syntax:	+FDIS=VR,BR,WD,LN,DF,EC,BF,ST
Valid values:	See Table 3-2.
Default values:	0,3,0,2,0,0,0,0 (9600 bps fax models) or 0,5,0,2,0,0,0,0 (14400 bps fax models)

Command: +FDCS   Current Session Results Parameters

Description:	The +FDCS parameter is loaded with the negotiated T.30 parameters for the current session. A transmitting DCE generates DCS; a receiving DCE gets DCS from the remote station. The DTE may read this parameter.

The +FDCS parameter is initialized 0,0,0,0,0,0,0,0 upon initialization and at the beginning of a session. If the DTE issues a +FDCS? command in the initial state, the DCE reports:

  <CR><LF>0,0,0,0,0,0,0,0<CR><LF>

The contents of +FDCS are spontaneously reported during execution of +FDR or +FDT commands by the +FDCS:VR,BR,WD,LN,BF,EC,BF,ST response using the same compound parameter format.

Several commands and responses reference T.30 session negotiated parameters. These are described by a set of common subparameters.

The +FDCC, +FDIS, and +FDCS compound parameters use these session parameters (On writes, unspecified subparameters are unchanged.)

The +FDIS:, +FDCS:, and +FDTC: session report responses use these subparameters.

For test response, ranges of values are reported for each subparameter enclosed in parentheses characters. For example, a DCE response to +FDCC=? could report:

<CRLF> (0,1), (0-5), (0-3), (0-2), (0-2), (0-2), (0), (0-7) <CRLF> (14400 fax models)

Read syntax:	+FDCS?
DCE response:	+FDCS=VR,BR,WD,LN,DF,EC,BF,ST
	or
	+FDCS=
Valid values:	See Table 3-2.
Default values:	0,0,0,0,0,0,0,0
Example:	+FDIS=0,5,0,2,0,0,0,1 =
	VR = 0 98 dpi vertical resolution,
	BR = 5 14400 bit/s
	WD = 0 1728 pixels,
	LN = 2 unlimited length
	DF = 0 1-D modified Huffman coding,
	EC = 0 no ECM,
	BF = 0 no BFT,
	ST = 1 5 ms scan time.

Command: +FLID=   Local ID String

Description:	If FLID is not a null string, it generates a TSI or CSI frame. Table 3/T.30 includes digits 0-9, "+" and space.

If the DCE supports use of Table 3/T.30 only, the response to a +FLID=? command is "(20) (32, 43, 48-57)." If the DCE supports printable ASCII <, the response is: "(20) (32-127)<CRLF>." The first "(20)" represents string length: the second (character values) field reports supported string values.

1. The string is saved in RAM.
2. Non-numeric characters are not filtered out.
3. The string is right justified.

Write syntax:	+FLID="<local ID string>"
Valid value:	20-character ASCII string
Default value:	Empty

Command: +FCR   Capability to Receive

Description:	+FCR=0 indicates that the DCE will not receive message data. This can be used when the DTE has insufficient storage. The DCE can send and can be polled for a file.
	+FCR is sampled in CCITT T.30 Phase A and Phase D.
Write syntax:	+FCR=\<value>
Valid values:	0 or 1
Default value:	0

Command: +FPTS= Page Transfer Status

Description:	The +FPTS parameter contains a value representing the post page response, including copy quality and related end-of-page status. These values correspond to post page response messages defined in T.30. The receiving DCE sets this parameter after it receives a page of Phase C data. The transmitting DCE sets this parameter with the status reported by the receiving station. The DTE may inspect or modify this parameter.
	The set of \<ppr> values is defined in Table 3-4. These values are also reported in the +FPTS response to the +FDR command.
Write Syntax:	+FPTS=\<ppr>
Valid values:	1, 2, 3, 4, 5
Default value:	0

Command: +FCQ   Copy Quality Checking

Description:	This parameter controls Copy Quality checking by a receiving facsimile DCE. The DCE returns +FCQ=0 which indicates the DCE does no quality checking. The DCE will generate Copy Quality OK (MCF) responses to complete pages, and set +FPTS=1.
Write syntax:	+FCQ=\<value>
Valid values:	0
Default value:	0

Command: +FPHCTO   DTE Phase C Response Time-out

Description:	The +FPHCTO command determines how long the DCE will wait for a command after reaching the end of data when transmitting in Phase C. When this time-out is reached, the DCE assumes there are no more pages and no documents to send. It then sends the T.30 EOP response to the remote device.
Write syntax:	+FPHCTO=\<value>
Valid values:	0 - 255, 100 millisecond units.
Default value:	30

Command: +FAXERR   T.30 Session Error Report

Description:	his read-only parameter indicates the cause of the hangup. Table 3-5 shows the valid values for this parameter as well as the meaning of the each value. +FAXERR is set by the DCE at the conclusion of a fax session. The DCE resets +FAXERR to 0 at the beginning of Phase A off-hook time.
Read syntax:	+FAXERR= \<table value>, read only
Valid values:	0 - 255

Command: +FBOR Data Bit Order

Description: This parameter controls the mapping between PSTN facsimile data and the DTE-DCE link. There are two choices:

> Direct: The first bit transferred to each byte on the DTE-DCE link is the first bit transferred on the PSTN data carrier.
> Reversed: The last bit transferred of each byte on the DTE-DCE link is the first bit transferred on the PSTN data carrier.

There are two data types to control:

> This command controls Phase C data (T.4 encoded data) transferred during execution of +FDT or +FDR commands.

The following two codes are supported:

> +FBOR=0 or 2 Selects direct bit order for Phase C data.
> +FBOR=1 or 3 Selects reversed bit order for Phase C data.

This parameter does not affect the bit order of control characters generated by the DCE.

Write syntax: +FBOR=<value>
Valid values: 0, 1, 2, or 3
Default value: 0

Command: +FAA Answer Parameter

Description: Fax adaptive answer operates only when +FCLASS=0.

Class 2 adaptive answer is implemented as follows:

First, a data mode handshake is attempted. If the DCE has been configured for automode detection (using the +MS command), the DCE may try several protocols before terminating attempts to make a data mode connection. This can take as long as 6-8 seconds.

If the data mode connection attempt fails, a facsimile Class 2 connection is assumed. When a connection is made as a result of the adaptive answer, the DCE issues the DATA or FAX result code before the CONNECT or +FCON message to inform the DTE of the connection type. After making a Class 2 connection, the DCE stays on-line rather than going into the command mode as with a Class 1 connection.

Write syntax: +FAA=<value>
Valid values: 0 or 1
Default value: 0

+FAA=0 Constrains the DCE to answer as set by +FCLASS.
+FAA=1   Indicates that the DCE can answer and automatically determine whether to answer as a Class 2 facsimile DCE or as a data modem. If the DCE automatically switches, it modifies FCLASS appropriately.

Command: +FBUF? Buffer Size

Description: The +FBUF parameter allows the DTE to determine the characteristics of the DCE's data buffer. Data buffers are used for flow control. Use of the reported values allow the DTE to transfer data without provoking XOFF.

Read syntax: +FBUF?
DCE response syntax: <bs>, <xoft>, <xont>, <bc>
                          where:
                           <bs> = total buffer size
                           <xoft> = XOFF threshold
                           <xont> = XON threshold
                           <bc> = current buffer byte count
Example: +FBUF?
                          512, 506, 500, 0

Example Sessions

Table 3-6 and Table 3-7 show the typical command and responses for sending and receiving two pages, respectively.

Table 3-6. Send Two Pages, 1-D, No Errors

DTE Command	DCE Response	Local DTE Action	Remote Station Action
AT+CLASS=2	OK	Set Class 2	X
AT+FLID="<local ID>"	OK	Set local ID	
AT<dial string>		Off-hook, dial	Answer,
		Send CNG	Send [CED]
	+FCON	Detect flags	V.21 flags
	[+FCSI:"<csi>"]	[Get CSI]	[CSI]
	+FDIS: <dis codes>	Get DIS	DIS
	OK		
AT+FDT		[Send TSI]	[Get TSI]
		Send DCS	Get DCS
	+FDCS:<DCS codes>	Send TCF	Get TCF
	CONNECT	Get CFR	Send CFR
	<XON>	Send carrier	Receive carrier
<1st page data>		Send page data	Receive page data
<DLE><ETX>	OK		
AT+FET=0		Send RTC	Get RTC
		Get MPS	Get MPS
	+FPTS:1	Get MCF	Send MCF
	OK		
AT+FDT	CONNECT	Send carrier	Receive carrier
	<XON>		
<2nd page data>		Send page data	Receive page data
<DLE><ETX>	OK		
AT+FET=2		Send RTC	Get RTC
		Send EOP	Get EOP
	+FPTS:1	Get MCF	Send MCF
	+FHNG:0	Send DCN	Get DCN
	OK	Hang up	Hang up

Table 3-7. Receive Two Pages, 1-D Data, No Errors

DTE Command	DCE Response	Local DTE Action	Remote Station Action
AT+FCR=1	OK	Enable reception	
AT+FLID="<local ID>"	OK	Set local ID	
	RING	Detect ring	Dials[, Send CNG]
ATA		Off-hook	
		Send CED	Get CED
		Send CSI	Get CSI
		Send DIS	Get DIS
	+FCON	Detect flags	Send V.21 flags
	[+FTSI:"<tsi>"]	[Get TSI]	[Send TSI]
	+FDCS:<dcs codes>	Get DCS	Send DCS
	OK	Begin TCF receive	Start TCF
AT+FDR		Accept TCF	Finish TCF
	+FCFR	Send CFR	Get CFR
	[+FDCS:"<dcs codes>]		
	CONNECT	Get page carrier	Send pager carrier
<DC2>		Get page data	Send page data
	<page data stream>		
	<DLE><ETX>	Detect RTC	Send RTC
	+FPTS:1, <lc>		Drop carrier
	+FET:0	Get MPS	Send MPS
	OK		
AT+FDR		Send MCF	Get MCF
	CONNECT	Get page carrier	Send page carrier
<DC2>		Get page data	Send page data
	<page data stream>		
	<DLE><ETX>	Detect RTC	Send RTC
	+FPTS:1, <lc>		Drop carrier
	+FET:2	Get EOP	Send EOP
	OK		
AT+FDR		Send MCF	Get MCF
	+FHNG:0	Get DCN	Send DCN
	OK		

Chapter 4 – Voice Commands

Voice Commands Overview

Voice commands are identified in Table 4-1.

Table 4-1. Voice Commands

Command	Function
Configuration	
+FCLASS	Set Mode
+VCID	Caller ID (CID)
+VNH	Automatic Hang-up control
+FMI?	Manufacturer Identification
+FMM?	Product Identification
+FMR?	Version, Revision, etc.
+FLO	Flow Control
Voice	
+VIP	Voice Initialize All Parameters
+VRX	Start modem Receive (Record)
+VTS	Voice Tone Send (Send single frequency or DTMF)
+VTX	Start modem Transmit (Playback)
+VGR	Voice Gain Receive (Record Gain)
+VGT	Voice Gain Transmit (Playback Volume)
+VIT	Voice Inactivity Timer (DTE/Modem)
+VLS	Analog Source/Destination Selection
+VRA	Ringback Goes Away Timer
+VRN	Ringback Never Appeared Timer
+VSD	Silence Detection (QUIET & SILENCE)
+VSM	Compression Method Selection
+VTD	Beep Tone Duration Timer
+VDR	Distinctive Ring
+VDT	Control Tone Cadence Reporting
+VPR	Select DTE/modem Interface Rate (Turn off autobaud)

<DLE> Shielded Event Codes Sent to the DTE

Table 4-2 lists the supported <DLE> shielded codes sent to the DTE in the expression <DLE><code>.
The number in parenthesis in the second column corresponds to the T.50 equivalent.

Table 4-2. Supported <DLE> Shielded Codes Sent to the DTE

Code	T.50 Equivalent	Event Report Description
<DLE>	(1/0)	Two contiguous <DLE><DLE> codes indicate a single <DLE> in the data stream
<SUB>	(1/10)	<DLE><DLE> in the data stream
<ETX>	(0/3)	End Data State
X	(5/8)	Packet Header for the "Complex Event Detection Report"
.	(2/14)	Packet Terminator for the "Complex Event Detection Report"
/	(2/15)	Start of DTMF tone shielding
~	(7/15)	DTMF transitions to off
R	(5/2)	Ring
1	(3/1)	DTMF 1
2	(3/2)	DTMF 2
3	(3/3)	DTMF 3
4	(3/4)	DTMF 4
5	(3/5)	DTMF 5
6	(3/6)	DTMF 6
7	(3/7)	DTMF 7
8	(3/8)	DTMF 8
9	(3/9)	DTMF 9
0	(3/0)	DTMF 0
A	(4/1)	Extended Keypad DTMF A
B	(4/2)	Extended Keypad DTMF B
C	(4/3)	Extended Keypad DTMF C
D	(4/4)	Extended Keypad DTMF D
*	(2/10)	Extended Keypad DTMF E
#	(2/3)	Extended Keypad DTMF F
o	(6/15)	Receive Buffer Overrun
c	(6/3)	Facsimile Calling
e	(6/5)	Data Calling
h	(6/8)	Line Current Break (local phone goes on-hook)
H	(4/8)	Line Current Detected (local phone goes off-hook)
s	(7/3)	"Presumed Hangup"(SILENCE) Time-out
q	(7/1)	"Presumed End of Message" (QUIET) Time-out
J	(4/10)	SIT Signal
l	(6/12)	Loop Current Interruption
r	(7/2)	Ringing Tone
b	(6/2)	BUSY
d	(6/4)	DIAL TONE
u	(7/5)	Transmit Buffer Underrun
p	(7/0)	Line voltage increase
P	(5/0)	Line voltage decrease (extension pickup)
a	(6/1)	Facsimile or Data Answer
f	(6/6)	Data Answer

<DLE> Shielded Codes Sent to the Modem (DCE)

Table 4-3 lists the supported <DLE> shielded codes sent to the modem in the expression <DLE><code>. The number in parenthesis in the second column corresponds to the T.50 equivalent.

Table 4-3. Supported <DLE> Shielded Codes Sent to the Modem (DCE)

Code	Code	Simple Action Command Description
<DLE>	(1/0)	Two contiguous <DLE><DLE> codes indicate a single <DLE> in the data stream ("Immediate Command" or "Stream Command")
u	(7/5)	[Action Numbers 0 and 3] Increase the volume or gain by one unit ("Immediate Command")
d	(6/4)	[Action Numbers 1 and 4] Decrease the volume or gain by one unit ("Immediate Command")
p	(7/0)	[Action Number 9] Pause
r	(7/2)	[Action Number 10] Resume
<ETX>	(0/3)	[Action Number 11] End voice Transmit State ("Stream Command")
<CAN>	(1/8)	[Action Number 12] Clear transmit buffer of voice data ("Immediate Command")
!	(2/1)	[Action Number 15] Receive abort ("Immediate Command")

Voice Configuration Commands

Command: +FCLASS=8   Select Voice Mode

+FCLASS=8 selects the Voice Mode. The Voice Mode commands and responses described in this section are applicable when command +FCLASS=8. (See the Generic Modem Control section for the definition of the FCLASS command.)

Command: +VNH   Automatic Hang-up Control

This command enables or disables automatic hangups.

Syntax: +VNH=<hook>

Defined Values: <hook> Decimal number corresponds to the selected option (Table 2-4).
0   The modem enables automatic hangups as is normal in other modes.
1   The modem disables automatic hangups usually found in the other non-Voice Modes.
2   The modem disables automatic hangups in the other non-Voice Modes. The modem performs only a "logical" hangup (returns to OK result code).

Table 4-4. +VNH Command Behavior

Command	Command Response			
	No Carrier Present	ATH	ATZ	DTR & D2
+VNH=0	Y	Y	Y	Y
+VNH=1	N	Y	Y	Y
+VNH=2	N	N	N	Y

Notes:
Y= will hang-up; N= will not hang-up.
How +VNH is reset:
    DTE uses +VNH command to change setting.
    DTE issues another +FCLASS mode change without issuing another +VNH.
    A hang-up event occurs (see this table).
                DTE issues +VIP command.

Reporting Current or Selected Values:
                Command: +VNH?
                Response: <hook>
                Example: 0 For the default setting.
Reporting Supported Range of Parameter Values:
                Command: +VNH=?
                Response: (<hook> range)
                Example: (0-2)
Result Codes: OK <hook> = 0-2.
                ERROR Otherwise.

Basic Voice Commands

Command: +VIP   **Voice Initialize All Parameters**

Description: his command causes the modem to initialize all voice parameters to their default values.

Syntax: +VIP

Result Code: OK
ERROR If not in Voice Mode.

Command: +VRX   **Start Modem Receive (Record):**

Description: This command causes the modem to start the voice reception process.

Syntax: +VRX

Result Codes: OK
ERROR If not in Voice Mode.

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

Description: This command causes the modem to send DTMF digit or hookflash tones with the duration specified by +VTD, to send DTMF digit or hookflash tones with duration specified by this command, or to send single or dual tone frequencies with duration specified with this command.

Syntax: +VTS=<string>

Defined Values: <string>   The tone generation consists of elements in a list where each element is separated by a comma. Each element can be:

1. A single character which the modem interprets as a DTMF digit (0 - 9, #, *, or A-D) or hookflash (!), with a duration given by the +VTD command.

2. A 3-element string enclosed in square brackets, "[freq1,freq2,dur]", which the modem interprets as a general dual tone and duration selection, or

3. A 2-element string enclosed in curly braces, "{X,dur}", which the modem interprets as a DTMF digit (0 - 9, #, *, or A-D), or hookflash (!) with a duration (dur) different than that given by the +VTD command.

Missing subparameters assume the default value. Unspecified values always default to zero for frequencies, DTMF * for DTMF tones, and +VTD for duration. The omission of commas (and associated subparameters) is valid.

The quantity in the square brackets consists of a 3-element list (freq1,freq2,dur), which can be used to send single or dual tones. The first element is the first frequency (freq1) with range 0 or 200-3000 Hz. The second element is the second frequency (freq2), with range 0 or 200-3000 Hz. The third element is the duration (dur) in 0.01 second intervals with range 0-255 (ASCII units of 10 ms). A list may contain null elements. For example [3000] means that the DCE generates a single tone at 3000 Hz for the default duration, [3000,3300] means that the DCE generates a dual tone at 3000 and 3300 Hz for the default duration, and [,3300] means that the DCE generates a single tone at 3300 Hz for the default duration.

The quantity in the curly braces consists of a 2-element list (X,dur), which can be used to send DTMF tones or hookflash. The first element is the DTMF tone or hookflash (!) character (X), and the second element is the duration (dur) in 0.01 seconds. The characters are of the same set given above. A list may contain null elements. For example, {2} means DTMF tone "2" for the default duration, and {} means silence for the default duration.

The modem will stop the tone generation at the point in the string where the modem detects a parsing error, encounters an invalid frequency range, encounters a <CR>, or encounters a semi-colon.

Reporting Supported Range of Parameter Values:

Command: +VTS=?

Response: (<freq1> range), (<freq2> range), (<dur> range)

Example: (200-3000),(200-3000),(0-255)

OK

Result Codes: OK Valid command.

ERROR The <string> command is invalid, or a selected frequency is out of range.

Example 1.   This example illustrates tone generation without using any null elements.

The command example is followed by a description of command execution.

AT+VTS= {!,30},1,2,[1000,1300,50],!,{*,6},[800,1300,50],9

1. Hookflash with a duration of 300 ms.

2. Play DTMF 1 with duration given by the +VTD command.

3. Play DTMF 2 with duration given by the +VTD command.

4. Play tone pair at 1 000 Hz and 1 300 Hz with a duration of 500 ms.

5. Hookflash with duration given by the +VTD command.

6. Play DTMF * with duration of 60 ms.

7. Play tone pair at 800 Hz and 1300 Hz with duration of 500 ms.

8. Play DTMF 9 with duration given by the +VTD command.

Example 2.   This example illustrates tone generation using null elements. The command

example is followed by a description of command execution.

AT+VTS=1,2,[1000,1300,50],[800],9

1. Play DTMF 1 with duration given by the +VTD command.

2. Play DTMF 2 with duration given by the +VTD command.

3. Play tone pair at 1000 Hz and 1300 Hz with a duration of 500 ms.

4. Play tone pair at 800 Hz with duration given by the +VTD command.

5. Play DTMF 9 with duration given by the +VTD command.

Example 3.   This example illustrates tone generation using null elements and periods of

silence. The command example is followed by a description of command execution.

AT+VTS=1,[,,50],2,[],9

1. Play DTMF 1 with duration given by the +VTD command.

2. Play silence with duration of 500 ms.

3. Play DTMF 2 with duration given by the +VTD command.

4. Play silence with duration given by the +VTD command.

5. Play DTMF 9 with duration given by the +VTD command.

Command: +VTX   Start Modem Transmit (Playback)

Description: This command causes the modem to start the voice transmission process.

Syntax: +VTX

Result Codes: CONNECT The modem accepts the command.

ERROR The modem is not connected to at least one off-hook telephone line

or one non-telephone line.

Command: +VGR   Voice Gain Receive (Record Gain)

Description: This command causes the modem to set the gain for received voice samples.

Syntax: +VGR=<gain> 0 (only valid number) selects automatic gain control

Reporting Current or Selected Values:

Command: +VGR?

Response: <gain>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values:

Command: +VGR=?

Response: <gain> range

Example: 0

Result Codes: OK <gain> = 0.

ERROR Otherwise, or if not in Voice Mode.

Command: +VGT   Voice Gain Transmit (Playback Volume)

Description: This command causes the modem to set the volume level.
Syntax: +VGT=<level>
Defined Values: <level> Decimal number corresponding to the volume level.
Reporting Current or Selected Values:
                                Command: +VGT?
                                Response: <level>
                                Example: 128 For the default setting.
Reporting Supported Range of Parameter Values:
                                Command: +VGT=?
                                Response: <level> range
                                Example: 0-255
Result Codes: OK <level> = 0-255.
                                ERROR Otherwise, or if not in Voice Mode.

Command: +VIT   Voice Inactivity Timer (DTE/Modem)

Description: This command sets the modem's initial value for the DTE/modem inactivity
                                timer.
Syntax: +VIT=<timer>
Defined Values: <timer> Decimal number corresponding to the time in units of 1.0 second.
                                A value of 0 disables the timer.
Reporting Current or Selected Values:
                                Command: +VIT?
                                Response: <timer>
                                Example: 0 For the default setting.
Reporting Supported Range of Parameter Values:
                                Command: +VIT=?
                                Response: <timer> range
                                Example: 0-255
Result Codes: OK <timer> = 0-255.
                                ERROR Otherwise, or if not in Voice Mode.

Command: +VLS   Analog Source/Destination Selection

Description: This command causes the modem to select one or more source/destinations of the analog data.

Syntax: +VLS=<label>

Defined Values: <label> Decimal number corresponding to the selected analog source/destination hardware configuration (see Table 2-5).
Response: <label>
Example: 0   For the default setting.

Reporting Supported Range of Parameter Values:

Command: +VLS=?
Response: <label>,<devices>,<transmit event>,<receive event>,<idle event>
Where each event subparameter is a hex number the represents an event bit field of the reporting capabilities of each state. (See Table 2-6):
<label> Identifies the modem analog source/destination hardware configuration.
<devices> A <string constant> made up of Primitives,
<xxxx event> <transmit event>, <receive event>, and <idle event>subparameters are the DCE event reporting capabilities for the Voice Transmit State, Voice Receive State, and the Voice Command State, respectively. Each of the event reporting subparameters is a hex number that represents an event bit field. The hex number format is defined in Table 2-6); a one in the bit field indicates that the DCE can report the associated event. Each of the possible hardware configurations has its own <label>, ..., <idle event> description line (the above form description shows just one). A <CR><LF> terminates each description line.

Example: AT+VLS=?
0,"",B0804100,B0804100,B0804100
1,"T",0B8433C1,0FE431C1,0B8431C1
2,"L",08800300,0CE00100,08800100
3,"LT",0B8433C1,0FE431C1,0B8431C1
4,"S",00800300,04E00100,20800100
5,"ST",0B8433C1,0FE431C1,0B8431C1
8,"S1",00800300, 04E00100,20800100
9,"S1T",0B8433C1,0FE431C1,0B8431C1
11,"M1",00800300,04E00100,20800100
14,"H",00800300,04E00100,20800100
18,"M1S",00800300,04E00100,20800100
19,"M1S1",00800300,04E00100,20800100

Result Codes: OK <label> = 0-5,8-9,11,14,18-19.
ERROR The <label> value is out of range, or if the modem cannot service the request in the <label> subparameter.

Table 4-5. +VLS Command Options

Label	Primitives	Description	+VTX	+VRX	+VSP=1
0	None	DCE on-hook. Local phone connected to the line.			
1	T	DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
2	L	DCE on-hook. Local phone connected to the DCE.	X	X	
3	LT	DCE off-hook. Local phone connected to the line. DCE connected to the line.	X	X	
4	S	Internal Speaker connected to the DCE. DCE on-hook. Local phone connected to the line.	X		
5	ST	Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
6	M	Internal Microphone connected to the DCE. DCE on-hook. Local phone connected to the line.		X	
7	MST	Internal Microphone and Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
8	S1	External Speaker connected to the DCE. DCE on-hook.	X		

Label	Primitives	Description	+VTX	+VRX	+VSP=1
		Local phone connected to the line.			
9	S1T	External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
10	MS1T	Internal microphone and External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
11	M1	External Microphone connected to the DCE. DCE on-hook. Local phone connected to the line.		X	
12	M1ST	External Microphone and Internal Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
13	M1S1T	External Microphone and External Speaker connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.			X
14	H	External Microphone and Speaker combination (handset or headset) connected to the DCE. DCE on-hook. Local phone connected to the line.	X	X	
15	HT	External Microphone and Speaker combination (handset or headset) connected to the line. DCE off-hook. DCE connected to the line. Local phone provided with power to detect hook condition.	X	X	
16	MS	MS Internal Microphone and Internal Speaker connected to DCE.			
17	M1S	MS1 Internal Microphone and External Speaker connected to DCE.			
18	MS1	External Microphone and Internal Speaker connected to DCE.			
19	M1S1	External Microphone and External Speaker connected to DCE.			

Primitives (Column 2):
    L Local Phone.
    T Telephone Line.
    M Internal Microphone.
    M1 External Microphone.
    S Internal Speaker.
    S1 External Speaker.
    H External Microphone and Speaker combination (handset or headset).
        Note: All label options in this table may not be supported by the product; see +VLS command

Table 4-6. Events Detectable in the Voice Mode per V.253

Event Number	Event Description	Event Reporting
0	Caller Id Report	Message
1	DID Report	Message
2	Distinctive Ringing	Pattern
3	RING	Simple
4	DTMF Received	Simple
5	Receive Buffer Overrun	Simple
6	Facsimile Calling (e.g., 1100 Hz)	Simple
7	Data Calling (e.g., 1300 Hz)	Simple
8	Local Phone On/Off-hook	Simple
9	Presumed Hangup (SILENCE) Time-out	Simple
10	Presumed End of Message (QUIET) Time-out	Simple
11	SIT Signal	Simple, Message
12	Bong Tone	Simple
13	Loop Current Interruption	Simple
14	Loop Current Polarity Reversal	Simple
15	Call Waiting Beep/Interrupt	Simple
16	Distinctive Call Waiting	Simple
18	Ringing Tone	Simple
19	BUSY	Simple
20	DIAL TONE	Simple
21	Reorder/Fast Busy	Simple
22	V.21 Channel 2 7E flags	Simple
23	Transmit Buffer Underrun	Simple
24	Extension Phone On/Off-hook	Simple
25	Facsimile or Data Answer (e.g., 2100 Hz)	Simple
26	Data Answer (e.g., 2225 Hz)	Simple
27	Voice Detect	Simple
29	Stuttered Dial tone	Simple (note 1)
30	Invalid Voice Data Format	Simple
31	Lost Data Detected Event	Simple
32	Facsimile Answer	Simple

Legend:

This table lists events without any regard as to whether the DCE reporting of the event is optional or mandatory, and without assigning a DCE reporting mechanism.

The first column lists the event number assignment for each event. The event number also serves another purpose; each number is a bit position in a bit field. Event number 0 is the most significant bit of the left most hex number in a hex representation (V.253 defines a total of eight hex digits). The final bit in the bit field occupies the least significant bit position of the right-most hex number. The bit representations of the event numbers are used in the +VLS= command.

The third column lists whether a single character is enough to report the event, or if the DCE must supply a more complicated report. The description Simple indicates a single character response (<DLE> shielded), Message indicates a full text message (<DLE><X> packet), and Pattern indicates a repeating Message.

Notes:

1. The use of complex event reporting for Stuttered Dial tone is for further study.

Command: +VRA   Ringback Goes Away Timer

Description: This command sets the length of time the modem will wait between ringbacks during call origination before the modem can assume that the remote station has gone off-hook.

Syntax: +VRA=<interval>

Defined Values: <interval> Decimal number (0-255) specifying the silence interval time in units of 0.10 second between the end of one ring interval and the start of the next ring interval. A value of 0 forces the modem to report the OK result code immediately after the first Ringback. The range is 0.1 to 25.5 seconds for <interval> = 1 to 255.

Reporting Current or Selected Values:
                     Command: +VRA?
                     Response: <interval>
                     Example: 50 (5 seconds) For the default setting.

Reporting Supported Range of Parameter Values:
                     Command: +VRA=?
                     Response: (<interval> range)
                     Example: (0-255) 255 = 25.5 sec

Result Codes: OK <interval> = 0-255
                     ERROR Otherwise, or if not in Voice Mode.

Command: +VRN   Ringback Never Appeared Timer

Description: This command sets the length of time the modem will wait between ringbacks during call origination before the modem can assume that the remote station has gone off-hook.

Syntax: +VRN=<interval>

Defined Values: <interval> Decimal number specifying the time period, in units of 1.0 second, that the modem will wait for Ringback during call origination. A value of 0 forces the modem to report the OK result code immediately after dialing. The range is 1 to 25 seconds for <interval> = 1 to 25.

Reporting Current or Selected Values:
                     Command: +VRN?
                     Response: <interval>
                     Example: 10 (10 seconds) For the default setting.

Reporting Supported Range of Parameter Values:
                     Command: +VRN=?
                     Response: (<interval> range)
                     Example: (0-25)

Result Codes: OK <interval> = 0-25
                     ERROR Otherwise, or if not in Voice Mode.

Command: +VSD   Silence Detection (Quiet and Silence)

Description: This command causes the modem to set the silence detection sensitivity and
the required period of silence before the modem reports silence detected at
the end of a voice receive either with the "Presumed End of Message" (QUIT)
or "Presumed Hangup (SILENCE) event reports.

Syntax: +VSD=<sds>,<sdi>

Defined Values: <sds> Decimal number corresponding to the selected parameter.
0 Use +VSM silence compression setting and algorithm for long-term silence
detection (if +VSM is in use) or proprietary silence compression setting and
algorithm for long-term silence detection (if +VSM is not in use).
127 Sets less aggressive long-term silence detection independent of
presence or use of silence compression.
128 Sets nominal long-term silence detection independent of presence or use
of silence compression.
129 Sets more aggressive long-term silence detection independent of
presence or use of silence compression.
<sdi> Decimal number specifying the required period of silence, in units of 0.1
second, before the modem can report silence detected at the end of a voice
receive either with the "Presumed End of Message" (QUIT) or "Presumed
Hangup (SILENCE) event reports. A value of 0 disables the modem silence
detection. The range is 0.1 to 25.5 seconds for <sdi> = 1 to 255.

Reporting Current or Selected Values:
Command: +VSD?
Response: <sds>,<sdi>
Example: 0,50 For the default setting.

Reporting Supported Range of Parameter Values:
Command: +VSD=?
Response: (<sds> range),(<sdi> range)
Example: (0,127-129),(0-255)

Result Codes: OK <hook> = 0 or 1.
ERROR Otherwise, or if not in Voice Mode.

Command: +VSM   Compression Method Selection

Description: This command causes the modem to set the voice compression method, the silence compression sensitivity, and the voice-sampling rate.

Syntax: +VSM=<cml>,<vsr>,<sds>,<sel>

Defined Values: <cml> Decimal number identifying the compression method.

<vsr> <range of values> containing the supported range of voice samples per second of the analog signal.

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

<sel> <range of values> containing the supported range of expansion values for voice transmits.

Reporting Current or Selected Values:

Command: +VSM?

Response: <cml>,<vsr>,<sds>,<sel>

Example: 1,8000,0,0 For the default setting.

Reporting Supported Range of Parameter Values:

Command: +VSM=?

Response: <cml>,<cmid>,<bps>,<tm>,<vsr>,<sds>,<sel>

<cml> Decimal number identifying the compression method (1, 129, 130, 140, or 141).

<cmid> Alphanumeric string describing the compression method (UNSIGNED PCM, IMA ADPCM, UNSIGNED PCM, 2 Bit ADPCM, or 4 Bit ADPCM).

<bps> Decimal number defining the average number of bits in the compressed sample not including silence compression (2, 4 or 8).

<tm> Decimal number (0) reporting the time interval, in units of 0.1 second, between timing marks. A 0 value reports that timing marks are not supported.

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

<scs> <range of values> containing the supported range of sensitivity settings for voice receives (0). A 0 indicates not supported.

<sel> <range of values> containing the supported range of expansion values for voice transmits (0). A 0 indicates not supported.

Example: 1,"UNSIGNED PCM",8,0,8000,0,0
129,"IMA ADPCM",4,0,8000,0,0
130,"UNSIGNED PCM",8,0,8000,0,00
140,"2 Bit ADPCM",2,0,8000,0,0
141,"4 Bit ADPCM",4,0,8000,0,0
OK

Result Codes: OK Valid range.

ERROR Otherwise, or if not in Voice Mode.

Command: +VTD   Beep Tone Duration Timer

Description: This command causes the modem to set the default DTMF/tone generation duration.

Syntax: +VTD=<dur>

Defined Values: <dur> Decimal number specifying the default DTMF/tone generation duration in units of 0.01 second. A value of 0 specifies the value entered by the S11 parameter (50-255 ms). The range is 0.01 to 2.55 seconds for <dur> = 1 to 255.

Reporting Current or Selected Values:

Command: +VTD?

Response: <dur>

Example: 100 For the default setting.

Reporting Supported Range of Parameter Values:

Command: +VTD=?

Response: (<dur> range)

Example: (0-255)

Result Codes: OK <dur>= 0-255.

ERROR Otherwise, or if not in Voice Mode.

Command: +VDR   Distinctive Ring

Description: This command causes the modem to enable or disable reporting of the ring cadence information and to control the timing of the RING event code report if ring cadence reporting is enabled.

Syntax: +VDR=<enable>, <report>

Defined Values: <enable> Decimal number corresponding to the selected option.

0 The modem will not report ring cadence information.

1 The modem will report ring cadence information as specified for the <report> subparameter.

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

0 The modem will produce only DROF and DRON messages. The modem will not produce any RING event codes. The modem will report other call progress event codes as normal.

Other The modem will produce only DROF and DRON messages. The modem will produce a RING event code after <report>/10 seconds after the falling edge of the ring pulse (i.e., after the DRON report).

Reporting Current or Selected Values:

Command: +VDR?

Response: <enable>,<report>

Example: 0,0 For the default setting.

Reporting Supported Range of Parameter Values:

Command: +VDR=?

Response: (<enable> range),(<report>range)

Example: (0,1),(0-6)

Result Codes: OK <enable>,<report> = (0,1),(0-6)

ERROR Otherwise, or if not in Voice Mode.

Command: +VDT   Control Tone Cadence Reporting

Description: his command is included for compatibility only and has no effect other than returning a result code.
                        This command allows the modem to enable or disable reporting of the control tone cadence information in the frequency band used by the Ringback/Remote Ring, BUSY, and reorder/Fast Busy tones (usually in the 300 to 600 Hz range).

Syntax: +VDT=<enable>,<report>

Defined Values: <enable> Decimal number corresponding to the selected option.
                        0 The modem will not produce any control tone cadence report.
                        <report> Decimal number specifying the produced any control tone cadence report when enabled by the <enable> subparameter.
                        0 The modem will produce only CPOF and CPON messages.
                        Other Reserved.

Reporting Current or Selected Values:
Command: +VDT?

                        Response: <enable>,<report>
                        Example: 0,0 For the default setting.

Reporting Supported Range of Parameter Values:
                        Command: +VDT=?
                        Response: (<enable> range),(<report> range)
                        Example: (0),(0)

Result Codes: OK <enable>,<report> = (0),(0)
                        ERROR Otherwise, or if not in Voice Mode.

Command: +VPR   Select DTE/Modem Interface Rate (Turn Off Autobaud)

Description: This command selects the DTE/modem interface rate.
Syntax: +VPR=<rate>
Defined Values: <rate>> Decimal number corresponding to the DTE/modem interface rate where 0 = autobaud rate determined by processing the AT command, and 1,2,3,4,8,16,24,48,96 correspond to multipliers of 2400 bps to determine the actual rate:

                              0 = Autobaud
                              1 = 2400 bps
                              2 = 4800 bps
                              3 = 7200 bps
                              4 = 9600 bps
                              8 = 19200 bps
                              16 = 38400 bps
                              24 = 57600 bps
                              48 = 115200 bps
                              96 = 230400 bps

Reporting Current or Selected Values:
                        Command: +VPR?
                        Response: <rate>
                        Example: 0 For the default setting (Autobaud).

Reporting Supported Range of Parameter Values:
                        Command: +VPR=?
                        Response: (<rate> range)
                        Example: (0,1,2,3,4,8,16,24,48,96)

Result Codes: OK <rate> = 0,1,2,3,4,8,16,24,48,96.
                        ERROR Otherwise, or if not in Voice Mode.

Chapter 5 – Setting Country or Regional Codes

The Default Country/Regional Code is B5.

If You Want to Change the Country/Regional Code

1. View the List of Available Country/Regional Codes by executing the command **AT+GCI=?<CR>**
2. Set and save the code by executing the command **AT+GCI=*nn*<CR>**
   Note: *nn* is the country/regional code. See the country/regional code list on the Multi-Tech Web site
3. **OK** is displayed.
4. The country code is then displayed (see the example below).

To Verify the Country Code

1. Type **AT+GCI?<CR>**, or you can type **ATI5<CR>**

Example

1. Type the command **AT+GCI=B5<CR>**
2. Verify **B5** was set by typing **AT+GCI?<CR>** or **ATI5<CR>**
3. **B5** indicates the configuration is set for any **B5** country such as **Canada** or the **United States**, etc.

Countries/Regions Supported

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

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

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

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